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NISSAN SENTRA

MODEL B15 SERIES

QUICK REFERENCE INDEX

A	GENERAL INFORMATION	GI	General Information
B	ENGINE	EM	Engine Mechanical
		LU	Engine Lubrication System
		CO	Engine Cooling System
		EC	Engine Control System
		FL	Fuel System
		EX	Exhaust System
		ACC	Accelerator Control System
C	TRANSMISSION/ TRANSAXLE	CL	Clutch
		MT	Manual Transaxle
		AT	Automatic Transaxle
D	DRIVELINE/AXLE	FAX	Front Axle
		RAX	Rear Axle
E	SUSPENSION	FSU	Front Suspension
		RSU	Rear Suspension
		WT	Road Wheels & Tires
F	BRAKES	BR	Brake System
		PB	Parking Brake System
		BRC	Brake Control System
G	STEERING	PS	Power Steering System
H	RESTRAINTS	SB	Seat Belts
		SRS	Supplemental Restraint System (SRS)
I	BODY	BL	Body, Lock & Security System
		GW	Glasses, Window System & Mirrors
		RF	Roof
		EI	Exterior & Interior
		IP	Instrument Panel
		SE	Seat
J	AIR CONDITIONER	MTC	Manual Air Conditioner
K	ELECTRICAL	SC	Starting & Charging System
		LT	Lighting System
		DI	Driver Information System
		WW	Wiper, Washer & Horn
		BCS	Body Control System
		LAN	LAN System
		AV	Audio Visual, Navigation & Telephone System
		ACS	Auto Cruise Control System
		PG	Power Supply, Ground & Circuit Elements
L	MAINTENANCE	MA	Maintenance
M	INDEX	IDX	Alphabetical Index

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FOREWORD

This manual contains maintenance and repair procedures for the 2004 NISSAN SENTRA.

In order to assure your safety and the efficient functioning of the vehicle, this manual should be read thoroughly. It is especially important that the PRECAUTIONS in the GI section be completely understood before starting any repair task.

All information in this manual is based on the latest product information at the time of publication. The right is reserved to make changes in specifications and methods at any time without notice.

IMPORTANT SAFETY NOTICE

The proper performance of service is essential for both the safety of the technician and the efficient functioning of the vehicle.
The service methods in this Service Manual are described in such a manner that the service may be performed safely and accurately.
Service varies with the procedures used, the skills of the technician and the tools and parts available. Accordingly, anyone using service procedures, tools or parts which are not specifically recommended by NISSAN must first be completely satisfied that neither personal safety nor the vehicle's safety will be jeopardized by the service method selected.

NISSAN NORTH AMERICA, INC.
Technical Publications Department
Gardena, California

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SERVICE MANUAL: Model: _____ **Year:** _____

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Please describe any Service Manual issues or problems in detail:

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Are the trouble diagnosis procedures logical and easy to use? (circle your answer) YES NO

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What information should be included in NISSAN Service Manuals to better support you in servicing or repairing customer vehicles?

_____

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DATE: _____ YOUR NAME: _____ POSITION: _____

DEALER: _____ DEALER NO.: _____ ADDRESS: _____

CITY:_____ STATE/PROV./COUNTRY: _____ ZIP/POSTAL CODE: _____

QUICK REFERENCE CHART: SENTRA (EQUIPPED WITH 1.8L, QG ENGINE)

PFP:00027

Engine Tune-Up Data

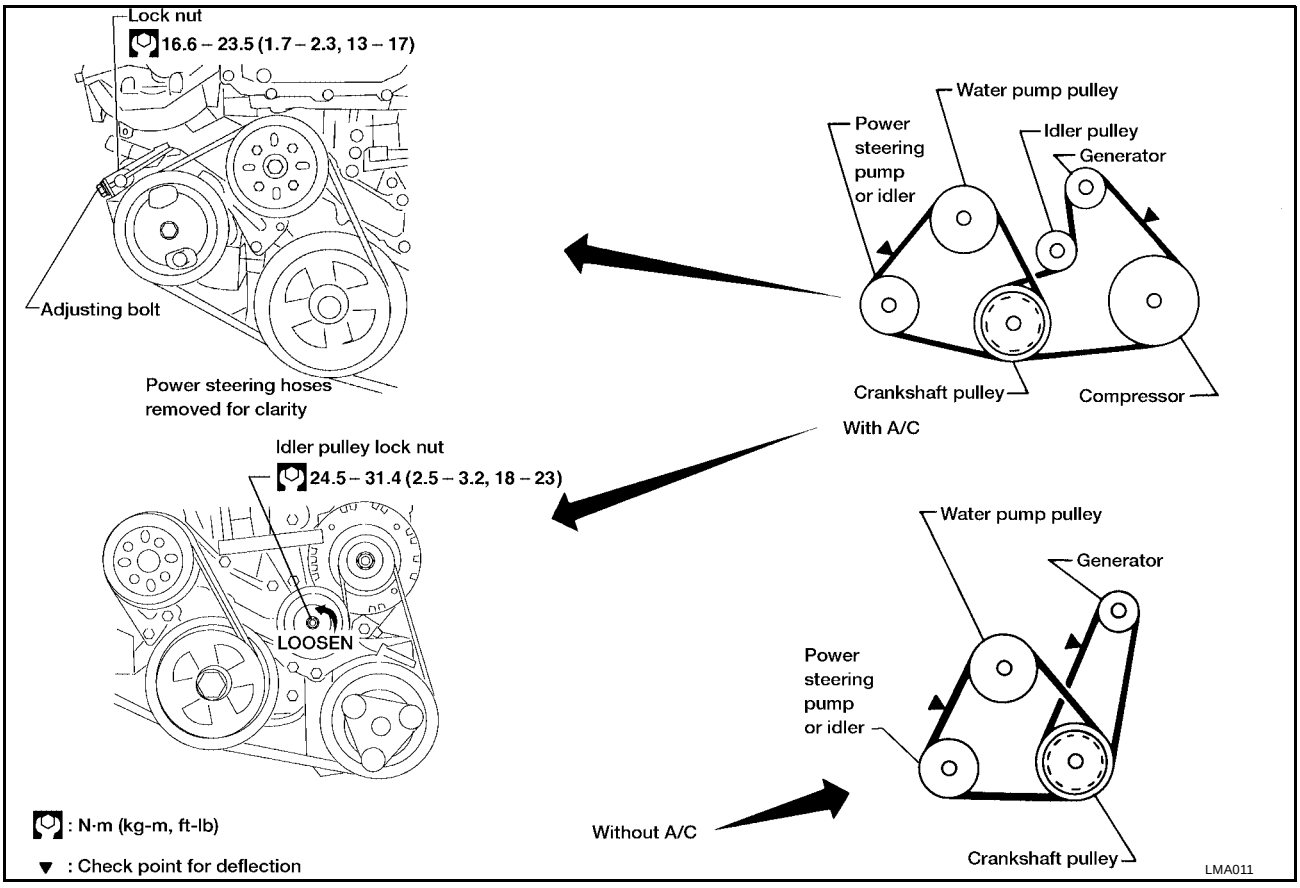
ELS001CL

Engine		QG18DE
Classification		Gasoline
Cylinder arrangement		4 in-line
Displacement		1,769 cm^3 (107.94 cu in)
Bore × stroke		80.0 × 88.0 mm (3.150 × 3.465 in)
Valve arrangement		DOHC
Firing order		1-3-4-2
Number of piston rings	Compression	2
	Oil	1
Number of main bearings		5
Compression ratio		9.5: 1

QUICK REFERENCE CHART: SENTRA (EQUIPPED WITH 1.8L, QG ENGINE)

2005

Drive Belt Deflection and Tension



Component		Deflection Adjustment Unit: mm (in)			Tension Adjustment*1 Unit: N (kg, lb)		
		Used Belt		New Belt	Used Belt		New Belt
		Limit	After Adjustment		Limit	After Adjustment	
Generator	With air conditioner compressor	8.1 (0.319)	5.3 - 5.7 (0.209 - 0.244)	4.5 - 5.0 (0.177- 0.197)	292 (30, 66)	652 - 740 (66.5 - 75.5, 146.6 - 166.4)	789 - 877 (80.5 - 89.5, 177.4 - 197.1)
	Without air conditioner compressor	10.2 (0.402)	6.5 - 7.0 (0.256 - 0.276)	5.5 - 6.1 (0.217 - 0.240)	292 (30, 60)	652 - 740 (66.5 - 75.5, 146.6 - 166.4)	789 - 877 (80.5 - 89.5, 177.4 - 197.1)
Power steering oil pump		7.1 (0.280)	4.4 - 4.9 (0.173 - 0.193)	3.9 - 4.4 (0.154 - 0.173)	196 (20, 44)	495 - 583 (50.5 -59.5, 111.4 - 131.2)	603- 691 (61.5 - 70.5, 135.6 - 155.5)
Applied pushing force		98 N (10 kg, 22 lb)			—		

*1: If the belt tension gauge cannot be installed at check points shown, check belt tension at a different location on the belt.

QUICK REFERENCE CHART: SENTRA (EQUIPPED WITH 1.8L, QG ENGINE)

2005

Spark Plugs (Double Platinum - Tipped)

Type	Standard	PLFR5A-11
	Hot	PLFR4A-11
	Cold	PLFR6A-11
Plug gap (nominal)		1.1 mm (0.043 in)

Front Wheel Alignment (Unladen*1)

ELS001CX

Camber Degree minute (Decimal degree)		Minimum	–1°05' (–1.08°)
		Nominal	–0°20' (–0.33°)
		Maximum	0°25′ (0.42°)
		Left and right difference	45′ (0.75°) or less
Caster Degree minute (Decimal degree)		Minimum	0°50′ (0.83°)
		Nominal	1°35′ (1.58°)
		Maximum	2°20′ (2.33°)
		Left and right difference	45′ (0.75°) or less
Kingpin inclination Degree minute (Decimal degree)		Minimum	13°52′ (13.87°)
		Nominal	14°37′ (14.62°)
		Maximum	15°22′ (15.37°)
Total toe-in	Distance (A – B) mm (in)	Minimum	1 (0.039")
		Nominal	2 (0.079")
		Maximum	3 (0.118")
	Angle (left plus right) Degree minute (Decimal degree)	Minimum	5.5′ (0.08°)
		Nominal	11′ (0.18°)
		Maximum	16′ (0.27°)
Wheel turning angle Full turn*2	Inside Degree minute (Decimal degree)	Minimum	34° (34.0°)
		Nominal	37° (37.0°)
		Maximum	38° (38.0°)
	Outside Degree minute (Decimal degree)	Nominal	31° (31.0°)

*1: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
*2: On power steering models, wheel turning force (at circumference of steering wheel) of 98 to 147 N (10 to 15 kg, 22 to 33 lb) with engine idle.

Rear Wheel Alignment (Unladen*)

ELS001CN

Unit: degree minute (decimal degree)

Camber		Minimum	–1°45′ (–1.75°)
		Nominal	–1°00′ (–1.00°)
		Maximum	–0°15′ (–0.25°)
Total toe-in	Distance	Minimum	–3 mm (–0.12 in)
		Nominal	1 mm (0.04 in)
		Maximum	5 mm (0.20 in)
	Angle (left plus right)	Minimum	–16′ (–0.27°)
		Nominal	5′30″ (0.09°)
		Maximum	26′ (0.43°)

*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

QUICK REFERENCE CHART: SENTRA (EQUIPPED WITH 1.8L, QG ENGINE)

2005

Brake

ELS001CO

Unit: mm (in)

Front brake	Brake model	CL25VA
	Cylinder bore diameter	57.2 (2.252)
	Pad length × width × thickness	125.6 × 46.0 × 11.0 (4.94 × 1.811 × 0.433)
	Rotor outer diameter × thickness	257 × 22 (10.12 × 0.87)
Rear brake	Brake model	LT20G
	Cylinder bore diameter/caliper bore diameter	15.87 (5/8) type a 17.45 (11/16) type b
	Lining length × width × thickness	219.4 × 35 × 4.5 (8.64 × 1.38 × 0.177)
	Drum inner diameter/Disc diameter × thickness	203.2 (8)
Master cylinder	Cylinder bore diameter	23.81 (15/16)
Control valve	Valve model	Dual proportioning valve
	Split point	1,961 kPa (20 kg/cm^2 , 284 psi)] × 0.2 reducing ratio
Brake booster	Booster model	M215T
	Diaphragm diameter	Primary: 230 (9.06) Secondary: 205 (8.07)
Brake fluid	Recommended brake fluid	Genuine NISSAN Super Heavy Duty Brake Fluid or equivalent DOT 3 (US FMVSS No. 116)

Disc Brake - Repair Limits

Unit: mm (in)

Brake model	CL25VA
Pad wear limit Minimum thickness	2.0 (0.079)
Rotor repair limit Minimum thickness	20 (0.79)

Drum Brake - Repair Limits

Unit: mm (in)

Brake model		LT20G
Lining wear limit	Minimum thickness	1.5 (0.059)
Drum repair limit	Maximum inner diameter	204.5 (8.05)
	Maximum out-of round	0.03 (0.0012)

QUICK REFERENCE CHART: SENTRA (EQUIPPED WITH 1.8L, QG ENGINE)

2005

Refill Capacities

ELS001CP

Description		Capacity (Approximate)		
		US measure	Imp measure	Liter
Fuel		13 1/4 gal	11 gal	50
Engine oil Drain and refill	With oil filter change	2 7/8 qt	2 3/8 qt	2.7
	Without oil filter change	2 5/8 qt	2 1/4 qt	2.5
Dry engine (engine overhaul)		3 1/4 qt	2 3/4 qt	3.1
Cooling system (with reservoir)	M/T	1 3/4 gal	1 1/2 gal	6.7
	A/T	1 3/4 gal	1 1/2 gal	6.6
Manual transaxle fluid (MTF)	RS5F70A	3 1/8 qt	2 5/8 qt	3.0
Automatic transaxle fluid (ATF)	RE4F03B	7 3/8 qt	6 1/8 qt	7.0
Power steering fluid (PSF)		1 1/8 qt	7/8 qt	1.0
Air conditioning system refrigerant		1.10 ± 0.11 lb	1.10 ± 0.11 lb	0.50 ± 0.05 kg
Air conditioning system lubricant		6.1 fl oz	6.3 fl oz	180 m ℓ

QUICK REFERENCE CHART: SENTRA (EQUIPPED WITH 2.5L, QR ENGINE)

PFP:00027

Engine Tune-Up Data

ELS001CR

Engine		QR25DE
Cylinder arrangement		4 in-line
Displacement		2,488 cm^3 (151.82 cu in)
Bore and stroke		89.0 x 100 mm (3.50 - 3.94 in)
Valve arrangement		DOHC
Firing order		1-3-4-2
Number of piston rings	Compression	2
	Oil	1
Compression ratio		9.5
Compression pressure	Standard	1,250 kPa (12.8 kg/cm^2 , 181.3 psi) / 250 rpm
	Minimum	1,060 kPa (10.8 kg/cm^2 , 153.7 psi) / 250 rpm
	Differential limit between cylinders	100 kPa (1.0 kg/cm^2 , 14 psi) / 250 rpm

Drive Belt Deflection and Tension

Tension of drive belts	Auto adjustment by auto-tensioner

Spark Plugs (Double Platinum Tipped)

Type	Standard	PLFR5A-11
	Hot	PLFR4A-11
	Cold	PLFR6A-11
Plug gap (nominal)		1.1 mm (0.043 in)

Front Wheel Alignment (Unladen*1)

ELS001CS

Unit: degree minute (decimal degree)

Camber		Minimum	–1°12' (–1.2°)
		Nominal	–0°27' (–0.45°)
		Maximum	0°18′ (0.3°)
		Left and right difference	45′ (0.75°) or less
Caster		Minimum	0°58′ (0.97°)
		Nominal	1°43′ (1.72°)
		Maximum	2°28′ (2.47°)
		Left and right difference	45′ (0.75°) or less
Kingpin inclination		Minimum	14°03′ (14.05°)
		Nominal	14°46′ (14.77°)
		Maximum	15°31′ (15.52°)
Total toe-in	Distance	Minimum	1 mm (0.039 in)
		Nominal	2 mm (0.079 in)
		Maximum	3 mm (0.118 in)
	Angle (left plus right)	Minimum	5.5′ (0.08°)
		Nominal	11′ (0.18°)
		Maximum	16′ (0.27°)

Wheel turning angle Full turn*2	Inside	Minimum	29° (29.0°)
		Nominal	32° (32.0°)
		Maximum	33° (33.0°)
	Outside	Nominal	27° (27.0°)

*1: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
*2: On power steering models, wheel turning force (at circumference of steering wheel) of 98 to 147 N (10 to 15 kg, 22 to 33 lb) with engine idle.

Rear Wheel Alignment (Unladen*)

ELS001CT

Unit: degree minute (decimal degree)

Camber		Minimum	–1°45′ (–1.75°)
		Nominal	–1°00′ (–1.00°)
		Maximum	–0°15′ (–0.25°)
Total toe-in	Distance	Minimum	–3 mm (–0.12 in)
		Nominal	1 mm (0.04 in)
		Maximum	5 mm (0.20 in)
	Angle (left plus right)	Minimum	–16′ (–0.27°)
		Nominal	5′30″ (0.09°)
		Maximum	26′ (0.43°)

*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

Brake

ELS001CU

Unit: mm (in)

Front brake	Brake model	CL25VB	OPB27VA
	Cylinder bore diameter	57.2 (2.252)	38 (1.50) x 2 + 44 (1.73) x 2
	Pad length × width × thickness	125.6 × 46.0 × 11.0 (4.94 × 1.811 × 0.433)	117.1 x 53.3 x 9.3 (4.61 x 2.098 x 0.366)
	Rotor outer diameter × thickness	280 × 22 (11.02 × 0.87)	324 x 30.0 (12.76 x 1.181)
Rear brake	Brake model	CL9HC	
	Cylinder bore diameter/caliper bore diameter	33.96 (1 11/32)	
	Lining length × width × thickness	89.1 × 39.5 × 10 (3.508 × 1.555 × 0.39)	
	Drum inner diameter/Disc diameter × thickness	232 × 7 (9.13 × 0.28)	232 × 7 (9.13 × 0.28) or 278 × 9 (10.94 × 0.35)*
Master cylinder	Cylinder bore diameter	23.81 (15/16)	
Control valve	Valve model	Dual proportioning valve	
	Split point	2,942 kPa (30 kg/cm^2 , 427 psi)] × 0.2 reducing ratio	
Brake booster	Booster model	M215T	
	Diaphragm diameter	Primary: 230 (9.06), Secondary: 205 (8.07)	
Brake fluid	Recommended brake fluid	Genuine NISSAN Super Heavy Duty Brake Fluid or equivalent DOT 3 (US FMVSS No. 116)	

*: With Spec V brake package.

Disc Brake - Repair Limits

Unit: mm (in)

Brake model	CL25VB (Front)	OPB27VA (Front)	CL9HC (Rear)
Pad wear limit Minimum thickness	2.0 (0.079)	2.0 (0.079)	2.0 (0.079)
Rotor repair limit Minimum thickness	20 (0.79)	20 (0.79)	8.0 (0.31) or 6.0 (0.24)*

*: With Spec V brake package.

QUICK REFERENCE CHART: SENTRA (EQUIPPED WITH 2.5L, QR ENGINE)

2005

Refill Capacities

ELS001CV

Description		Capacity (Approximate)		
		US measure	Imp measure	Liter
Fuel		13 1/4 gal	11 gal	50
Engine oil Drain and refill	With oil filter change	4 1/4 qt	3 1/2 qt	4.0
	Without oil filter change	4 qt	3 3/8 qt	3.8
Dry engine (engine overhaul)		4 3/4 qt	4 qt	4.5
Cooling system (with reservoir)	M/T	1 3/4 gal	1 1/2 gal	6.8
	A/T	1 3/4 gal	1 1/2 gal	6.7
Manual transaxle fluid (MTF)	RS6F51H	2 3/8 qt	2 qt	2.2
Automatic transaxle fluid (ATF)	RE4F04B	9.0 qt	7.5 qt	8.5
Power steering fluid (PSF)		1 1/8 qt	7/8 qt	1.0
Air conditioning system refrigerant		1.10 ± 0.11 lb	1.10 ± 0.11 lb	0.50 ± 0.05 kg
Air conditioning system lubricant		6.1 fl oz	6.3 fl oz	180 m ℓ

SECTION GI
GENERAL INFORMATION

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EAS000X3

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**

Description

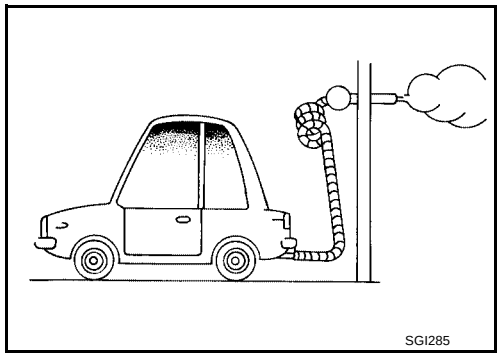
EAS000V5

Observe the following precautions to ensure safe and proper servicing. These precautions are not described in each individual section.

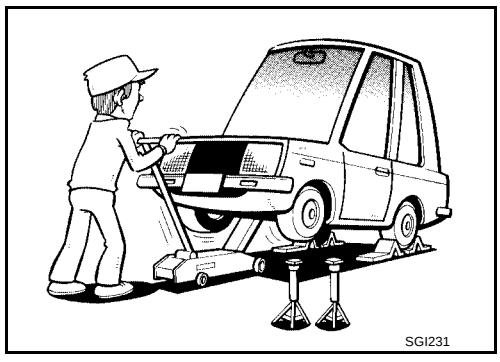
General Precautions

EAS000V6

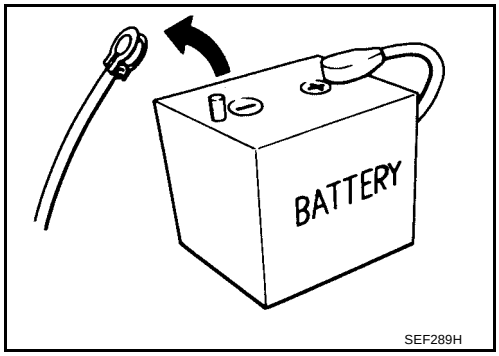
- Do not operate the engine for an extended period of time without proper exhaust ventilation.
  Keep the work area well ventilated and free of any inflammable materials. Special care should be taken when handling any inflammable or poisonous materials, such as gasoline, refrigerant gas, etc. When working in a pit or other enclosed area, be sure to properly ventilate the area before working with hazardous materials.
  Do not smoke while working on the vehicle.


SGI285

- Before jacking up the vehicle, apply wheel chocks or other tire blocks to the wheels to prevent the vehicle from moving. After jacking up the vehicle, support the vehicle weight with safety stands at the points designated for proper lifting before working on the vehicle.
  These operations should be done on a level surface.
- When removing a heavy component such as the engine or transaxle/transmission, be careful not to lose your balance and drop them. Also, do not allow them to strike adjacent parts, especially the brake tubes and master cylinder.

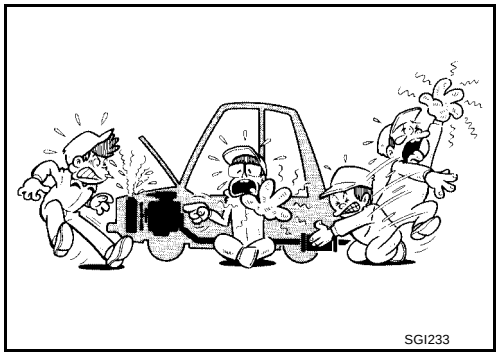

SGI231

- Before starting repairs which do not require battery power:
  Turn off ignition switch.
  Disconnect the negative battery terminal.
- If the battery terminals are disconnected, recorded memory of radio and each control unit is erased.

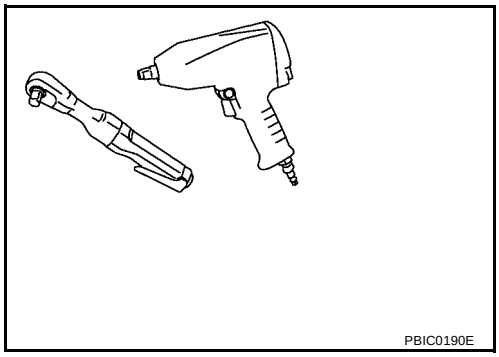


SEF289H

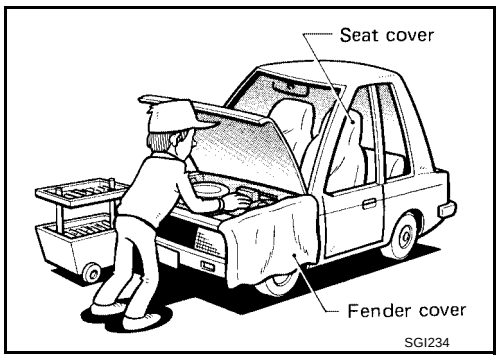
- To prevent serious burns:
  Avoid contact with hot metal parts.
  Do not remove the radiator cap when the engine is hot.
- Dispose of drained oil or the solvent used for cleaning parts in an appropriate manner.
- Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically.
  Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.
- Clean all disassembled parts in the designated liquid or solvent prior to inspection or assembly.


SGI233

- Replace oil seals, gaskets, packings, O-rings, locking washers, cotter pins, self-locking nuts, etc. with new ones.
- Replace inner and outer races of tapered roller bearings and needle bearings as a set.
- Arrange the disassembled parts in accordance with their assembled locations and sequence.
- Do not touch the terminals of electrical components which use microcomputers (such as ECM).
  Static electricity may damage internal electronic components.
- After disconnecting vacuum or air hoses, attach a tag to indicate the proper connection.
- Use only the fluids and lubricants specified in this manual.
- Use approved bonding agent, sealants or their equivalents when required.
- Use hand tools, power tools (disassembly only) and recommended special tools where specified for safe and efficient service repairs.
- When repairing the fuel, oil, water, vacuum or exhaust systems, check all affected lines for leaks.


PBIC0190E

- Before servicing the vehicle:
  Protect fenders, upholstery and carpeting with appropriate covers.
  Take caution that keys, buckles or buttons do not scratch paint.



SGI234

WARNING:
To prevent ECM from storing the diagnostic trouble codes, do not carelessly disconnect the harness connectors which are related to the engine control system and TCM (transmission control module) system. The connectors should be disconnected only when working according to the WORK FLOW of TROUBLE DIAGNOSES in EC and AT sections.

Precautions for NVIS/IVIS (NISSAN/INFINITI VEHICLE IMMOBILIZER SYSTEM - NATS) (If Equipped)

EAS000V7

NVIS/IVIS (NATS) will immobilize the engine if someone tries to start it without the registered key of NVIS/IVIS (NATS).
Both of the originally supplied ignition key IDs have been NVIS/IVIS (NATS) registered.
The security indicator is located on the instrument panel. The indicator blinks when the immobilizer system is functioning.
Therefore, NVIS/IVIS (NATS) warns outsiders that the vehicle is equipped with the anti-theft system.

- When NVIS/IVIS (NATS) detects trouble, the security indicator lamp lights up while ignition switch is in "ON" position.
  This lighting up indicates that the anti-theft is not functioning, so prompt service is required.
- When servicing NVIS/IVIS (NATS) (trouble diagnoses, system initialization and additional registration of other NVIS/IVIS (NATS) ignition key IDs), CONSULT-II hardware and CONSULT-II NVIS/IVIS (NATS) software is necessary.
  Regarding the procedures of NVIS/IVIS (NATS) initialization and NVIS/IVIS (NATS) ignition key ID registration, refer to CONSULT-II operation manual, NVIS/IVIS (NATS).

Therefore, CONSULT-II NVIS/IVIS (NATS) software (program card and operation manual) must be kept strictly confidential to maintain the integrity of the anti-theft function.

- When servicing NVIS/IVIS (NATS) (trouble diagnoses, system initialization and additional registration of other NVIS/IVIS (NATS) ignition key IDs), it may be necessary to re-register original key identification. Therefore, be sure to receive all keys from vehicle owner. A maximum of four or five key IDs can be registered into NVIS/IVIS (NATS).
- When failing to start the engine first time using the key of NVIS/IVIS (NATS), start as follows.

1. Leave the ignition key in "ON" position for approximately 5 seconds.
2. Turn ignition key to "OFF" or "LOCK" position and wait approximately 5 seconds.
3. Repeat step 1 and 2 again.
4. Restart the engine while keeping the key separate from any others on key-chain.

Precautions for Three Way Catalyst

EAS000V8

If a large amount of unburned fuel flows into the catalyst, the catalyst temperature will be excessively high. To prevent this, follow the instructions.

- Use unleaded gasoline only. Leaded gasoline will seriously damage the three way catalyst.
- When checking for ignition spark or measuring engine compression, make tests quickly and only when necessary.
- Do not run engine when the fuel tank level is low, otherwise the engine may misfire, causing damage to the catalyst.

Do not place the vehicle on flammable material. Keep flammable material off the exhaust pipe and the three way catalyst.

Precautions for Fuel (Unleaded Regular Gasoline Recommended)

EAS000X4

Use unleaded regular gasoline with an octane rating of at least 87 AKI (Anti-Knock Index) number (Research octane number 91).

CAUTION:
Do not use leaded gasoline. Using leaded gasoline will damage the three way catalyst. Using a fuel other than that specified could adversely affect the emission control devices and systems, and could also affect the warranty coverage validity.

Precautions for Fuel (Unleaded Premium Gasoline Recommended)

EAS000X5

Use unleaded regular gasoline with an octane rating of at least 87 AKI (Anti-Knock Index) number (Research octane number 91).

For improved vehicle performance, NISSAN/INFINITI recommend the use of unleaded premium gasoline with an octane rating of at least 91 AKI number (Research octane number 96).

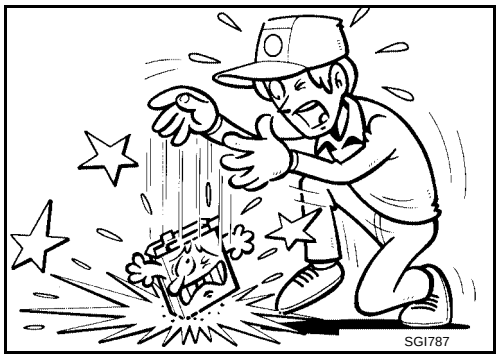
CAUTION:

Do not use leaded gasoline. Using leaded gasoline will damage the three way catalyst. Using a fuel other than that specified could adversely affect the emission control devices and systems, and could also affect the warranty coverage validity.

Precautions for Multiport Fuel Injection System or Engine Control System

EAS000VA

- Before connecting or disconnecting any harness connector for the multiport fuel injection system or ECM:
  Turn ignition switch to “OFF” position.
  Disconnect negative battery terminal.
  Otherwise, there may be damage to ECM.
- Before disconnecting pressurized fuel line from fuel pump to injectors, be sure to release fuel pressure.
- Be careful not to jar components such as ECM and mass air flow sensor.

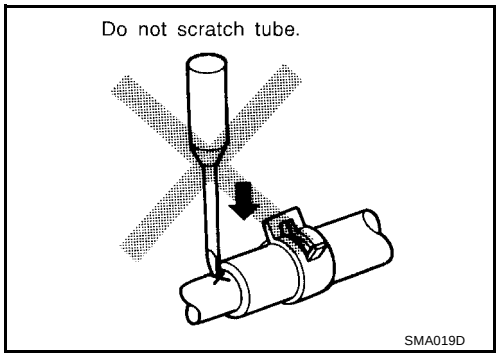


Precautions for Hoses

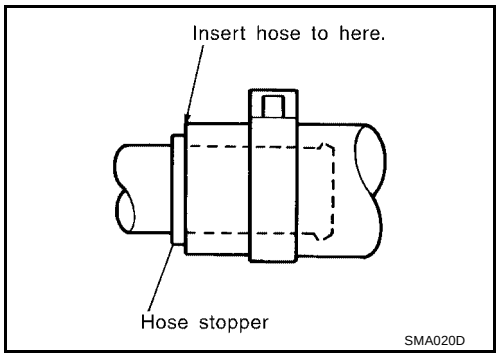
EAS000VB

HOSE REMOVAL AND INSTALLATION

- To prevent damage to rubber hose, do not pry off rubber hose with tapered tool or screwdriver.

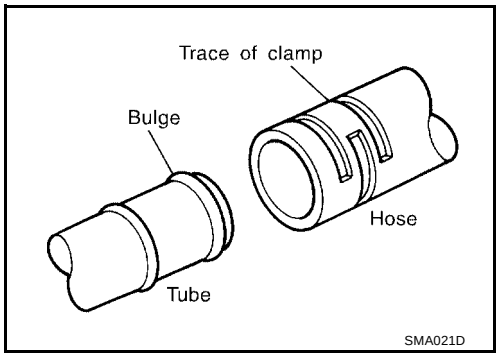


- To reinstall the rubber hose securely, make sure that hose insertion length and orientation is correct. (If tube is equipped with hose stopper, insert rubber hose into tube until it butts up against hose stopper.)

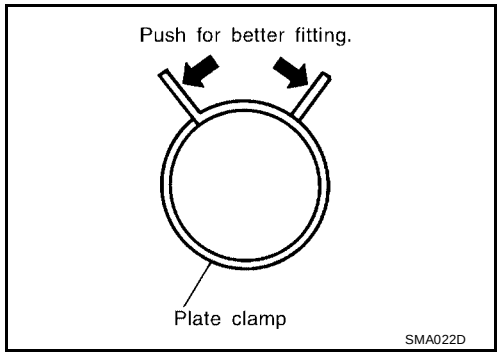


HOSE CLAMPING

- If old rubber hose is re-used, install hose clamp in its original position (at the indentation where the old clamp was). If there is a trace of tube bulging left on the old rubber hose, align rubber hose at that position.
- Discard old clamps; replace with new ones.



- After installing plate clamps, apply force to them in the direction of the arrow, tightening rubber hose equally all around.



Precautions for Engine Oils

EAS000VC

Prolonged and repeated contact with used engine oil may cause skin cancer. Try to avoid direct skin contact with used oil.
If skin contact is made, wash thoroughly with soap or hand cleaner as soon as possible.

HEALTH PROTECTION PRECAUTIONS

- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including impervious gloves where practicable.
- Do not put oily rags in pockets.
- Avoid contaminating clothes, particularly underpants, with oil.
- Heavily soiled clothing and oil-impregnated footwear should not be worn. Overalls must be cleaned regularly.
- First aid treatment should be obtained immediately for open cuts and wounds.
- Use barrier creams, applying them before each work period, to help the removal of oil from the skin.
- Wash with soap and water to ensure all oil is removed (skin cleansers and nail brushes will help). Preparations containing lanolin replace the natural skin oils which have been removed.
- Do not use gasoline, kerosene, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- If skin disorders develop, obtain medical advice without delay.
- Where practical, degrease components prior to handling.
- Where there is a risk of eye contact, eye protection should be worn, for example, chemical goggles or face shields; in addition an eye wash facility should be provided.

ENVIRONMENTAL PROTECTION PRECAUTIONS

Dispose of used oil and used oil filters through authorized waste disposal contractors to licensed waste disposal sites, or to the waste oil reclamation trade. If in doubt, contact the local authority for advice on disposal facilities.
It is illegal to pour used oil on to the ground, down sewers or drains, or into water sources.
The regulations concerning pollution vary between regions.

Precautions for Air Conditioning

EAS000VD

Use an approved refrigerant recovery unit any time the air conditioning system must be discharged. Refer to ATC/MTC section “HFC-134a (R-134a) Service Procedure”, “REFRIGERANT LINES” for specific instructions.

HOW TO USE THIS MANUAL

PFP:00008

Description

EAS000VE

This volume explains “Removal, Disassembly, Installation, Inspection and Adjustment” and “Trouble Diagnoses”.

Terms

EAS000VF

- The captions **WARNING** and **CAUTION** warn you of steps that must be followed to prevent personal injury and/or damage to some part of the vehicle.
  WARNING indicates the possibility of personal injury if instructions are not followed.
  CAUTION indicates the possibility of component damage if instructions are not followed.
  BOLD TYPED STATEMENTS except **WARNING** and **CAUTION** give you helpful information.
  Standard value:Tolerance at inspection and adjustment.
  Limit value:The maximum or minimum limit value that should not be exceeded at inspection and adjustment.

Units

EAS000VG

- The **UNITS** given in this manual are primarily expressed as the SI UNIT (International System of Unit), and alternatively expressed in the metric system and in the yard/pound system.
  “Example”

  Outer Socket Lock Nut : 59 - 78 N-m (6.0 - 8.0 kg-m, 43 - 58 ft-lb)

Contents

EAS000VH

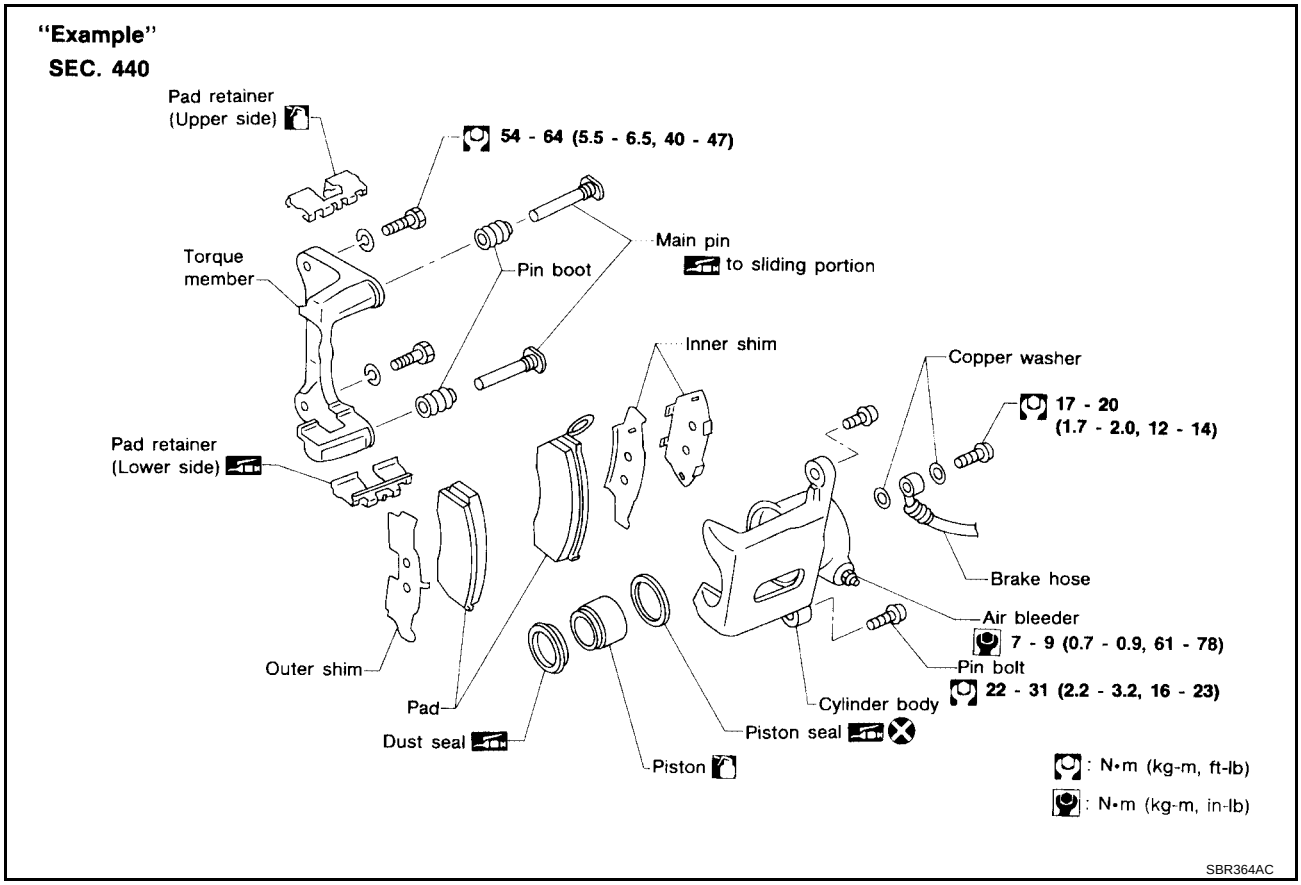
- **ALPHABETICAL INDEX** is provided at the end of this manual so that you can rapidly find the item and page you are searching for.
- **A QUICK REFERENCE INDEX**, a black tab (e.g. BR) is provided on the first page. You can quickly find the first page of each section by matching it to the section's black tab.
- **THE CONTENTS** are listed on the first page of each section.
- **THE TITLE** is indicated on the upper portion of each page and shows the part or system.
- **THE PAGE NUMBER** of each section consists of two or three letters which designate the particular section and a number (e.g. “BR-5”).
- **THE SMALL ILLUSTRATIONS** show the important steps such as inspection, use of special tools, knacks of work and hidden or tricky steps which are not shown in the previous large illustrations.
  Assembly, inspection and adjustment procedures for the complicated units such as the automatic transaxle or transmission, etc. are presented in a step-by-step format where necessary.

Components

EAS000VI

- **THE LARGE ILLUSTRATIONS** are exploded views (See the following) and contain tightening torques, lubrication points, section number of the **PARTS CATALOG** (e.g. SEC. 440) and other information necessary to perform repairs.

The illustrations should be used in reference to service matters only. When ordering parts, refer to the appropriate **PARTS CATALOG** .



SYMBOLS

SYMBOL	DESCRIPTION
	Tightening torque
	Should be lubricated with grease. Unless otherwise indicated, use recommended multi-purpose grease.
	Should be lubricated with oil.
	Sealing point
	Checking point
	Always replace after every disassembly.
P	Apply petroleum jelly.
ATF	Apply ATF.
★	Select with proper thickness.
☆	Adjustment is required.

How to Follow Trouble Diagnoses

EAS000VJ

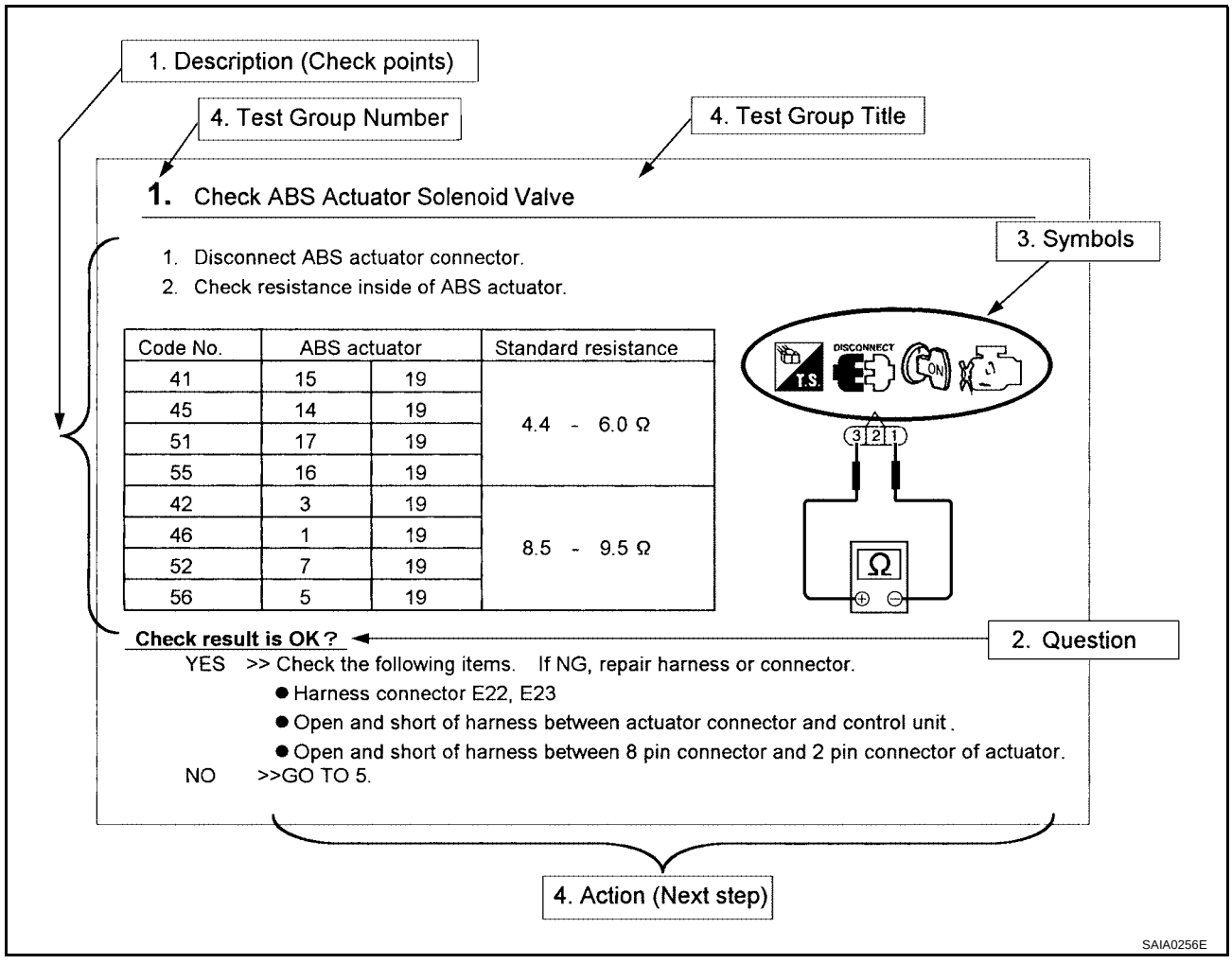
DESCRIPTION

NOTICE:

Trouble diagnoses indicate work procedures required to diagnose problems effectively. Observe the following instructions before diagnosing.

1. **Before performing trouble diagnoses, read the "Preliminary Check", the "Symptom Chart" or the "Work Flow".**
2. **After repairs, re-check that the problem has been completely eliminated.**
3. **Refer to Component Parts and Harness Connector Location for the Systems described in each section for identification/location of components and harness connectors.**
4. **Refer to the Circuit Diagram for quick pinpoint check.**
   If you need to check circuit continuity between harness connectors in more detail, such as when a sub-harness is used, refer to Wiring Diagram in each individual section and Harness Layout in PG section for identification of harness connectors.
5. **When checking circuit continuity, ignition switch should be OFF.**
6. **Before checking voltage at connectors, check battery voltage.**
7. **After accomplishing the Diagnostic Procedures and Electrical Components Inspection, make sure that all harness connectors are reconnected as they were.**

HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES



1. **Work and diagnostic procedure**
   Start to diagnose a problem using procedures indicated in enclosed test groups.
2. **Questions and required results**
   Questions and required results are indicated in bold type in test group.
   The meaning of are as follows:

   a. Battery voltage → 11 - 14V or approximately 12V
   b. Voltage : Approximately 0V → Less than 1V

3. **Symbol used in illustration**

Symbols included in illustrations refer to measurements or procedures. Before diagnosing a problem, familiarize yourself with each symbol. Refer to "Connector Symbols" in GI Section and "KEY TO SYMBOLS SIGNIFYING MEASUREMENTS OR PROCEDURES" below.

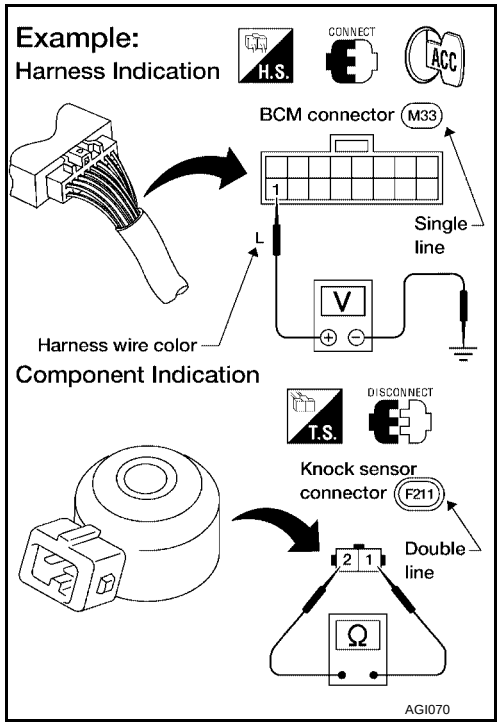
4. **Action items**
   Next action for each test group is indicated based on result of each question. Test group number is shown in the left upper portion of each test group.

HARNESS WIRE COLOR AND CONNECTOR NUMBER INDICATION

There are two types of harness wire color and connector number indication.

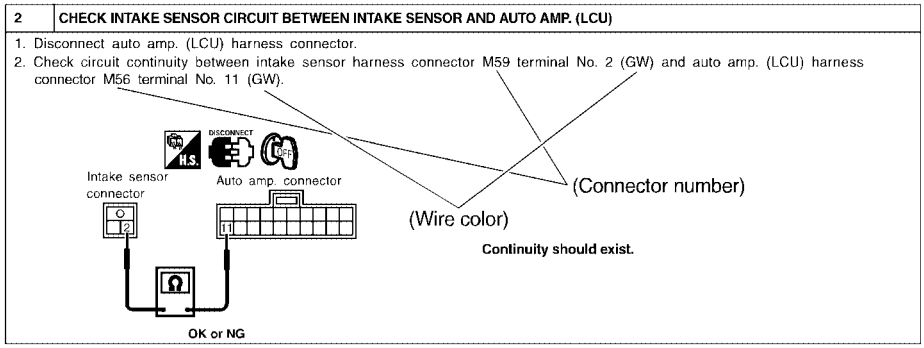
TYPE 1: Harness Wire Color and Connector Number are Shown in Illustration

- Letter designations next to test meter probe indicate harness wire color.
- Connector numbers in a single circle (e.g. M33) indicate harness connectors.
- Connector numbers in a double circle (e.g. F211) indicate component connectors.

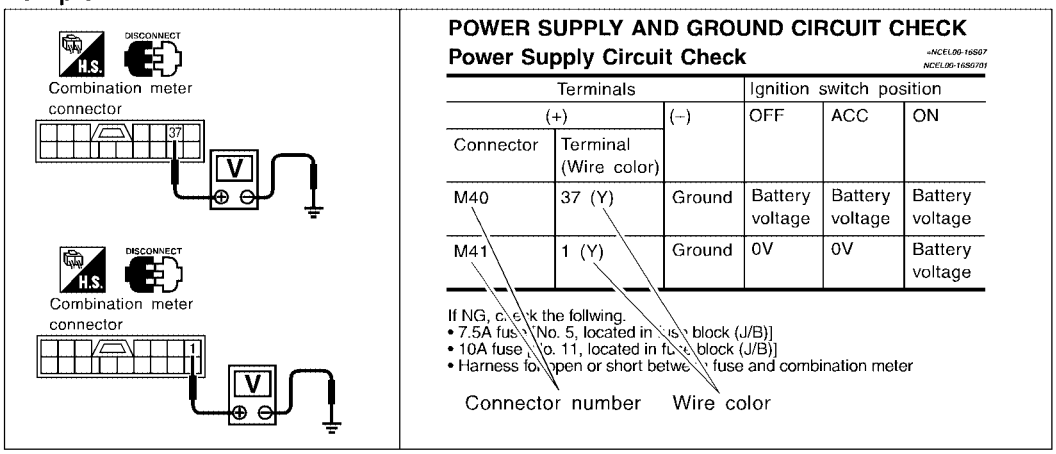


TYPE 2: Harness Wire Color and Connector Number are Shown in Text

Example 1:



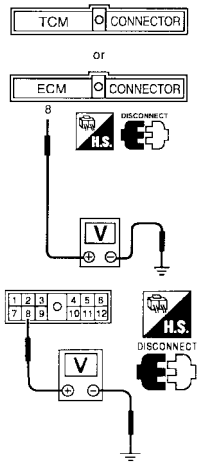
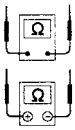
Example 2:



SGI144A

KEY TO SYMBOLS SIGNIFYING MEASUREMENTS OR PROCEDURES

Symbol	Symbol explanation	Symbol	Symbol explanation
DISCONNECT	Check after disconnecting the connector to be measured.	GST	Procedure with Generic Scan Tool (GST, OBD-II scan tool)
CONNECT	Check after connecting the connector to be measured.	NO TOOLS	Procedure without CONSULT, CONSULT-II or GST
	Insert key into ignition switch.	A/C	A/C switch is “OFF”.
	Remove key from ignition switch.	A/C	A/C switch is “ON”.
OFF	Turn ignition switch to “OFF” position.		REC switch is “ON”.
ON	Turn ignition switch to “ON” position.		REC switch is “OFF”.
ST	Turn ignition switch to “START” position.		Fan switch is “ON”. (At any position except for “OFF” position)
OFF→ACC	Turn ignition switch from “OFF” to “ACC” position.		Fan switch is “OFF”.
ACC→OFF	Turn ignition switch from “ACC” to “OFF” position.	FUSE BAT	Apply positive voltage from battery with fuse directly to components.

Symbol	Symbol explanation	Symbol	Symbol explanation
	Turn ignition switch from “OFF” to “ON” position.		Drive vehicle.
	Turn ignition switch from “ON” to “OFF” position.		Disconnect battery negative cable.
	Do not start engine, or check with engine stopped.		Depress brake pedal.
	Start engine, or check with engine running.		Release brake pedal.
	Apply parking brake.		Depress accelerator pedal.
	Release parking brake.		Release accelerator pedal.
	Check after engine is warmed up sufficiently.		Pin terminal check for SMJ type ECM and TCM connectors. **For details regarding the terminal arrangement, refer to the “ELECTRICAL UNITS” electrical reference page at the end of the manual.**
	Voltage should be measured with a voltmeter.		
	Circuit resistance should be measured with an ohmmeter.		
	Current should be measured with an ammeter.		
	Procedure with CONSULT-II		
	Procedure without CONSULT-II		

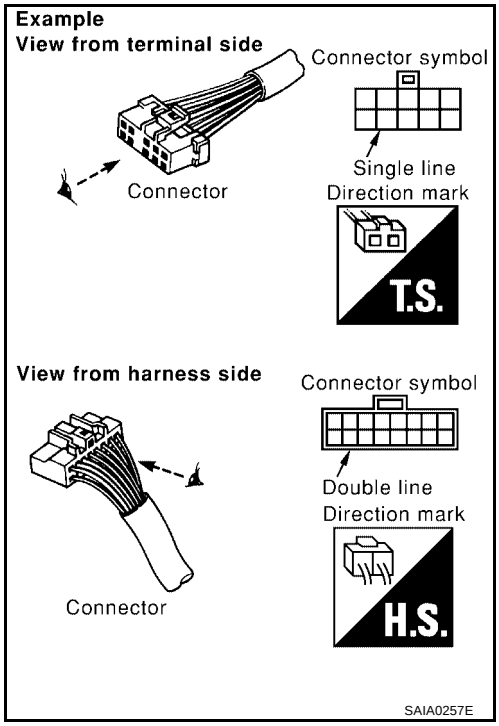
How to Read Wiring Diagrams

EAS000VK

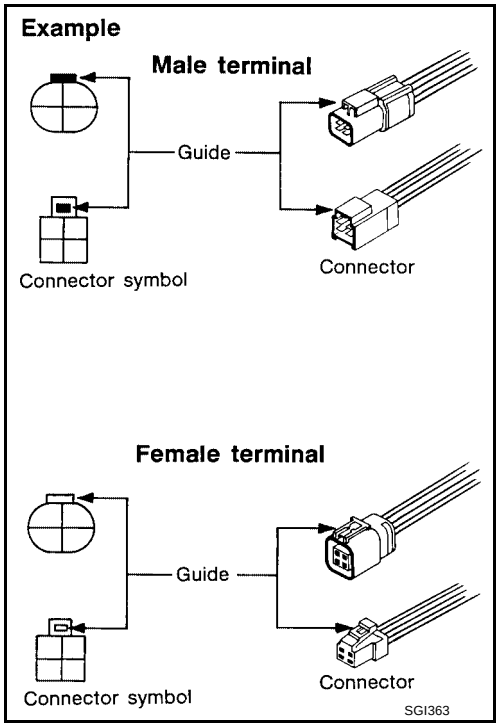
CONNECTOR SYMBOLS

Most of connector symbols in wiring diagrams are shown from the terminal side.

- Connector symbols shown from the terminal side are enclosed by a single line and followed by the direction mark.
- Connector symbols shown from the harness side are enclosed by a double line and followed by the direction mark.
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG section, “Description”, “HARNESS CONNECTOR”.

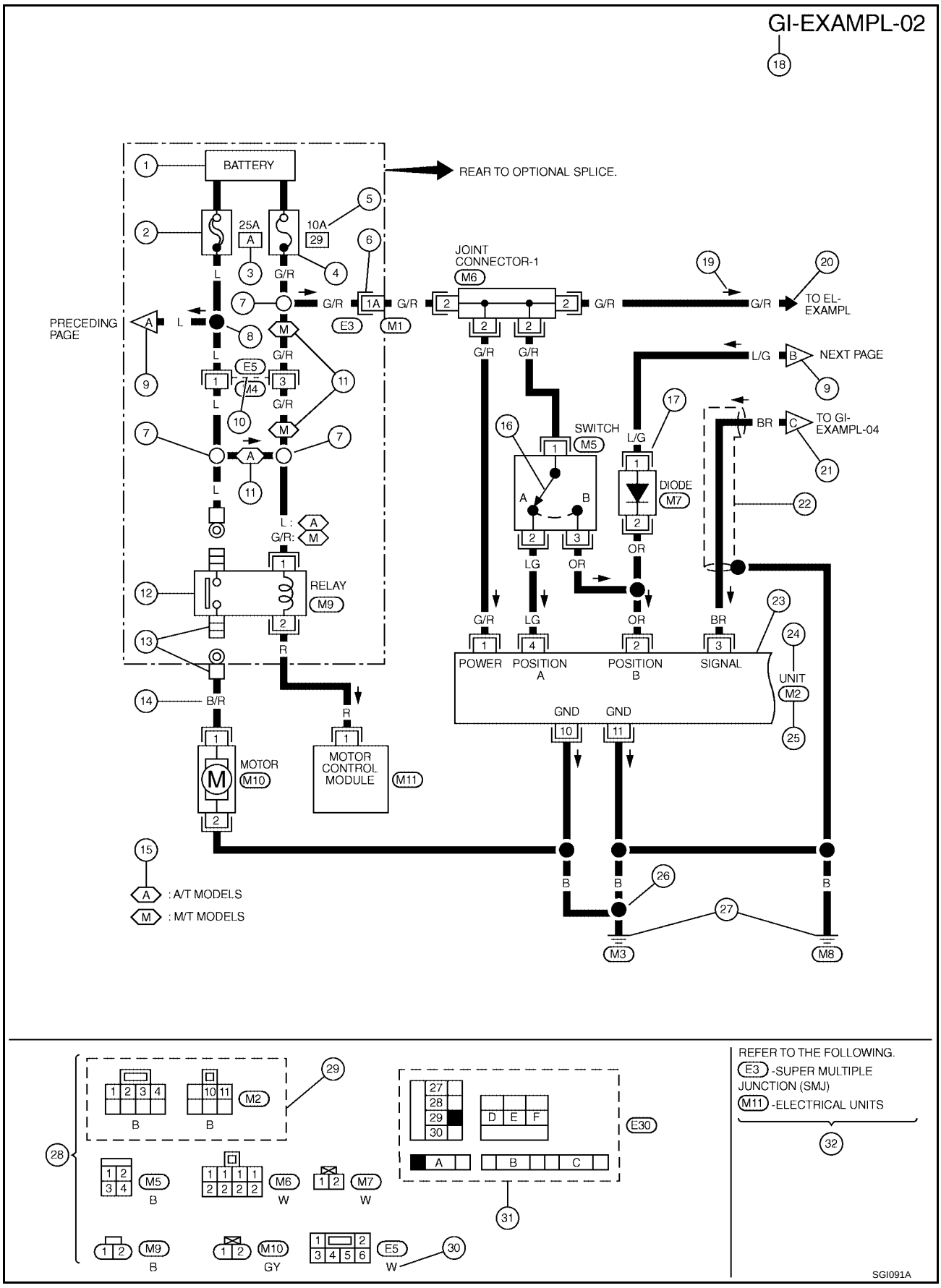


- Male and female terminals
  Connector guides for male terminals are shown in black and female terminals in white in wiring diagrams.

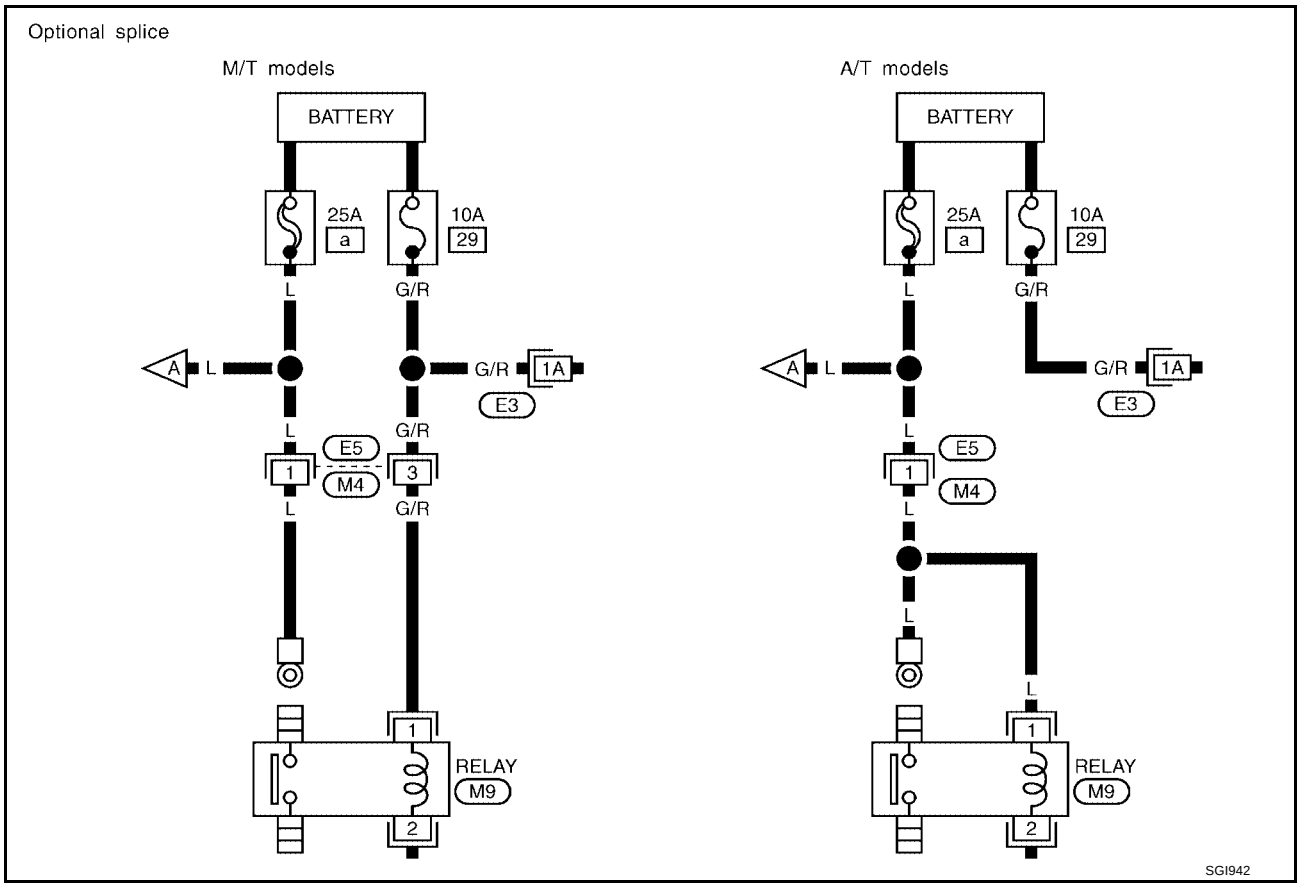


SAMPLE/WIRING DIAGRAM - EXAMPL -

- For detail, refer to following "DESCRIPTION".



Optional Splice



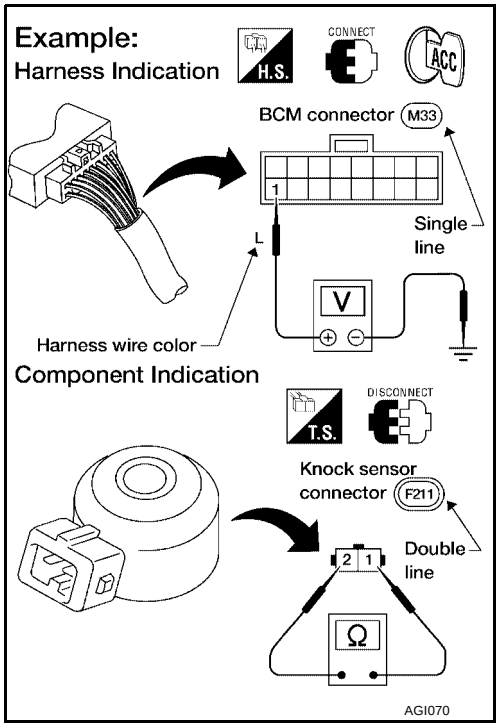
DESCRIPTION

Number	Item	Description
1	Power condition	● This shows the condition when the system receives battery positive voltage (can be operated).
2	Fusible link	● The double line shows that this is a fusible link. ● The open circle shows current flow in, and the shaded circle shows current flow out.
3	Fusible link/fuse location	● This shows the location of the fusible link or fuse in the fusible link or fuse box. For arrangement, refer to PG section, POWER SUPPLY ROUTING.
4	Fuse	● The single line shows that this is a fuse. ● The open circle shows current flow in, and the shaded circle shows current flow out.
5	Current rating	● This shows the current rating of the fusible link or fuse.
6	Connectors	● This shows that connector E3 is female and connector M1 is male. ● The G/R wire is located in the 1A terminal of both connectors. ● Terminal number with an alphabet (1A, 5B, etc.) indicates that the connector is SMJ connector. Refer to PG section, SMJ (SUPER MULTIPLE JUNCTION).
7	Optional splice	● The open circle shows that the splice is optional depending on vehicle application.
8	Splice	● The shaded circle shows that the splice is always on the vehicle.
9	Page crossing	● This arrow shows that the circuit continues to an adjacent page. ● The A will match with the A on the preceding or next page.
10	Common connector	● The dotted lines between terminals show that these terminals are part of the same connector.
11	Option abbreviation	● This shows that the circuit is optional depending on vehicle application.
12	Relay	● This shows an internal representation of the relay. For details, refer to PG section, STANDARDIZED RELAY.
13	Connectors	● This shows that the connector is connected to the body or a terminal with bolt or nut.

Number	Item	Description
14	Wire color	● This shows a code for the color of the wire.
		B = Black W = White R = Red G = Green L = Blue Y = Yellow LG = Light Green BR = Brown OR = Orange P = Pink PU = Purple GY = Gray SB = Sky Blue CH = Dark Brown DG = Dark Green
		When the wire color is striped, the base color is given first, followed by the stripe color as shown below: Example: L/W = Blue with White Stripe
15	Option description	● This shows a description of the option abbreviation used on the page.
16	Switch	● This shows that continuity exists between terminals 1 and 2 when the switch is in the A position. Continuity exists between terminals 1 and 3 when the switch is in the B position.
17	Assembly parts	● Connector terminal in component shows that it is a harness incorporated assembly.
18	Cell code	● This identifies each page of the wiring diagram by section, system and wiring diagram page number.
19	Current flow arrow	● Arrow indicates electric current flow, especially where the direction of standard flow (vertically downward or horizontally from left to right) is difficult to follow. ● A double arrow “ ↔ ” shows that current can flow in either direction depending on circuit operation.
20	System branch	● This shows that the system branches to another system identified by cell code (section and system).
21	Page crossing	● This arrow shows that the circuit continues to another page identified by cell code. ● The C will match with the C on another page within the system other than the next or preceding pages.
22	Shielded line	● The line enclosed by broken line circle shows shield wire.
23	Component box in wave line	● This shows that another part of the component is also shown on another page (indicated by wave line) within the system.
24	Component name	● This shows the name of a component.
25	Connector number	● This shows the connector number. ● The letter shows which harness the connector is located in. ● Example: **M** : main harness. For detail and to locate the connector, refer to PG section "Main Harness", “Harness Layout”. A coordinate grid is included for complex harnesses to aid in locating connectors.
26	Ground (GND)	● The line spliced and grounded under wire color shows that ground line is spliced at the grounded connector.
27	Ground (GND)	● This shows the ground connection. For detailed ground distribution information, refer to "Ground Distribution" in PG section.
28	Connector views	● This area shows the connector faces of the components in the wiring diagram on the page.
29	Common component	● Connectors enclosed in broken line show that these connectors belong to the same component.
30	Connector color	● This shows a code for the color of the connector. For code meaning, refer to wire color codes, Number 14 of this chart.
31	Fusible link and fuse box	● This shows the arrangement of fusible link(s) and fuse(s), used for connector views of "POWER SUPPLY ROUTING" in PG section. The open square shows current flow in, and the shaded square shows current flow out.
32	Reference area	● This shows that more information on the Super Multiple Junction (SMJ) and Joint Connectors (J/C) exists on the PG section. Refer to "Reference Area" for details.

Harness Indication

- Letter designations next to test meter probe indicate harness (connector) wire color.
- Connector numbers in a single circle M33 indicate harness connectors.



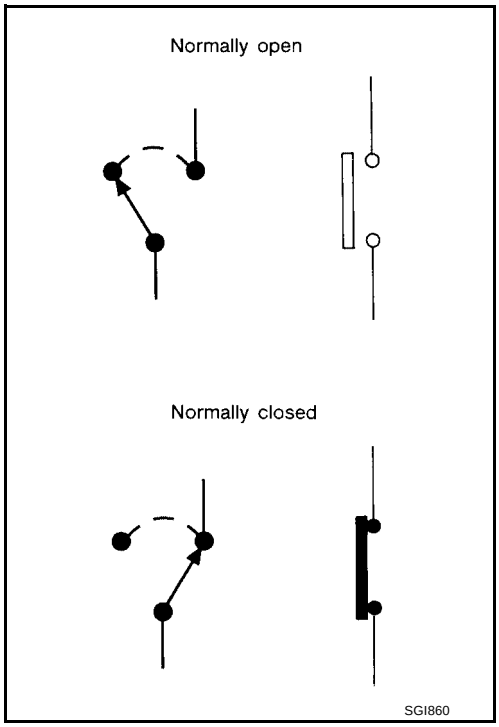
Component Indication

Connector numbers in a double circle F211 indicate component connectors.

Switch Positions

Switches are shown in wiring diagrams as if the vehicle is in the “normal” condition.
A vehicle is in the “normal” condition when:

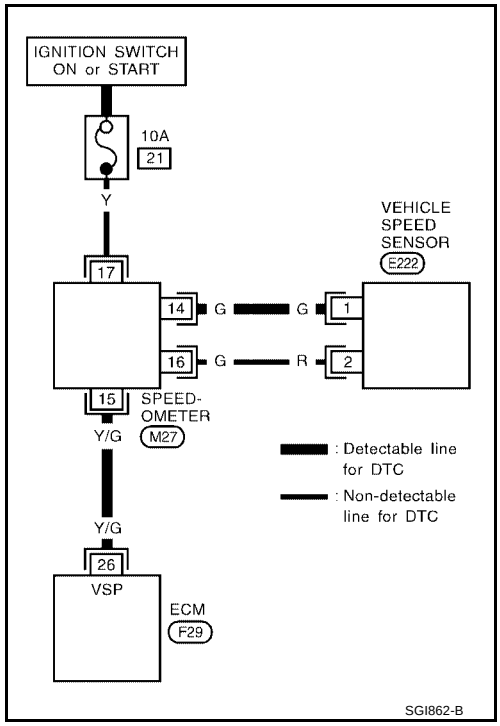
- ignition switch is “OFF”,
- doors, hood and trunk lid/back door are closed,
- pedals are not depressed, and
- parking brake is released.



Detectable Lines and Non-Detectable Lines

In some wiring diagrams, two kinds of lines, representing wires, with different weight are used.

- A line with regular weight (wider line) represents a “detectable line for DTC (Diagnostic Trouble Code)”. A “detectable line for DTC” is a circuit in which ECM can detect its malfunctions with the on board diagnostic system.
- A line with less weight (thinner line) represents a “non-detectable line for DTC”. A “non-detectable line for DTC” is a circuit in which ECM cannot detect its malfunctions with the on board diagnostic system.



Multiple Switch

The continuity of multiple switch is described in two ways as shown below.

- The switch chart is used in schematic diagrams.

- The switch diagram is used in wiring diagrams.

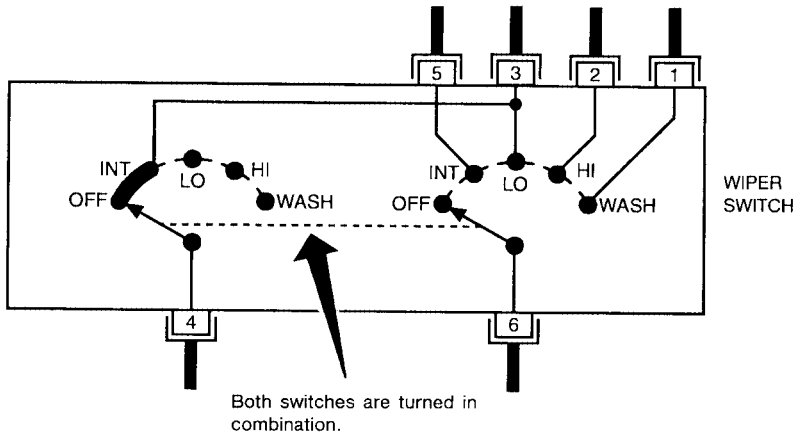
Example

(SWITCH CHART)

WIPER SWITCH

	OFF	INT	LO	HI	WASH
1					○
2				○	
3	○	○	○		
4	○	○			
5		○			
6		○	○	○	○

(SWITCH DIAGRAM)



Continuity circuit of wiper switch

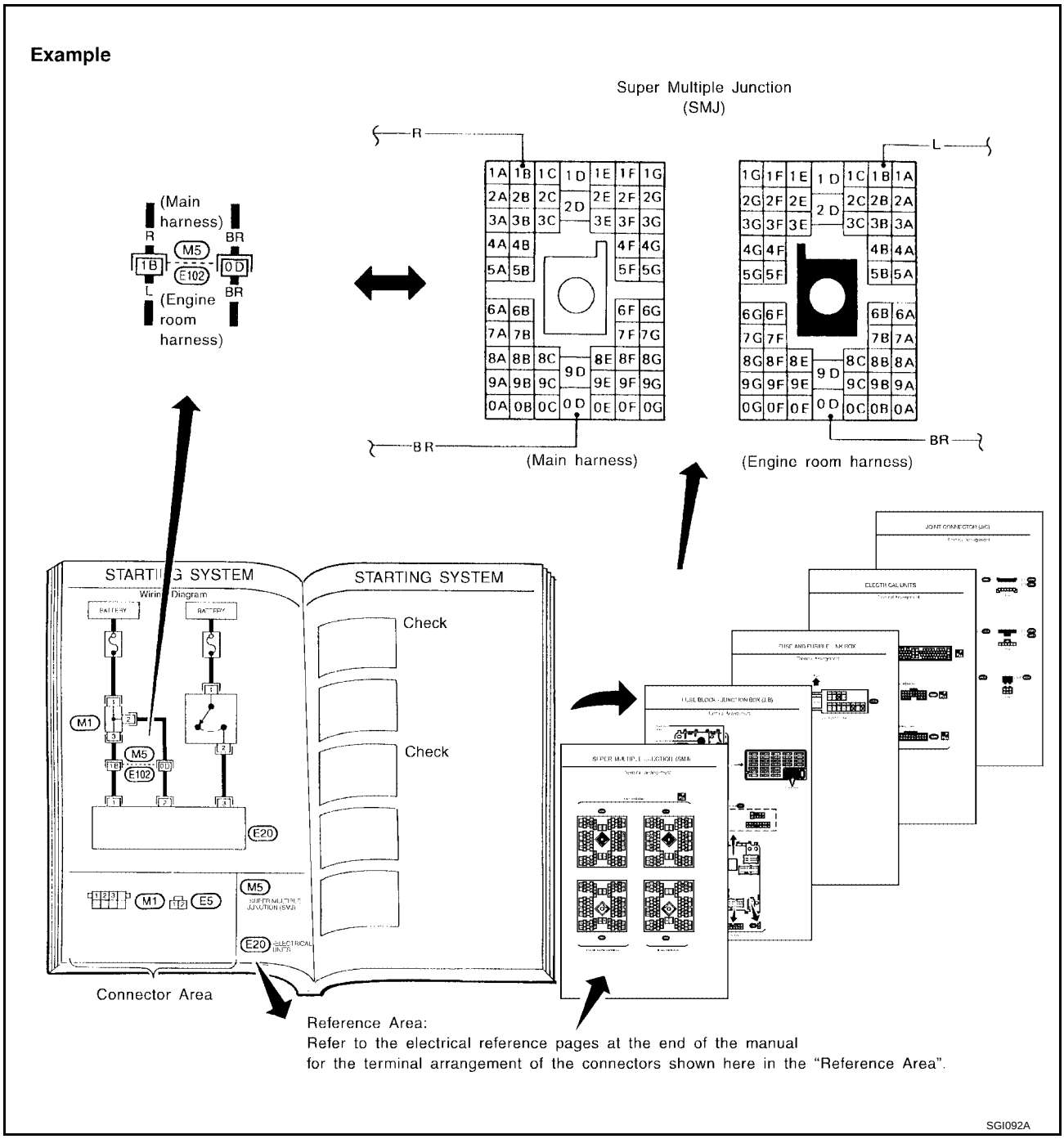
SWITCH POSITION	CONTINUITY CIRCUIT
OFF	3-4
INT	3-4, 5-6
LO	3-6
HI	2-6
WASH	1-6

SGI875

Reference Area

The Reference Area of the wiring diagram contains references to additional electrical reference pages at the end of the manual. If connector numbers and titles are shown in the Reference Area of the wiring diagram, these connector symbols are not shown in the Connector Area.

Example



Abbreviations

EAS000VL

The following **ABBREVIATIONS** are used:

ABBREVIATION	DESCRIPTION
A/C	Air Conditioner
A/T	Automatic Transaxle/Transmission
ATF	Automatic Transmission Fluid
D_1	Drive range 1st gear
D_2	Drive range 2nd gear

ABBREVIATION	DESCRIPTION
D_3	Drive range 3rd gear
D_4	Drive range 4th gear
FR, RR	Front, Rear
LH, RH	Left-Hand, Right-Hand
M/T	Manual Transaxle/Transmission
OD	Overdrive
P/S	Power Steering
SAE	Society of Automotive Engineers, Inc.
SDS	Service Data and Specifications
SST	Special Service Tools
2WD	2-Wheel Drive
2_2	2nd range 2nd gear
2_1	2nd range 1st gear
1_2	1st range 2nd gear
1_1	1st range 1st gear

SERVICE INFORMATION FOR ELECTRICAL INCIDENT

PFP:00000

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How to Check Terminal

EAS000VM

CONNECTOR AND TERMINAL PIN KIT

Use the connector and terminal pin kits listed below when replacing connectors or terminals.
The connector and terminal pin kits contain some of the most commonly used NISSAN/INFINITI connectors and terminals. For detailed connector and terminal pin replacement procedures, refer to the latest NISSAN/INFINITI CONNECTOR AND TERMINAL PIN SERVICE MANUAL.

Tool number (Kent-Moore No.) Tool name	Description
- (J38751-95NI) Connector and terminal pin kit (NISSAN) - (J38751-95INF) Connector and terminal pin kit (INFINITI) - (J42992-98KIT) OBD and terminal repair kit - (J42992-2000UPD) OBD-II Connector Kit Update	J38751-95NI, J38751-95INF, J42992-98KIT, J42992-2000UPD WAIA0004E WAIA0005E

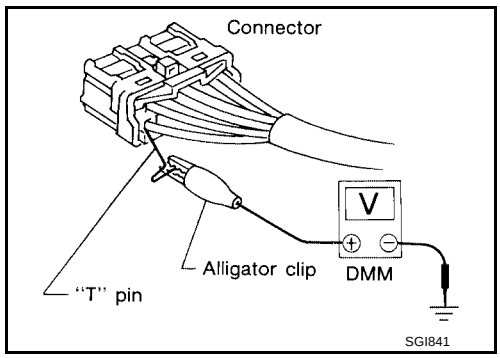
HOW TO PROBE CONNECTORS

Connector damage and an intermittent connection can result from improperly probing of the connector during circuit checks.
The probe of a digital multimeter (DMM) may not correctly fit the connector cavity. To correctly probe the connector, follow the procedures below using a “T” pin. For the best contact grasp the “T” pin using an alligator clip.

Probing from Harness Side

Standard type (not waterproof type) connector should be probed from harness side with “T” pin.

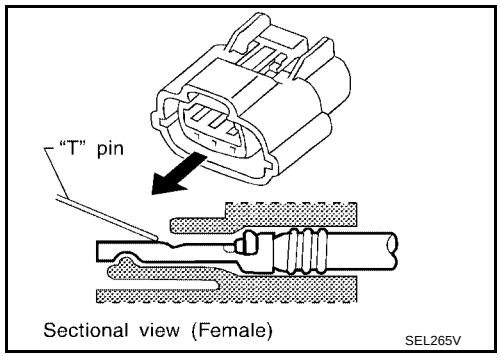
- If the connector has a rear cover such as a ECM connector, remove the rear cover before probing the terminal.
- Do not probe waterproof connector from harness side. Damage to the seal between wire and connector may result.



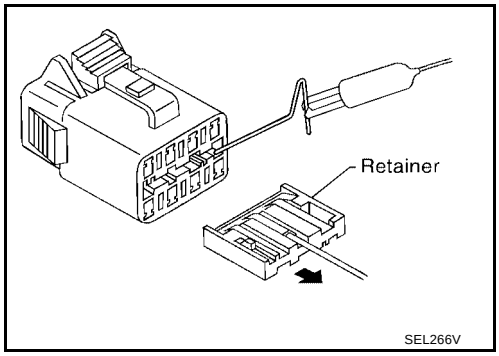
Probing from Terminal Side

FEMALE TERMINAL

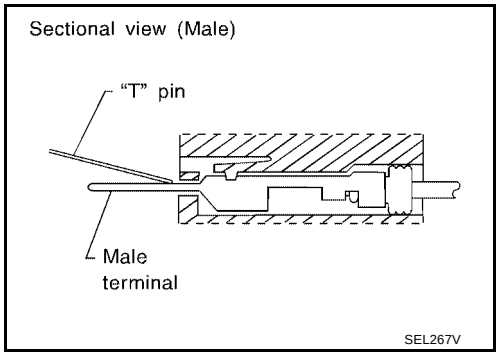
- There is a small notch above each female terminal. Probe each terminal with the “T” pin through the notch.
  Do not insert any object other than the same type male terminal into female terminal.



- Some connectors do not have a notch above each terminal. To probe each terminal, remove the connector retainer to make contact space for probing.



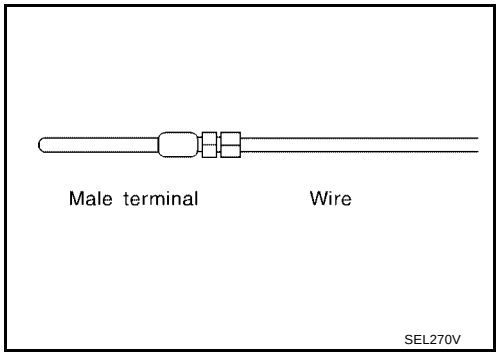
MALE TERMINAL
Carefully probe the contact surface of each terminal using a “T” pin.
Do not bend terminal.



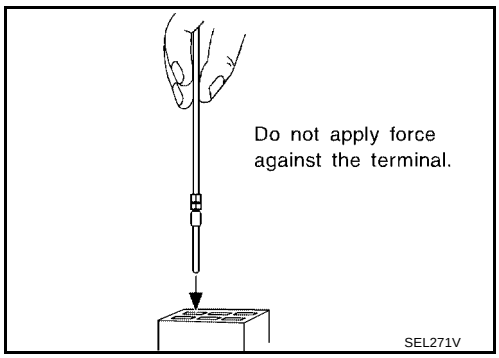
How to Check Enlarged Contact Spring of Terminal

An enlarged contact spring of a terminal may create intermittent signals in the circuit.
If the intermittent open circuit occurs, follow the procedure below to inspect for open wires and enlarged contact spring of female terminal.

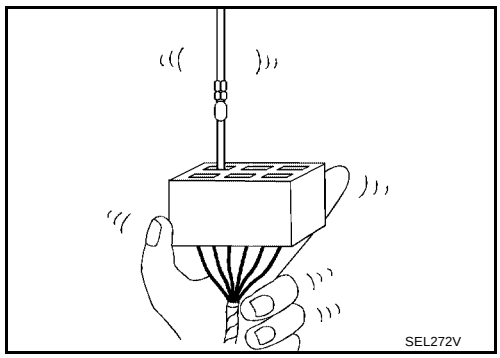
1. Assemble a male terminal and approx. 10 cm (3.9 in) of wire.
   Use a male terminal which matches the female terminal.
2. Disconnect the suspected faulty connector and hold it terminal side up.



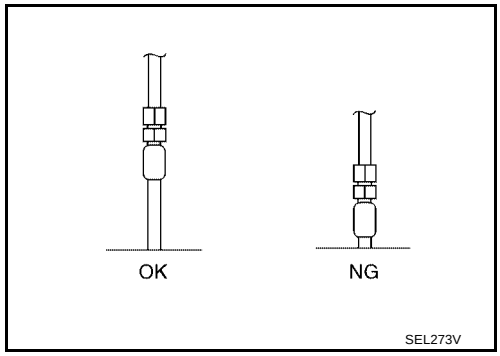
3. While holding the wire of the male terminal, try to insert the male terminal into the female terminal.
   Do not force the male terminal into the female terminal with your hands.



4. While moving the connector, check whether the male terminal can be easily inserted or not.



- If the male terminal can be easily inserted into the female terminal, replace the female terminal.

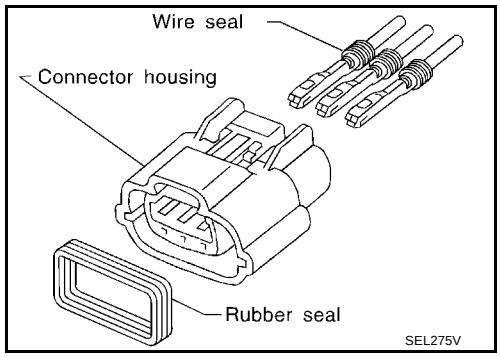


Waterproof Connector Inspection

If water enters the connector, it can short interior circuits. This may lead to intermittent problems. Check the following items to maintain the original waterproof characteristics.

RUBBER SEAL INSPECTION

- Most waterproof connectors are provided with a rubber seal between the male and female connectors. If the seal is missing, the waterproof performance may not meet specifications.
- The rubber seal may come off when connectors are disconnected. Whenever connectors are reconnected, make sure the rubber seal is properly installed on either side of male or female connector.

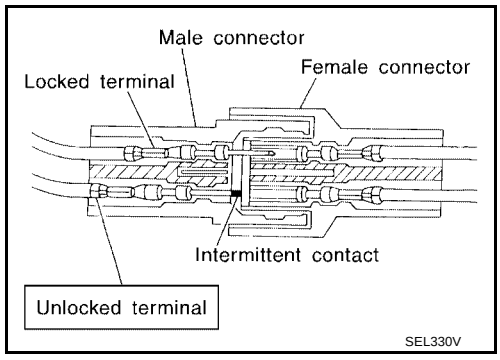


WIRE SEAL INSPECTION

The wire seal must be installed on the wire insertion area of a waterproof connector. Be sure that the seal is installed properly.

Terminal Lock Inspection

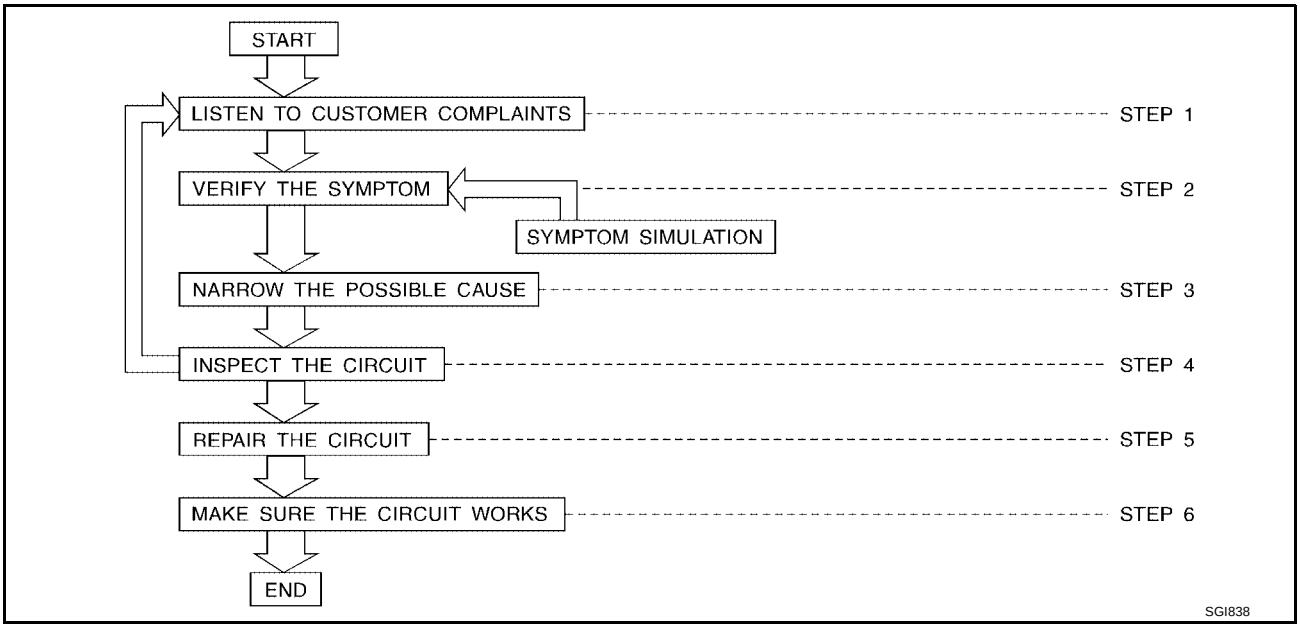
Check for unlocked terminals by pulling wire at the end of connector. An unlocked terminal may create intermittent signals in the circuit.



How to Perform Efficient Diagnosis for an Electrical Incident

EAS000VN

WORK FLOW



STEP	DESCRIPTION	
STEP 1	Get detailed information about the conditions and the environment when the incident occurred. The following are key pieces of information required to make a good analysis:	
	WHAT	Vehicle Model, Engine, Transmission/Transaxle and the System (i.e. Radio).
	WHEN	Date, Time of Day, Weather Conditions, Frequency.
	WHERE	Road Conditions, Altitude and Traffic Situation.
	HOW	System Symptoms, Operating Conditions (Other Components Interaction). Service History and if any After Market Accessories have been installed.
STEP 2	Operate the system, road test if necessary. Verify the parameter of the incident. If the problem cannot be duplicated, refer to “Incident Simulation Tests”.	
STEP 3	Get the proper diagnosis materials together including: ● Power Supply Routing ● System Operation Descriptions ● Applicable Service Manual Sections ● Check for any Service Bulletins Identify where to begin diagnosis based upon your knowledge of the system operation and the customer comments.	
STEP 4	Inspect the system for mechanical binding, loose connectors or wiring damage. Determine which circuits and components are involved and diagnose using the Power Supply Routing and Harness Layouts.	
STEP 5	Repair or replace the incident circuit or component.	
STEP 6	Operate the system in all modes. Verify the system works properly under all conditions. Make sure you have not inadvertently created a new incident during your diagnosis or repair steps.	

INCIDENT SIMULATION TESTS

Introduction

Sometimes the symptom is not present when the vehicle is brought in for service. If possible, re-create the conditions present at the time of the incident. Doing so may help avoid a No Trouble Found Diagnosis. The following section illustrates ways to simulate the conditions/environment under which the owner experiences an electrical incident.

The section is broken into the six following topics:

- Vehicle vibration
- Heat sensitive

- Freezing
- Water intrusion
- Electrical load
- Cold or hot start up

Get a thorough description of the incident from the customer. It is important for simulating the conditions of the problem.

Vehicle Vibration

The problem may occur or become worse while driving on a rough road or when engine is vibrating (idle with A/C on). In such a case, you will want to check for a vibration related condition. Refer to the following illustration.

CONNECTORS & HARNESS

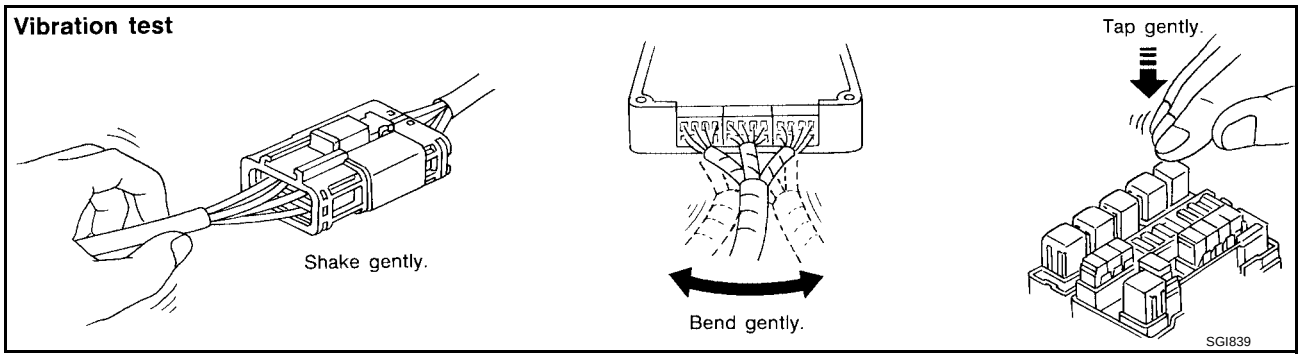
Determine which connectors and wiring harness would affect the electrical system you are inspecting. Gently shake each connector and harness while monitoring the system for the incident you are trying to duplicate. This test may indicate a loose or poor electrical connection.

HINT

Connectors can be exposed to moisture. It is possible to get a thin film of corrosion on the connector terminals. A visual inspection may not reveal this without disconnecting the connector. If the problem occurs intermittently, perhaps the problem is caused by corrosion. It is a good idea to disconnect, inspect and clean the terminals on related connectors in the system.

SENSORS & RELAYS

Gently apply a slight vibration to sensors and relays in the system you are inspecting.
This test may indicate a loose or poorly mounted sensor or relay.



ENGINE COMPARTMENT

There are several reasons a vehicle or engine vibration could cause an electrical complaint. Some of the things to check for are:

- Connectors not fully seated.
- Wiring harness not long enough and is being stressed due to engine vibrations or rocking.
- Wires laying across brackets or moving components.
- Loose, dirty or corroded ground wires.
- Wires routed too close to hot components.

To inspect components under the hood, start by verifying the integrity of ground connections. (Refer to Ground Inspection described later.) First check that the system is properly grounded. Then check for loose connection by gently shaking the wiring or components as previously explained. Using the wiring diagrams inspect the wiring for continuity.

BEHIND THE INSTRUMENT PANEL

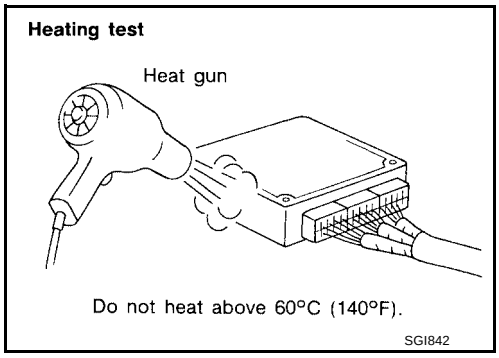
An improperly routed or improperly clamped harness can become pinched during accessory installation. Vehicle vibration can aggravate a harness which is routed along a bracket or near a screw.

UNDER SEATING AREAS

An unclamped or loose harness can cause wiring to be pinched by seat components (such as slide guides) during vehicle vibration. If the wiring runs under seating areas, inspect wire routing for possible damage or pinching.

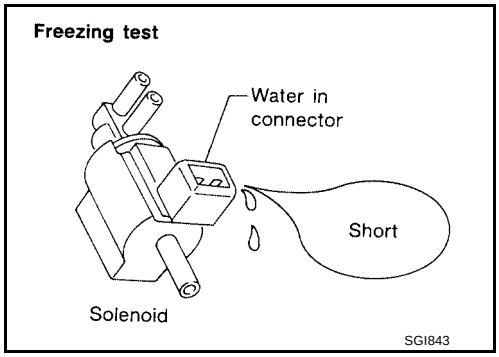
Heat Sensitive

The customer's concern may occur during hot weather or after car has sat for a short time. In such cases you will want to check for a heat sensitive condition.
To determine if an electrical component is heat sensitive, heat the component with a heat gun or equivalent.
Do not heat components above 60°C (140°F). If incident occurs while heating the unit, either replace or properly insulate the component.



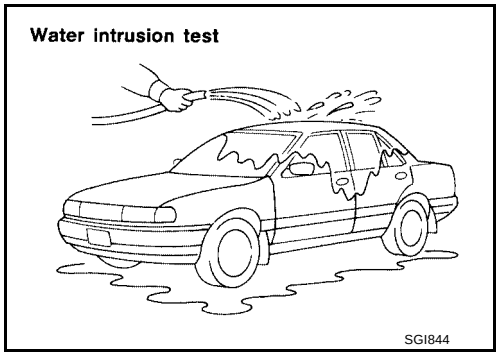
Freezing

The customer may indicate the incident goes away after the car warms up (winter time). The cause could be related to water freezing somewhere in the wiring/electrical system.
There are two methods to check for this. The first is to arrange for the owner to leave his car overnight. Make sure it will get cold enough to demonstrate his complaint. Leave the car parked outside overnight. In the morning, do a quick and thorough diagnosis of those electrical components which could be affected.
The second method is to put the suspect component into a freezer long enough for any water to freeze. Reinstall the part into the car and check for the reoccurrence of the incident. If it occurs, repair or replace the component.



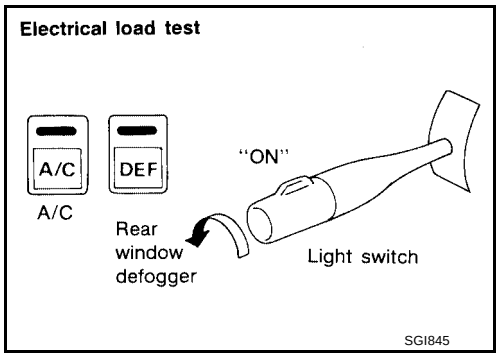
Water Intrusion

The incident may occur only during high humidity or in rainy/snowy weather. In such cases the incident could be caused by water intrusion on an electrical part. This can be simulated by soaking the car or running it through a car wash.
Do not spray water directly on any electrical components.



Electrical Load

The incident may be electrical load sensitive. Perform diagnosis with all accessories (including A/C, rear window defogger, radio, fog lamps) turned on.



Cold or Hot Start Up

On some occasions an electrical incident may occur only when the car is started cold, or it may occur when the car is restarted hot shortly after being turned off. In these cases you may have to keep the car overnight to make a proper diagnosis.

CIRCUIT INSPECTION

Introduction

In general, testing electrical circuits is an easy task if it is approached in a logical and organized method. Before beginning it is important to have all available information on the system to be tested. Also, get a thorough understanding of system operation. Then you will be able to use the appropriate equipment and follow the correct test procedure.
You may have to simulate vehicle vibrations while testing electrical components. Gently shake the wiring harness or electrical component to do this.

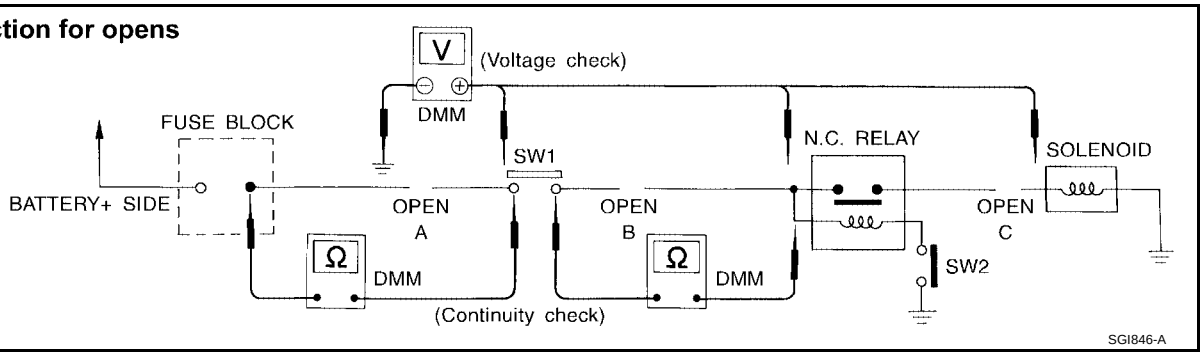
OPEN	A circuit is open when there is no continuity through a section of the circuit.	
SHORT	There are two types of shorts.	
	● SHORT CIRCUIT	When a circuit contacts another circuit and causes the normal resistance to change.
	● SHORT TO GROUND	When a circuit contacts a ground source and grounds the circuit.

NOTE:
Refer to “How to Check Terminal” to probe or check terminal.

Testing for “Opens” in the Circuit

Before you begin to diagnose and test the system, you should rough sketch a schematic of the system. This will help you to logically walk through the diagnosis process. Drawing the sketch will also reinforce your working knowledge of the system.

Inspection for opens



CONTINUITY CHECK METHOD
The continuity check is used to find an open in the circuit. The digital multimeter (DMM) set on the resistance function will indicate an open circuit as over limit (no beep tone or no ohms symbol). Make sure to always start with the DMM at the highest resistance level.
To help in understanding the diagnosis of open circuits, please refer to the previous schematic.

- Disconnect the battery negative cable.
- Start at one end of the circuit and work your way to the other end. (At the fuse block in this example)
- Connect one probe of the DMM to the fuse block terminal on the load side.
- Connect the other probe to the fuse block (power) side of SW1. Little or no resistance will indicate that portion of the circuit has good continuity. If there were an open in the circuit, the DMM would indicate an over limit or infinite resistance condition. (point A)
- Connect the probes between SW1 and the relay. Little or no resistance will indicate that portion of the circuit has good continuity. If there were an open in the circuit, the DMM would indicate an over limit or infinite resistance condition. (point B)
- Connect the probes between the relay and the solenoid. Little or no resistance will indicate that portion of the circuit has good continuity. If there were an open in the circuit, the DMM would indicate an over limit or infinite resistance condition. (point C)

Any circuit can be diagnosed using the approach in the previous example.

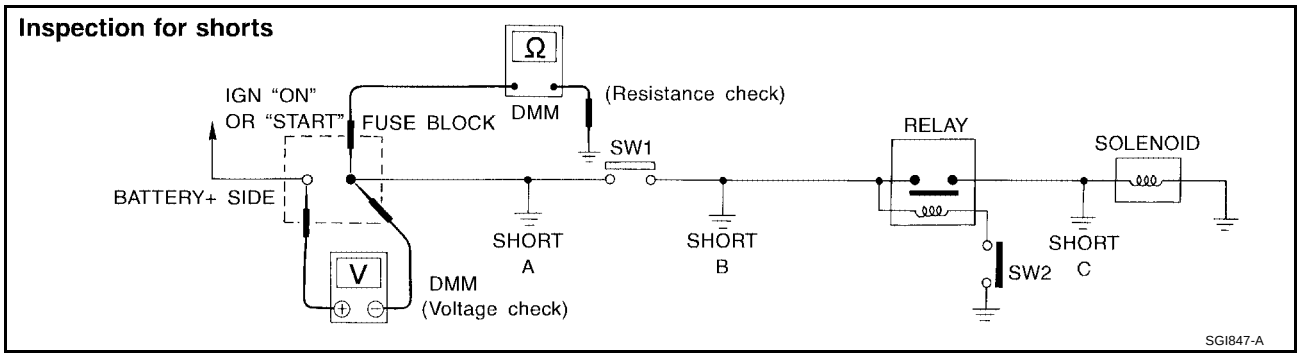
VOLTAGE CHECK METHOD
To help in understanding the diagnosis of open circuits please refer to the previous schematic.
In any powered circuit, an open can be found by methodically checking the system for the presence of voltage. This is done by switching the DMM to the voltage function.

- Connect one probe of the DMM to a known good ground.
- Begin probing at one end of the circuit and work your way to the other end.
- With SW1 open, probe at SW1 to check for voltage.
  voltage; open is further down the circuit than SW1.
  no voltage; open is between fuse block and SW1 (point A).
- Close SW1 and probe at relay.
  voltage; open is further down the circuit than the relay.
  no voltage; open is between SW1 and relay (point B).
- Close the relay and probe at the solenoid.
  voltage; open is further down the circuit than the solenoid.
  no voltage; open is between relay and solenoid (point C).

Any powered circuit can be diagnosed using the approach in the previous example.

Testing for "Shorts" in the Circuit

To simplify the discussion of shorts in the system, please refer to the following schematic.



RESISTANCE CHECK METHOD

- Disconnect the battery negative cable and remove the blown fuse.
- Disconnect all loads (SW1 open, relay disconnected and solenoid disconnected) powered through the fuse.
- Connect one probe of the DMM to the load side of the fuse terminal. Connect the other probe to a known good ground.
- With SW1 open, check for continuity.
  continuity; short is between fuse terminal and SW1 (point A).
  no continuity; short is further down the circuit than SW1.
- Close SW1 and disconnect the relay. Put probes at the load side of fuse terminal and a known good ground. Then, check for continuity.
  continuity; short is between SW1 and the relay (point B).
  no continuity; short is further down the circuit than the relay.
- Close SW1 and jump the relay contacts with jumper wire. Put probes at the load side of fuse terminal and a known good ground. Then, check for continuity.
  continuity; short is between relay and solenoid (point C).
  no continuity; check solenoid, retrace steps.

VOLTAGE CHECK METHOD

- Remove the blown fuse and disconnect all loads (i.e. SW1 open, relay disconnected and solenoid disconnected) powered through the fuse.
- Turn the ignition key to the ON or START position. Verify battery voltage at the battery + side of the fuse terminal (one lead on the battery + terminal side of the fuse block and one lead on a known good ground).
- With SW1 open and the DMM leads across both fuse terminals, check for voltage.
  voltage; short is between fuse block and SW1 (point A).
  no voltage; short is further down the circuit than SW1.
- With SW1 closed, relay and solenoid disconnected and the DMM leads across both fuse terminals, check for voltage.
  voltage; short is between SW1 and the relay (point B).

no voltage; short is further down the circuit than the relay.

- With SW1 closed, relay contacts jumped with fused jumper wire check for voltage.
  voltage; short is down the circuit of the relay or between the relay and the disconnected solenoid (point C).
  no voltage; retrace steps and check power to fuse block.

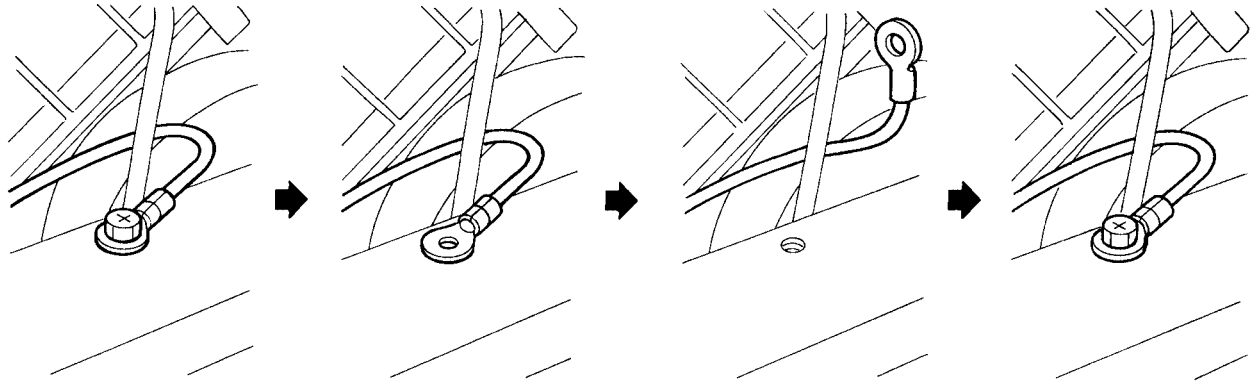
Ground Inspection

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to “Ground Distribution” in PG section.

Ground Inspection



Voltage Drop Tests

Voltage drop tests are often used to find components or circuits which have excessive resistance. A voltage drop in a circuit is caused by a resistance when the circuit is in operation.
Check the wire in the illustration. When measuring resistance with DMM, contact by a single strand of wire will give reading of 0 ohms. This would indicate a good circuit. When the circuit operates, this single strand of wire is not able to carry the current. The single strand will have a high resistance to the current. This will be picked up as a slight voltage drop.
Unwanted resistance can be caused by many situations as follows:

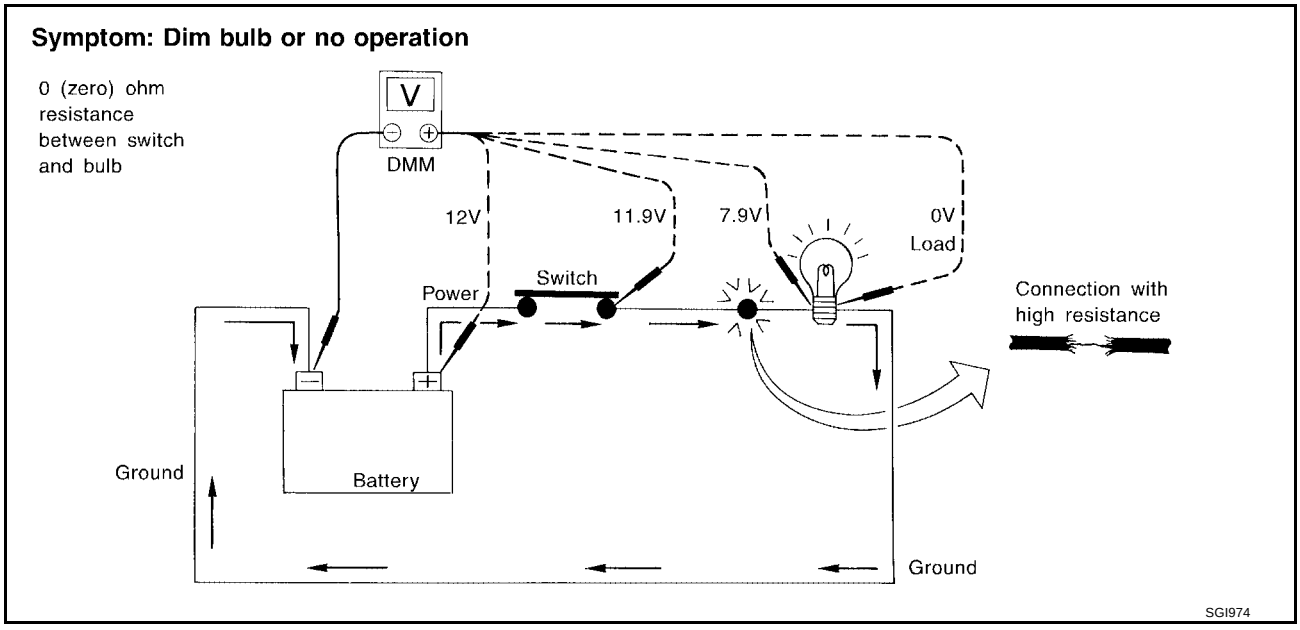
- Undersized wiring (single strand example)
- Corrosion on switch contacts
- Loose wire connections or splices.

If repairs are needed always use wire that is of the same or larger gauge.

MEASURING VOLTAGE DROP — ACCUMULATED METHOD

- Connect the DMM across the connector or part of the circuit you want to check. The positive lead of the DMM should be closer to power and the negative lead closer to ground.
- Operate the circuit.
- The DMM will indicate how many volts are being used to “push” current through that part of the circuit.

Note in the illustration that there is an excessive 4.1 volt drop between the battery and the bulb.



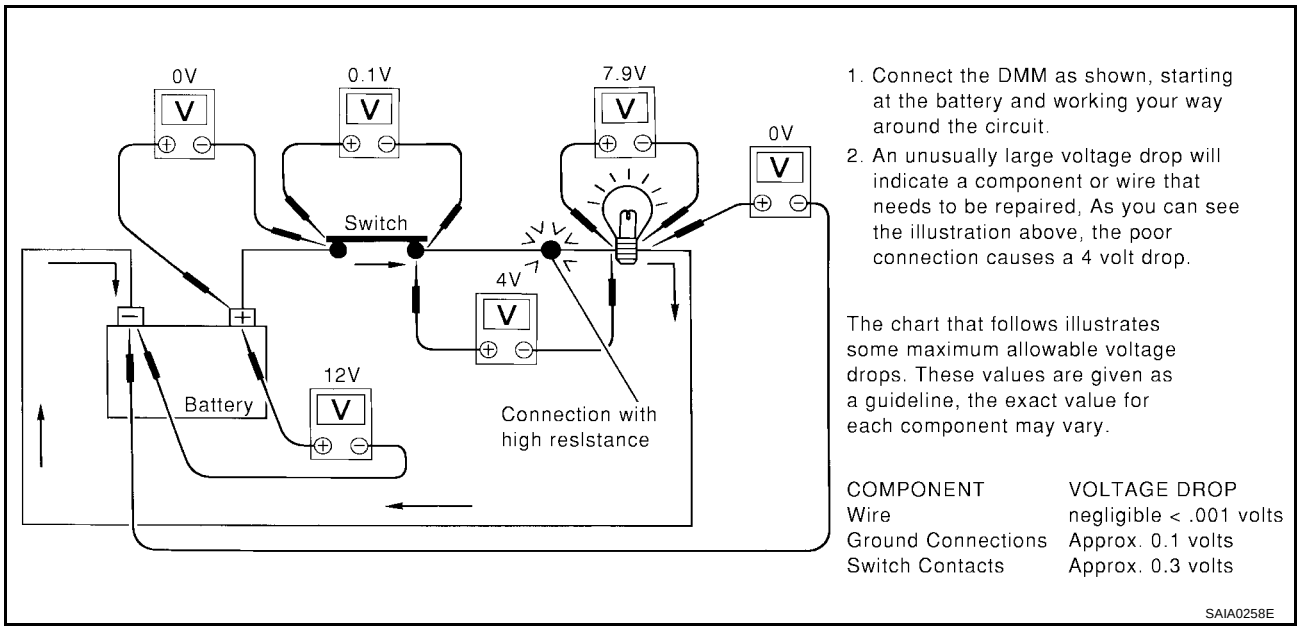
MEASURING VOLTAGE DROP — STEP-BY-STEP

The step-by-step method is most useful for isolating excessive drops in low voltage systems (such as those in “Computer Controlled Systems”).

Circuits in the “Computer Controlled System” operate on very low amperage.

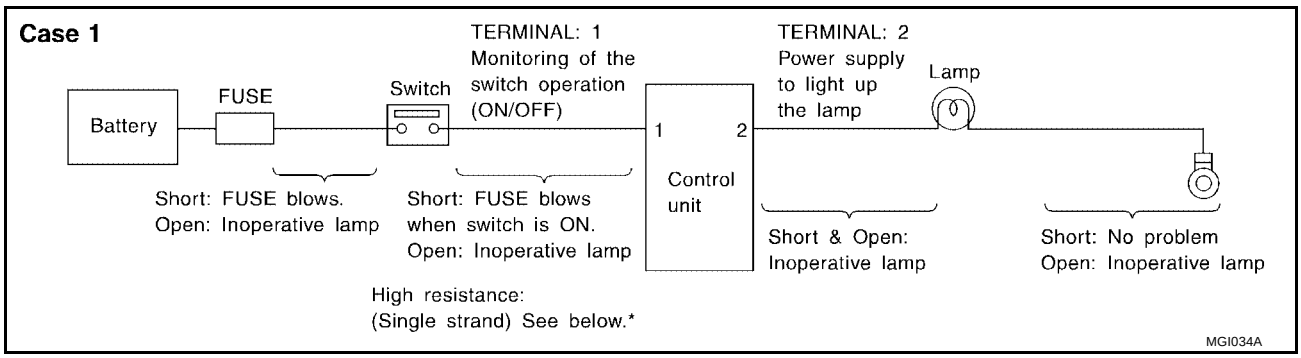
The (Computer Controlled) system operations can be adversely affected by any variation in resistance in the system. Such resistance variation may be caused by poor connection, improper installation, improper wire gauge or corrosion.

The step by step voltage drop test can identify a component or wire with too much resistance.



Control Unit Circuit Test

System Description:When the switch is ON, the control unit lights up the lamp.

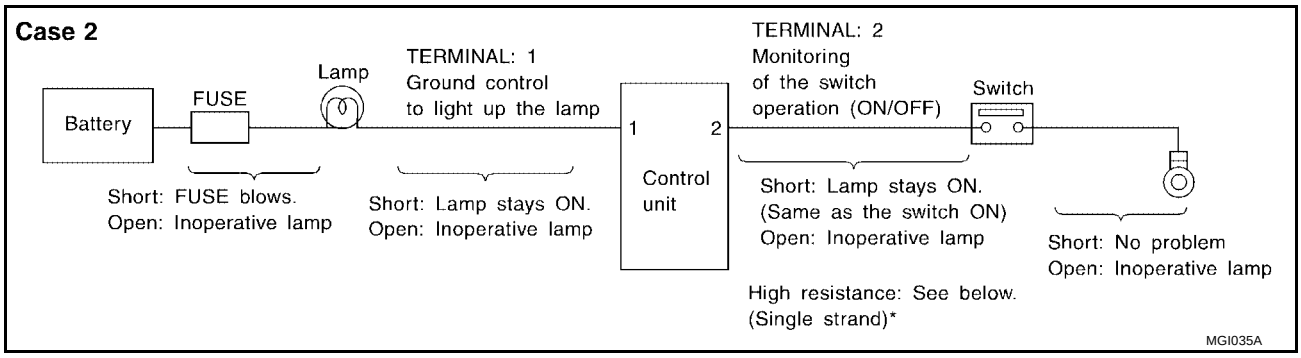


INPUT-OUTPUT VOLTAGE CHART

Pin No.	Item	Condition	Voltage value [V]	In case of high resistance such as single strand [V] *
1	Switch	Switch ON	Battery voltage	Lower than battery voltage Approx. 8 (Example)
		Switch OFF	Approx. 0	Approx. 0
2	Lamp	Switch ON	Battery voltage	Approx. 0 (Inoperative lamp)
		Switch OFF	Approx. 0	Approx. 0

The voltage value is based on the body ground.

*:If high resistance exists in the switch side circuit (caused by a single strand), terminal 1 does not detect battery voltage. Control unit does not detect the switch is ON even if the switch does not turn ON. Therefore, the control unit does not supply power to light up the lamp.



INPUT-OUTPUT VOLTAGE CHART

Pin No.	Item	Condition	Voltage value [V]	In case of high resistance such as single strand [V] *
1	Lamp	Switch ON	Approx. 0	Battery voltage (Inoperative lamp)
		Switch OFF	Battery voltage	Battery voltage
2	Switch	Switch ON	Approx. 0	Higher than 0 Approx. 4 (Example)
		Switch OFF	Approx. 5	Approx. 5

The voltage value is based on the body ground.

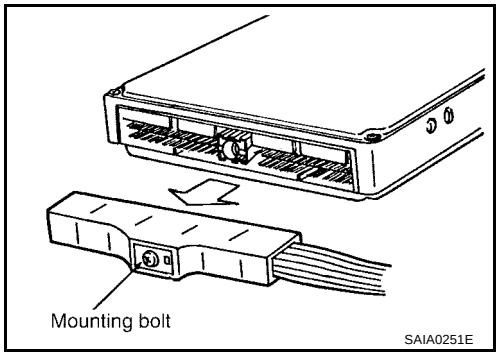
*:If high resistance exists in the switch side circuit (caused by a single strand), terminal 2 does not detect approx. 0V. Control unit does not detect the switch is ON even if the switch does not turn ON. Therefore, the control unit does not control ground to light up the lamp.

Control Units and Electrical Parts

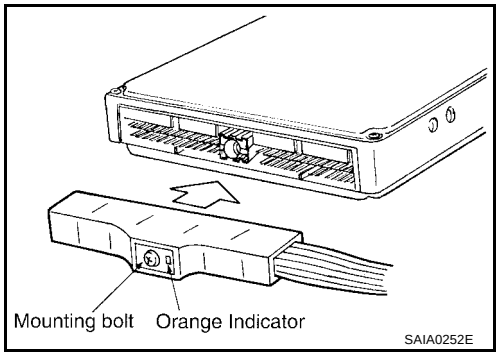
EAS000VO

PRECAUTIONS

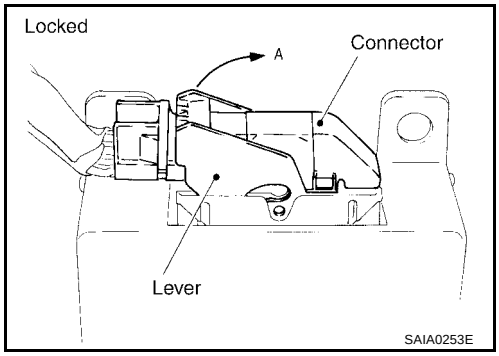
- Never reverse polarity of battery terminals.
- Install only parts specified for a vehicle.
- Before replacing the control unit, check the input and output and functions of the component parts.
- Do not apply excessive force when disconnecting a connector.
- If a connector is installed by tightening bolts, loosen bolt mounting it, then take it out by hand.



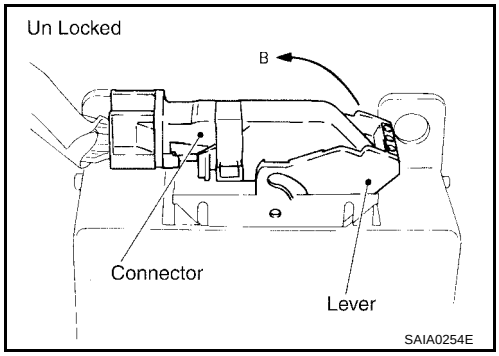
- Before installing a connector, make sure the terminal is not bent or damaged, and then correctly connect it.
  When installing a connector by tightening bolts, fix it by tightening the mounting bolt until the painted projection of the connector becomes even with the surface.



- For removal of the lever type connector, pull the lever up to the direction pointed to by the arrow A in the figure, and then remove the connector.

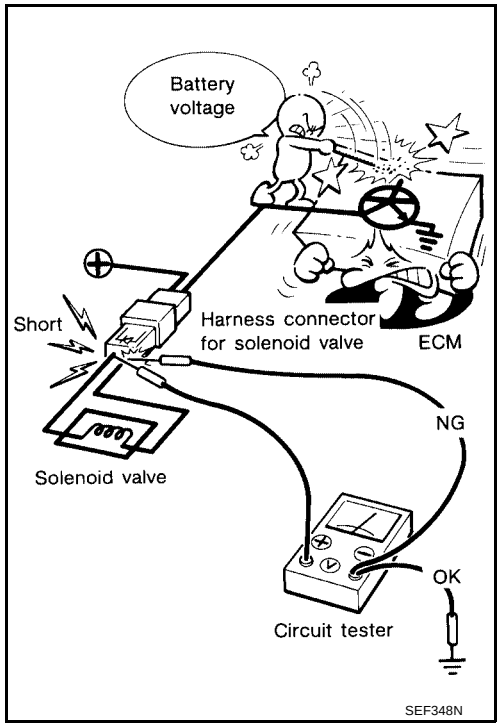


- For installation of the lever type connector, pull down the lever to the direction pointed by the arrow B in the figure, and then push the connector until a clicking noise is heard.



- Do not apply excessive shock to the control unit by dropping or hitting it.
- Be careful to prevent condensation in the control unit due to rapid temperature changes and do not let water or rain get on it. If water is found in the control unit, dry it fully and then install it in the vehicle.
- Be careful not to let oil to get on the control unit connector.
- Avoid cleaning the control unit with volatile oil.
- Do not disassemble the control unit, and do not remove the upper and lower covers.

- When using a DMM, be careful not to let test probes get close to each other to prevent the power transistor in the control unit from damaging battery voltage because of short circuiting.
- When checking input and output signals of the control unit, use the specified check adapter.



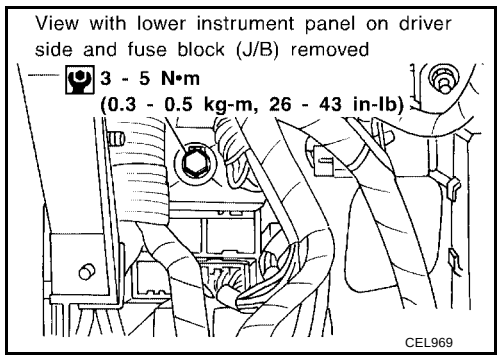
SMJ INSTALLATION

To install SMJ, tighten bolts until orange “fulltight” mark appears and then retighten to specified torque as required.

SMJ :3 - 5 N-m (0.3 - 0.5 kg-m, 26 - 43 in-lb)

CAUTION:

Do not overtighten bolts, otherwise, they may be damaged.



CONSULT CHECKING SYSTEM

PFP:00000

Description

EAS000VP

- CONSULT-II is a hand-held type tester. When it is connected with a diagnostic connector equipped on the vehicle side, it will communicate with the control unit equipped in the vehicle and then enable various kinds of diagnostic tests.
- Refer to “CONSULT Operator's Manual” for more information.

Function and System Application

EAS000VQ

Diagnostic test mode	Function	ENGINE	A/T	ABS	AIR BAG	SMART ENTRANCE	NVIS (NATS)*
Work support	This mode enables a technician to adjust some devices faster and more accurate by following the indications on CONSULT-II.	x	x	—	—	—	—
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.	x	x	x	x	—	x
Trouble diagnostic record	Current self-diagnostic results and all trouble diagnostic records previously stored can be read.	—	—	—	x	—	—
ECU discriminated No.	Classification number of a replacement ECU can be read to prevent an incorrect ECU from being installed.	—	—	—	x	—	—
Data monitor	Input/Output data in the ECU (ECM) can be read.	x	x	x	—	—	—
DTC work support	This mode enables a technician to set operating conditions to confirm self-diagnosis status/ results.	—	x	—	—	—	—
Data monitor (Spec.)	The specified values will be displayed when an OK/NG judgement is difficult for the DATA MONITOR items by Bar Chart and Line Graph.	x	—	—	—	—	—
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECU (ECM) and also shifts some parameters in a specified range.	x	—	x	—	—	—
ECU (ECM) part number	ECU (ECM) part number can be read.	x	x	x	—	—	—
Control unit initialization	All registered ignition key IDs in NATS components can be initialized and new IDs can be registered.	—	—	—	—	—	x
Function test	Conducted by CONSULT-II instead of a technician to determine whether each system is "OK" or "NG".	x	—	—	x	—	—
SRT & DTC confirmation	The results of SRT (System Readiness Test) and the self-diagnosis status/results can be confirmed.	x	—	—	—	—	—
REMO CONT ID SET UP	A maximum of four IDs (identifications) can be registered in the memory using the remote controller. These IDs can also be confirmed and erased.	—	—	—	—	x	—

x: Applicable
*: NVIS (NATS) [Nissan Vehicle Immobilizer System (Nissan Anti-Theft System)]

Nickel Metal Hydride Battery Replacement

EAS000VR

CONSULT-II contains a nickel metal hydride battery. When replacing the battery obey the following:

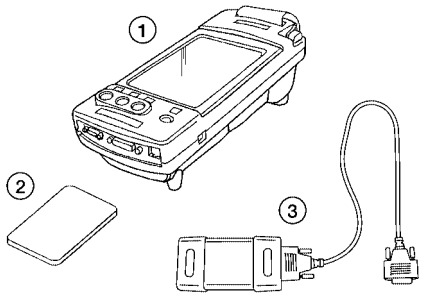
WARNING:

Replace the nickel metal hydride battery with Genuine CONSULT-II battery only. Use of another battery may present a risk of fire or explosion. The battery may present a fire or chemical burn hazard if mistreated. Do not recharge, disassemble or dispose of in fire.
Keep the battery out of reach of children and discard used battery conforming to the local regulations.

Checking Equipment

EAS000VT

When ordering the below equipment, contact your NISSAN distributor.

Tool name	Description
NISSAN CONSULT-II (J-44200) 1. CONSULT-II unit (Tester internal soft: Resident version 3.3.0) and accessories 2. Program card AED04A and AEN02C-1 (For NATS) To confirm the best combination of these softwares, refer to CONSULT-II Operation Manual. 3. CONSULT-II coverter	 LAIA0038E

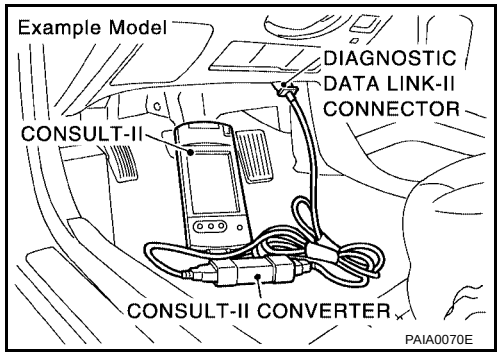
NOTE:

- The CONSULT-II must be used in conjunction with a program card. CONSULT-II does not require loading (Initialization) procedure.
- Be sure the CONSULT-II is turned off before installing or removing a program card.

CONSULT-II Start Procedure

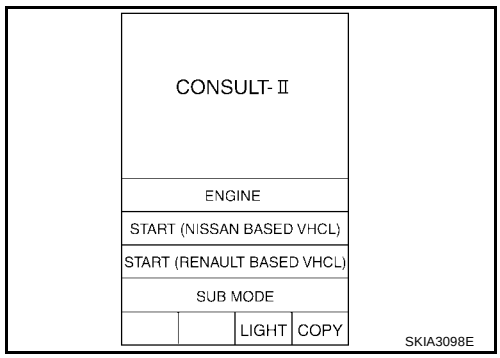
EAS000ZM

1. Turn off the ignition switch.
2. Connect CONSULT-II and CONSULT-II CONVERTER to the data link connector.



PAIA0070E

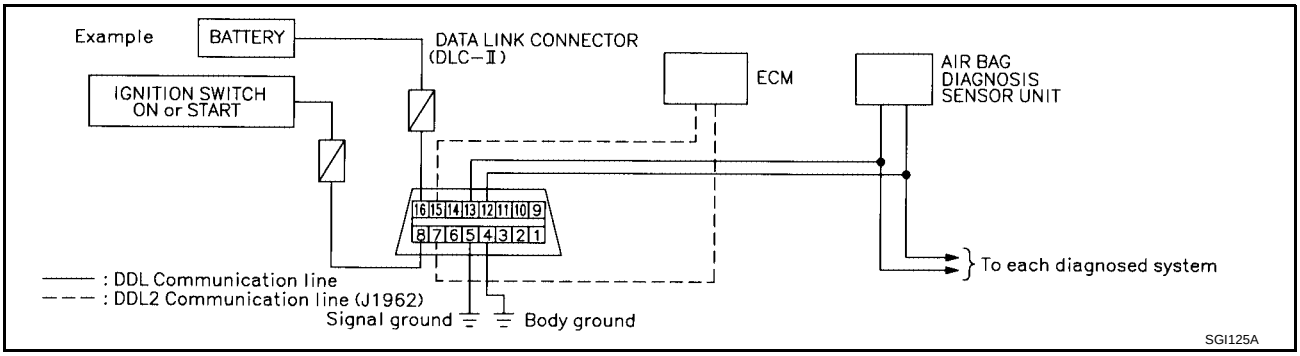
3. Turn on the ignition switch.
4. Touch “START (NISSAN BASED VECL)” or “System Shortcut” (eg: Engine) on the screen.



SKIA3098E

CONSULT-II Data Link Connector (DLC) Circuit

EAS000VU



INSPECTION PROCEDURE

If the CONSULT-II cannot diagnose the system properly, check the following items.

Symptom	Check item
CONSULT-II cannot access any system.	● CONSULT-II DLC power supply circuit (Terminal 8) and ground circuit (Terminal 4) (For detailed circuit, refer to “MIL & Data Link Connectors Wiring Diagram” in EC section.) ● CONSULT-II DLC cable
CONSULT-II cannot access individual system. (Other systems can be accessed.)	● CONSULT-II program card (Check the appropriate CONSULT-II program card for the system. Refer to "Checking Equipment".) ● Power supply and ground circuit for the control unit of the system (For detailed circuit, refer to wiring diagram for each system.) ● Open or short circuit between the system and CONSULT-II DLC (For detailed circuit, refer to wiring diagram for each system.)

NOTE:

The DDL1 and DDL2 circuits from DLC pins 12, 13, 14 and 15 may be connected to more than one system. A short in a DDL circuit connected to a control unit in one system may affect CONSULT-II access to other systems.

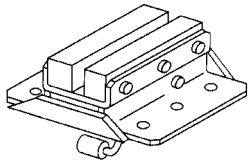
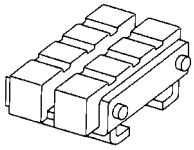
LIFTING POINT

PFP:00000

Special Service Tools

EAS000ZN

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore number) Tool name	Description
LM4086-0200 (—) Board-on attachment	 NT001
LM4519-0000 (—) Safety stand attachment	 NT002

CAUTION:

- **Every time the vehicle is lifted up, maintain the complete vehicle curb condition.**
- **Since the vehicle's center of gravity changes when removing main parts on the front side (engine, transmission, suspension, etc.), support the rear of the vehicle with a suitable jack.**
- **Since the vehicle's center of gravity changes when removing main parts on the rear side (rear axle, suspension, etc.), support the front of the vehicle with a suitable jack.**
- **Make sure not to damage piping parts when lifting vehicle.**

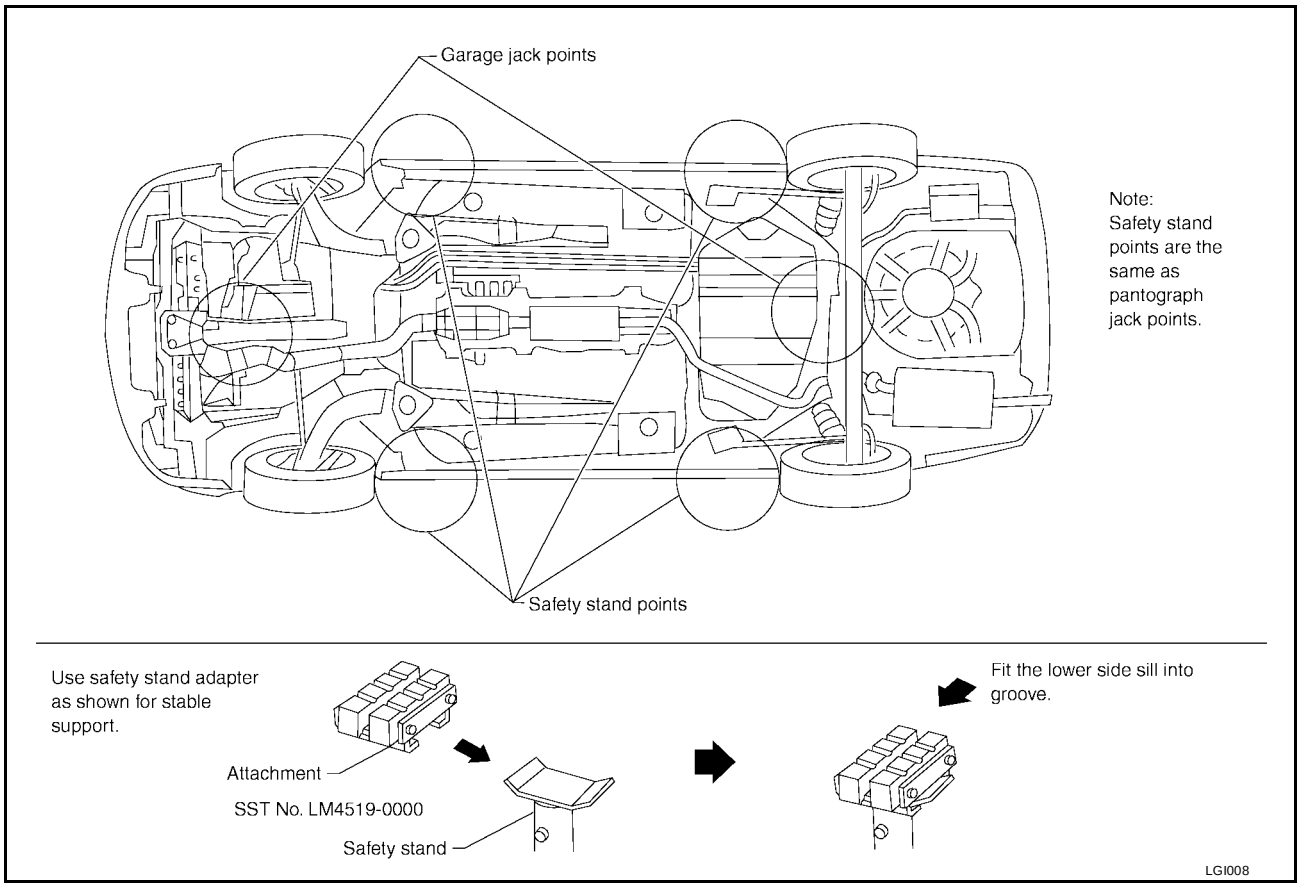
Garage Jack and Safety Stand

EAS000ZO

WARNING:

- **Never get under the vehicle while it is supported only by the jack. Always use safety stands when you have to get under the vehicle.**

- **Place wheel chocks at both front and back of the wheels on the ground.**



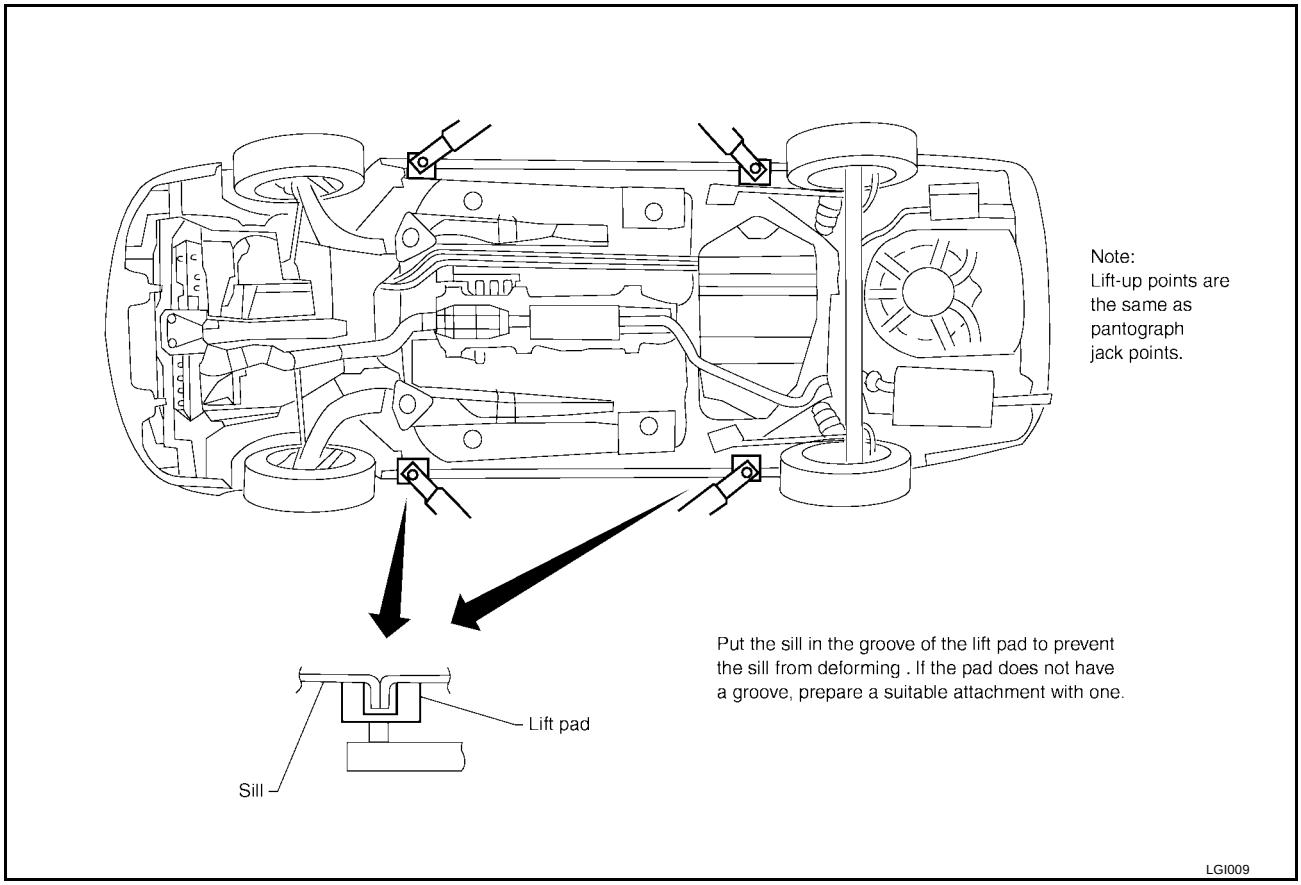
2-Pole Lift

EAS000ZP

WARNING:

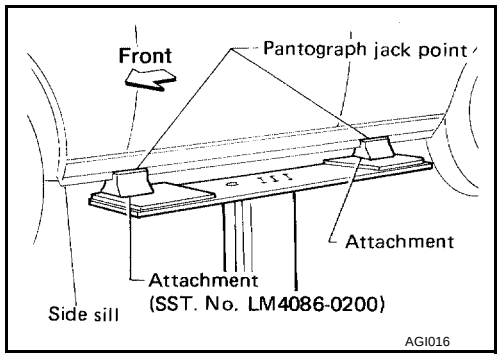
When lifting the vehicle, open the lift arms as wide as possible and ensure that the front and rear of the vehicle are well balanced.

When setting the lift arm, do not allow the arm to contact the brake tubes, brake cable, fuel lines and sill spoiler.



Board-On Lift

EAS000ZQ



CAUTION:

Make sure vehicle is empty when lifting.

- **The board-on lift attachment (LM4086-0200) set at front end of vehicle should be set on the front of the sill under the front door opening.**
- **Position attachments at front and rear ends of board-on lift.**

TOW TRUCK TOWING

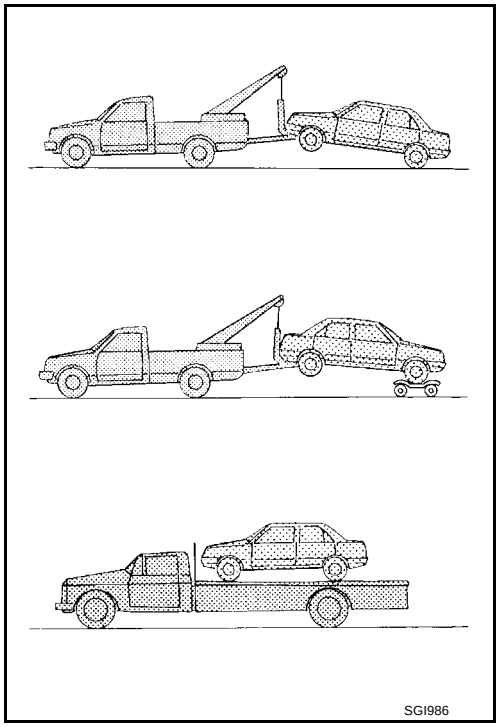
PFP:00000

Tow Truck Towing

EAS000VW

CAUTION:

- **All applicable state or Provincial (in Canada) laws and local laws regarding the towing operation must be obeyed.**
- **It is necessary to use proper towing equipment to avoid possible damage to the vehicle during towing operation. Towing is in accordance with Towing Procedure Manual at dealer.**
- **Always attach safety chains before towing.**
- **When towing, make sure that the transmission, steering system and power train are in good order. If any unit is damaged, dollies must be used.**



NISSAN recommends that the vehicle be towed with the driving (front) wheels off the ground as illustrated.

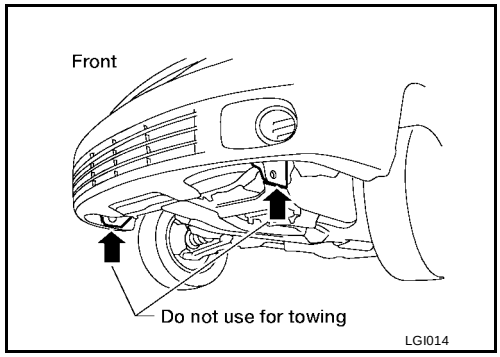
CAUTION:

- **Always release the parking brake when towing the vehicle with the front wheels raised with the rear wheels on the ground.**
- **When towing manual transaxle models with the front wheels on the ground (if a towing dolly is not used), turn the ignition key to the OFF position, and secure the steering wheel in the straight-ahead position with a rope or similar device. Never place the ignition key in the LOCK position. This will result in damage to the steering lock mechanism.**
  Move the shift lever to the N (Neutral) position.
- **Never tow an automatic transaxle model with the rear wheels raised and the front wheels on the ground. This may cause serious and expensive damage to the transaxle. If it is necessary to tow the vehicle with the rear wheels raised, always use towing dollies under the front wheels.**
- **Never tow an automatic transaxle model from the rear (that is backward) with four wheels on the ground. This may cause serious and expensive damage to the transaxle.**

Vehicle Recovery (Freeing a stuck vehicle)

EAS000VX

- **Tow chains or cables must be attached only to the main structural members of the vehicle.**
- **Pulling devices should be routed so they do not touch any part of the suspension, steering, brake or cooling systems.**
- **Always pull the cable straight out from the front of the vehicle. Never pull on the vehicle at an angle.**
- **Pulling devices such as ropes or canvas straps are not recommended for use in vehicle towing or recovery.**



TIGHTENING TORQUE OF STANDARD BOLTS

PFP:00000

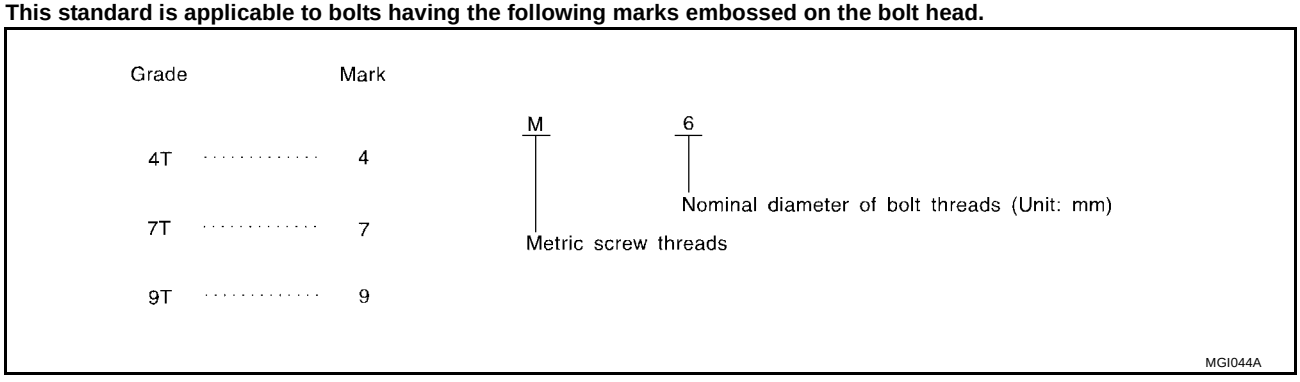
Tightening Torque Table

EAS000VY

Grade	Bolt size	Bolt diameter * mm	Pitch mm	Tightening torque (Without lubricant)							
				Hexagon head bolt				Hexagon flange bolt			
				N-m	kg-m	ft-lb	in-lb	N-m	kg-m	ft-lb	in-lb
4T	M6	6.0	1.0	5.1	0.52	3.8	45.1	6.1	0.62	4.5	53.8
	M8	8.0	1.25	13	1.3	9	—	15	1.5	11	—
			1.0	13	1.3	9	—	16	1.6	12	—
	M10	10.0	1.5	25	2.5	18	—	29	3.0	22	—
			1.25	25	2.6	19	—	30	3.1	22	—
	M12	12.0	1.75	42	4.3	31	—	51	5.2	38	—
			1.25	46	4.7	34	—	56	5.7	41	—
	M14	14.0	1.5	74	7.5	54	—	88	9.0	65	—
7T	M6	6.0	1.0	8.4	0.86	6.2	74.6	10	1.0	7	87
	M8	8.0	1.25	21	2.1	15	—	25	2.5	18	—
			1.0	22	2.2	16	—	26	2.7	20	—
	M10	10.0	1.5	41	4.2	30	—	48	4.9	35	—
			1.25	43	4.4	32	—	51	5.2	38	—
	M12	12.0	1.75	71	7.2	52	—	84	8.6	62	—
			1.25	77	7.9	57	—	92	9.4	68	—
	M14	14.0	1.5	127	13.0	94	—	147	15.0	108	—
9T	M6	6.0	1.0	12	1.2	9	—	15	1.5	11	—
	M8	8.0	1.25	29	3.0	22	—	35	3.6	26	—
			1.0	31	3.2	23	—	37	3.8	27	—
	M10	10.0	1.5	59	6.0	43	—	70	7.1	51	—
			1.25	62	6.3	46	—	74	7.5	54	—
	M12	12.0	1.75	98	10.0	72	—	118	12.0	87	—
			1.25	108	11.0	80	—	137	14.0	101	—
	M14	14.0	1.5	177	18.0	130	—	206	21.0	152	—

*: Nominal diameter

1. **Special parts are excluded.**
2. **This standard is applicable to bolts having the following marks embossed on the bolt head.**



RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS

PFP:00000

Recommended Chemical Products and Sealants

EAS000VZ

Refer to the following chart for help in selecting the appropriate chemical product or sealant.

	Product Description	Purpose	Nissan North America Part No. (USA)	Nissan Canada Part No. (Canada)	Aftermarket Cross Reference Part Nos.
1	Rear View Mirror Adhesive	Used to permanently remount rear view mirrors to windows.	999MP-AM000P	99998-50505	Permatex 81844
2	Anaerobic Liquid Gasket	For metal-to-metal flange sealing. Can fill a 0.38 mm (0.015 inch) gap and provide instant sealing for most powertrain applications.	999MP-AM001P	99998-50503	Three Bond 1215; Permatex 51813 and 51817
3	High Performance Thread Sealant	Provides instant sealing on any threaded straight or parallel threaded fitting. (Thread sealant only, no locking ability.) ● Do not use on plastic.	999MP-AM002P	999MP-AM002P	Permatex 56521
4	Silicone RTV	Gasket Maker	999MP-AM003P (Ultra Grey)	99998-50506 (Ultra Grey)	Permatex Ultra Grey 82194; Three Bond 1207 and 1216; Nissan RTV Part No. 999MP-A7007
5	High Temperature, High Strength Thread Locking Sealant (Red)	Threadlocker	999MP-AM004P	999MP-AM004P	Permatex 27200; Three Bond 1360, 1360N, 1305 N&P, 1307N, 1335, 1335B, 1363B, 1377C, 1386B, D&E and 1388
6	Medium Strength Thread Locking Sealant (Blue)	Threadlocker (service tool removable)	999MP-AM005P	999MP-AM005P	Permatex 24200, 24206, 24240, 24283 and 09178; Three Bond 1322, 1322N, 1324 D&N, 1333D, 1361C, 1364D, 1370C and 1374

IDENTIFICATION INFORMATION

PFP:00010

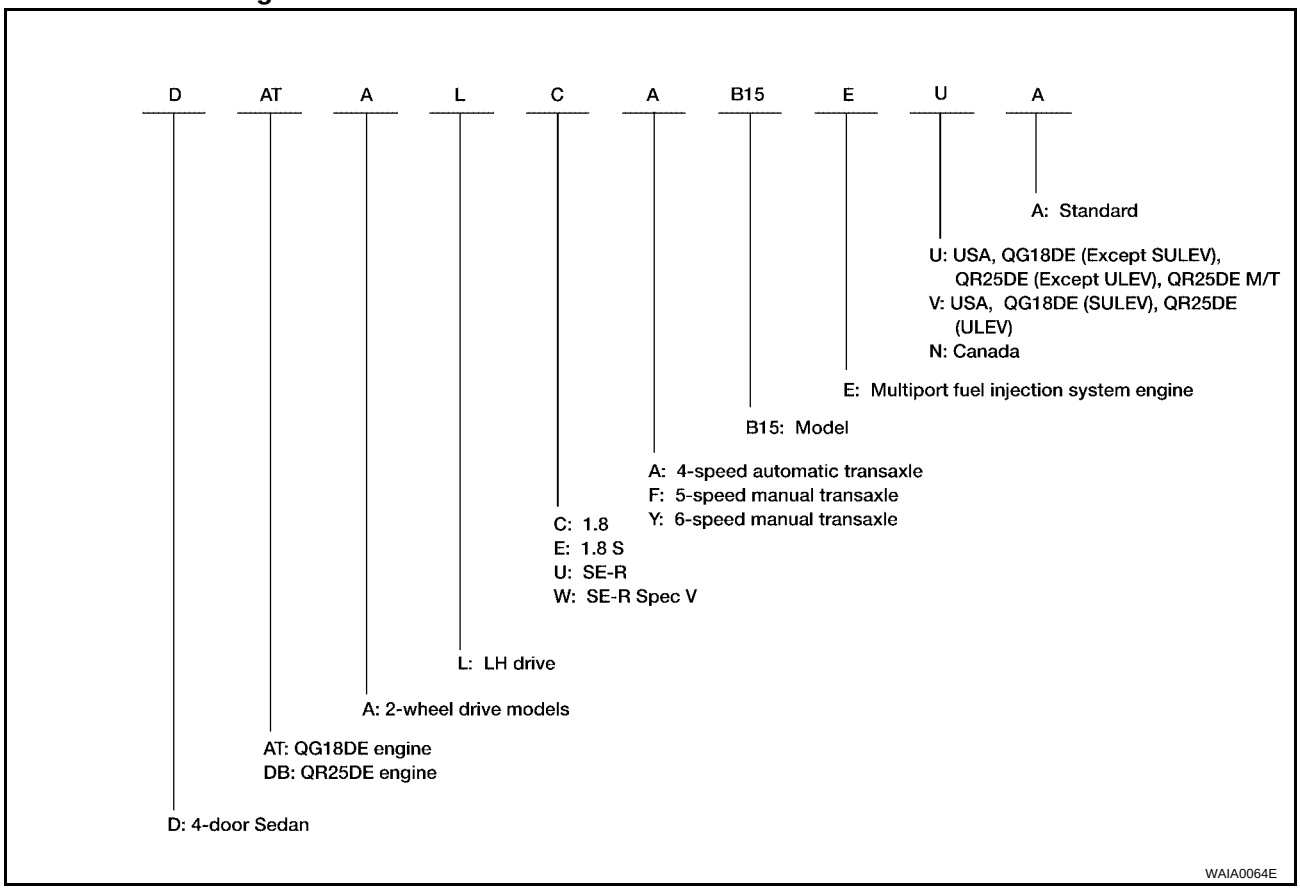
Identification Information

EAS000W0

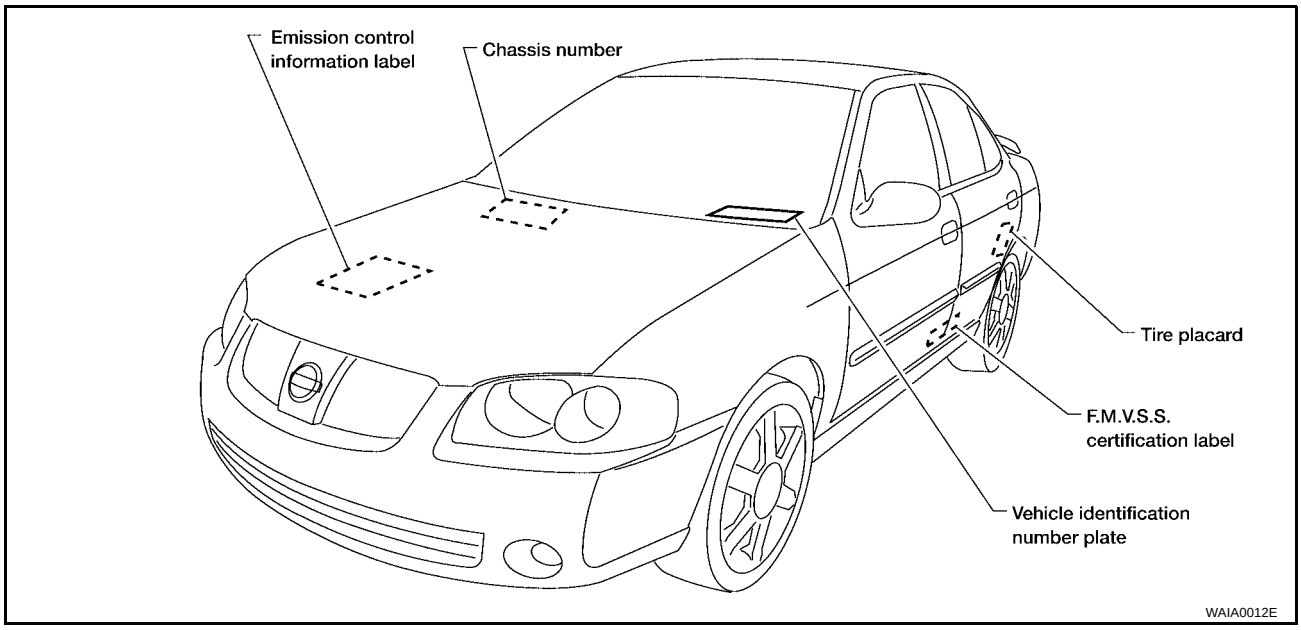
MODEL VARIATION

Body	Grade	Transaxle	Destination/Engine						
			USA					Canada	
			QG18DE (Except SULEV)	QG18DE (SULEV)	QR25DE (Except ULEV)	QR25DE (ULEV)	QR25DE	QG18DE	QR25DE
Sedan	1.8	RE4F03B (A/T)	DATALCA-EUA	DATALCA-EVA	—	—	—	DATALCA-ENA	—
		RS5F70A (M/T)	DATALCF-EUA	DATALCF-EVA	—	—	—	DATALCF-ENA	—
	1.8 S	RE4F03B (A/T)	DATALEA-EUA	DATALEA-EVA	—	—	—	DATALEA-ENA	—
		RS5F70A (M/T)	DATALEF-EUA	DATALEF-EVA	—	—	—	DATALEF-ENA	—
	SE-R	RE4F04B (A/T)	—	—	DDBALUA-EUA	DDBALUA-EVA	—	—	DDBALUA-ENA
	SE-R SPEC V	RS6F51A (6M/T)	—	—	—	—	DDBALWY-EUA	—	DDBALWY-ENA

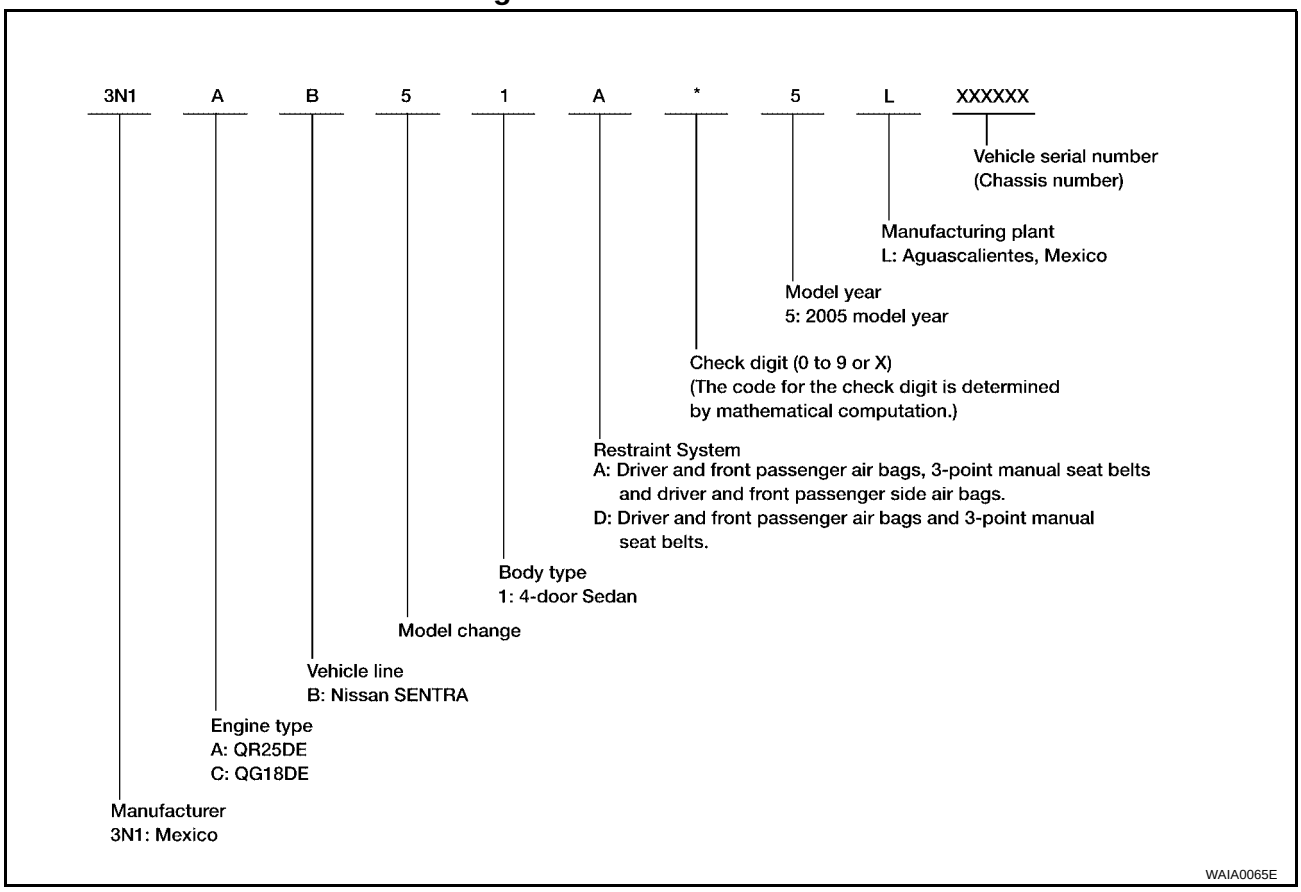
Prefix and suffix designations:



IDENTIFICATION NUMBER

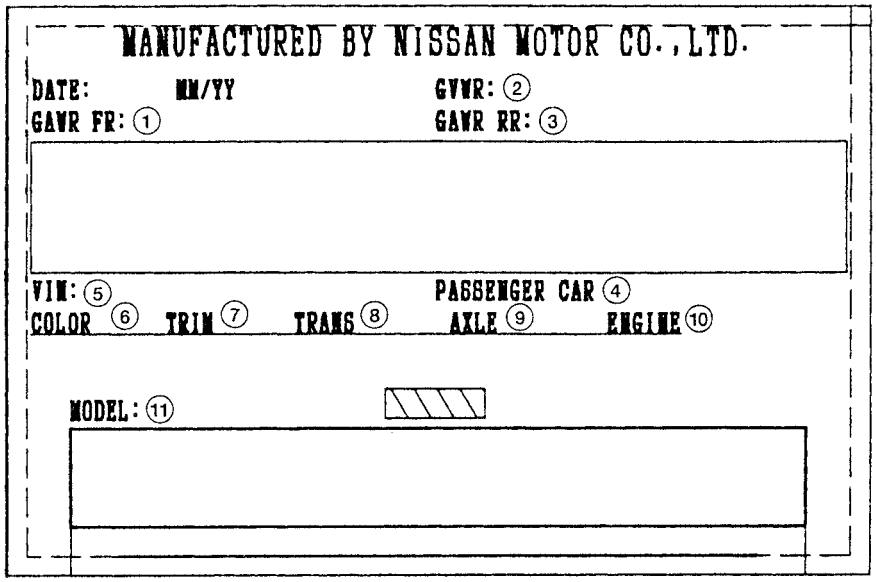


Vehicle Identification Number Arrangement



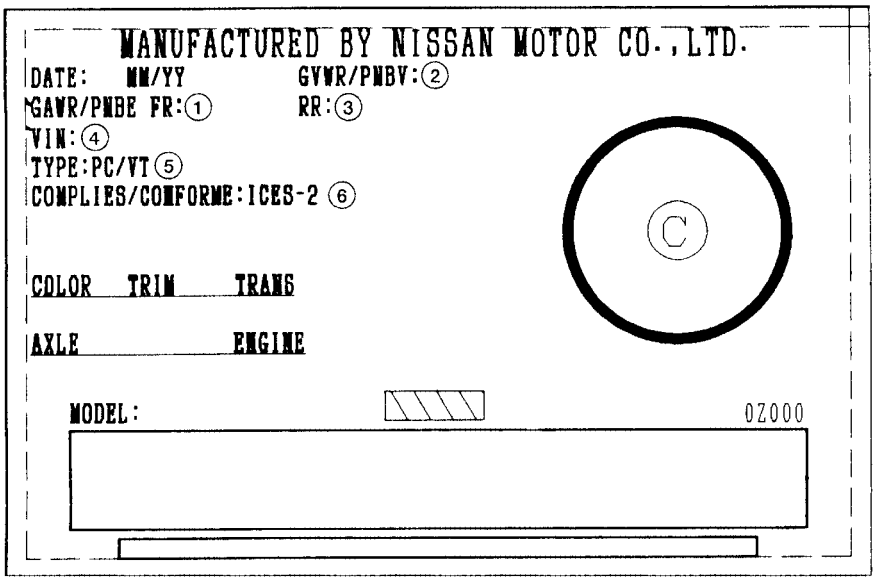
F.M.V.S.S. Certification Label

For US Vehicles



1. Gross front axle weight (in pounds)
2. Gross vehicle weight (in pounds)
3. Gross rear axle weight (in pounds)
4. Type
5. Vehicle identification number (chassis number)
6. Body color code
7. Trim color code
8. Transaxle
9. Axle model
10. Engine model
11. Model

For Canadian Vehicles

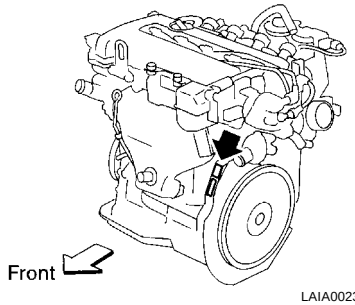


1. Gross axle weight rating front in English and French (in kilograms)
2. Gross vehicle weight rating in English and French (in kilograms)
3. Gross axle weight rating rear in English and French (in kilograms)
4. Vehicle identification number (chassis number)
5. Type of vehicle in English and French.
6. Radio frequency interference statement in English and French.

LGI013

Engine Serial Number

QG18DE



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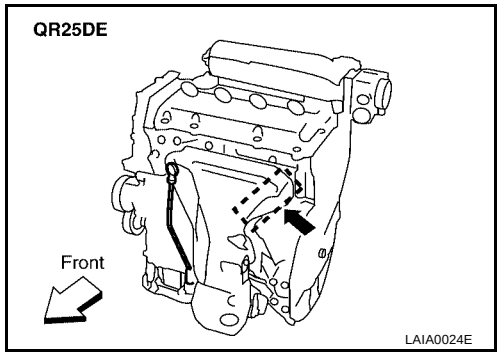
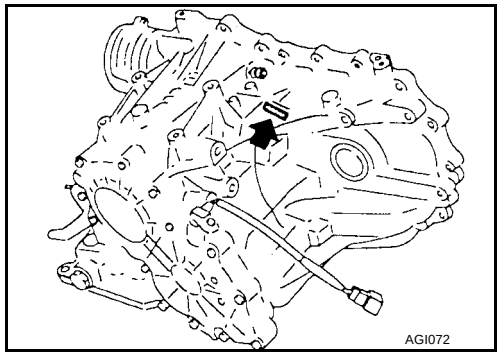
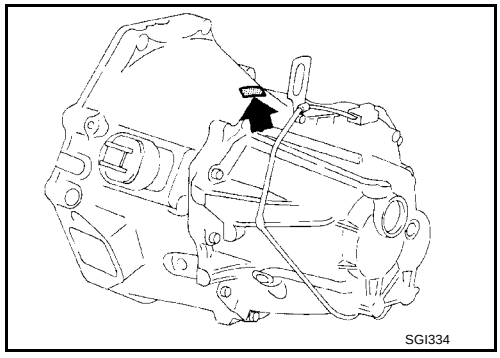


Automatic Transaxle Number



Manual Transaxle Number



DIMENSIONS

Unit: mm (in)

Overall length		4,508 (177.5)
Overall width		1,710 (67.3)
Overall height		1,410 (55.5)
Front tread 15/16 inch 17 inch		 1,476 (58.1) 1466 (57.7)
Rear tread 15/16 inch 17 inch		 1,455 (57.3) 1446 (56.9)
Wheelbase		2,535 (99.8)
Gross vehicle weight rating kg (lb)		See the “F.M.V.S.S. certification label” on the driver's side lock pillar.
Gross axle weight rating	Front kg (lb)	
	Rear kg (lb)	

WHEELS & TIRES

Road wheel Offset mm (in)	15 × 6JJ (steel) 45 (1.77)	15 × 6JJ (aluminum) 45 (1.77)	16 × 6JJ (aluminum) 45 (1.77)	17 x 7JJ (aluminum) 47 (1.85)
Conventional tire	P195/60HR15	P195/60HR15	P195/55HR16	P215/45ZR17
Spare tire	T125/70*14 or T125/70*15	T125/70*15	T125/70*15	T135/80D15T2 or T135/80*17

*: D or R, depending on manufacturer.

TERMINOLOGY

PFP:00011

SAE J1930 Terminology List

EAS000W1

All emission related terms used in this publication in accordance with SAE J1930 are listed. Accordingly, new terms, new acronyms/abbreviations and old terms are listed in the following chart.

NEW TERM	NEW ACRONYM / ABBREVIATION	OLD TERM
Air cleaner	ACL	Air cleaner
Barometric pressure	BARO	***
Barometric pressure sensor-BCDD	BAROS-BCDD	BCDD
Camshaft position	CMP	***
Camshaft position sensor	CMPS	Crank angle sensor
Canister	***	Canister
Carburetor	CARB	Carburetor
Charge air cooler	CAC	Intercooler
Closed loop	CL	Closed loop
Closed throttle position switch	CTP switch	Idle switch
Clutch pedal position switch	CPP switch	Clutch switch
Continuous fuel injection system	CFI system	***
Continuous trap oxidizer system	CTOX system	***
Crankshaft position	CKP	***
Crankshaft position sensor	CKPS	***
Data link connector	DLC	***
Data link connector for CONSULT-II	DLC for CONSULT-II	Diagnostic connector for CONSULT-II
Diagnostic test mode	DTM	Diagnostic mode
Diagnostic test mode selector	DTM selector	Diagnostic mode selector
Diagnostic test mode I	DTM I	Mode I
Diagnostic test mode II	DTM II	Mode II
Diagnostic trouble code	DTC	Malfunction code
Direct fuel injection system	DFI system	***
Distributor ignition system	DI system	Ignition timing control
Early fuel evaporation-mixture heater	EFE-mixture heater	Mixture heater
Early fuel evaporation system	EFE system	Mixture heater control
Electrically erasable programmable read only memory	EEPROM	***
Electronic ignition system	EI system	Ignition timing control
Engine control	EC	***
Engine control module	ECM	ECCS control unit
Engine coolant temperature	ECT	Engine temperature
Engine coolant temperature sensor	ECTS	Engine temperature sensor
Engine modification	EM	***
Engine speed	RPM	Engine speed
Erasable programmable read only memory	EPROM	***
Evaporative emission canister	EVAP canister	Canister
Evaporative emission system	EVAP system	Canister control solenoid valve
Exhaust gas recirculation valve	EGR valve	EGR valve

NEW TERM	NEW ACRONYM / ABBREVIATION	OLD TERM
Exhaust gas recirculation control-BPT valve	EGRC-BPT valve	BPT valve
Exhaust gas recirculation control-solenoid valve	EGRC-solenoid valve	EGR control solenoid valve
Exhaust gas recirculation temperature sensor	EGRT sensor	Exhaust gas temperature sensor
EGR temperature sensor		
Flash electrically erasable programmable read only memory	FEEPROM	***
Flash erasable programmable read only memory	FEPROM	***
Flexible fuel sensor	FFS	***
Flexible fuel system	FF system	***
Fuel pressure regulator	***	Pressure regulator
Fuel pressure regulator control solenoid valve	***	PRVR control solenoid valve
Fuel trim	FT	***
Heated Oxygen sensor	HO2S	Exhaust gas sensor
Idle air control system	IAC system	Idle speed control
Idle air control valve-air regulator	IACV-air regulator	Air regulator
Idle air control valve-auxiliary air control valve	IACV-AAC valve	Auxiliary air control (AAC) valve
Idle air control valve-FICD solenoid valve	IACV-FICD solenoid valve	FICD solenoid valve
Idle air control valve-idle up control solenoid valve	IACV-idle up control solenoid valve	Idle up control solenoid valve
Idle speed control-FI pot	ISC-FI pot	FI pot
Idle speed control system	ISC system	***
Ignition control	IC	***
Ignition control module	ICM	***
Indirect fuel injection system	IFI system	***
Intake air	IA	Air
Intake air temperature sensor	IAT sensor	Air temperature sensor
Knock	***	Detonation
Knock sensor	KS	Detonation sensor
Malfunction indicator lamp	MIL	Check engine light
Manifold absolute pressure	MAP	***
Manifold absolute pressure sensor	MAPS	***
Manifold differential pressure	MDP	***
Manifold differential pressure sensor	MDPS	***
Manifold surface temperature	MST	***
Manifold surface temperature sensor	MSTS	***
Manifold vacuum zone	MVZ	***
Manifold vacuum zone sensor	MVZS	***
Mass air flow sensor	MAFS	Air flow meter
Mixture control solenoid valve	MC solenoid valve	Air-fuel ratio control solenoid valve
Multiport fuel injection System	MFI system	Fuel injection control

NEW TERM	NEW ACRONYM / ABBREVIATION	OLD TERM
Nonvolatile random access memory	NVRAM	***
On board diagnostic system	OBD system	Self-diagnosis
Open loop	OL	Open loop
Oxidation catalyst	OC	Catalyst
Oxidation catalytic converter system	OC system	***
Oxygen sensor	O2S	Exhaust gas sensor
Park position switch	***	Park switch
Park/neutral position switch	PNP switch	Park/neutral switch Inhibitor switch Neutral position switch
Periodic trap oxidizer system	PTOX system	***
Positive crankcase ventilation	PCV	Positive crankcase ventilation
Positive crankcase ventilation valve	PCV valve	PCV valve
Powertrain control module	PCM	***
Programmable read only memory	PROM	***
Pulsed secondary air injection control solenoid valve	PAIRC solenoid valve	AIV control solenoid valve
Pulsed secondary air injection system	PAIR system	Air induction valve (AIV) control
Pulsed secondary air injection valve	PAIR valve	Air induction valve
Random access memory	RAM	***
Read only memory	ROM	***
Scan tool	ST	***
Secondary air injection pump	AIR pump	***
Secondary air injection system	AIR system	***
Sequential multiport fuel injection system	SFI system	Sequential fuel injection
Service reminder indicator	SRI	***
Simultaneous multiport fuel injection system	***	Simultaneous fuel injection
Smoke puff limiter system	SPL system	***
Supercharger	SC	***
Supercharger bypass	SCB	***
System readiness test	SRT	***
Thermal vacuum valve	TVV	Thermal vacuum valve
Three way catalyst	TWC	Catalyst
Three way catalytic converter system	TWC system	***
Three way + oxidation catalyst	TWC + OC	Catalyst
Three way + oxidation catalytic converter system	TWC + OC system	***
Throttle body	TB	Throttle chamber SPI body
Throttle body fuel injection system	TBI system	Fuel injection control
Throttle position	TP	Throttle position
Throttle position sensor	TPS	Throttle sensor
Throttle position switch	TP switch	Throttle switch
Torque converter clutch solenoid valve	TCC solenoid valve	Lock-up cancel solenoid Lock-up solenoid

NEW TERM	NEW ACRONYM / ABBREVIATION	OLD TERM
Transmission control module	TCM	A/T control unit
Turbocharger	TC	Turbocharger
Vehicle speed sensor	VSS	Vehicle speed sensor
Volume air flow sensor	VAFS	Air flow meter
Warm up oxidation catalyst	WU-OC	Catalyst
Warm up oxidation catalytic converter system	WU-OC system	***
Warm up three way catalyst	WU-TWC	Catalyst
Warm up three way catalytic converter system	WU-TWC system	***
Wide open throttle position switch	WOTP switch	Full switch

***: Not applicable

SECTION EM
ENGINE MECHANICAL

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PRECAUTIONS

PFP:00001

Precautions for Draining Coolant

EBS00GJK

- Drain coolant when engine is cooled.

Precautions for Disconnecting Fuel Piping

EBS00GJL

- Before starting work, make sure no fire or spark producing items are in the work area.
- Release fuel pressure before any removal or disassembly.
- After disconnecting pipes, plug openings to stop fuel leakage.

Precautions for Removal and Disassembly

EBS00GJM

- When instructed to use special service tools, use the specified tools. Always be careful to work safely, avoid forceful operations.
- Use maximum care to avoid damage to mating or sliding surfaces.
- Cover openings of engine system with tape or equivalent, if necessary, to seal out foreign materials.
- Mark and arrange disassembly parts in an organized way for easy troubleshooting and assembly.
- When loosening nuts and bolts, as a basic rule, start with the one furthest outside, then the one diagonally opposite, and so on. If the order of loosening is specified, follow the specifications.

Precautions for Inspection, Repair and Replacement

EBS00GJN

- Before repairing or replacing, thoroughly inspect parts. Inspect new replacement parts in the same way, and replace if necessary.

Precautions for Assembly and Installation

EBS00GJO

- Use torque wrench to tighten bolts or nuts.
- When tightening nuts and bolts, as a basic rule, equally tighten in several different steps starting with the ones in center, then ones on inside and outside diagonally in this order. If the order of tightening is specified, follow the specifications.
- Always replace the old with a new gasket, packing, oil seal or O-ring.
- Thoroughly wash, clean, and air-blow each part. Carefully check oil or coolant passages for any restriction and blockage.
- Avoid damaging sliding or mating surfaces. Completely remove foreign materials such as cloth lint or dust. Before assembly, oil sliding surfaces well.
- Bleed the air trapped within the system after draining the coolant.
- Before starting engine, apply fuel pressure to fuel lines with turning ignition switch ON (with engine stopped). Then make sure that there are no leaks at fuel line connections.
- After repairing, start engine and increase engine speed to check coolant, fuel, oil, and exhaust systems for leakage or rattles.

Parts Requiring Angular Tightening

EBS00GJP

- Use an angle wrench for the final tightening of the following engine parts.
  - Cylinder head bolts
  - Lower cylinder block bolts
  - Connecting rod cap bolts
  - Crankshaft pulley bolt (No angle wrench is required as the bolt flange is provided with notches for angular tightening)
- Do not use a torque value for final tightening.
- The torque value for these parts are for a preliminary step.
- Ensure thread and seat surfaces are clean and coated with engine oil.

Precautions for Liquid Gasket

EBS00GJQ

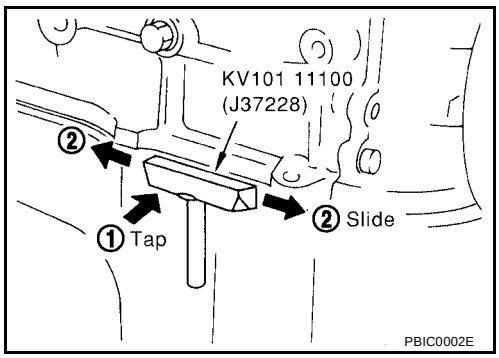
REMOVAL OF LIQUID GASKET SEALING

- After removing the mounting bolts and nuts, separate the mating surface using Tool and remove the liquid gasket sealing.

  Tool number : KV10111100 (J-37228)

  CAUTION:
  Be careful not to damage the mating surfaces.

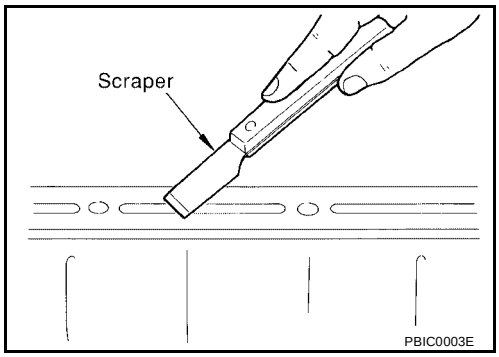
- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap (1) the cutter where the Silicone RTV Sealant is applied. Use a plastic hammer to slide the cutter (2) by tapping on the side.



CAUTION:
If for some unavoidable reason a tool such as a flat-bladed screwdriver is used, be careful not to damage the mating surfaces.

LIQUID GASKET APPLICATION PROCEDURE

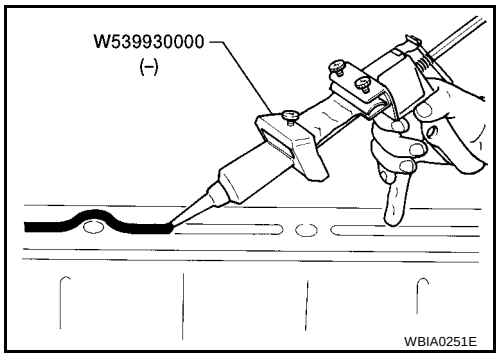
1. Using a scraper, remove the old Silicone RTV Sealant adhering to the gasket application surface and the mating surface.
   - Remove the sealant completely from the groove of the gasket application surface, mounting bolts, and bolt holes.
2. Thoroughly clean the gasket application surface and the mating surface and remove adhering moisture, grease and foreign materials.
3. Attach the sealant tube to Tool.
   - Use Genuine Silicone RTV Sealant or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .

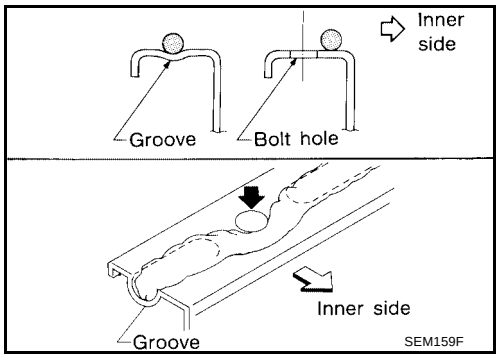


4. Apply the sealant using Tool without breaks to the specified location.

   Tool number : WS 39930000 (—)

   - If there is a groove for the sealant application, apply the sealant to the groove.
   - As for the bolt holes, normally apply the sealant inside the holes. If specified, it should be applied outside the holes. Make sure to read the text of this manual.
   - Within five minutes of the sealant application, install the mating component.
   - If the sealant protrudes, wipe it off immediately.
   - Do not retighten after the installation.
   - After 30 minutes or more have passed from the installation, fill the engine with the specified oil and coolant. Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .





CAUTION:
Follow all specific instructions in this manual.

Rocker Cover Bolts

EBS00EWP

NOTE:
Remove and install rocker cover bolts with a socket or wrench only.

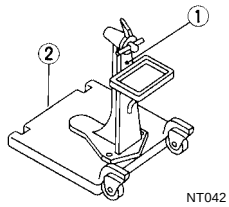
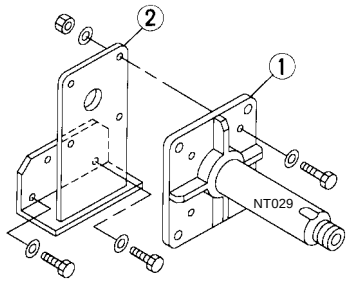
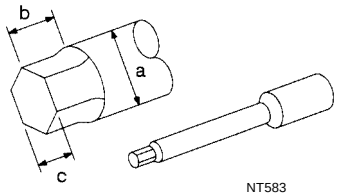
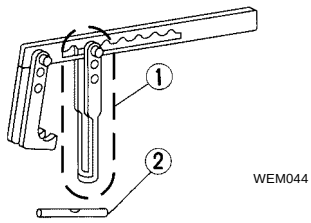
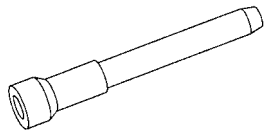
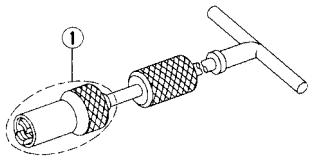
PREPARATION

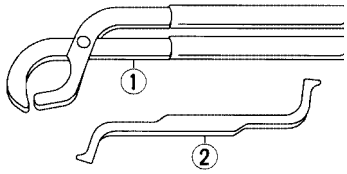
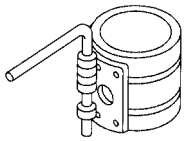
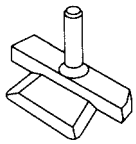
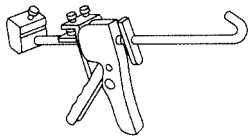
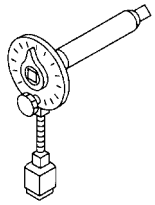
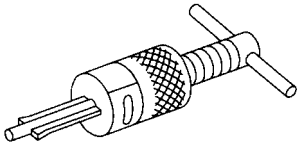
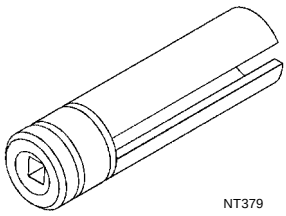
PFP:00002

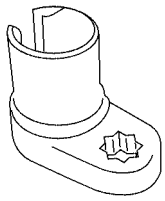
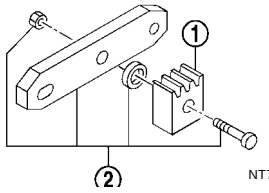
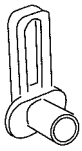
Special Service Tools

EBS00CE8

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

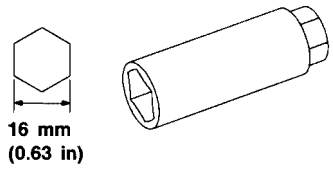
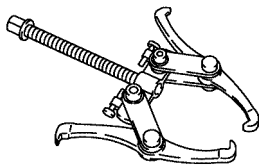
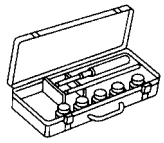
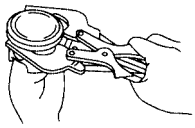
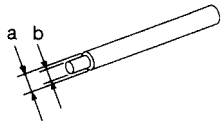
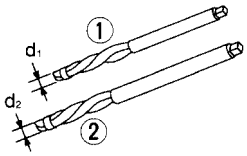
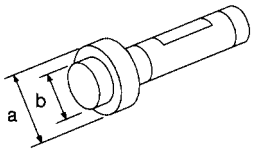
Tool number (Kent-Moore No.) Tool name		Description
ST0501S000 (—) Engine stand assembly 1. ST05011000 (—) Engine stand 2. ST05012000 (—) Base	 NT042	Disassembling and assembling
Engine attachment assembly 1. KV10106500 (—) Engine attachment 2. KV10113300 (—) Sub-attachment	 NT029	Overhauling engine
ST10120000 (J-24239-O1) Cylinder head bolt wrench	 NT583	Loosening and tightening cylinder head bolt **a: 13 mm (0.51 in) dia.** **b: 12 mm (0.47 in)** **c: 10 mm (0.39 in)**
KV10116200 (J-26336-B) Valve spring compressor 1. KV10115900 (J-26336-20) Attachment 2. KV10109220 (—) Adapter	 WEM044	Disassembling valve mechanism
KV10115600 (J-38958) Valve oil seal drift	 NT024	Installing valve oil seal
KV10107902 (J-38959) Valve oil seal puller 1. KV10116100 Valve oil seal puller adapter	 NT605	Displacing valve lip seal

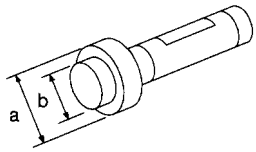
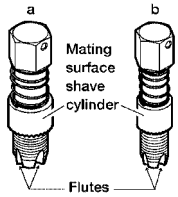
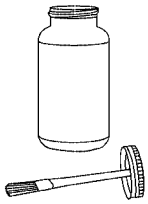
Tool number (Kent-Moore No.) Tool name		Description
J-45074 Valve shim lifter set 1. J-45074-1 Camshaft pliers 2. J-45074-2 Lifter holding tool	 NT041	Changing valve lifter shims
EM03470000 (J-8037) Piston ring compressor	 NT044	Installing piston assembly into cylinder bore
KV10111100 (J-37228) Seal cutter	 NT046	Removing oil pan
WS39930000 (—) Tube presser	 NT052	Pressing the tube of liquid gasket
KV10112100 (BT-8653-A) Angle wrench	 NT014	Tightening bolts for bearing cap, cylinder head, etc. in angle.
ST16610001 (J-23907) Pilot bushing puller	 NT045	Removing pilot bushing
KV1017100 (J-36471-A) Front (heated) oxygen sensor wrench	 NT379	Loosening or tightening heated oxygen sensor with 22 m (0.87 in) hexagon nut

Tool number (Kent-Moore No.) Tool name	Description
(J-44626) Air fuel ratio (A/F) sensor wrench  LEM054	Loosening or tightening air fuel ratio (A/F) sensor 1
KV101056S0 (—) Rear gear stopper 1. KV10105620 (—) Adapter 2. KV10105610 (—) Plate assembly  NT773	Preventing crankshaft from rotating
J-45488 Quick connector release  PBIC0198E	Removing fuel tube quick connectors in engine room

Commercial Service Tools

EBS00CE9

Tool name Kent-Moore No.	Description
Spark plug wrench  NT047	Removing and installing spark plug
Crankshaft pulley puller  PBIC0887E	Removing crankshaft pulley
Valve seat cutter set  NT048	Finishing valve seat dimensions
Piston ring expander  NT030	Removing and installing piston ring
Valve guide drift  NT015	Removing and installing valve guide **Intake & Exhaust:** **a: 9.5 mm (0.374 in) dia.** **b: 5.5 mm (0.217 in) dia.**
Valve guide reamer  NT016	Reaming valve guide **1** or hole for oversize valve guide **2** **Intake & Exhaust:** **d1 : 5.5 mm (0.217 in) dia.** **d2 : 9.685 mm (0.3813 in) dia.**
Front oil seal drift  NT049	Installing front oil seal **a: 52 mm (2.05 in) dia.** **b: 40 mm (1.57 in) dia.**

Tool name Kent-Moore No.	Description
Rear oil seal drift  NT049	Installing rear oil seal **a: 103 mm (4.06 in) dia.** **b: 84 mm (3.31 in) dia.**
Oxygen sensor thread cleaner J-43897-18 J-43897-12  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor (Use with anti-seize lubricant shown below.) **a: J-43897-18 [18 mm dia.] for zirconium oxygen sensor** **b: J-43897-12 [12 mm dia.] for titania oxygen sensor**
Anti-seize lubricant (Permatex 133AR or equivalent meeting MIL specification MIL-A-907)  AEM489	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

Noise, Vibration and Harshness (NVH) Troubleshooting

EBS00CEA

NVH TROUBLESHOOTING — ENGINE NOISE

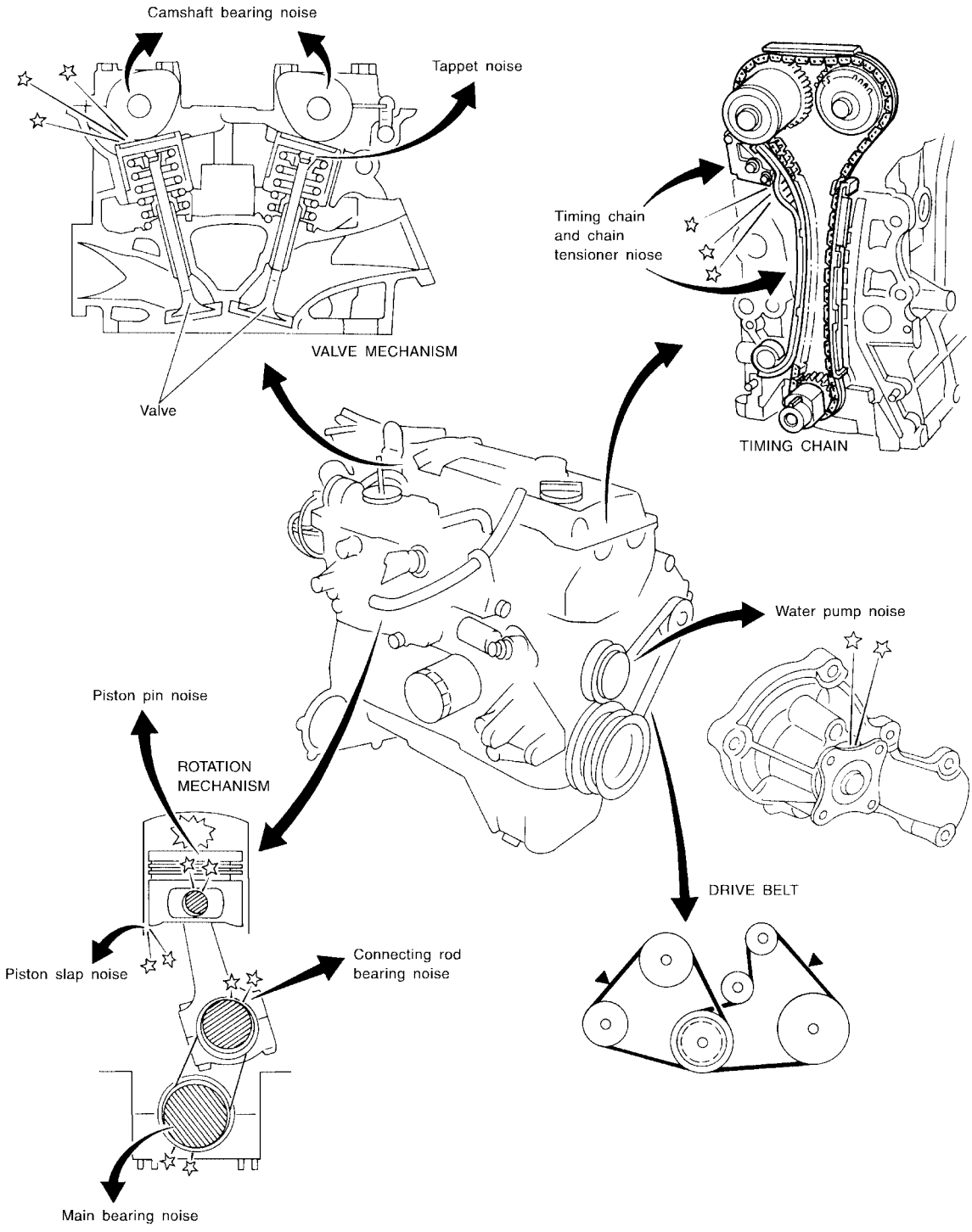
Use the chart below to help you find the cause of the symptom.

1. Locate the area where noise occurs.
2. Confirm the type of noise.
3. Specify the operating condition of engine.
4. Check specified noise source.

If necessary, repair or replace these parts.

Location of noise	Type of noise	Operating condition of engine						Source of noise	Check item	Reference page
		Before warm-up	After warm-up	When start-ing	When idling	When racing	While driv-ing			
Top of Engine Rocker Cover Cyl-inder Head	Ticking or click	C	A	—	A	B	—	Tappet noise	Valve clearance	EM-38
	Rattle	C	A	—	A	B	C	Camshaft bearing noise	Camshaft journal clear-ance Camshaft runout	EM-35 , EM-36
Crank-shaft Pul-ley Cylinder Block (Side of Engine) Oil pan	Slap or knock	—	A	—	B	B	—	Piston pin noise	Piston and piston pin clear-ance Connecting rod bushing clearance	EM-71 , EM-78
	Slap or rap	A	—	—	B	B	A	Piston slap noise	Piston-to-bore clearance Piston ring side clearance Piston ring end gap Connecting rod bend and torsion	EM-71, EM-72 , EM-72 ,EM-72
	Knock	A	B	C	B	B	B	Connect-ing rod bearing noise	Connecting rod bearing clearance (Big end) Connecting rod bushing clearance (Small end)	EM-77 , EM-79
	Knock	A	B	—	A	B	C	Main bear-ing noise	Main bearing oil clearance Crankshaft runout	EM-75 , EM-74
Front of Engine Timing Chain Cover	Tapping or ticking	A	A	—	B	B	B	Timing chain and chain ten-sioner noise	Timing chain cracks and wear Timing chain tensioner operation	EM-48
Front of Engine	Squeak or fizzing	A	B	—	B	—	C	Drive belts (sticking or slipping)	Drive belts deflection	MA-16
	Creaking	A	B	A	B	A	B	Drive belts (slipping)	Idler pulley bearing opera-tion	
	Squall or creak	A	B	—	B	A	B	Water pump noise	Water pump operation	CO-11

A: Closely related B: Related C: Sometimes related —: Not related


Camshaft bearing noise
Tappet noise
VALVE MECHANISM
Valve
Timing chain
and chain
tensioner niose
TIMING CHAIN
Water pump noise
Piston pin noise
ROTATION
MECHANISM
DRIVE BELT
Piston slap noise
Connecting rod
bearing noise
Main bearing noise

WBIA0061E

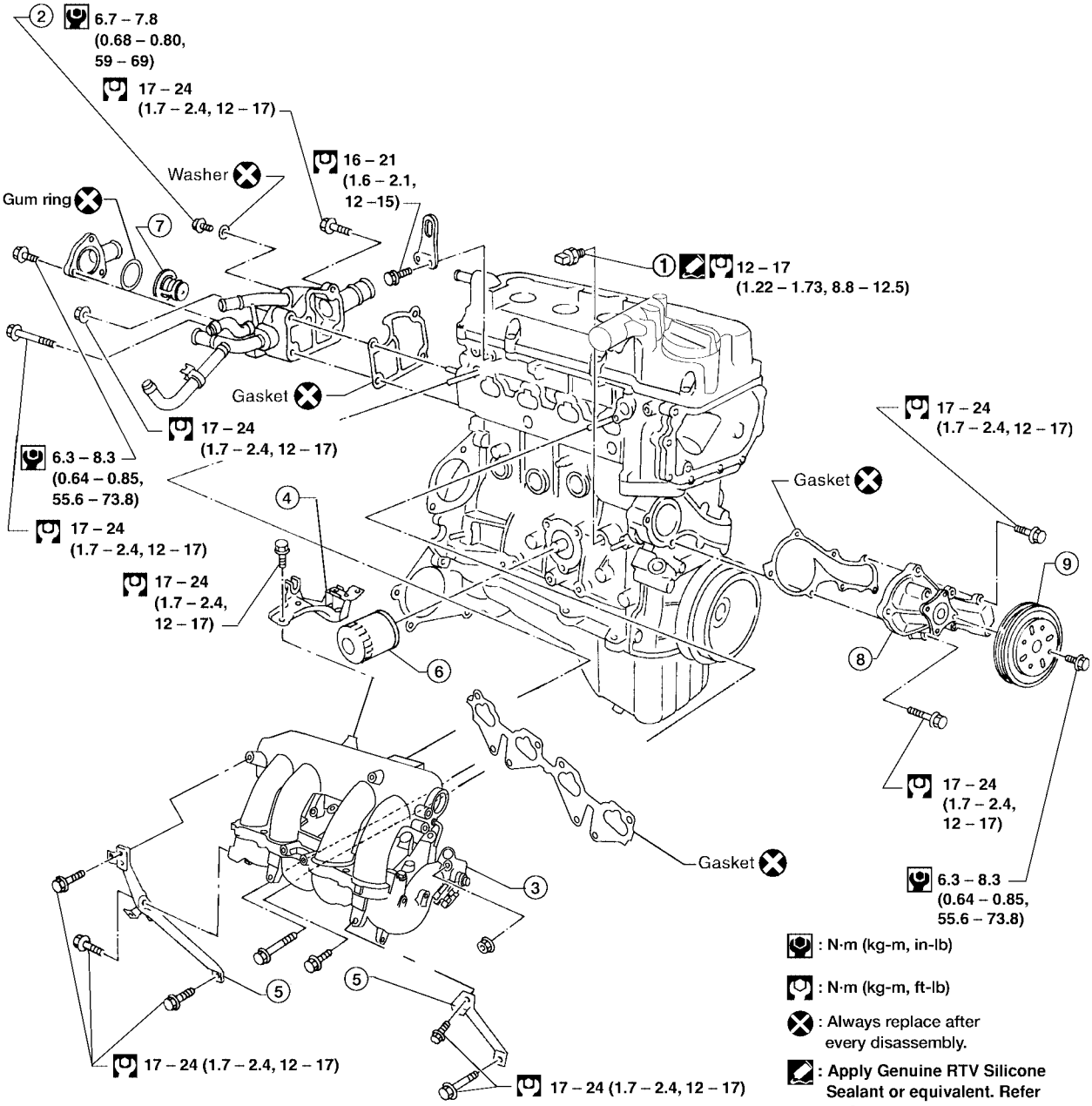
OUTER COMPONENT PARTS

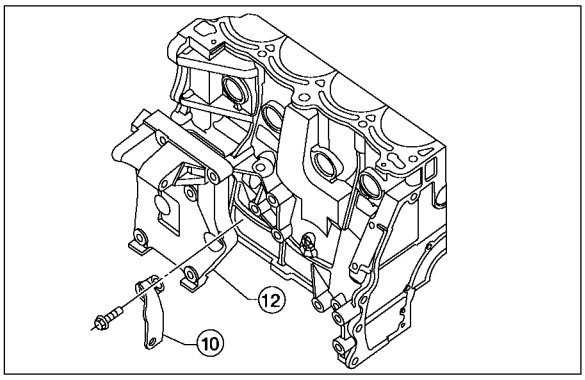
PFP:00100

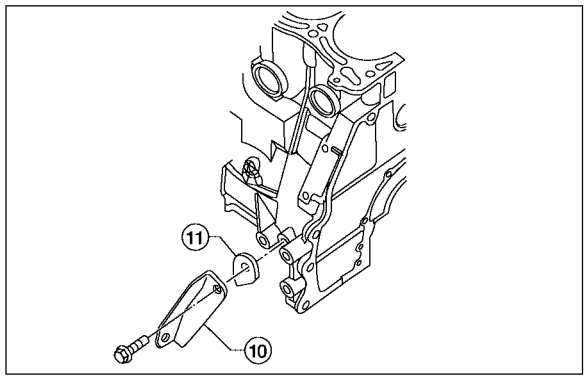
Removal and Installation

EBS00CEC

SEC. 140•147•150•210

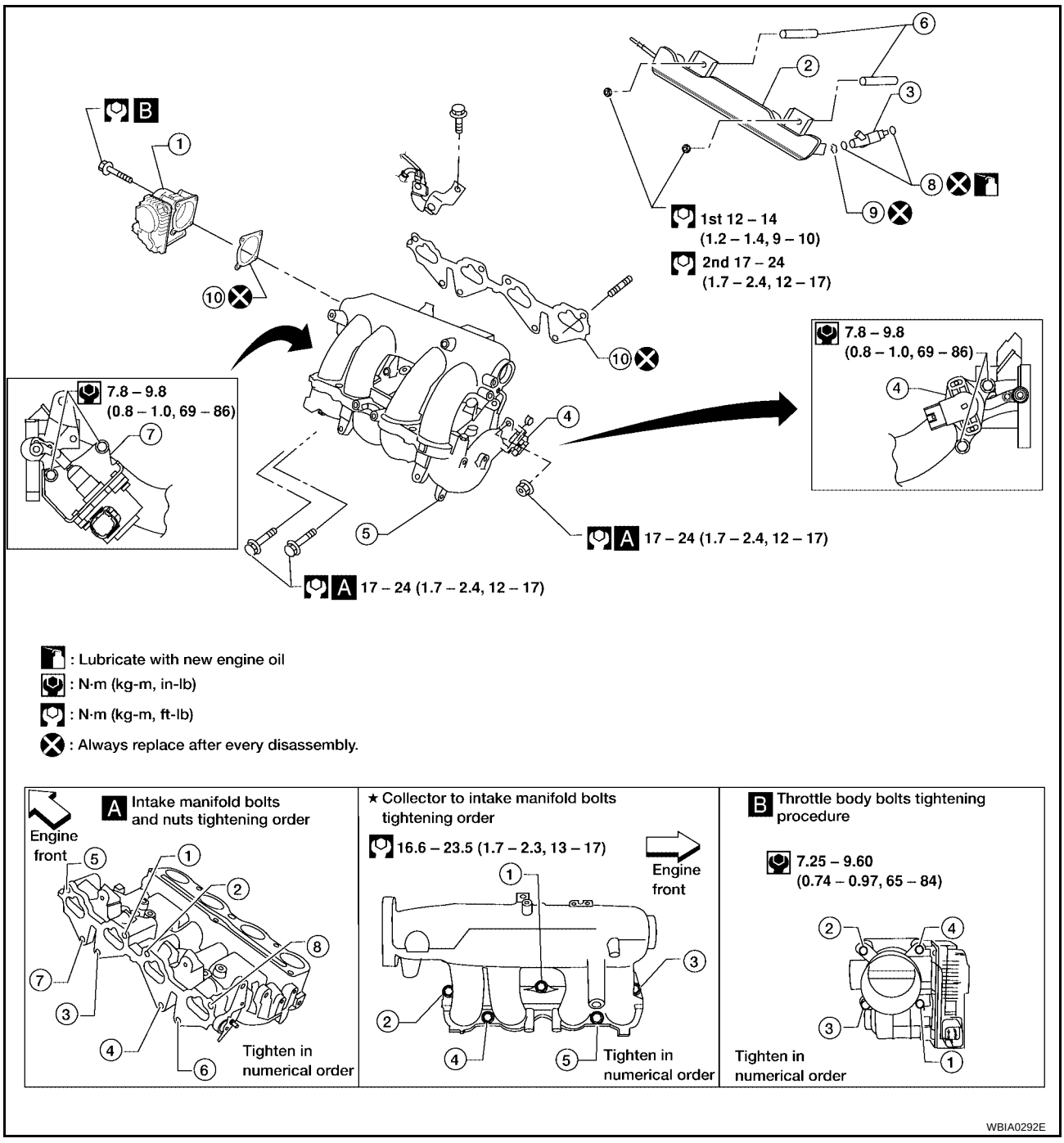






WBIA0112E

1. Oil pressure switch
2. Air relief plug
3. Intake manifold
4. Intake manifold upper support
5. Intake manifold rear supports
6. Oil filter
7. Thermostat
8. Water pump
9. Water pump pulley
10. Support container
11. Container gusset
12. Compressor bracket

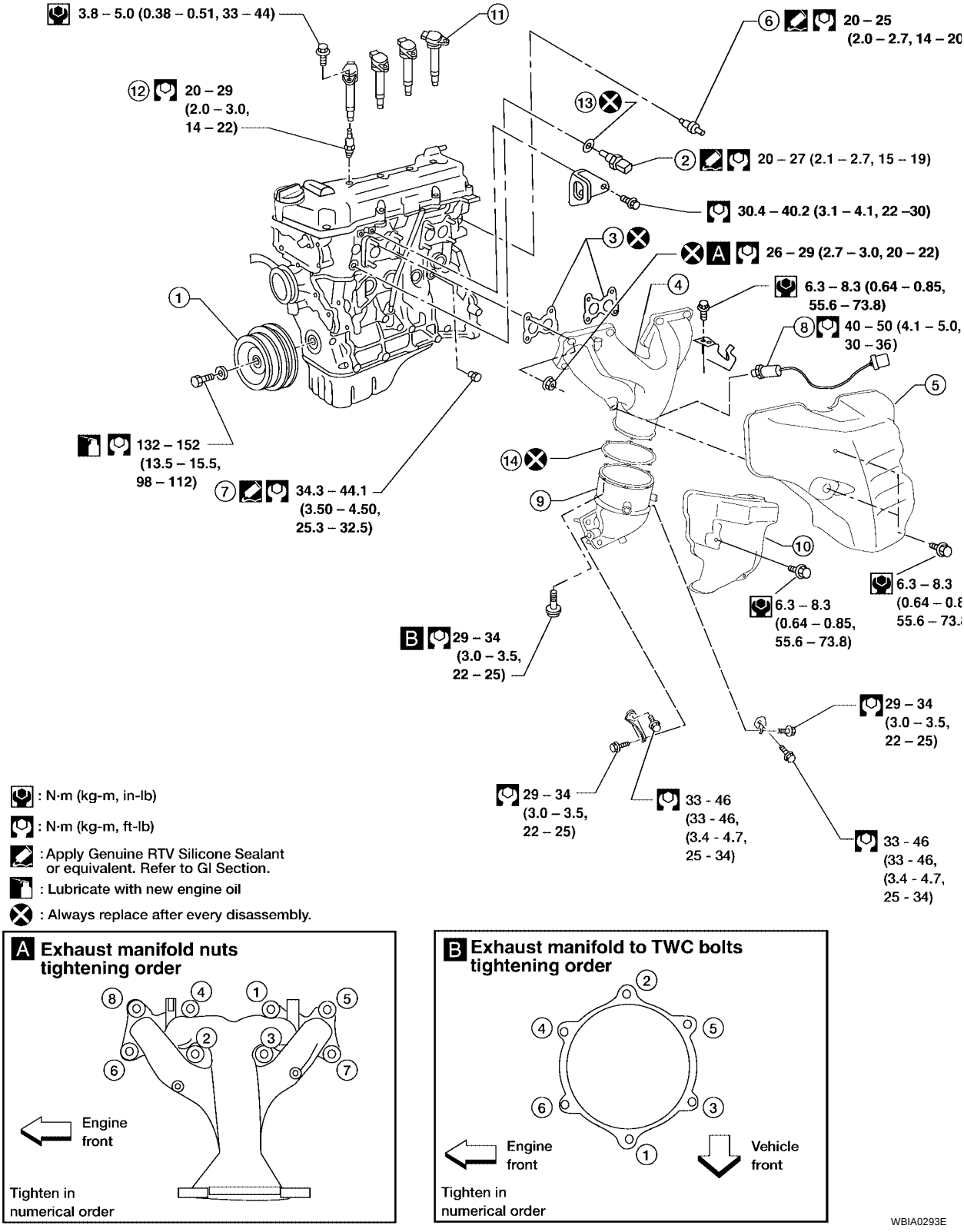


1. Throttle body
2. Fuel tube
3. Injector
4. Swirl control position sensor (SULEV only)
5. Intake manifold
6. Fuel tube spacer
7. Swirl control valve (SULEV only)
8. O-rings
9. Clip
10. Gasket

CAUTION:

- **Perform "Throttle Valve Closed Position Learning" when harness connector of electronic throttle control actuator is disconnected. Refer to EC-92, "Throttle Valve Closed Position Learning" .**

- **Perform "Idle Air Volume Learning" when harness connector of electronic throttle control actuator is replaced. Refer to EC-92, "Idle Air Volume Learning" .**



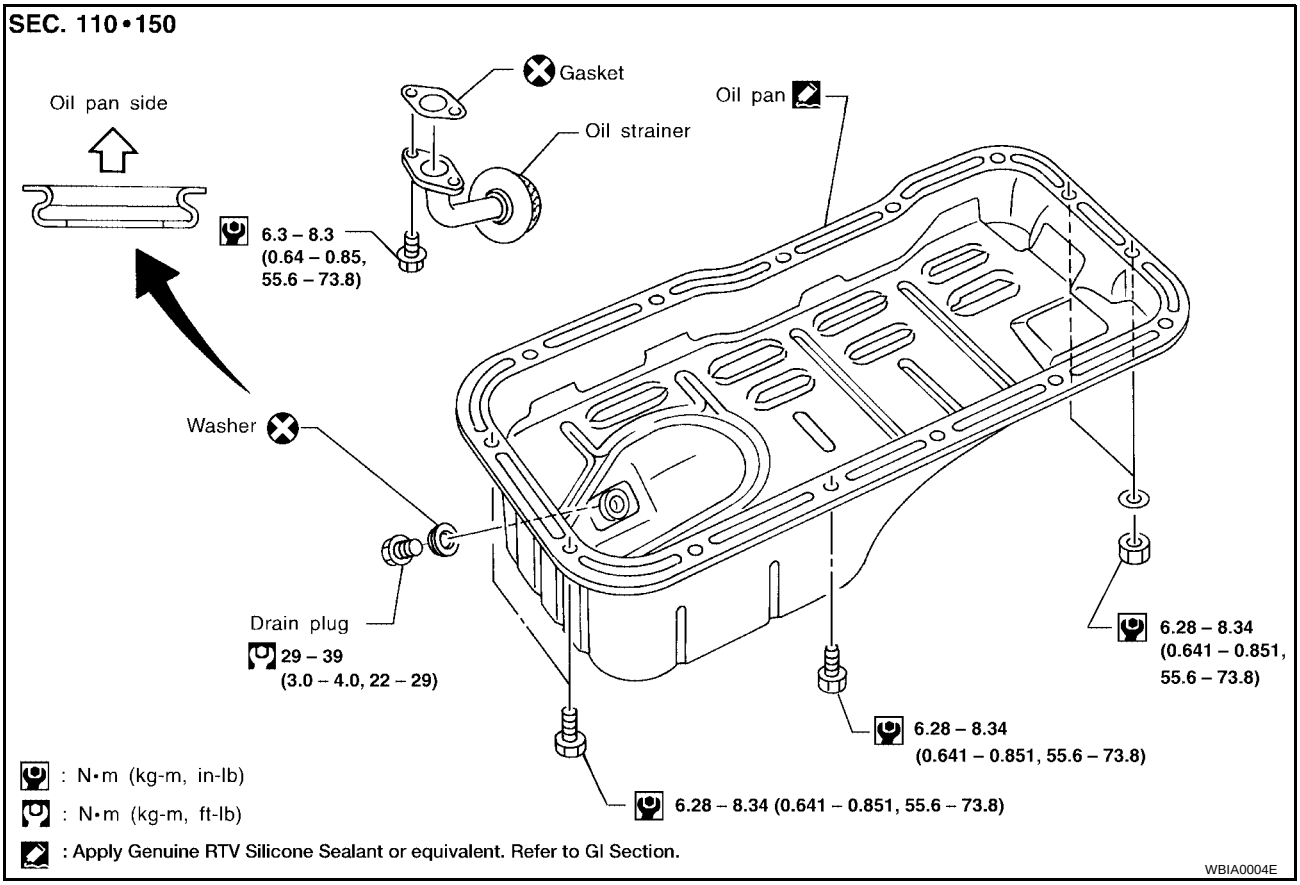
1. Crankshaft pulley
2. Engine coolant temperature sensor
3. Gasket
4. Exhaust manifold
5. Exhaust manifold cover
6. Thermal transmitter
7. Drain plug
8. Air fuel ratio (A/F) sensor 1
9. TWC (manifold)
10. TWC cover
11. Ignition coil
12. Spark plug
13. Washer
14. Gasket

OIL PAN

PFP:11110

Components

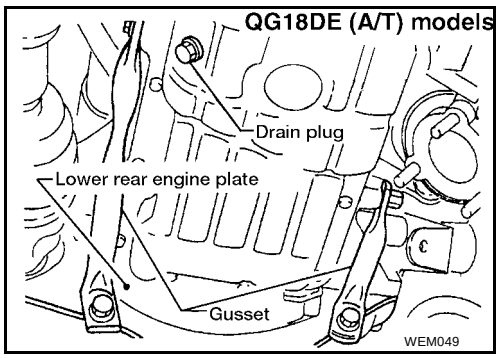
EBS00CED

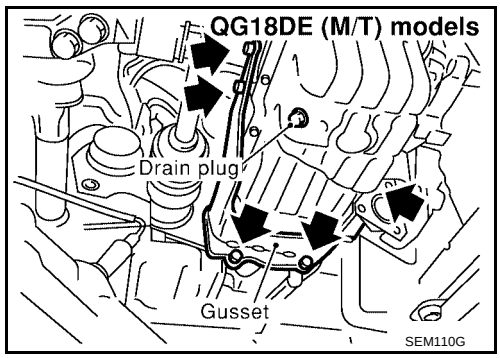


Removal

EBS00CEE

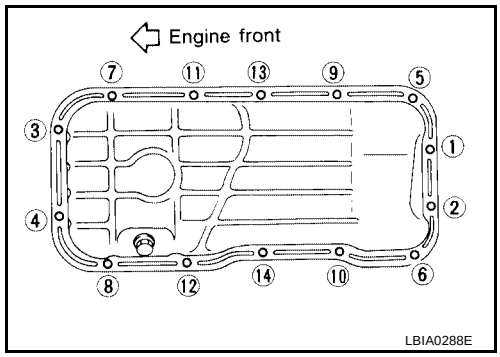
1. Remove engine RH side undercover splash shield.
2. Drain engine oil. Refer to MA-20, "Changing Engine Oil" .
3. Remove front exhaust tube. Refer to EX-3, "Removal and Installation" .
4. Remove the exhaust manifold support.
5. Remove the engine gusset.





6. Remove rear plate cover (lower) (A/T models).
7. Remove oil pan.

a. Loosen and remove nuts and bolts of oil pan in order shown.

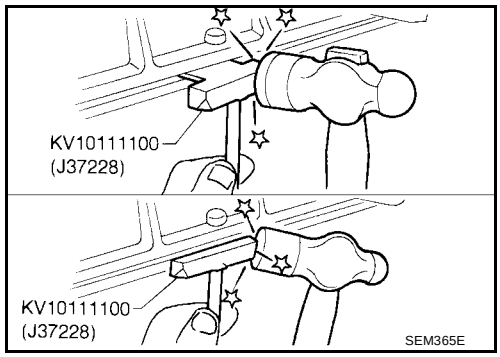


b. Insert Tool between cylinder block and oil pan.

CAUTION:

- **Be careful not to damage aluminum mating face.**
- **Do not insert screwdriver, or oil pan flange will be damaged.**

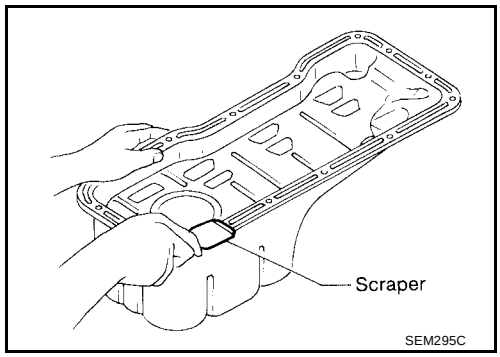
c. Slide Tool by tapping on the side of the Tool with a hammer.



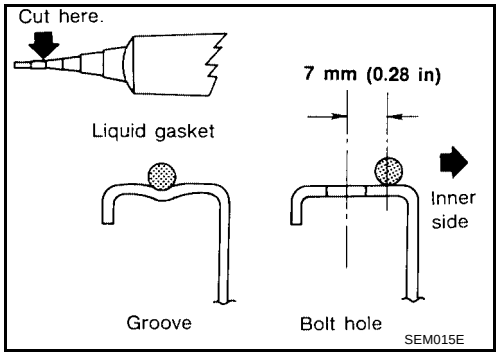
Installation

EBS00CEF

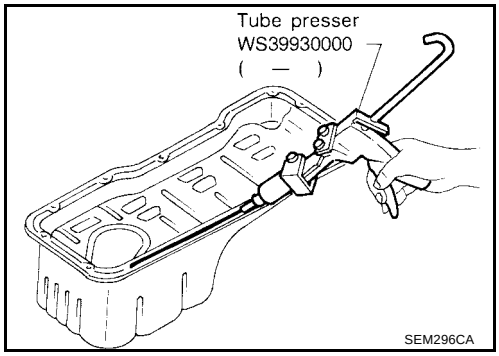
1. Use a scraper to remove old RTV Silicone Sealant from mating surface of oil pan.
   - Also remove old RTV Silicone Sealant from mating surface of cylinder block.



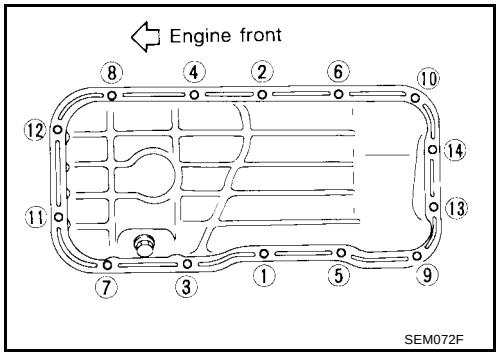
2. Apply a continuous bead of RTV Silicone Sealant to mating surface of oil pan using Tool.
   - Use Genuine RTV Silicone Sealant or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .
   - Apply to groove on mating surface.
   - Allow 7 mm (0.28 in) clearance around bolt holes.



   - Be sure RTV Silicone Sealant diameter is 3.5 to 4.5 mm (0.138 to 0.177 in).
   - Installation should be done within 5 minutes after applying sealant.



3. Install oil pan.
   - Tighten oil pan nuts and bolts in the order shown.
   - Wait at least 30 minutes before refilling engine oil.
4. Installation of the remaining components is in the reverse order of removal.

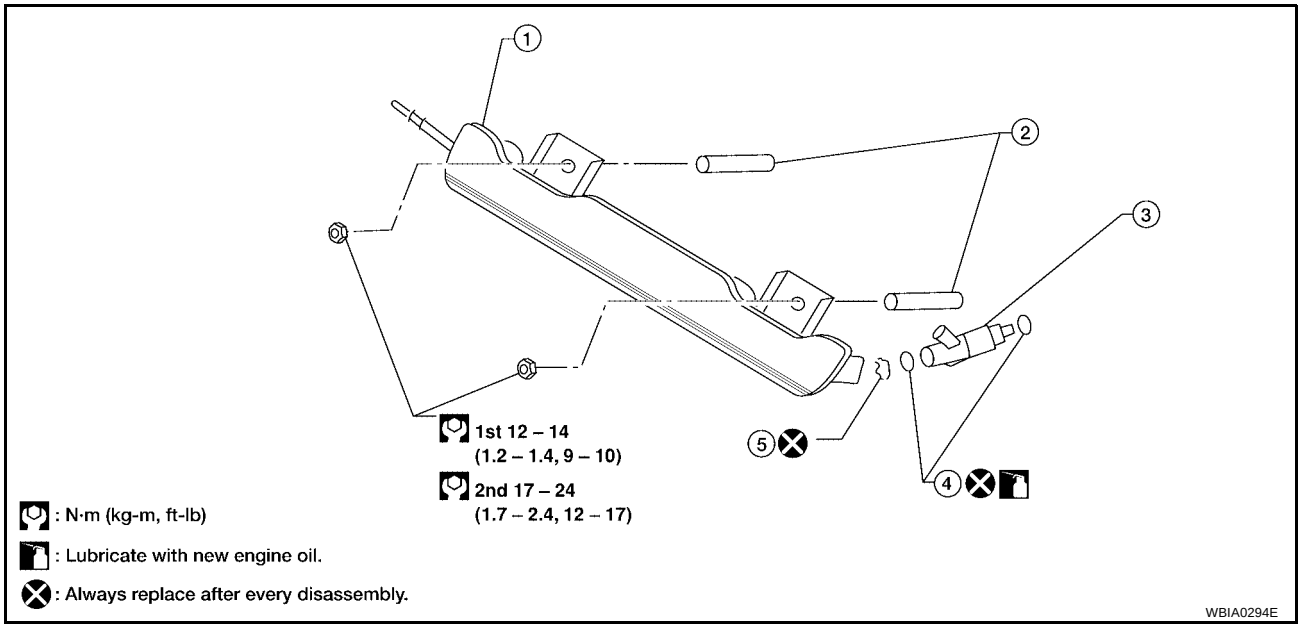


FUEL INJECTOR AND FUEL TUBE

PFP:16600

Removal and Installation

EBS00CEG



1. Fuel tube
2. Fuel tube spacer
3. Fuel injector
4. O-rings
5. Clip

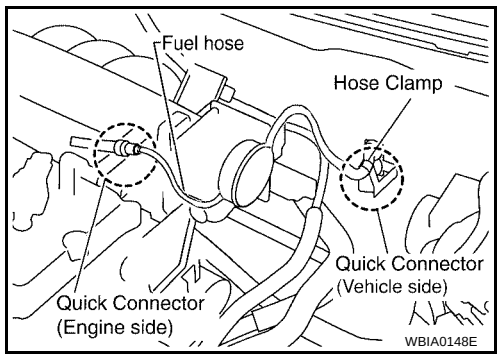
CAUTION:

- **Apply new engine oil when installing the parts that specified to do so in the figure.**
- **Do not remove or disassemble parts unless instructed as shown above.**

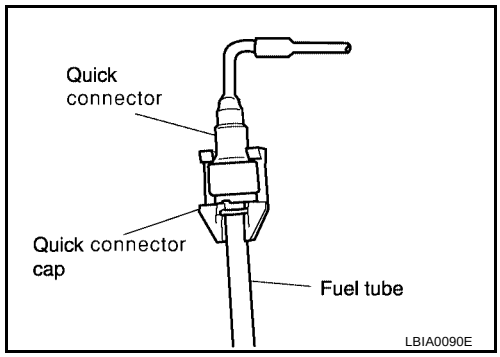
REMOVAL

1. Release the fuel pressure. Refer to EC-94, "FUEL PRESSURE RELEASE" .
2. Disconnect the intake manifold bracket.
3. Remove the PCV hose and bracket.
4. Disconnect the sub-harness for the fuel injectors.
5. Disconnect the fuel quick connector on the engine side.
   - Using Tool perform the following steps to disconnect the quick connector.

   Tool number : J-45488



a. Remove quick connector cap.

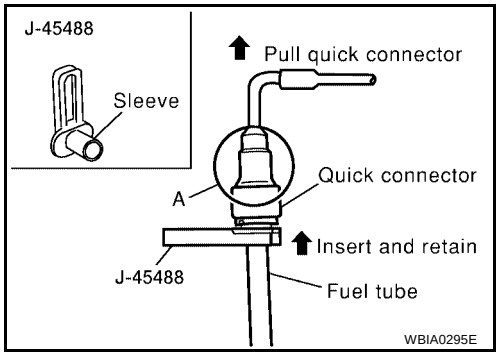


b. With the sleeve side of Tool facing quick connector, install Tool onto fuel tube.

c. Insert Tool into quick connector until sleeve contacts and goes no further. Hold the Tool on that position.

CAUTION:
Inserting the Tool hard will not disconnect quick connector. Hold Tool where it contacts and goes no further.

d. Pull the quick connector straight out from the fuel tube.

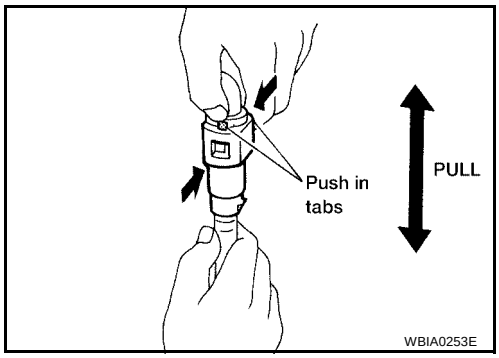


CAUTION:
- **Pull quick connector holding it at the "A" position, as shown.**
- **Do not pull with lateral force applied. O-ring inside quick connector may be damaged.**
- **Prepare container and cloth beforehand as fuel will leak out.**
- **Avoid fire and sparks.**
- **Be sure to cover openings of disconnected pipes with plug or plastic bag to avoid fuel leakage and entry of foreign materials.**

6. When removing fuel hose quick connector at vehicle piping side, perform as follows.

a. Remove quick connector cap.

b. Hold the sides of the connector, push in tabs and pull out the tube.
- If the connector and the tube are stuck together, push and pull several times until they start to move. Then disconnect them by pulling.



CAUTION:
- **The tube can be removed when the tabs are completely depressed. Do not twist it more than necessary.**
- **Do not use any tools to remove the quick connector.**
- **Keep the resin tube away from heat. Be especially careful when welding near the tube.**
- **Prevent acid liquid such as battery electrolyte etc. from getting on the resin tube.**
- **Do not bend or twist the tube during installation and removal.**
- **Do not remove the remaining retainer on tube.**
- **When the tube is replaced, also replace the retainer with a new one.**
  Retainer color: Green.
- **To keep clean the connecting portion and to avoid damage and foreign materials, cover them completely with plastic bags or something similar.**

7. Remove the fuel injectors from the fuel tube, as follows:

a. Release the clip, and remove the fuel injector.

b. Pull the fuel injector straight out of the fuel tube.

CAUTION:
- **Be careful not to damage the nozzle.**
- **Avoid any impact, such as dropping the fuel injector.**
- **Do not disassemble or adjust the fuel injector.**

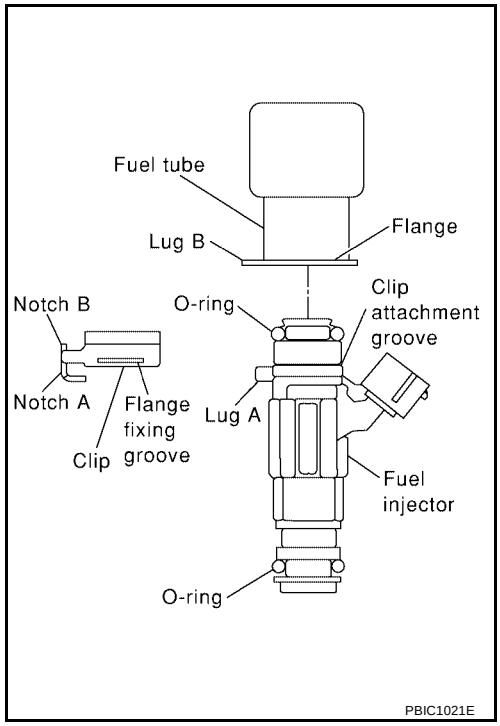
INSTALLATION

1. Installation is in the reverse order of removal.
- Install new O-rings on the fuel injectors.
- Lubricate the new O-rings lightly with new engine oil.
- Be careful not to scratch the injector during installation. Also be careful not to twist or stretch the O-ring. If the O-ring was stretched while it was installed, do not insert it into the fuel tube immediately.

a. Install the fuel injector into the fuel tube with the following procedure:
   - Do not reuse the clip, replace it with a new one.
   - Insert the clip into the clip mounting groove on the fuel injector.
   - Insert clip so that lug A of fuel injector matches notch A of the clip.

b. Insert fuel injector into fuel tube with clip attached.
   - Insert it while matching it to the axial center.
   - Insert fuel injector so that projection B of fuel injector matches notch B of the clip.
   - Make sure that fuel tube flange is securely fixed in flange fixing groove on the clip.
   - Make sure that installation is complete by checking that fuel injector does not rotate or come off.

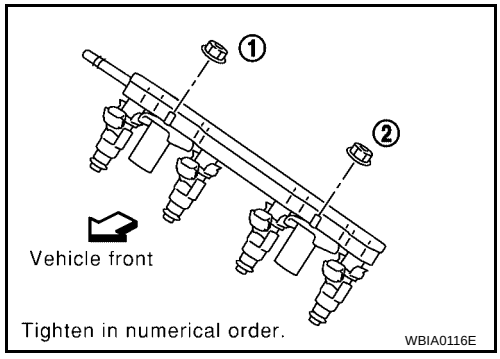
c. Install the fuel tube assembly with the following procedure:
   - Insert the tip of each fuel injector into the intake manifold.



   - Tighten the fuel tube nuts in two steps in the order shown.

Step 1 : 12 - 14 N·m (1.2 - 1.4 kg-m, 9 - 10 ft-lb)
Step 2 : 17 - 24 N·m (1.7 - 2.4 kg-m, 12 - 17 ft-lb)

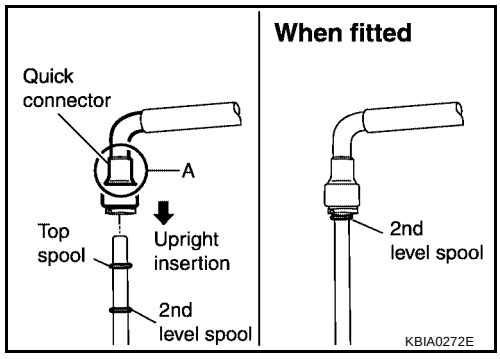
CAUTION:
- **After properly connecting fuel tube assembly to injector and fuel hose, check connection for fuel leakage.**



CONNECTING QUICK CONNECTOR ON THE FUEL HOSE (ENGINE SIDE)

1. Make sure no foreign substances are deposited in and around the fuel tube and quick connector, and there is no damage to them.
2. Thinly apply new engine oil around the fuel tube tip end.
3. Align center to insert quick connector straight into fuel tube.
   - Insert fuel tube into quick connector until the top spool on fuel tubes is inserted completely and the second level spool is positioned slightly below the quick connector bottom end.

   CAUTION:
   - **Hold at position "A" as shown, when inserting the fuel tube into the quick connector.**
   - **Carefully align to center to avoid inclined insertion to prevent damage to the O-ring inside the quick connector.**
   - **Insert the fuel tube until you hear a “click” sound and actually feel the engagement.**
   - **To avoid misidentification of engagement with a similar sound, be sure to perform the next step.**

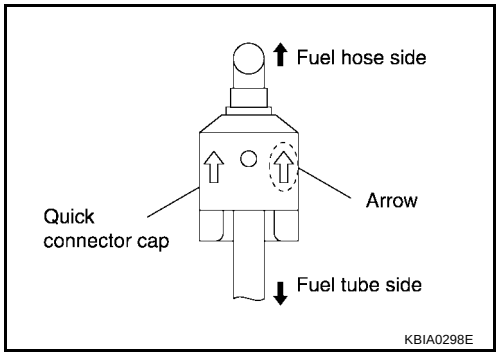


4. Before clamping the fuel hose with the hose clamp, pull the quick connector hard by hand, holding at the "A" position, as shown. Make sure it is completely engaged (connected) so that it does not come off of the fuel tube.

   NOTE:
   Recommended pulling force is 50 N (5.1 kg, 11.2 lb).
5. Install quick connector cap on quick connector joint.

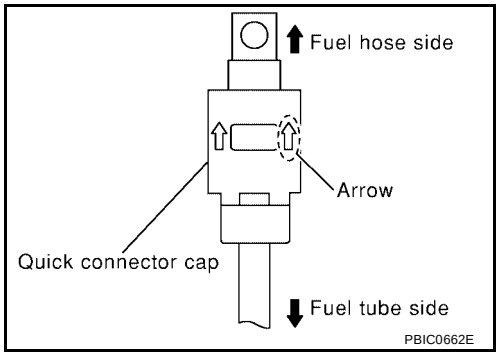
- Direct arrow mark on quick connector cap to upper side (fuel hose side).

6. Install fuel hose to hose clamp.



CONNECTING QUICK CONNECTOR ON THE FUEL HOSE (VEHICLE PIPING SIDE)

1. Make sure no foreign substances are deposited in and around the fuel tube and quick connector, and there is no damage to them.
2. Align center to insert quick connector straight into fuel tube.
   - Insert fuel tube until a click is heard.
   - Install quick connector cap on quick connector joint. Direct arrow mark on quick connector cap upper side.
   - Install fuel hose to hose clamp.



INSPECTION AFTER INSTALLATION

Make sure there is no fuel leakage at connections as follows:

1. Apply fuel pressure to fuel lines by turning ignition ON (with engine stopped). Then check for fuel leaks at connections.
2. Start the engine and rev it up and check for fuel leaks at connections.

   NOTE:
   Use mirrors for checking on hard to see points of the fuel system.

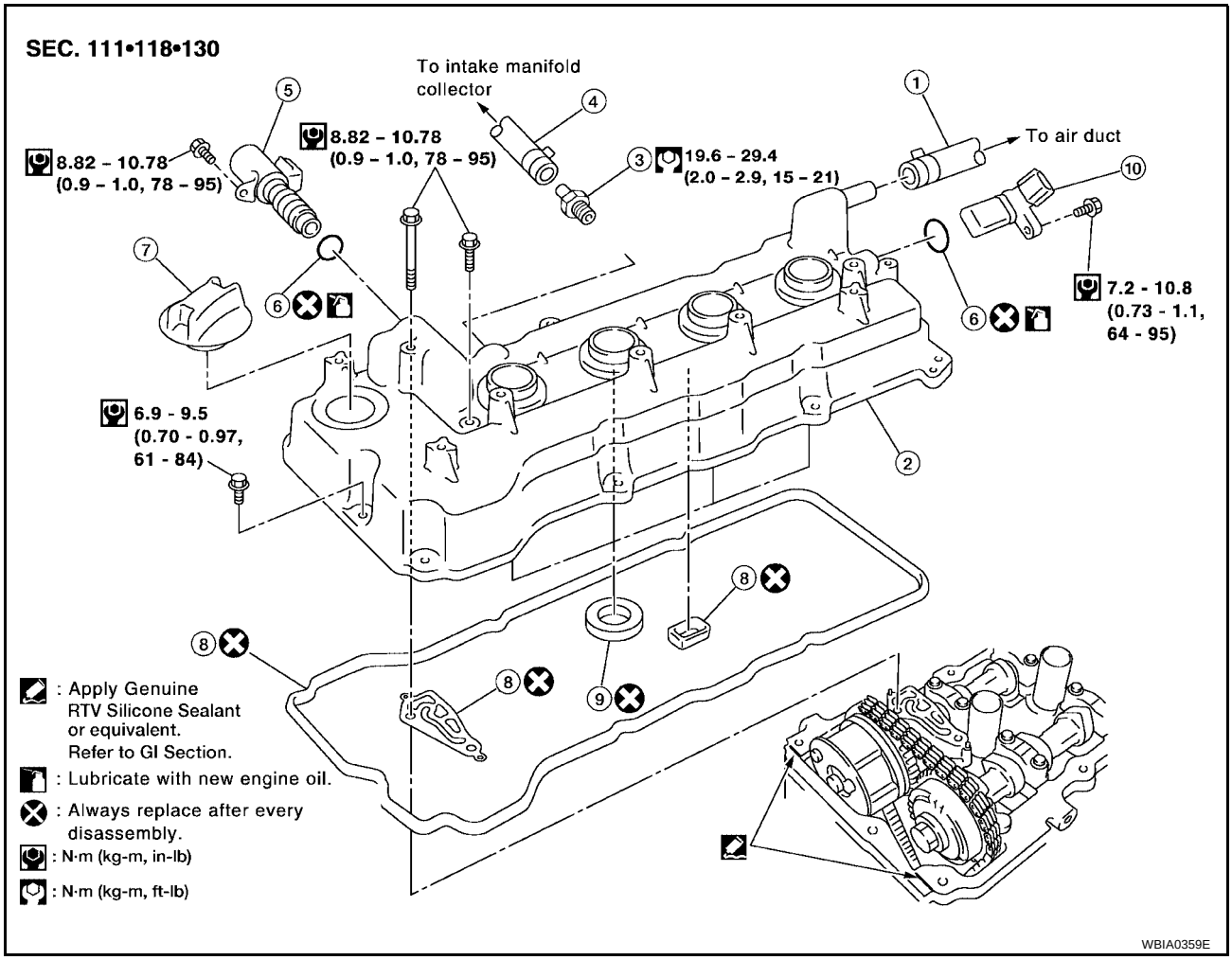
   CAUTION:
   Do not touch the engine immediately after stopping, as the engine becomes extremely hot.

ROCKER COVER

PFP:13264

Removal and Installation

EBS00EWR



1. Blowby hose
2. Rocker cover
3. PCV control valve
4. PCV hose
5. Intake valve timing control solenoid valve
6. O-ring
7. Oil filler cap
8. Gasket
9. Rocker cover oil seal
10. Camshaft position sensor (PHASE)

REMOVAL

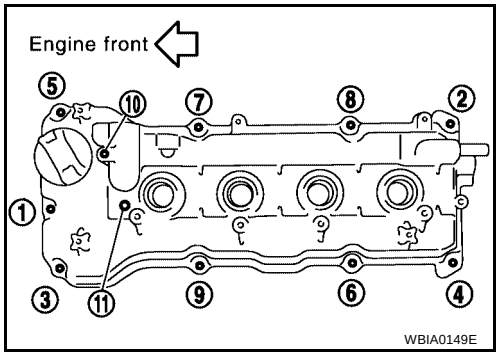
1. Move the harnesses on top surface and right side of rocker cover aside.
2. Remove the ignition coils.
3. Disconnect the PCV hose and blowby hose from the rocker cover.
4. If necessary, remove the PCV control valve.
5. Disconnect the intake valve timing control solenoid valve and camshaft position sensor (PHASE).
6. If necessary, remove the intake valve timing control solenoid valve and camshaft position sensor (PHASE).

CAUTION:

- **Do not shock it.**
- **Do not disassemble it.**
- **The tip of the camshaft position sensor (PHASE) generates a strong magnetic field. Keep it away from metallic particles or objects affected by magnetic fields.**

7. Loosen the bolts in the order shown.
8. If replacement is necessary, remove the rocker cover oil seal using a flat-head screwdriver.

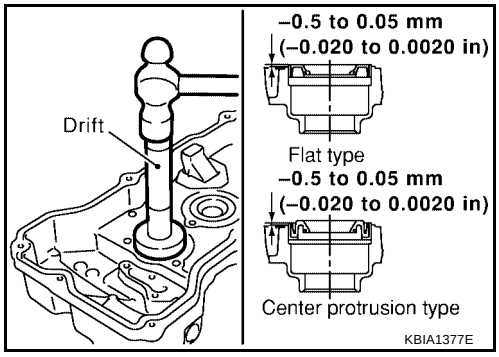
   CAUTION:
   Be careful not to damage the rocker cover.
9. Remove the rocker cover oil seal using a suitable tool.



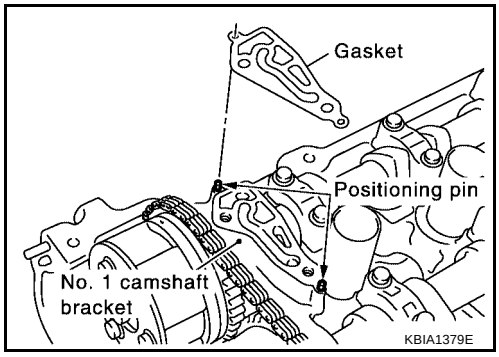
INSTALLATION

1. Install the rocker cover oil seal.
   - Using a drift with outer diameter 97 mm (3.82 in) and inner diameter 83 mm (3.27 in) to 88 mm (3.46 in), press in oil seal.

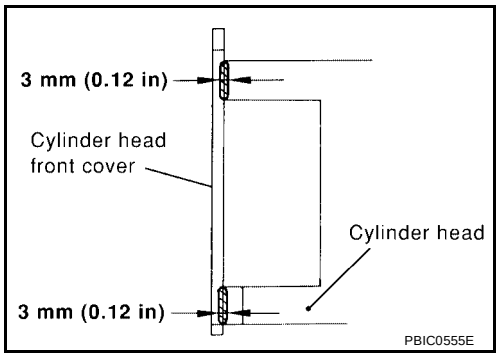
     NOTE:
     There are two types of oil seal. If oil seal with flat bottom surface is pressed in, drift with any inner diameter can be used.
   - Press oil seal in until it is flush with installation surface.



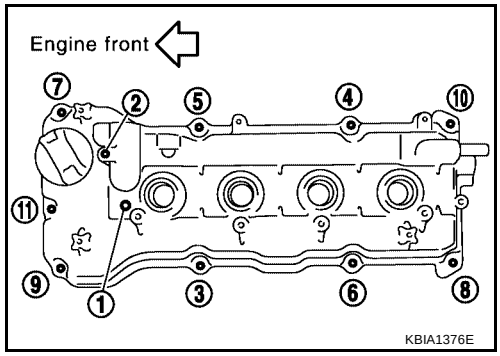
2. Install the gasket on top of No. 1 camshaft bracket.
   - Position the gasket aligning its shape with camshaft bracket side. Align positioning pin with gasket holes, and install.
3. Install the gasket (for circumference, square type) to installation groove of rocker cover.



4. Apply sealant to the positions shown, then install rocker cover.
   - Use Genuine RTV Silicone Sealant, or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .



5. Tighten the rocker cover bolts to specified torque in two steps, in the numerical order as shown.



Bolt length:	Bolt position	Torque
25 mm (0.98 in)	: 1	: 8.82 - 10.78 N-m (0.9 - 1.0 kg-m, 78 - 95 in-lb)
65 mm (2.56 in)	: 2	: 8.82 - 10.78 N-m (0.9 - 1.0 kg-m, 78 - 95 in-lb)
20 mm (0.79 in)	Except the above (all circumference)	: 6.9 - 9.5 N-m (0.70 - 0.97 kg-m, 61 - 84 in-lb)

6. Install the intake valve timing control solenoid valve and camshaft position sensor (PHASE).
   - Tighten bolt after fully inserting into rocker cover.

Intake valve timing control solenoid valve bolt	: 8.82 - 10.78 N·m (0.9 - 1.0, 78 - 95 in-lb)
Camshaft position sensor (PHASE) bolt	: 7.2 - 10.8 N·m (0.73 - 1.1, 64 - 95 in-lb)

7. Install the PCV control valve.

PCV control valve	: 19.6 - 29.4 N·m (2.0 - 2.9 kg-m, 15 - 21 ft-lb)

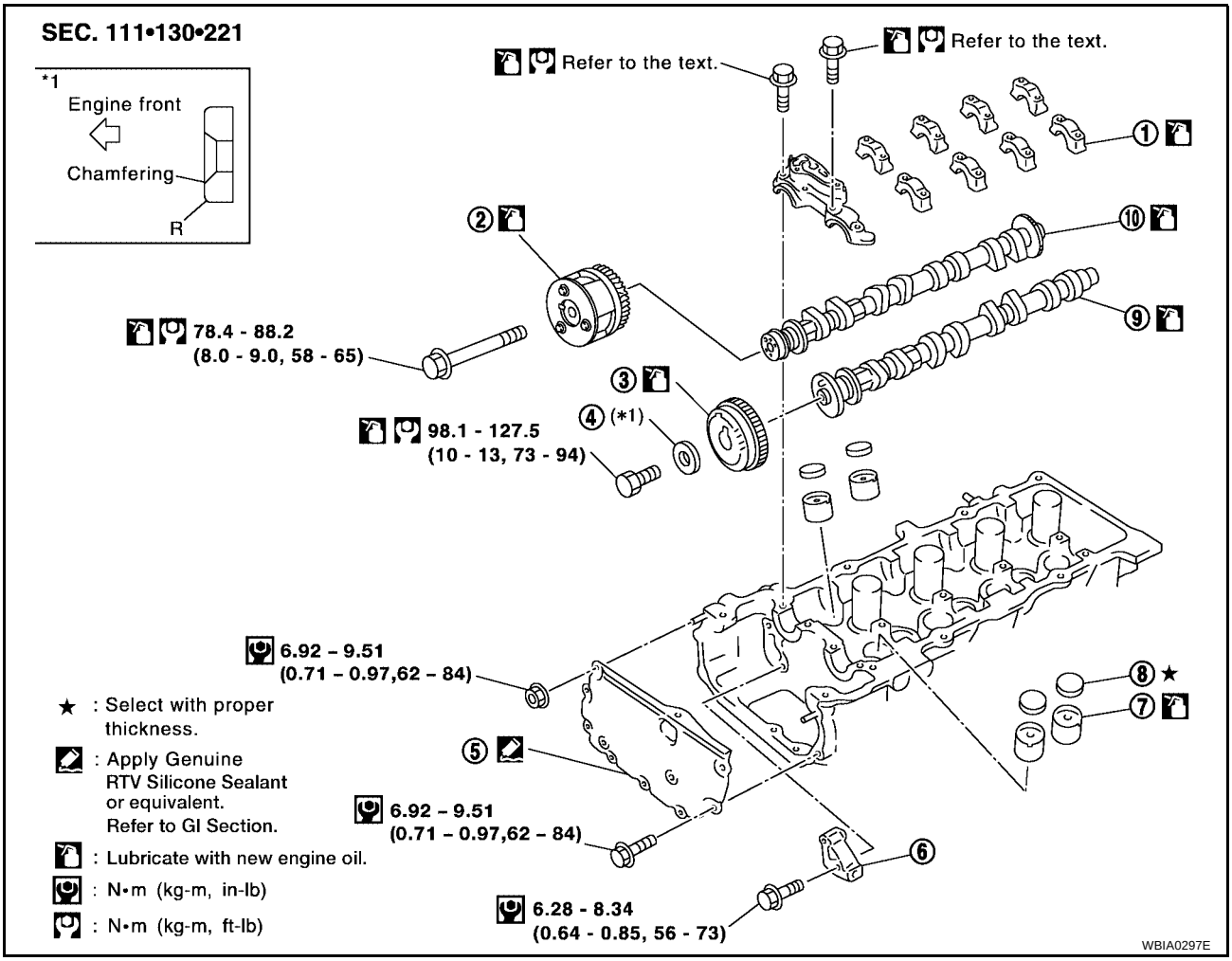
8. Installation of the remaining components is in the reverse order of removal.

CAMSHAFT

PFP:13001

Removal and Installation

EBS00EWS



1. Camshaft brackets
2. Camshaft sprocket (INT)
3. Camshaft sprocket (EXH)
4. Washer
5. Cylinder head front cover
6. Chain tensioner
7. Valve lifter
8. Adjusting shim (if equipped)
9. Camshaft (EXH)
10. Camshaft (INT)

CAUTION:

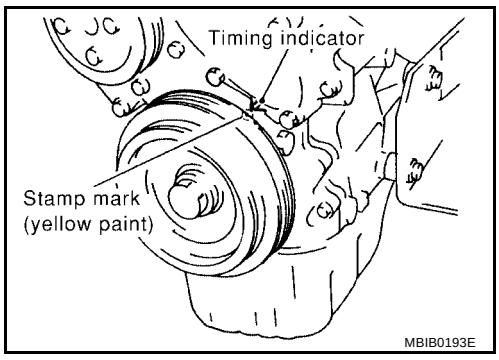
Prior to installation, apply engine oil to the parts marked in the figure.

REMOVAL

1. Remove the rocker cover. Refer to EM-25, "ROCKER COVER" .
2. Remove the cylinder head front cover.
   - Move harness secured to the front surface beforehand.
3. Set No. 1 cylinder at TDC of its compression stroke.

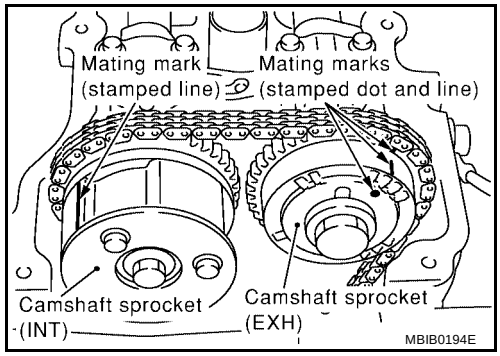
a. Remove the RH splash cover.

b. Rotate crankshaft pulley clockwise and align the yellow paint mark with the timing indicator.



c. Confirm mating marks stamped on intake and exhaust sprockets are located as shown.
   - If not, rotate crankshaft pulley as shown and align them.

d. Referring to mating marks on the intake and exhaust camshaft sprockets, put paint mating marks on timing chain links.

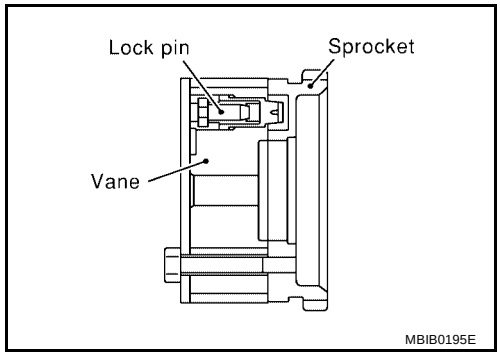


4. Set the intake camshaft sprocket to the most advanced position.

CAUTION:

Removal and installation of the intake camshaft sprocket is required to maintain the most advanced position because of the following reasons. Therefore, follow the procedure exactly.

- **Sprocket and vane (camshaft in front) rotate and become offset within the specific angle range.**
- **When engine is stationary, the vane is located at the most retarded position. The vane is fixed to the sprocket by an internal lock pin. Therefore, it does not rotate.**



- **If the camshaft sprocket mounting bolts are turned under the above circumstance, the lock pin will be damaged by lateral load (shear stress). It may cause non-standard operation.**

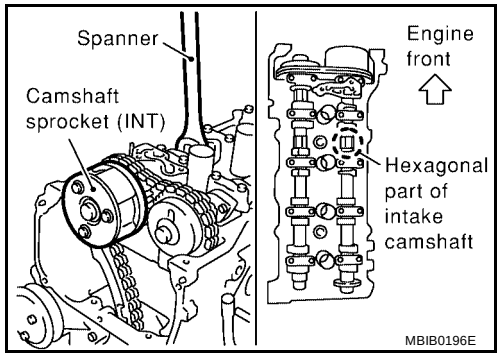
NOTE:

"Rotating direction" means direction viewed from the engine front side.

CAUTION:

Do not remove the chain tensioner before performing this step.

a. Using a wrench, hold the hexagonal part so that the intake camshaft does not move.



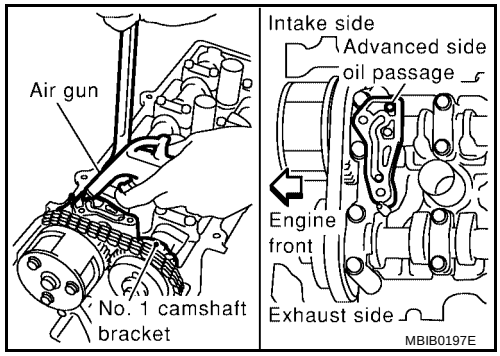
b. Using an air gun, apply air pressure to the intake valve timing control solenoid valve advance side oil passage on the top surface of the No. 1 camshaft bracket.

Compressed air pressure : 300 kPa (3.06 kg/cm2, 43.5 psi) or more

- Keep applying air pressure until step "d" is completed.

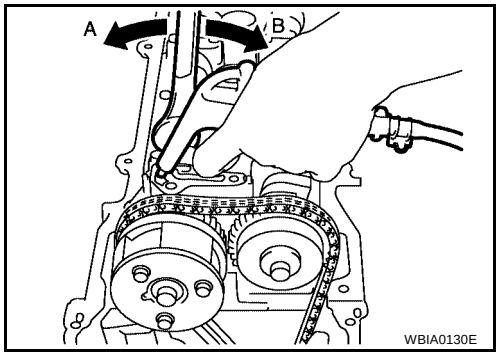
CAUTION:

- **Be careful not to damage the oil passage from interference of the air gun tip.**
- **Thoroughly wipe off the oil before applying air pressure. When applying air pressure, cover around the air gun using a rag. Wear protective glasses if necessary.**



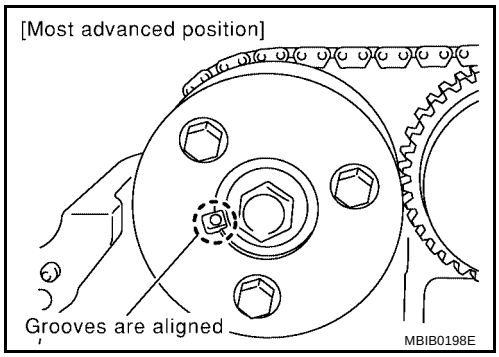
c. Slowly turn the intake camshaft in direction A (counterclockwise: intake manifold side).
   - Perform while applying air pressure.

   CAUTION:
   Be careful not to dislocate the camshaft retaining spanner.



d. During the above step, an operating click (a sound indicating internal lock pin is disengaged) is heard from the inside of the intake camshaft sprocket. After hearing it, slowly turn intake camshaft in direction B (clockwise: exhaust manifold side), and set to most advanced position.
   - Perform while applying air pressure.
   - When the vane rotates solely against sprocket, lock pin is disengaged even if operating click is not heard.
   - If the lock pin is not disengaged, jiggle the camshaft with a wrench.
   - If the lock pin is not disengaged with the above step, tap the intake camshaft in front with a plastic hammer.

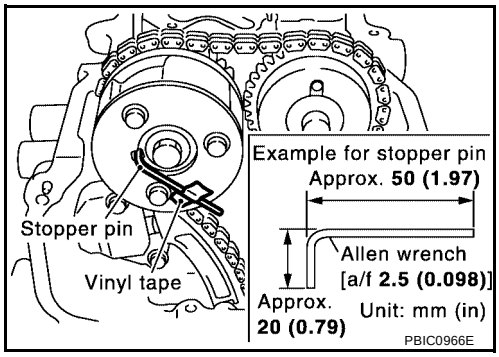
e. The following status indicates that the most advanced position is achieved: vane starts rotating on it own, then the sprocket also starts rotating when camshaft is turned. When above status is achieved, this step is complete.
   - The most advanced position is confirmed when the stopper pin groove and lock pin breathing groove are aligned.



f. Stop the air and insert stopper pin [approximately 3 mm (0.12 in) dia., length of inserted part is approximately 15 mm (0.59 in)] into pinhole on camshaft sprocket to fix the most advanced position.

   CAUTION:
   Load (spring reaction force) is not applied to stopper pin. Pin is easily detached. Therefore, secure it with vinyl tape to prevent detachment.

   NOTE:
   In the figure, an Allen wrench [a/f 2.5 mm (0.091 in), short part: approximately 20 mm (0.79 in), long part: approximately 50 mm (1.97 in)] is used for stopper pin as an example.



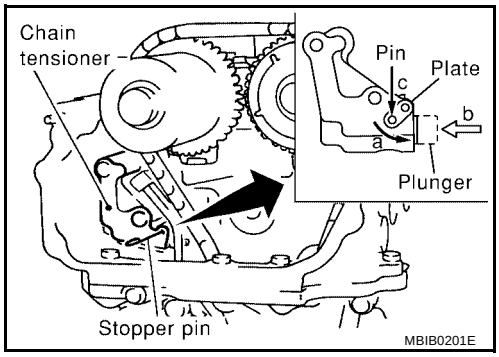
5. Remove the chain tensioner.

a. Press the plate down and release the stopper tab.

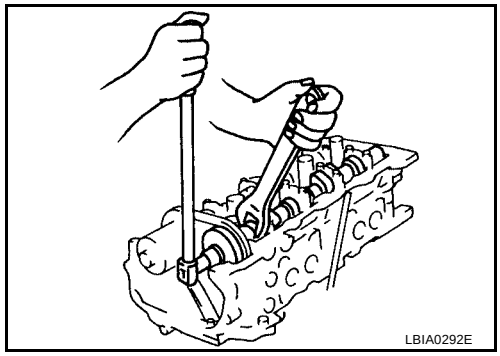
b. Insert the plunger into the tensioner body until it stops.

c. Secure the plate by passing the stopper pin (such as a hard wire) through the plate hole and body hole. (Plunger is also secured.)

d. Remove the chain tensioner bolts and remove the chain tensioner.

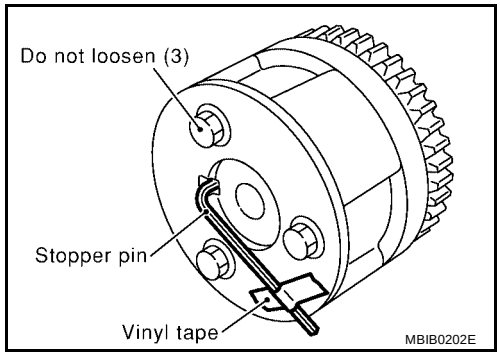


6. While holding the hexagonal part of the camshaft with a wrench, loosen the intake and exhaust camshaft sprocket bolts and remove the intake and exhaust camshaft sprockets.



CAUTION:
- **Avoid securing the camshaft at other than the hexagonal part and loosening bolts by utilizing tension of timing chain.**
- **After this step is completed, do not rotate crankshaft and camshaft separately in order to prevent interference between the valves and pistons.**

7. Handle the intake camshaft sprocket as follows.



CAUTION:
- **Secure the stopper pin with vinyl tape to prevent detachment.**
- **Avoid dropping it or subjecting it to impact.**
- **Do not disassemble. (Do not loosen the 3 bolts on front surface.)**

NOTE:
If stopper pin is detached and the lock pin is engaged at the most retarded position during removal, recover as follows.

a. Reinstall the stopper pin to intake camshaft, and tighten the intake camshaft sprocket bolts so that air does not leak.

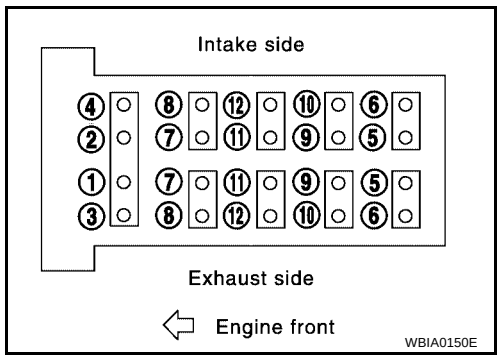
CAUTION:
Tightening torque for the bolts must be minimum so that air does not leak, preventing damage to the internal lock pin.

b. Apply air pressure to disengage the lock pin, and turn the vane to the most advanced position. (This step can be performed with the timing chain removed.)

c. Reinstall stopper pin.

d. Remove intake camshaft sprocket from the camshaft.

8. Loosen the camshaft bracket bolts in the order shown, and remove the camshaft brackets and camshafts.



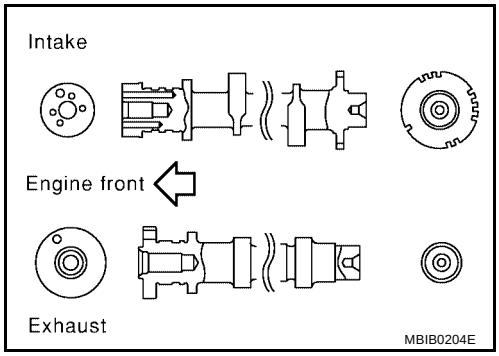
CAUTION:
Be careful not to damage signal plate on rear end of intake camshaft.

9. Remove adjusting shims and valve lifters.
   - Note positions, and set them aside in the order removed.

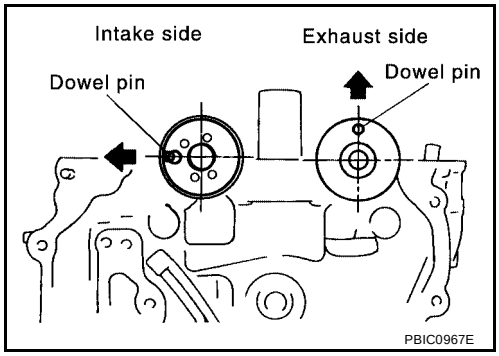
INSTALLATION

1. Install the valve lifter and adjusting shims.
   - Install them in the same position from which they were removed.
   - Install adjusting shim with its stamped mark facing down (valve lifter side).

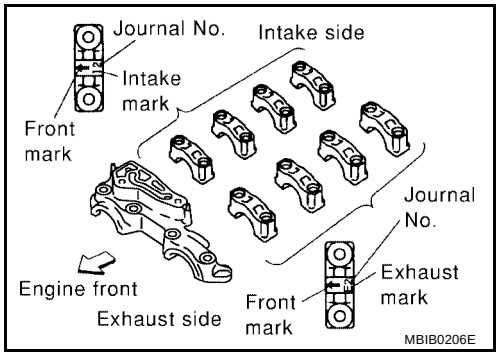
2. Install the camshafts.
   - Intake and exhaust camshafts are distinguished by checking difference between front and rear end shapes.



- Install camshafts so that the dowel pins on the front side are positioned as shown.



3. Install camshaft brackets.
- Completely remove any foreign material on mounting surfaces of camshaft brackets and mounting surface of cylinder head.
- Referring to marks on top surfaces of camshaft brackets, install them to their original positions and in their original directions.



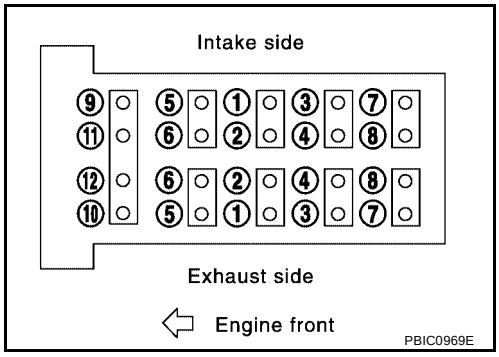
4. Tighten camshaft bracket bolts as follows.
   - Different bolts are used depending on installation location. Refer to following for proper bolt locations.

Bolt color:

1 to 10 in figure	**: black (reamer bolt)**
11 and 12 in figure	**: gold**

Camshaft bracket bolt

Step 1 (bolts 9 - 12)	**: 2.0 N-m (0.2 kg-m, 18 in-lb)**
Step 2 (bolts 1 - 8)	**: 2.0 N-m (0.2 kg-m, 18 in-lb)**
Step 3	**: 5.9 N-m (0.6 kg-m, 52 in-lb)**
Step 4	**: 9.0 - 11.8 N-m (0.92 - 1.2 kg-m, 80 - 104in-lb)**

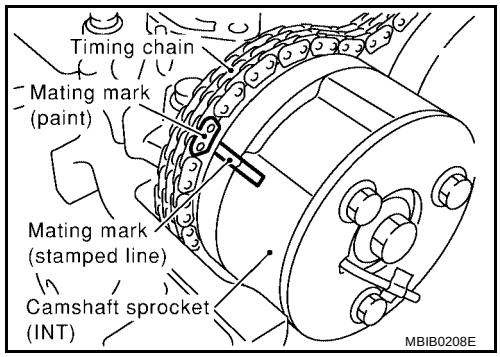


5. Install intake camshaft sprocket as follows.
   - Before installation, make sure that stopper pin is inserted in intake camshaft sprocket.

NOTE:
Service parts are provided with pin inserted.

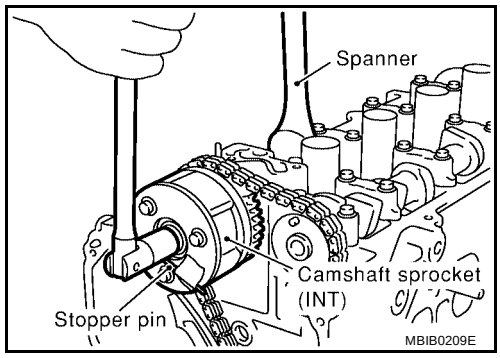
CAUTION:
Stopper pin is easily detached. Secure it with vinyl tape to prevent detachment.

a. Install timing chain by aligning the mating mark (marked when timing chain is removed) with mark on camshaft sprocket.
- Align dowel pin on camshaft front surface and pinhole on sprocket backside, then install.



b. While holding the hexagonal part of camshaft with a wrench, tighten intake camshaft sprocket bolt.
- Make sure that stopper pin is not detached.

Intake camshaft sprocket bolt	**: 78.4 - 88.2 N·m (8.0 - 9.0 kg-m, 58 - 65 ft-lb)**

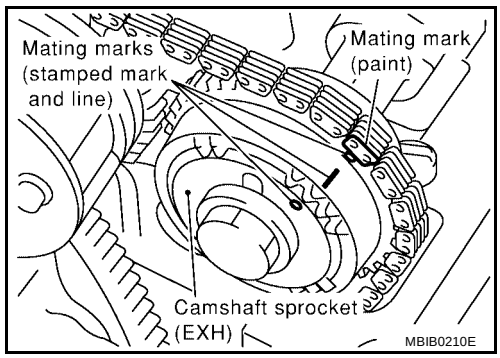


6. Install exhaust camshaft sprocket as follows.

a. Install timing chain by aligning the mating mark (marked when timing chain is removed) with mark on camshaft sprocket.
- Align dowel pin on camshaft front surface and pinhole on sprocket, then install.

b. While holding the hexagonal part of the camshaft with a wrench, tighten exhaust camshaft sprocket bolt.

Exhaust camshaft sprocket bolt	**: 98.1 - 127.5 N-m (10 - 13 kg-m, 73 - 94 ft-lb)**

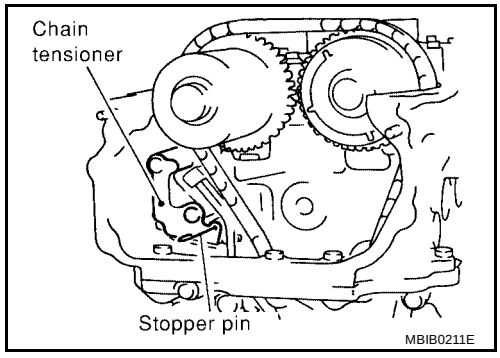


c. Make sure that mating marks on intake/exhaust camshaft sprockets and mating mark on timing chain are aligned.

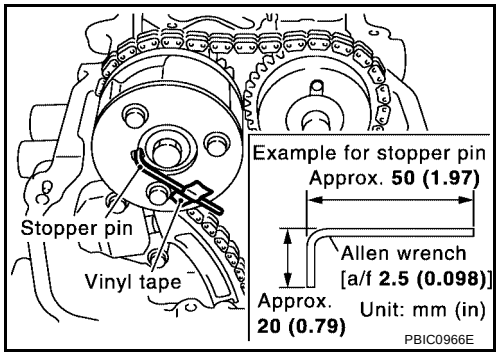
7. Install chain tensioner.
- Hold plate and plunger with a stopper pin, then install them.

Chain tensioner bolt	**: 6.28 - 8.34 N-m (0.64 - 0.85 kg-m, 56 - 73 in-lb)**

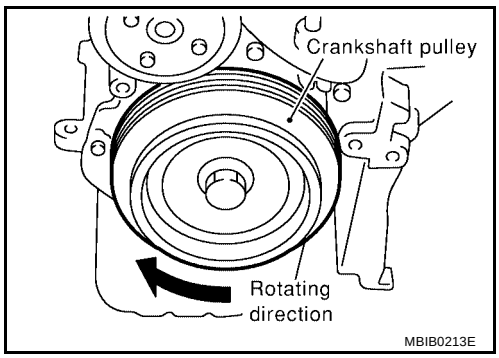
- After installation, remove stopper pin and release plunger.
- Make sure again that mating marks on intake/exhaust camshaft sprockets and mating mark on timing chain are aligned.



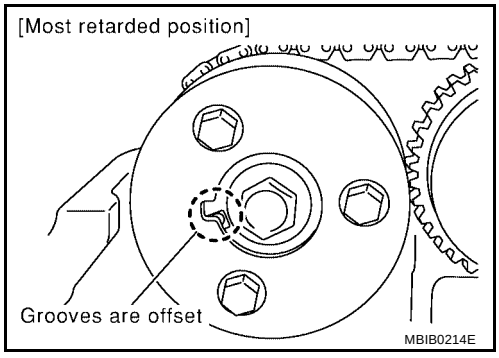
8. Remove stopper pin from intake camshaft sprocket.



9. Slowly turn crankshaft pulley clockwise to set intake camshaft sprocket to most retarded position.



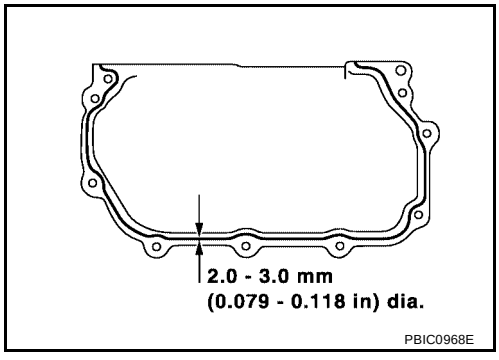
- The sprocket begins turning after the crankshaft does. Once sprocket starts turning, keep turning crankshaft until the vane (camshaft) also begins turning. The most retarded position should now be achieved.
- The most retarded position is confirmed when stopper pin groove is at a clockwise offset from lock pin breathing groove.
- While turning crankshaft slightly more counterclockwise, confirm that the lock pin is engaged when vane and sprocket turn together.



10. Install cylinder head front cover.
    - Apply Genuine Anaerobic Liquid Gasket or equivalent as shown in the figure. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .
    - Install it by aligning the dowel pin on the cylinder head.

    Cylinder head front cover bolts : 6.92 - 9.51 N-m (0.71 - 0.97 kg-m, 62 - 84 in-lb)

11. Check and adjust valve clearance. Refer to EM-38, "Valve Clearance" .
12. Installation of the remaining components is in the reverse order of removal.



INSPECTION AFTER REMOVAL

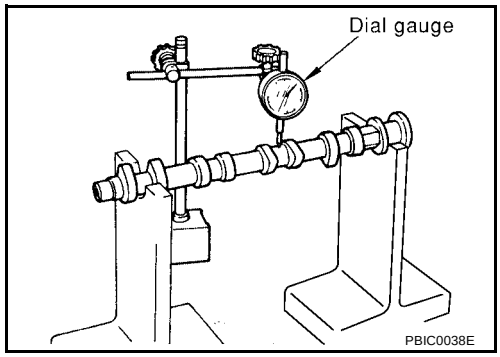
Check camshaft for scratches, seizure and wear.

Camshaft Runout

1. Put the camshaft on a V-block supporting the No.2 and No.5 journals.
2. Set the dial gauge vertically on the No.3 journal.
3. Turn camshaft in one direction by hand, and measure the camshaft runout on the dial gauge total indicator reading.

Standard : Less than 0.02 mm (0.0008 in)
Limit : 0.1 mm (0.004 in)

4. If it exceeds the limit, replace camshaft.

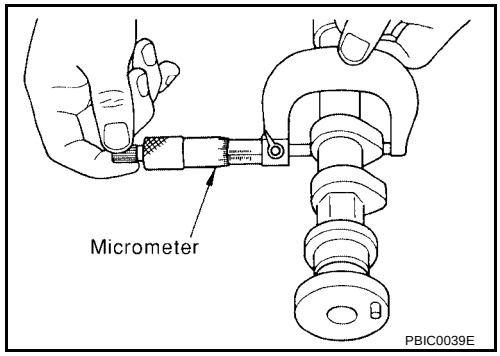


Camshaft Cam Height

1. Measure the camshaft cam height.

Standard intake cam height : 40.61 - 40.8 mm (1.599 - 1.606 in)
Standard exhaust cam height : 38.965 - 39.155 mm (1.534 - 1.542 in)
Cam wear limit : 0.20 mm (0.0079 in)

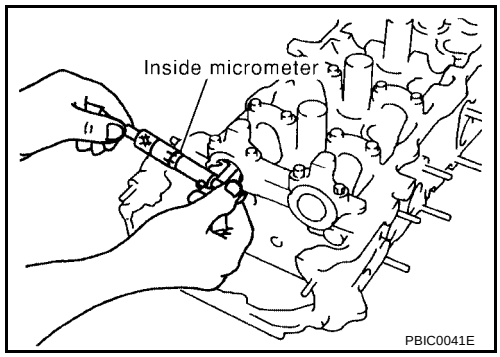
2. If wear is beyond the limit, replace the camshaft.



Camshaft Journal Clearance

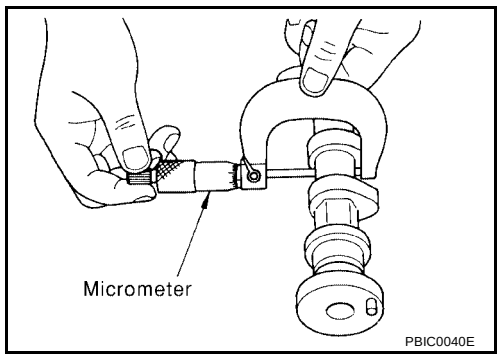
1. Install the camshaft brackets and tighten the bolts to specified torque.
2. Using inside micrometer, measure inner diameter of camshaft bracket.

Standard No. 1 Intake and exhaust : 28.000 - 28.021 mm (1.1024 - 1.1032 in)
Standard No.2, 3, 4, 5
Intake : 23.985 - 24.006 mm (0.9443 - 0.9451 in)
Exhaust : 24.000 - 24.021 mm (0.9449 - 0.9457 in)



3. Measure the outer diameter of the camshaft journal.

Standard No.1 : 27.935 - 27.955 mm (1.0998 - 1.1006 in)
Standard No. 2, 3, 4, 5 : 23.935 - 23.955 mm (0.9423 - 0.9431 in)



4. If the journal clearance exceeds the limit, replace camshaft and/or cylinder head.
   - (Camshaft journal clearance) = (inner diameter of camshaft bracket) – (outer diameter of camshaft journal)

Camshaft journal clearance

Standard

Intake : **0.030 - 0.071 mm (0.0012 - 0.0028 in)**

Exhaust : **0.045 - 0.086 mm (0.0018 - 0.0034 in)**

Limit

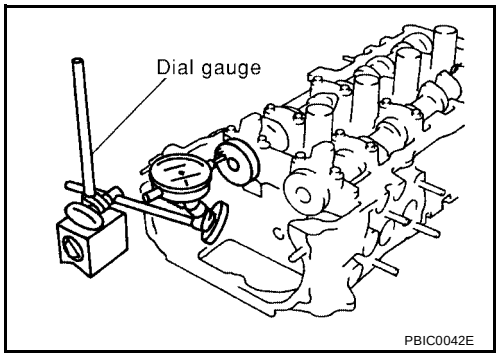
Intake : **0.135 mm (0.0053 in)**

Exhaust : **0.150 mm (0.0059 in)**

NOTE:
Inner diameter of the camshaft bracket is manufactured together with the cylinder head. If the camshaft bracket is out of specification, replace the entire cylinder head assembly.

Camshaft End Play

1. Install camshaft in cylinder head. Refer to EM-31, "INSTALLATION"
2. Install a dial gauge in the thrust direction on the front end of the camshaft. Measure the end play with the dial gauge while moving the camshaft forward and backward (in direction to axis).



Camshaft end play

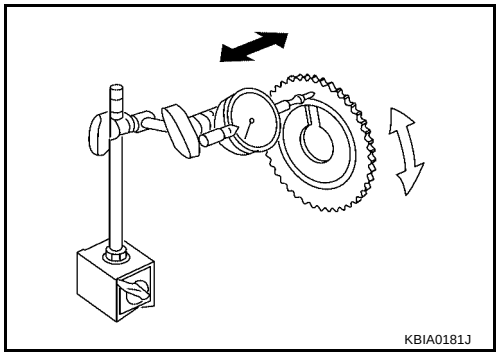
Standard : **0.115 - 0.188 mm (0.0045 - 0.0074 in)**

Limit : **0.20 mm (0.0079 in)**

3. If out of the specified range, replace with new camshaft and measure again.
4. If out of the specified range again, replace with new cylinder head assembly.

Camshaft Sprocket Runout

1. Install the camshaft sprocket on the camshaft.
2. Measure camshaft sprocket runout while turning the camshaft by hand.

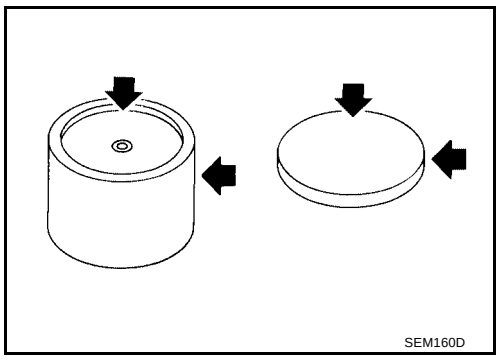


Runout (total indicator reading : **Less than 0.15 mm (0.0059 in)**

3. If it exceeds the specification, replace camshaft sprocket.

Valve Lifter and Valve Shim

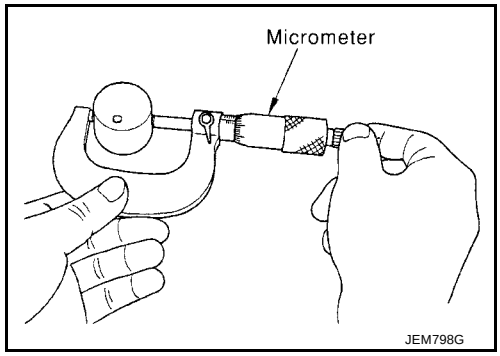
1. Check contact and sliding surfaces for excessive wear or cracks, replace as necessary.



2. Measure the valve lifter outer diameter.

Valve lifter outer diameter : 29.960 - 29.975 mm (1.1795 - 1.1801 in)

If out of the specified range, replace the valve lifter.

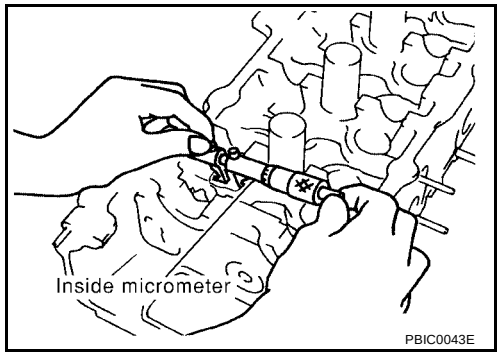


3. Measure the valve lifter guide bore.

Valve lifter guide bore : 30.000 - 30.021 mm (1.1811 - 1.1819 in)

4. Calculate valve lifter clearance. If out of specified range, replace valve lifter and/or cylinder head of whichever exceeds standard limit.
(Valve lifter clearance) = (valve lifter guide bore) – (outer diameter of valve lifter)

Valve lifter clearance : 0.025 - 0.065 mm (0.0010 - 0.0026 in)



Inspection After Installation

EBS00M48

INSPECTION OF CAMSHAFT SPROCKET (INT) OIL GROOVE

CAUTION:

- **Perform this inspection only when DTC P0011 is detected in self-diagnostic results of CONSULT II and it is directed according to inspection procedure of EC section. Refer to EC-175, "DTC P0011 IVT CONTROL" .**
- **Check when engine is cold so as to prevent burns from any splashing engine oil.**

1. Check engine oil level. Refer to LU-5, "ENGINE OIL" .
2. Perform the following procedure so as to prevent the engine from being unintentionally started while checking.

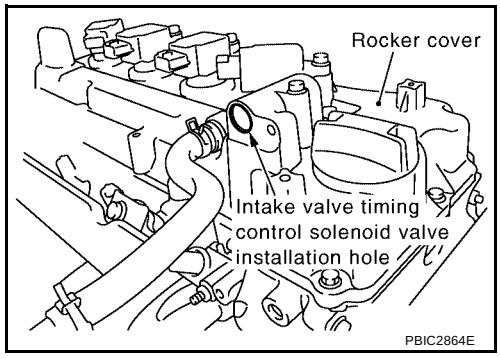
a. Release fuel pressure. Refer to EC-94, "FUEL PRESSURE RELEASE" .
b. Disconnect ignition coil and injector harness connectors if practical.

3. Remove IVT control solenoid valve. Refer to EM-28, "CAMSHAFT" .
4. Crank engine, and then make sure that engine oil comes out from IVT control cover oil hole. End cranking after checking.

WARNING:
Be careful not to touch rotating parts (drive belts, idler pulley, and crankshaft pulley, etc.).

CAUTION:

- **Engine oil may squirt from IVT control solenoid valve installation hole during cranking. Use a shop cloth to prevent engine oil from splashing on worker, engine components and vehicle.**
- **Do not allow engine oil to get on rubber components such as drive belts or engine mount insulators. Immediately wipe off any splashed engine oil.**



5. Clean oil groove between oil strainer and IVT control solenoid valve if engine oil does not come out from IVT control cover oil hole. Refer to LU-4, "LUBRICATION SYSTEM" .
6. Remove components between IVT control solenoid valve and camshaft sprocket (INT), and then check each oil groove for clogging.
   - Clean oil groove if necessary. Refer to LU-4, "Lubrication Circuit" .
7. After inspection, installation of the remaining components is in the reverse order of removal.

Valve Clearance

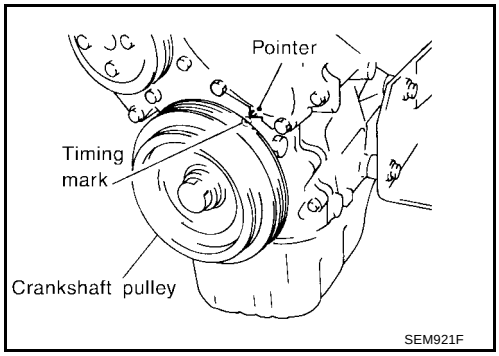
EBS00CES

INSPECTION

NOTE:
The following procedure is applicable when: components related to camshafts or valves are removed, installed, or replaced. Driveability concerns (poor starting, poor idling, noise) are caused by valve clearance aging.

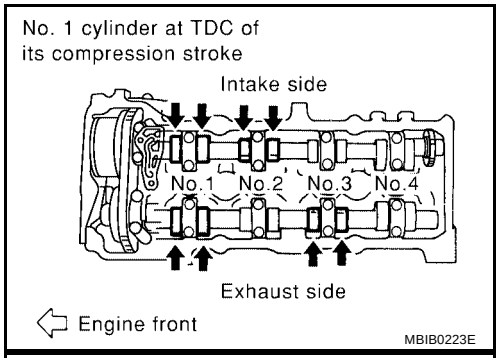
1. Warm engine and stop.
2. Remove RH splash cover.
3. Remove the rocker cover. Refer to EM-25, "ROCKER COVER" .
4. Remove all of the spark plugs.
5. Set No. 1 cylinder at TDC on its compression stroke.
   - Align pointer with TDC mark on crankshaft pulley.
   - Check that both intake and exhaust cam noses on No. 1 cylinder face outward.
   - If not, turn crankshaft one revolution (360°) and align as described above.

   NOTE:
   Or, valves to be checked when No. 4 cylinder is at TDC of its compression stroke can be checked first following step 8.

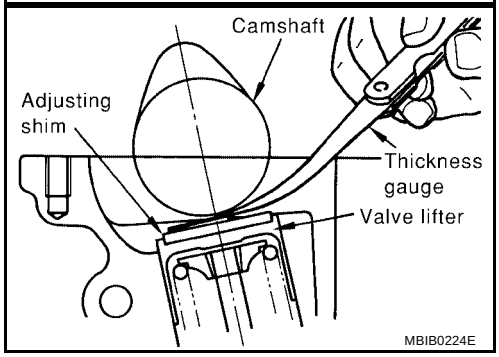


6. Referring to figure, measure valve clearances of valves with x in table below using a thickness gauge.

Cylinder	No. 1		No. 2		N0. 3		No. 4	
Valve	INT	EXH	INT	EXH	INT	EXH	INT	EXH
No. 1 cylinder at TDC of its compression stroke	X	X	X			X		



- Using a feeler gauge, measure clearance between valve lifter and camshaft.
- Record any valve clearance measurements which are out of specification. They will be used later to determine the required replacement adjusting shim.

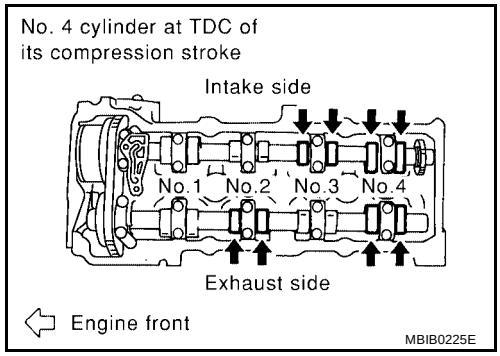


Valve clearance standard:		
Hot	**Intake**	**: 0.32 - 0.40 mm (0.013 - 0.016 in)**
	Exhaust	**: 0.37 - 0.45 mm (0.015 - 0.018 in)**
Cold*	**Intake**	**: 0.25 - 0.33 mm (0.010 - 0.013 in)**
	Exhaust	**: 0.32 - 0.40 mm (0.013 - 0.016 in)**
***:Approximately 20°C (68°F) (Reference data)**		
If an adjustment is done with a cold engine, confirm reference values with hot engine are met.		
Limit values with hot engine (reference)	**Intake**	**: 0.21 - 0.47 mm (0.008 - 0.019 in)**
	Exhaust	**: 0.30 - 0.56 mm (0.012 - 0.022 in)**

7. Turn crankshaft one revolution (360°) to position No. 4 cylinder at TDC of its compression stroke.

8. Check only those valves shown in the figure and marked with an x in the table.

Cylinder	No. 1		No. 2		N0. 3		No. 4	
Valve	INT	EXH	INT	EXH	INT	EXH	INT	EXH
No. 4 cylinder at TDC of its compression stroke				X	X		X	X

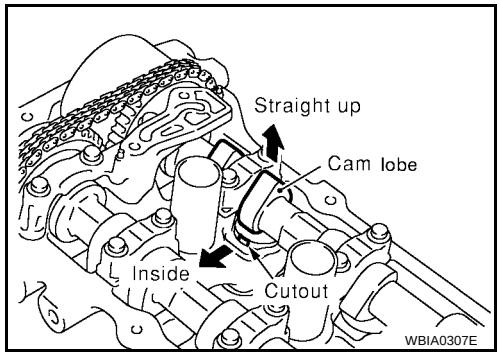


9. If outside the standard, adjust applicable valves. Refer to EM-39, "ADJUSTING" .

ADJUSTING

NOTE:
Adjust valve clearance while engine is cold.

1. Turn crankshaft clockwise (viewed from front) to position cam lobe upward on camshaft for valve that must be adjusted.
2. Turn valve lifter and adjusting shim to removal direction.
   - Using a slotted screwdriver with an extra-thin tip, turn the valve lifter cutout in the direction shown by the arrow.

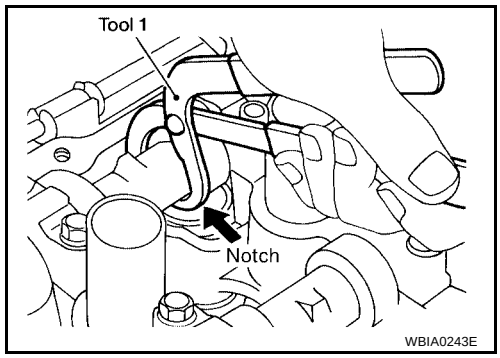


3. Place Tool (1) around camshaft as shown.

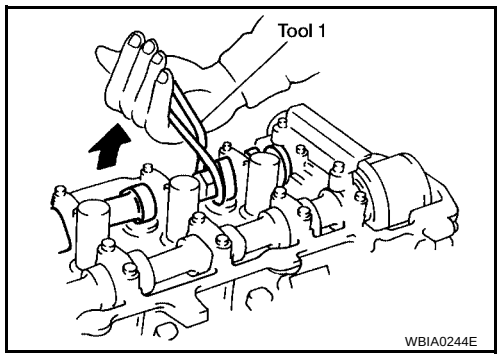
   Tool number : 45074-1

   NOTE:
   Before placing Tool (1), rotate notch toward center of cylinder head. This will simplify shim removal later.

   CAUTION:
   - **Be careful not to damage camshaft and cylinder head.**
   - **Be careful not to damage surroundings of valve lifter.**



4. Rotate Tool (1) so that valve lifter is pushed down, compressing the spring.

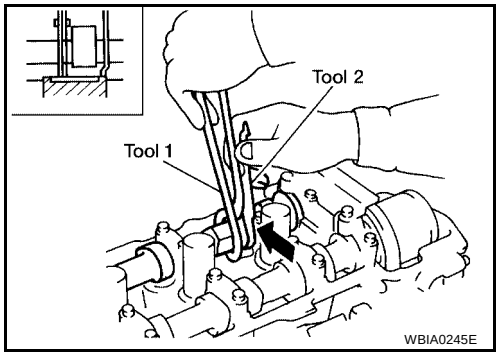


5. Place Tool (2) between camshaft and valve lifter to retain valve lifter.

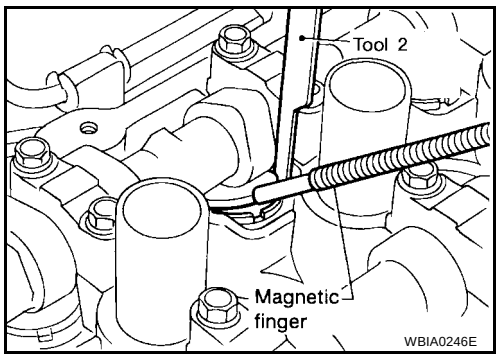
Tool number : 45074-2

CAUTION:

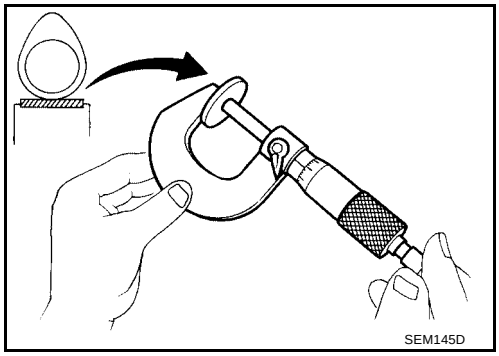
- **If camshaft pliers are suddenly turned back, the lifter stopper may contact and damage the camshaft journals. Turn back the camshaft pliers carefully to remove.**
- **Tool (2) must be placed as close to camshaft bracket as possible.**
- **Be careful not to damage cam surface with Tool (2).**



6. Remove Tool (1).
7. Remove adjusting shim using Tool and a magnetic finger.



8. Determine replacement adjusting shim size using the following formula.
   - Use a micrometer to determine thickness (t1) of removed shim at camshaft contact face (around center).
   - Use t1 + (C1-C2) to calculate thickness of new adjusting shim so valve clearance comes within specified values.
     t1 = Thickness of removed shim
     C1 = Measured valve clearance
     C2 = Standard valve clearance



Hot engine:

Intake : 0.32 - 0.40 mm (0.013 - 0.016 in)

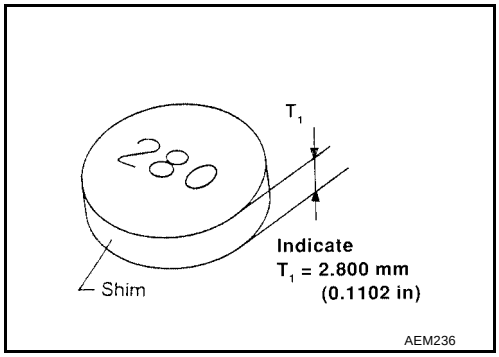
Exhaust : 0.37 - 0.45 mm (0.015 - 0.018 in)

Reference values with cold engine:

Intake : 0.25 - 0.33 mm (0.010 - 0.013 in)

Exhaust : 0.32 - 0.40 mm (0.013 - 0.016 in)

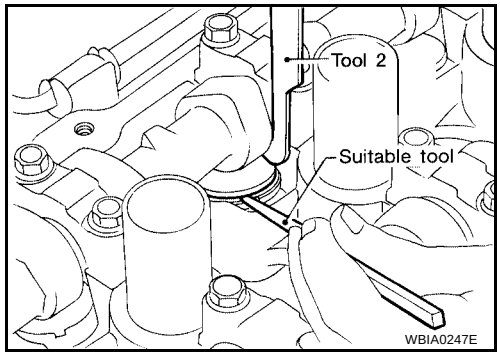
- Thickness of new adjusting shim is indicated with stamped mark on its back.
- Shims are available in 50 sizes from 2.00 mm (0.0787 in) to 2.98 mm (0.1173 in), in steps of 0.02 mm (0.0008 in).
- Select the closest size shim to the calculated thickness. Refer to EM-86, "AVAILABLE SHIMS" .



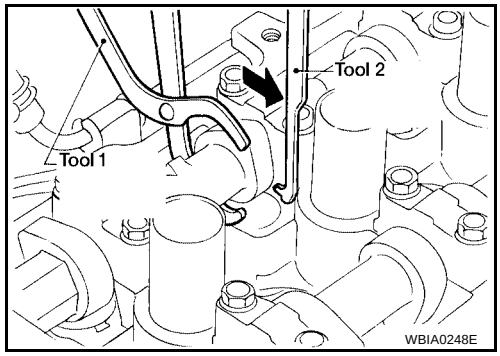
9. Install new shim using Tool (2).

Tool number : 45074-2

- Install with the surface on which the thickness is stamped facing down.



10. Place Tool (1) as explained in steps 4 and 5.
11. Remove Tool (2).
12. Remove Tool (1).
13. Turn the crankshaft a couple of times by hand.
14. Recheck the valve clearance.

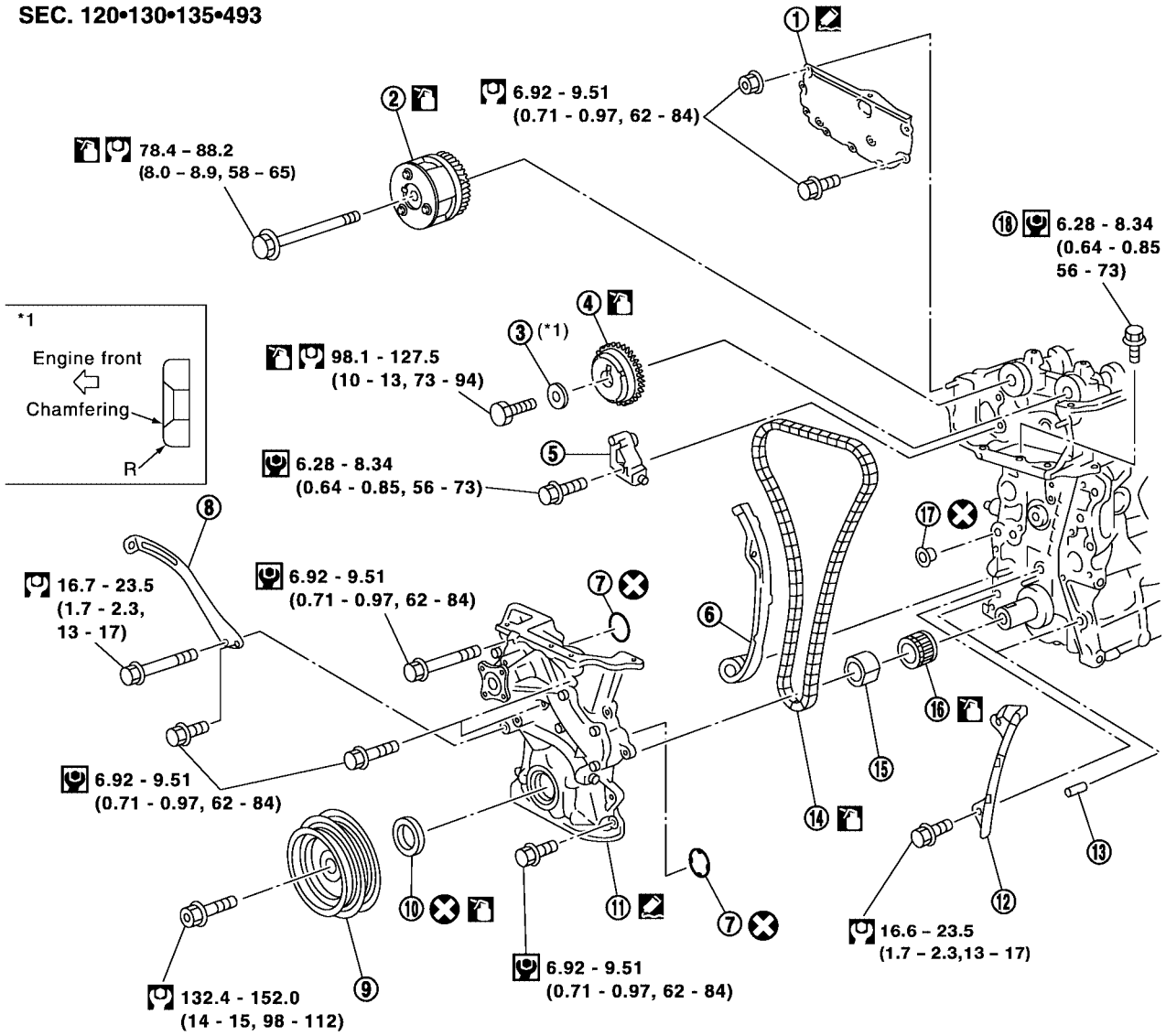


TIMING CHAIN

PFP:13028

Components

EBS00CEH



1.	Cylinder head front cover	2.	Camshaft sprocket (INT)	3.	Washer
4.	Camshaft sprocket (EXH)	5.	Chain tensioner	6.	Chain slack guide
7.	O-ring	8.	Power steering pump adjusting bar	9.	Crankshaft pulley
10.	Front oil seal	11.	Front cover	12.	Chain tensioner guide
13.	Dowel pin	14.	Timing chain	15.	Oil pump drive spacer
16.	Crankshaft sprocket	17.	O-ring (with collar)	18.	Auxiliary bolt of cylinder head

CAUTION:

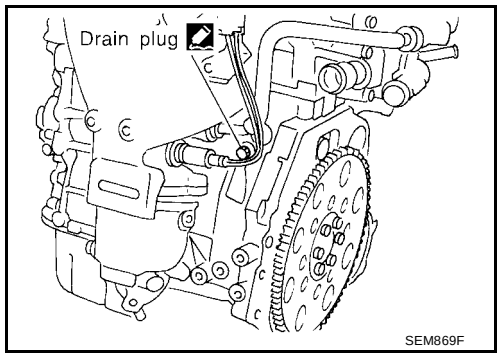
- **After removing timing chain, do not turn crankshaft and camshaft separately, or valves will strike piston heads.**
- **When installing chain tensioner, oil seats, or other sliding parts, lubricate contacting surfaces with new engine oil.**

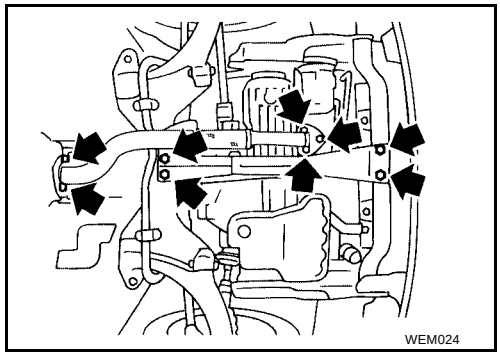
- **Apply new engine oil to bolt threads and seat surfaces when installing camshaft sprocket and crankshaft pulley.**

Removal

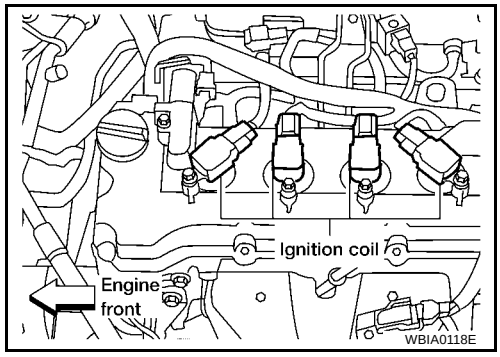
EBS00CEI

1. Disconnect battery negative cable.
2. Drain engine coolant. Refer to MA-16, "DRAINING ENGINE COOLANT" .
   Be careful not to spill coolant on drive belts.
3. Drain engine oil. Refer to MA-20, "Changing Engine Oil" .
4. Remove the following belts.
   - Power steering pump drive belt
   - Alternator drive belt
5. Remove power steering pump from adjusting bar.
6. Remove generator. Refer to SC-31, "Removal" .
7. Remove front RH wheel. Refer to WT-4, "Removal" .
8. Remove front/right-side splash undercover.
9. Remove front exhaust tube. Refer to EX-3, "Removal and Installation" .

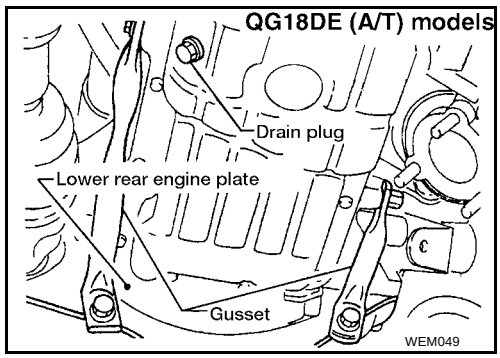


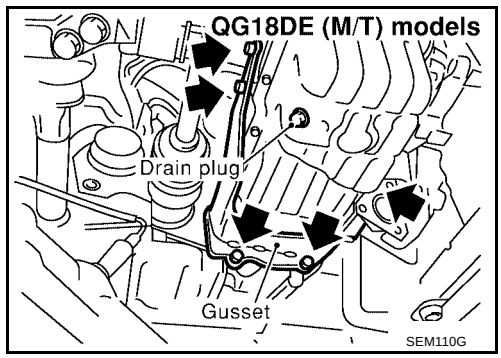


10. Disconnect vacuum hoses for:
    - EVAP canister
    - Brake power booster
11. Remove ignition coils.
12. Remove spark plugs.
13. Remove rocker cover. Refer to EM-25, "REMOVAL"



14. Remove gusset.





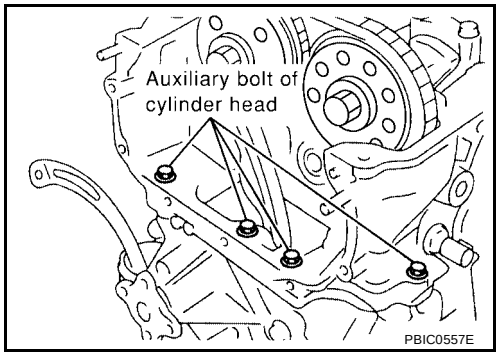
15. Remove rear plate (lower)(A/T models).
16. Remove oil pan and oil strainer. Refer to EM-18, "Removal" .
17. Remove RH engine mounting and RH engine mounting bracket. Refer to EM-65, "ENGINE ASSEMBLY" .

a. Remove any parts that make it difficult to remove RH mount.
b. Support cylinder block bottom surface with a transmission jack.

CAUTION:
- **When positioning jack, use a wooden block to avoid damage to the oil pan mounting surface.**

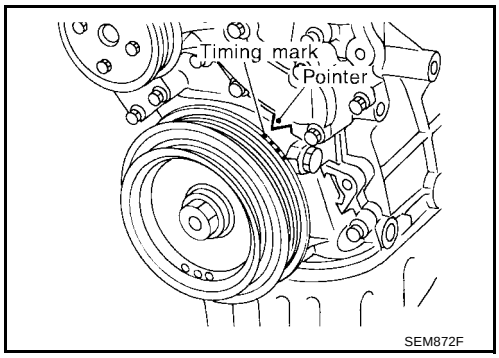
c. Separate and remove engine mounting bracket and engine mounting.

18. Remove cylinder head front cover.
19. Remove auxiliary bolts of cylinder head.

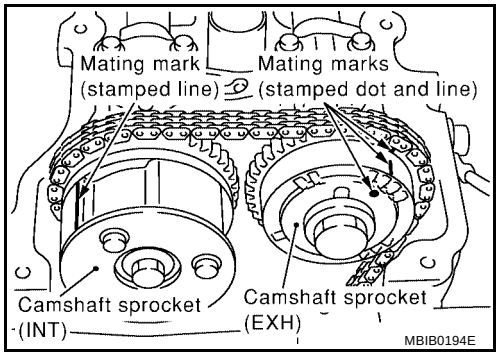


20. Set No. 1 piston at TDC on its compression stroke.

a. Turn the crankshaft pulley clockwise, and align the pointer to the timing mark on the pulley.



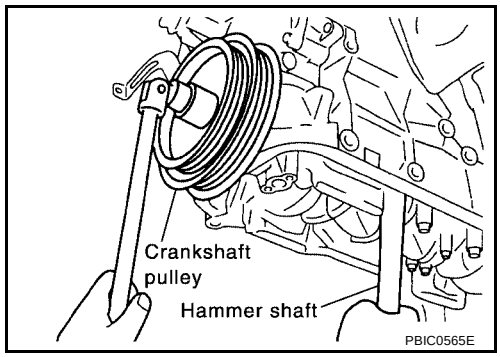
b. Make sure the camshaft sprocket mating mark is in the position shown in the figure.
   - If the mating mark is not in position, turn the crankshaft pulley once more and position it.



21. Remove crankshaft pulley as follows.

a. Secure crankshaft counterweight with the handle of a hammer, and loosen crankshaft pulley bolt.

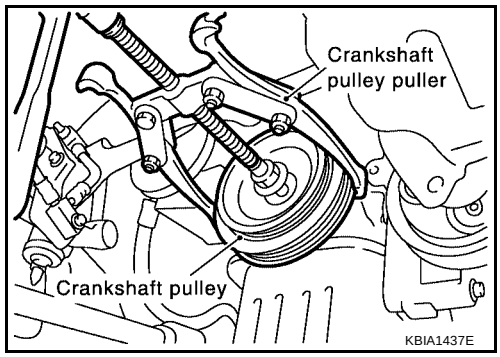
CAUTION:
Take care to prevent foreign material from entering the engine.



b. Remove crankshaft pulley using crankshaft pulley puller.

CAUTION:
- **Hook tab onto back of crankshaft pulley only.**
- **Do not remove crankshaft pulley bolt. Fully loosen, and then use it as support point.**

22. Remove water pump pulley and idler pulley bracket assembly.
23. Remove the water pump. Refer to CO-10, "Removal and Installation" .

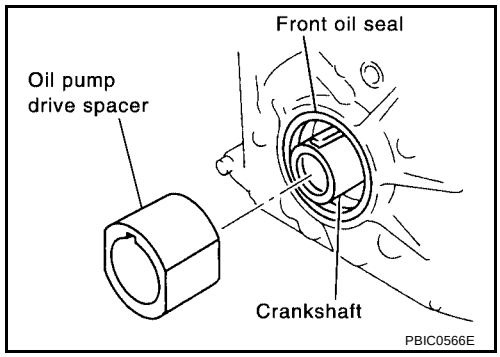


24. Remove front cover as follows.

a. To ease front cover removal, pull oil pump drive spacer out through front oil seal.
- Pull it straight out using long nose pliers or two flat-bladed screwdrivers.

CAUTION:
Be careful not to damage side of oil pump drive spacer and front oil seal lip.

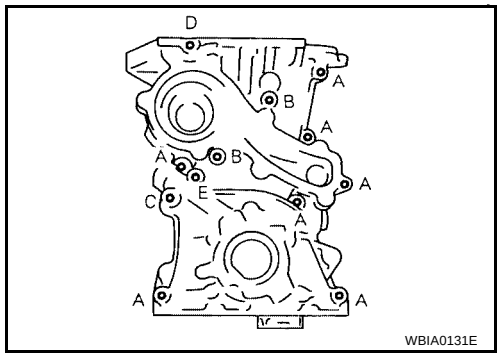
b. Remove power steering pump adjusting bar.



c. Remove front cover carefully.
- Remove mounting bolts A - E shown in figure.

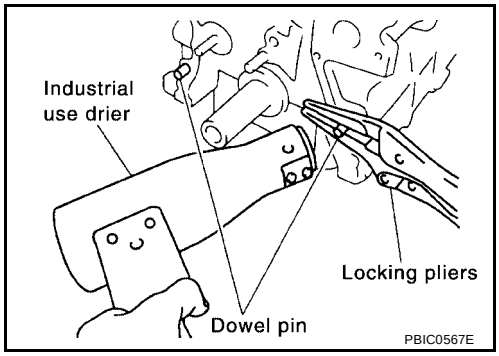
NOTE:
Bolts C and E have been removed in step b.

CAUTION:
- **When removing, be careful not to damage or bend front end of cylinder head gasket. Also after peeling off contact surface between front cover and gasket, their surfaces shall be smooth.**
- **If cylinder head gasket is damaged, replace it with a new one.**

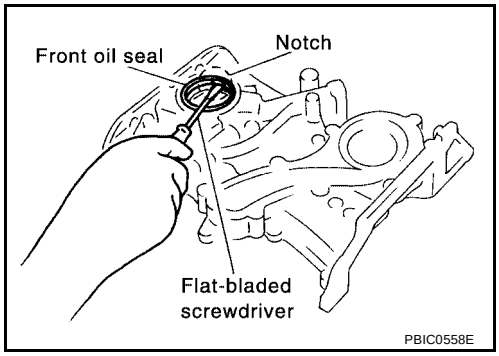


d. Remove O-rings from front cover and cylinder block.

25. Pull two dowel pins for front cover out of cylinder block.
    - **Heat them sufficiently with industrial dryer, then pull them out using locking pliers.**



26. If front oil seal is to be replaced, remove it from the front cover.
    - Insert a flat-bladed screwdriver in notch on oil seal mounting point, and pry out oil seal.



27. Set the intake camshaft sprocket to the most advanced position.

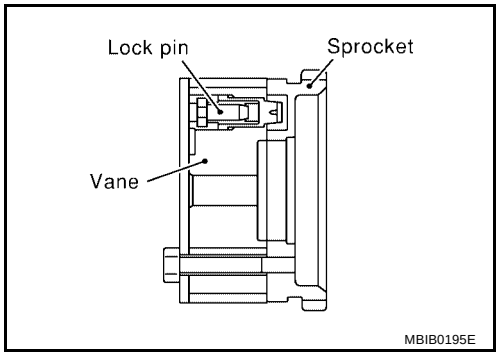
    CAUTION:

    Do not remove the chain tensioner before performing this step.

    CAUTION:

    Removal/installation of the intake camshaft sprocket is required to maintain the most advanced position because of the following reasons. Therefore, follow the procedure exactly.

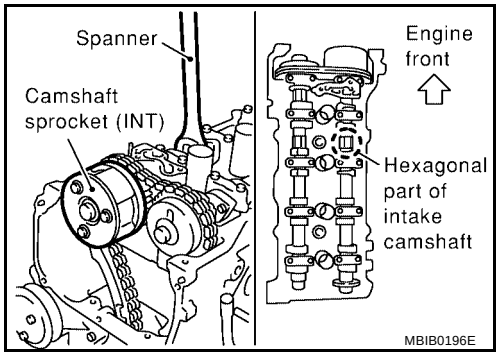
    - **Sprocket and vane (camshaft in front) rotate and become offset within the specific angle range.**
    - **When engine is stationary, the vane is located at the most retarded position. The vane is fixed to the sprocket by an internal lock pin. Therefore, it does not rotate.**
    - **If the camshaft sprocket mounting bolts are turned under the above circumstance, the lock pin will be damaged by lateral load (shear stress). It may cause non-standard operation.**



    NOTE:

    "Rotating direction" means direction viewed from the engine front side.

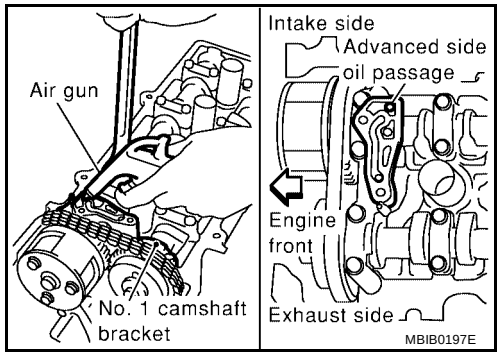
a. Using a wrench, hold the hexagonal part so that the intake camshaft does not move.



b. Using an air gun, apply air pressure to the intake valve timing control solenoid valve advance side oil passage on the top surface of the No. 1 camshaft bracket.

Compression pressure **:300 kPa (3.06 kg/cm2, 43.5 psi) or more**

- Keep applying air pressure until substep d is completed.



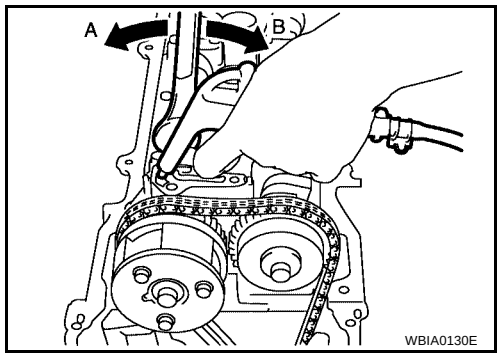
CAUTION:

- **Be careful not to damage the oil passage from interference of the air gun tip.**
- **Thoroughly wipe off the oil before applying air pressure. When applying air pressure, cover around the air gun using a rag. Wear protective glasses if necessary.**

c. Slowly turn the intake camshaft in direction A (counterclockwise: intake manifold side).

CAUTION:

Be careful not to dislocate the camshaft retaining spanner.

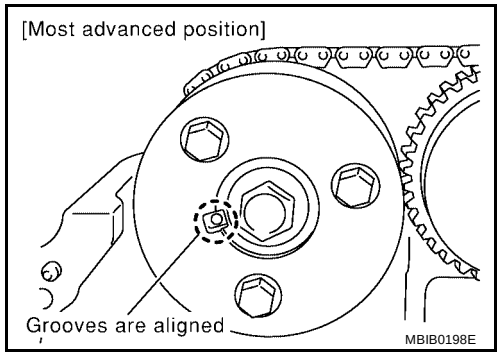


d. During the above step, an operating click (a sound indicating internal lock pin is disengaged) is heard from the inside of the intake camshaft sprocket. After hearing it, slowly turn intake camshaft in direction B (clockwise: exhaust manifold side), and set to most advanced position.

- Perform while applying air pressure.
- When the vane rotates solely against sprocket, lock pin is disengaged even if operating click is not heard.
- If the lock pin is not disengaged, jiggle the camshaft with a wrench.
- If the lock pin is not disengaged with the above step, tap the intake camshaft in front with a plastic hammer.

e. The following status indicates that the most advanced position is achieved: vane starts rotating on it own, then the sprocket also starts rotating when camshaft is turned. When above status is achieved, this step is complete.

- The most advanced position is confirmed when the stopper pin groove and lock pin breathing groove are aligned.



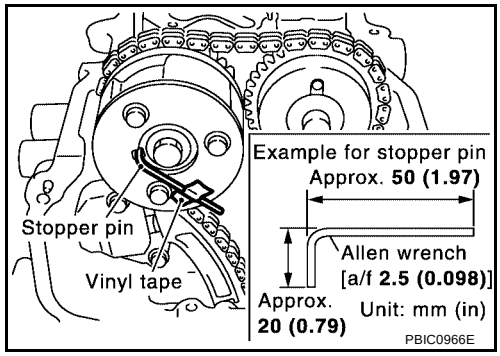
f. Stop the air and insert stopper pin [approximately 3 mm (0.12 in) dia., length of inserted part is approximately 15 mm (0.59 in)] into pinhole on camshaft sprocket to fix the most advanced position.

CAUTION:

Load (spring reaction force) is not applied to stopper pin. Pin is easily detached. Therefore, secure it with vinyl tape to prevent detachment.

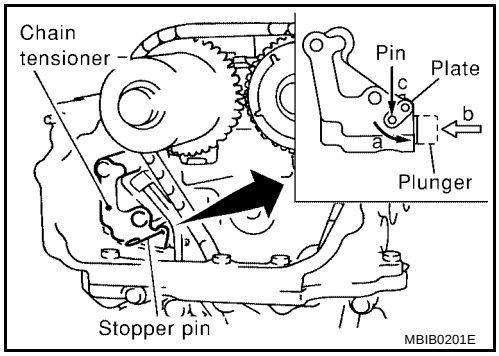
NOTE:

In the figure, an Allen wrench [a/f 2.5 mm (0.098 in), short part: approximately 20 mm (0.79 in), long part: approximately 50 mm (1.97 in)] is used for stopper pin as an example.



28. Remove the chain tensioner.
    - Remove in the following order.

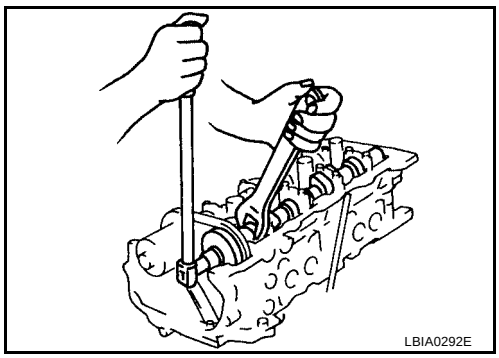
a. Press the plate down and release the stopper tab.
b. Insert the plunger into the tensioner body until it stops.
c. Secure the plate by passing the stopper pin (such as a hard wire) through the plate hole and body hole. (Plunger is also secured.)
d. Remove the mounting bolts and remove the chain tensioner.



29. While holding the hexagonal part of the camshaft with a wrench, loosen the mounting bolts and remove the intake and exhaust camshaft sprockets.

    CAUTION:
    - **Avoid securing the camshaft at other than the hexagonal part and loosening mounting bolts by utilizing tension of timing chain.**
    - **After this step is completed, do not rotate crankshaft and camshaft separately in order to prevent interference between the valves and pistons.**

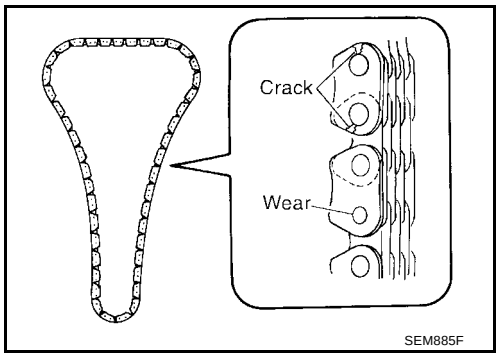
30. Remove the timing chain, timing chain slack guide and tension guide.
31. Remove crankshaft sprocket.



INSPECTION AFTER REMOVAL

EBS00CEJ

Check for cracks and excessive wear at roller links. Replace if necessary.



INSTALLATION

EBS00CEK

CAUTION:
- **Use a scraper to completely remove all liquid gasket adhering to mounting surface. De-grease and clean mounting surfaces.**
- **After installation, wipe off any protruding liquid gasket.**

1. Install timing chain and its related parts as follows.
   - Refer to figure for proper alignment positions for the sprockets, timing chain and their related parts.
   - Install each sprocket with its mating mark facing the engine front side.

a. Install timing chain and crankshaft sprocket.
   - Make sure that the crankshaft key points straight up (No. 1 cylinder is at TDC).
   - Hook timing chain on front end of camshaft so that it will not fall off.

b. Install timing chain slack guide and tension guide.

c. Install the camshaft sprocket. Refer to EM-31, "INSTALLATION" .

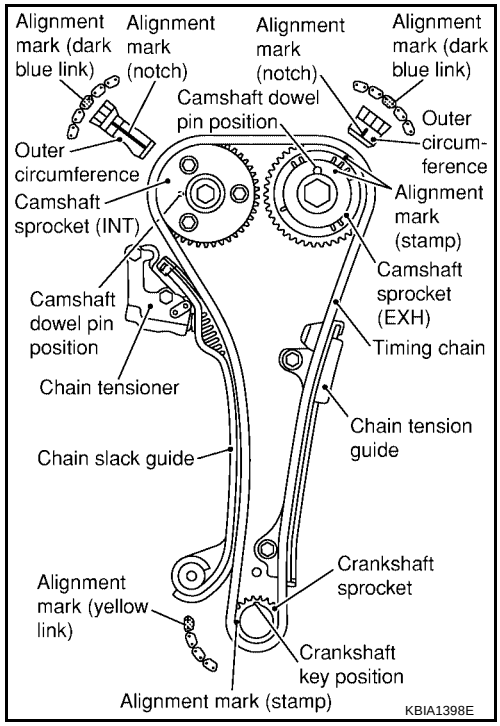
d. Install the chain tensioner. Refer to EM-31, "INSTALLATION" .

e. Make sure that mating marks are properly aligned.

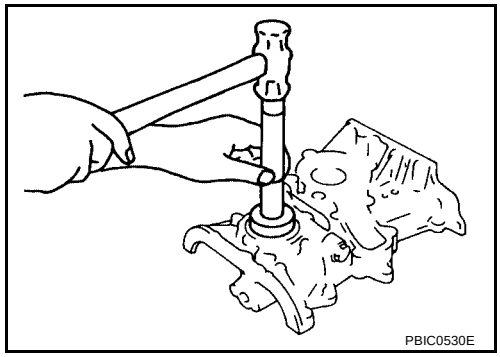
f. Temporarily install the oil pump drive spacer, crankshaft pulley and crankshaft pulley bolt so that the crankshaft can be rotated.

g. Rotate crankshaft clockwise several times to make sure it rotates normally.

h. Remove components installed in step f.



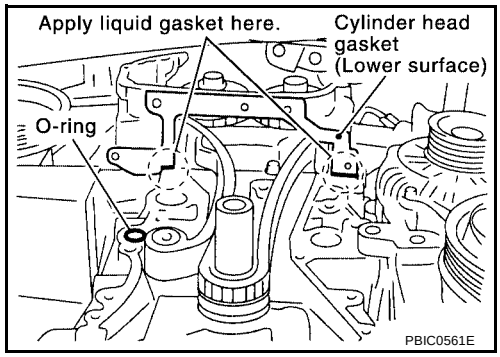
2. Install front oil seal to front cover.
   - Install it so that identification letters on oil seal will face toward front side of the engine.
   - Using an oil seal drift, press oil seal in until it is flush with end surface of mounting position.
   - Make sure that oil seal outer circumference is free from damage and burrs.



3. Install front cover as follows.

a. Install O-ring to cylinder block.

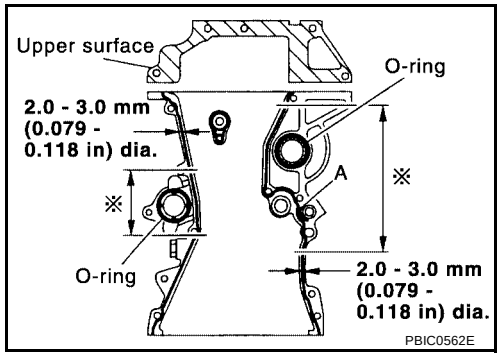
b. Apply a continuous bead of sealant to the positions shown in the figure between the cylinder head gasket lower surface and the cylinder block.
   - Use Genuine RTV Silicone Sealant, or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .



c. Apply a continuous bead of sealant to the back surface of the front cover as shown in the figure.
   - Use Genuine RTV Silicone Sealant, or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .

CAUTION:
- **Do not apply sealant to groove A shown in figure.**
- **Be especially careful of amount of sealant being applied in locations indicated with a * in the figure.**

d. Apply sealant to the top surface of front cover lightly and evenly.

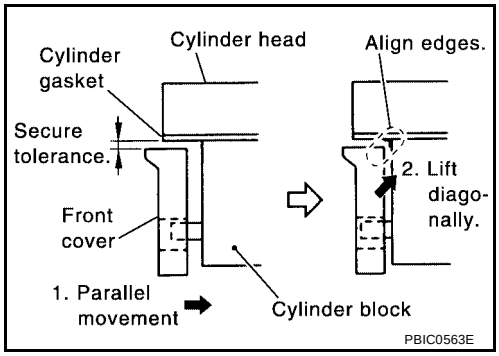


- Use Genuine RTV Silicone Sealant, or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .

e. Install O-ring to back surface to front cover.

f. With socket oil pump inner rotor placed on crankshaft top surface (clearance between front cover top surface and cylinder head gasket lower surface is secured), move front cover close to cylinder block.

g. Lift front cover at an angle and install it to mounting position so that front cover will come in contact with both cylinder head gasket lower surface and cylinder block front surface at the same time.

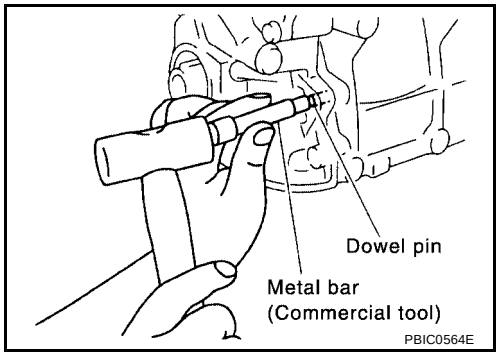


CAUTION:

- **Be careful not to damage cylinder head gasket.**
- **Make sure both sealing surfaces are contacted at the same time to ensure proper sealant adhesion and location.**

h. Install the front cover with bolts temporarily so that front cover will not move.

i. Press fit the dowel pin into the cylinder block through the front cover.

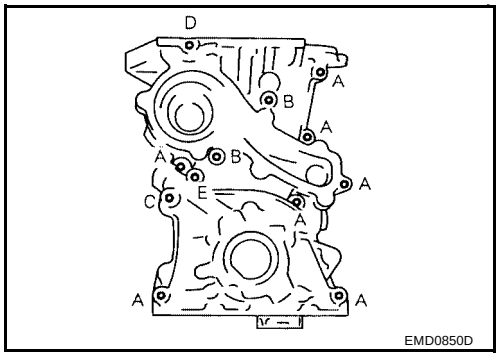


j. Tighten the front cover bolts temporarily.

- A [M6 x 20 mm (0.79 in)], B [M6 x 40 mm (1.57 in)], C [M8 x 70 mm (2.76)], D [M6 x 73 mm (2.87 in)]
- Bolt C also secures the power steering pump adjusting bar.
- Bolt E [M6 x 12 mm (0.47 in)] is for installing power steering pump adjusting bar.

k. Tighten the cylinder head auxiliary bolts (M6) temporarily.

l. Tighten the front cover bolts and cylinder head auxiliary bolts to specified torque.

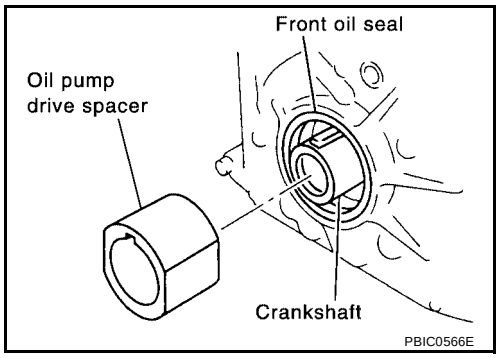


4. Install oil pump drive spacer.

- When installing, align with flat of oil pump rotor.
- If they are not aligned, rotate inner rotor with a flat-bladed screwdriver to align them.

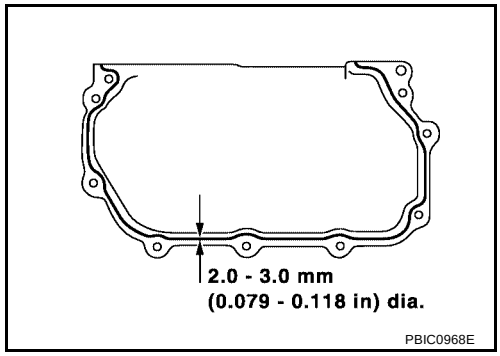
CAUTION:
Be careful not to damage oil seal lips.

5. Install the water pump. Refer to CO-10, "Removal and Installation" .
6. Install water pump pulley and idler pulley bracket assembly.
7. Install crankshaft pulley.



- When installing it, make sure that front oil seal lip is not inverted and garter spring is in position.
- Secure crankshaft counterweight with the handle of a hammer, and tighten crankshaft pulley bolt.

8. Install cylinder head front cover.
   - Apply Silicone RTV Sealant to cylinder head front cover in the specified thickness, as shown.
   - Use Genuine Silicone RTV Sealant or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .
9. Install engine front mounting bracket and engine front mounting. Refer to EM-65, "Removal and Installation" .
10. Installation of the remaining components is in reverse order of removal.



INSPECTION AFTER INSTALLATION

EBS00EWU

- In order to allow sealant to cure, perform inspection at least 30 minutes after the last step involving sealant is installed.
- With engine warmed up, check each part for engine oil leakage.

OIL SEAL

PFP:00100

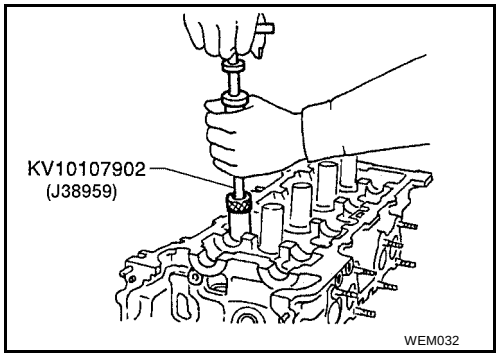
Replacement

EBS00CEL

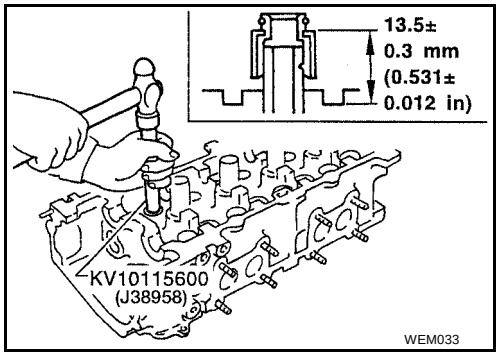
VALVE OIL SEAL

1. Remove rocker cover. Refer to EM-25, "Removal and Installation" .
2. Remove camshaft. Refer to EM-28, "Removal and Installation" .
3. Remove valve spring. Refer to EM-59, "DISASSEMBLY" .
4. Remove valve oil seal using Tool.

   CAUTION:
   Piston concerned should be set at TDC to prevent valve from falling into combustion chamber.



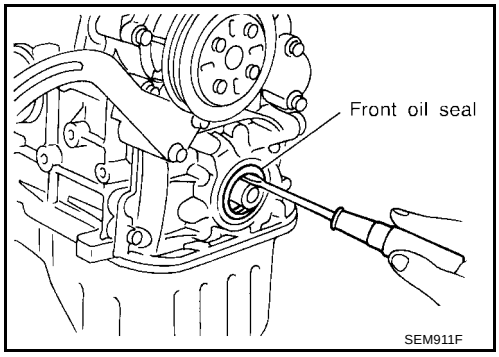
5. Apply new engine oil to new valve oil seal and install it using Tool.



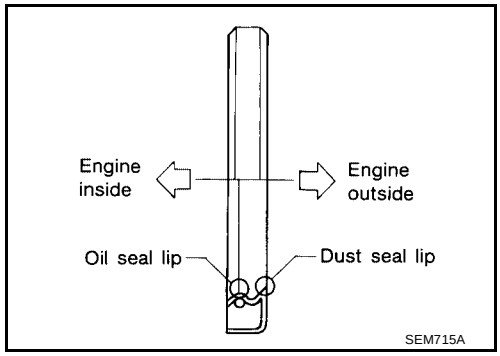
FRONT OIL SEAL

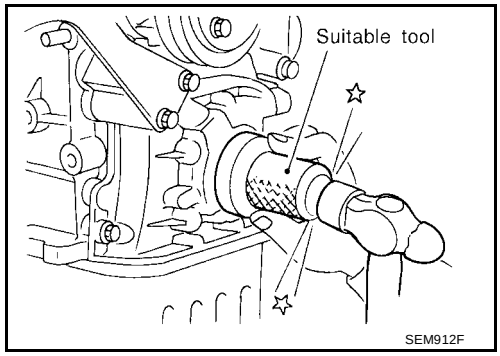
1. Remove the following parts:
   - Engine under cover
   - RH engine side cover
   - Generator and power steering drive belts
   - Crankshaft pulley
2. Remove front oil seal from front cover using suitable tool.

   CAUTION:
   Be careful not to scratch front cover.



3. Apply new engine oil to new oil seal and install it using a suitable tool.
   - Install new oil seal in the direction shown.

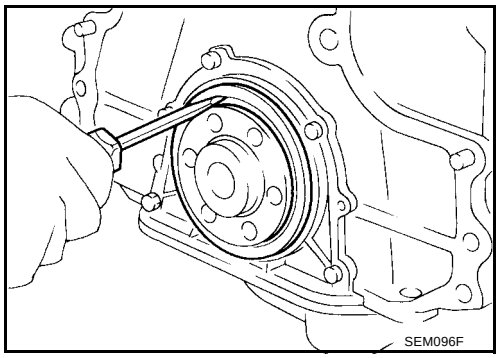




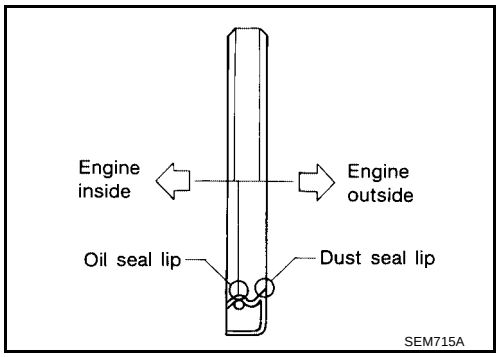
REAR OIL SEAL

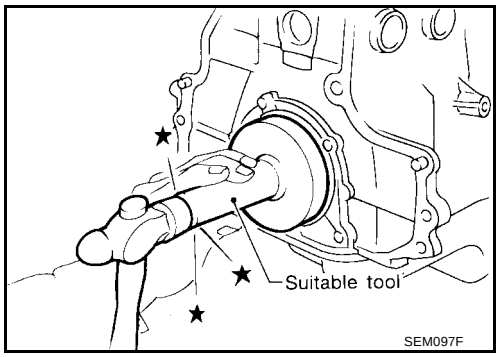
1. Remove the transaxle. Refer to MT-15, "Removal and Installation" (RS5F70A M/T), or AT-264, "REMOVAL AND INSTALLATION" (RE4F03B A/T).
2. Remove flywheel (MT) or drive plate (AT).
3. Remove rear oil seal using suitable tool.

   CAUTION:
   Be careful not to scratch rear oil seal retainer.



4. Apply new engine oil to new oil seal and install it using a suitable tool.
   - Install new oil seal in the direction shown.





5. Install flywheel (MT) or drive plate (AT). Refer to EM-69, "Components" .
6. Install the transaxle. Refer to MT-15, "Removal and Installation" (RS5F70A), MT-79, "Removal and Installation" (RS6F51H), or AT-264, "REMOVAL AND INSTALLATION" (RE4F03B), AT-644, "REMOVAL AND INSTALLATION" (RE4F04B).

CYLINDER HEAD

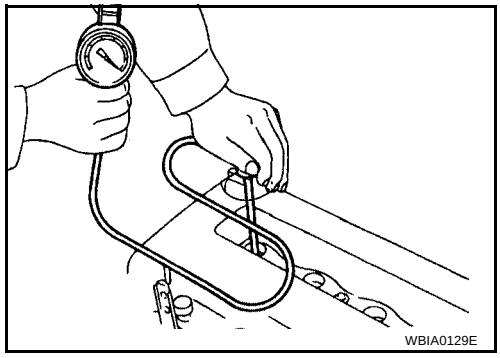
PFP:11041

On-Vehicle Service

EBS00EZ5

CHECKING COMPRESSION PRESSURE

1. Warm up the engine to full operating temperature.
2. Turn the ignition switch OFF.
3. Release the fuel pressure. Refer to EC-94, "FUEL PRESSURE RELEASE" .
4. Remove the ignition coils.
5. Remove the spark plugs.
   - Clean the area around the spark plug with compressed air before removing the spark plug.
6. Attach a compression tester to No. 1 cylinder.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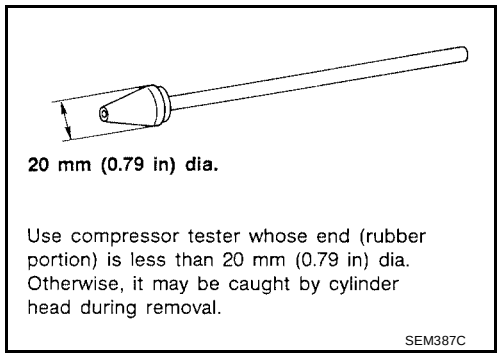


7. Depress the accelerator pedal fully to keep the throttle valve wide open.
8. Crank the engine and record highest gauge indication.
9. Repeat the measurement on each cylinder as shown above.

   NOTE:
   Always use a fully-charged battery to obtain specified engine speed.

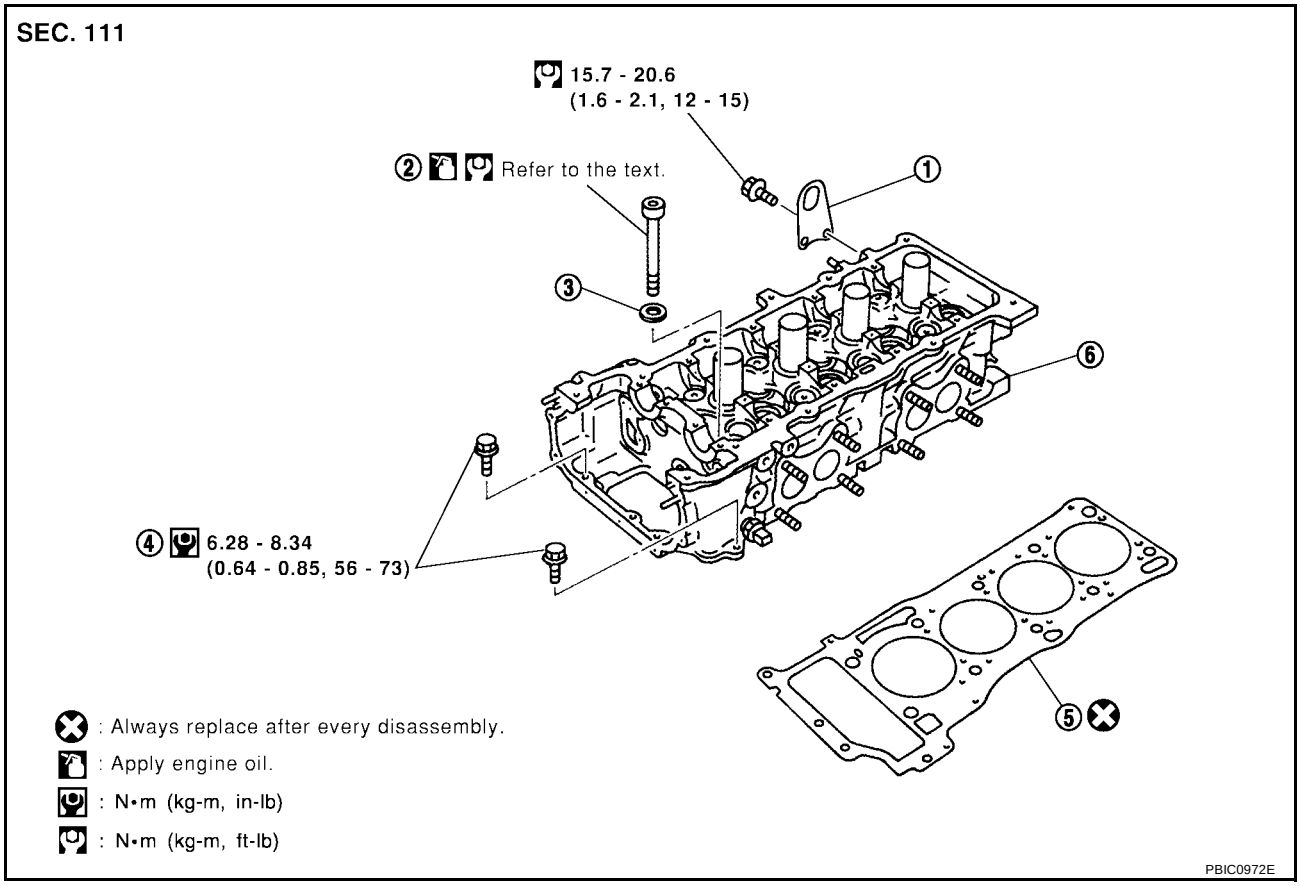
Compression pressure	**: kPa (kg/cm^2 , psi)/rpm**
Standard	**: 1,324 (13.5, 192)/350**
Minimum	**: 1,157 (11.5, 168)/350**
Maximum allowable difference between cylinders	**: 98 (1.0, 14)/350**

10. If cylinder compression in one or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and retest compression.
    - If adding oil improves cylinder compression, piston rings may be worn or damaged. If so, replace piston rings after checking the piston and cylinder walls.
    - If pressure stays low, a valve may be sticking or seating improperly. Inspect and repair valve and valve seat. Refer to EM-38, "INSPECTION" , EM-63, "VALVE SEATS" . If valve or valve seat is damaged excessively, replace them.
    - If compression in any two adjacent cylinders is low and if adding oil does not improve compression, there is leakage past the gasket surface. If so, replace cylinder head gasket.
11. Install spark plugs, ignition coils and fuel pump fuse.

12. Erase DTC if any DTC appears. Refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

Removal and Installation

EBS00CEN



1. Rear engine slinger
2. Cylinder head bolt
3. Washer
4. Auxiliary bolt of cylinder head
5. Cylinder head gasket
6. Cylinder head assembly

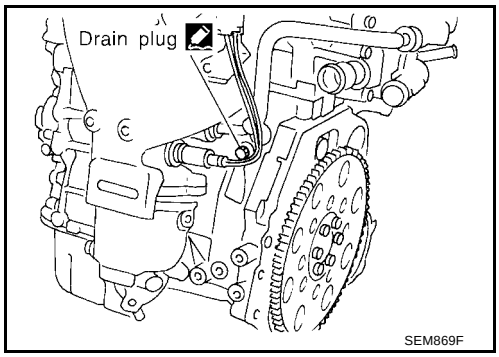
CAUTION:

- **When installing camshaft and oil seal, lubricate contacting surfaces with new engine oil.**
- **When tightening cylinder head bolts, camshaft sprocket bolts and camshaft bracket bolts, lubricate bolt threads and seat surfaces with new engine oil.**
- **Attach tags to valve lifters so as not to mix them up.**

REMOVAL

1. Drain engine coolant. Refer to MA-16, "DRAINING ENGINE COOLANT" .

   CAUTION:
   Be careful not to spill coolant on drive belts.



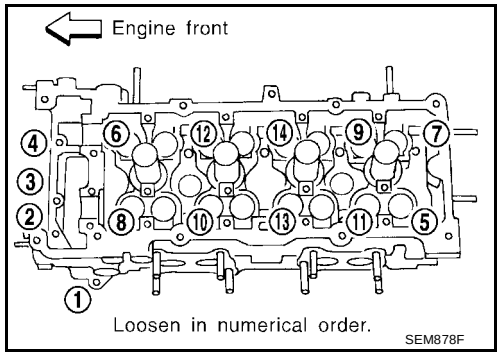
2. Release the fuel pressure. Refer to EC-94, "FUEL PRESSURE RELEASE" .
3. Remove the air duct to intake manifold collector.
4. Remove the engine drive belts.
5. Remove the front splash undercovers.

6. Remove the front exhaust tube. Refer to EX-3, "Removal and Installation" .
7. Before removing the intake manifold collector from the engine, the following parts should be disconnected to remove the intake manifold collector:
   - Fuel injector tube quick connectors. Refer to EM-21, "FUEL INJECTOR AND FUEL TUBE" .
   - Ground harness

   Harness connectors for:
   - Electric throttle control actuator
   - Swirl control valve (SULEV only)
   - Swirl control position sensor (SULEV only)
   - Water hoses from collector
   - Heater hoses

   Vacuum hoses for:
   - EVAP canister
   - Power brake booster
8. Remove the intake manifold rear supports. Refer to EM-15, "Removal and Installation" .
9. Remove the exhaust manifold. Refer to EM-15, "Removal and Installation" .
10. Remove the spark plugs.
11. Remove rocker cover. Refer to EM-25, "Removal and Installation" .
12. Remove camshafts. Refer to EM-28, "Removal and Installation" .
13. Remove cylinder head bolts.
    - Cylinder head bolts should be loosened in two or three steps.

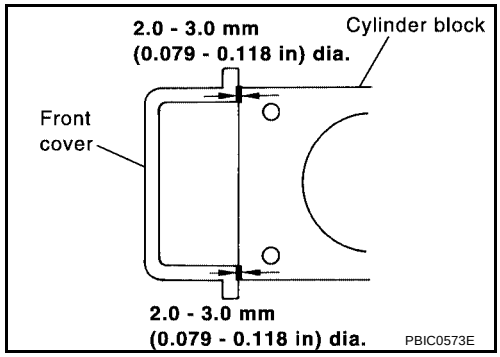
    CAUTION:
    Head warping or cracking could result from removing the cylinder head bolts in incorrect order.
14. Remove cylinder head with intake manifold.



INSTALLATION

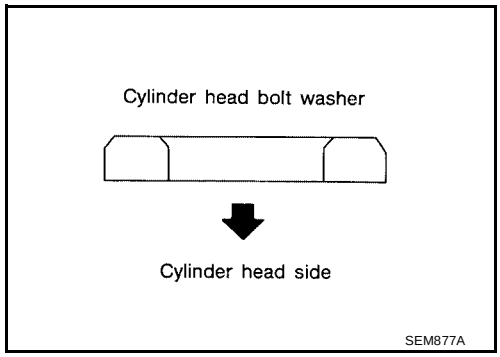
1. Before installing cylinder head gasket, apply a bead of Genuine RTV Silicone Sealant or equivalent, to mating surface of cylinder block as shown.
   - Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .
2. Install the cylinder head gasket.

   NOTE:
   When installing the cylinder head with intake manifold, use a new cylinder head gasket.



3. Install cylinder head and cylinder head bolts with washers.
   - Apply new engine oil to threads and seating surface of mounting bolts.

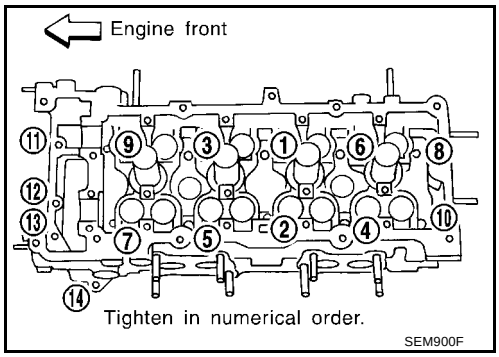
   CAUTION:
   - **Be sure to install washers between bolts and cylinder head with washer orientation as shown.**

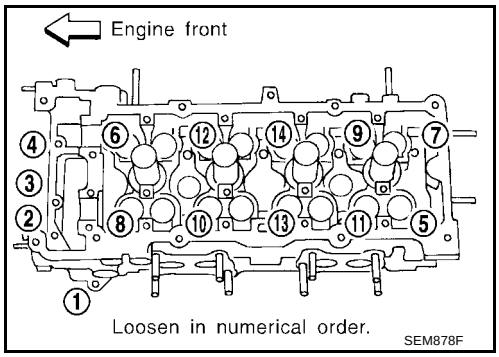


4. Tighten cylinder head bolts (1) to (10) in numerical order as shown in six steps.

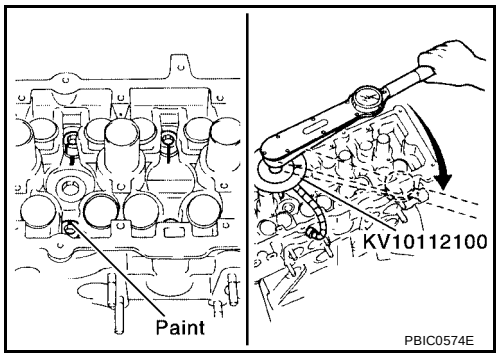
Cylinder head bolts

Step 1 : 50.0 N·m (5.1 kg-m, 37 ft-lb)
Step 2 : 60° clockwise
Step 3 : 0 N·m (0 kg-m, 0 ft-lb) (loosen)
Step 4 : 34.3 - 44.1 N·m (3.5 - 4.4 kg-m, 26 - 32 ft-lb)
Step 5 : 75° - 80° (target: 75°) clockwise
Step 6 : 75° - 80° (target: 75°) clockwise





CAUTION:
Check and confirm the tightening angle by using angle wrench.

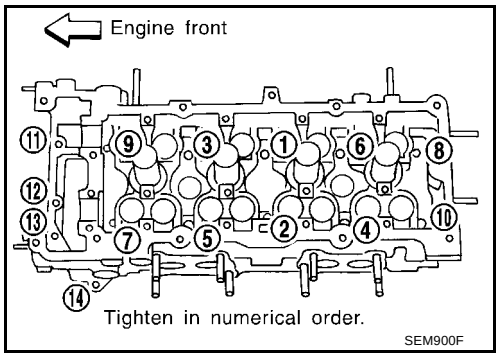


5. Tighten cylinder head auxiliary bolts (11) to (14) in numerical order shown.

Cylinder head auxiliary bolts : 6.28 - 8.34 N·m (0.64 - 0.85 kg-m, 56 - 73 in-lb)

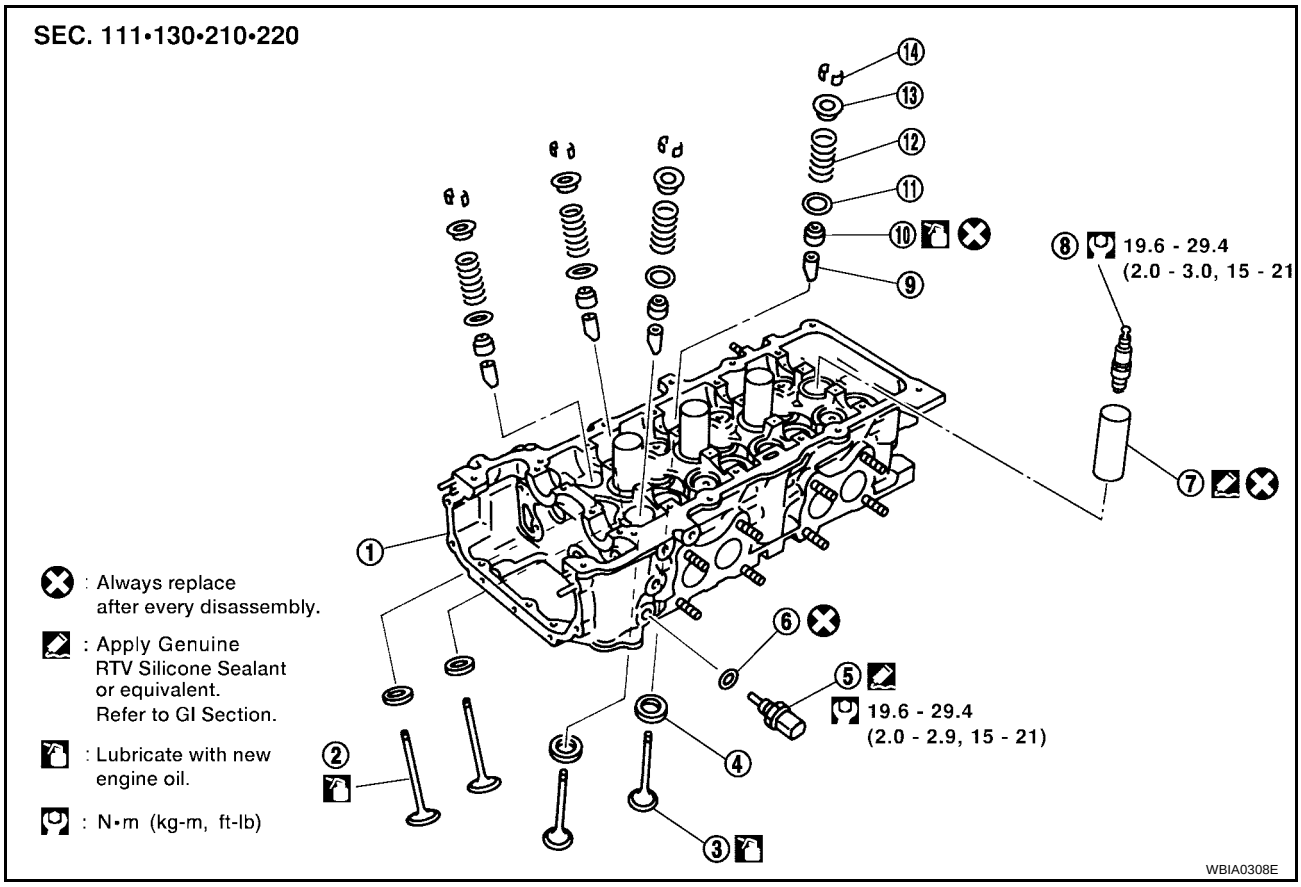
- Verify shank length under bolt head. [Bolt 11: 20 mm (0.79 in), bolts 12 - 14: 25 mm (0.98 in)]

6. Installation of the remaining components is in the reverse order of removal.



Disassembly and Assembly

EBS00EWV



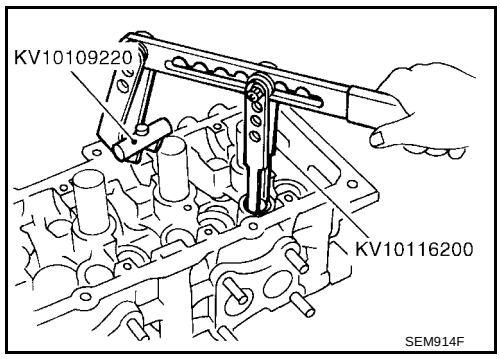
1. Cylinder head
2. Valve (INT)
3. Valve (EXH)
4. Valve seat
5. Engine coolant temperature sensor
6. Copper washer
7. Spark plug tube
8. Spark plug
9. Valve guide
10. Valve oil seal
11. Valve spring seat
12. Valve spring
13. Valve spring retainer
14. Valve collet

CAUTION:

- **When installing camshafts, chain tensioners, oil seals or other sliding parts, lubricate contacting surface with new engine oil.**
- **Apply new engine oil to threads and seat surface when installing cylinder head, camshaft sprocket, crankshaft pulley and camshaft bracket.**
- **Note valve lifter positions so as to ensure proper installation locations.**

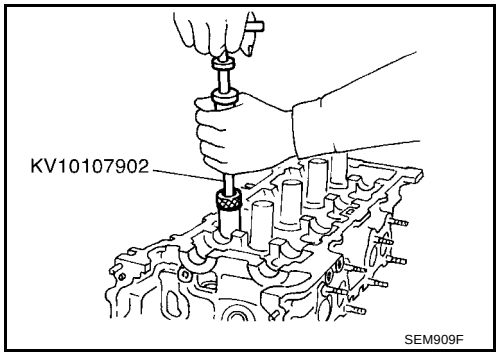
DISASSEMBLY

1. Remove intake manifold assembly. Refer to EM-15, "Removal and Installation" .
2. Remove adjusting shims (if equipped) and valve lifters.
   - Note locations for installation.
3. Remove valve collet.
   - Compress valve spring using Tool as shown. Remove valve collet with magnet.
4. Remove valve spring retainer and valve spring.
5. Push valve stem through the combustion chamber side, and remove valve.
   - Inspect valve guide clearance before removal. Refer to EM-61, "VALVE GUIDE CLEARANCE" .
   - Label components for installation in the same location.



6. Remove valve oil seal using Tool as shown.
7. Remove valve spring seat.
8. When valve seat must replaced, refer to EM-63, "REPLACING VALVE SEAT FOR SERVICE PARTS" .
9. When valve guide must be replaced, refer to EM-62, "VALVE GUIDE REPLACEMENT" .
10. Remove spark plugs.
11. Remove engine coolant temperature sensor.

CAUTION:
Do not shock it.

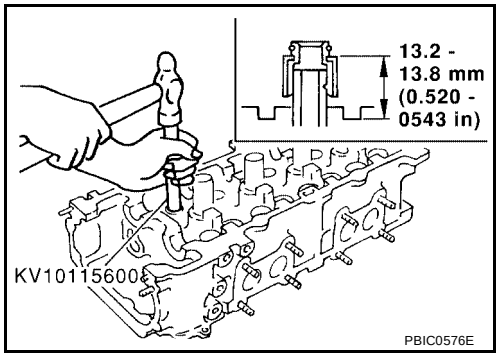


12. Remove spark plug tubes, as necessary.
    - Using a pair of pliers, pull spark plug tube out of cylinder head.

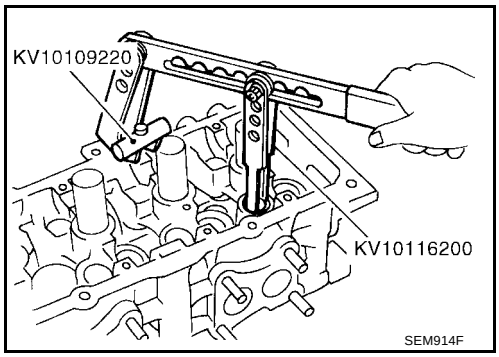
CAUTION:
- **Take care not to damage cylinder head.**
- **Spark plug tubes are deformed during removal and cannot be reused once removed. Do not remove unless necessary.**

ASSEMBLY

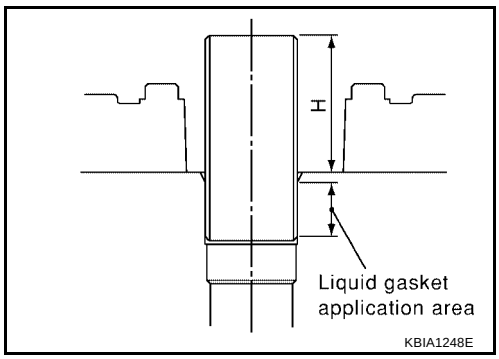
1. If removed, install valve seat, refer to EM-63, "REPLACING VALVE SEAT FOR SERVICE PARTS" .
2. If removed, install valve guide, refer to EM-62, "VALVE GUIDE REPLACEMENT" .
3. Install valve oil seal using Tool as shown.
4. Install valve spring seat.
5. Install valve.
   - Install large diameter to intake side.
6. Install valve spring.
7. Install valve spring retainer.



8. Install valve collet.
   - Compress valve spring using Tool as shown. Install valve collet with magnet.
   - Tap stem edge lightly with plastic hammer after installation to check if installed securely.
9. Install adjusting shim, if equipped in their original positions.
10. Apply sealant to engine coolant temperature sensor threads.
    - Use Genuine Anaerobic Liquid Gasket, or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .
11. Install engine coolant temperature sensor.
12. Install spark plug tube.
    - Press-fit spark tube as follows.



a. Remove old liquid gasket adhering to cylinder-head mounting hole.
b. Apply liquid gasket to area within approximately 15 mm (0.59 in) from edge of spark plug tube press-fit side as shown.
   - Use Genuine Anaerobic Liquid Gasket, or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .
c. Using a drift, press-fit the spark plug tube so that its height "H" is as shown.



Standard press-fit height "H" : 41.0 - 42.0 mm (1.61 - 1.65 in)

CAUTION:

- **When press-fitting, take care not to deform spark plug tube.**
- **After press-fitting, wipe off liquid gasket protruding onto cylinder head upper surface.**

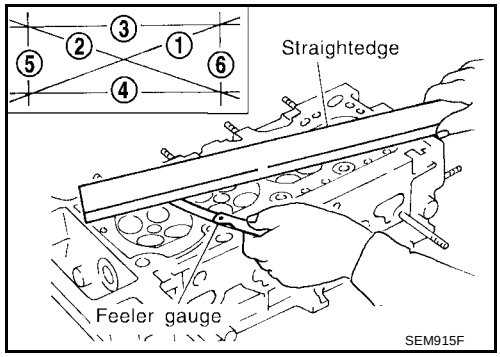
13. Install spark plugs. Refer to EM-15, "OUTER COMPONENT PARTS" .
14. Install intake manifold. Refer to EM-15, "OUTER COMPONENT PARTS" .

Inspection after Disassembly

EBS00CEP

CYLINDER HEAD DISTORTION

1. Clean surface of cylinder head.
2. Use a reliable straightedge and feeler gauge to check the flatness of cylinder head mating surface.
   - Check along six positions as shown.



Head surface flatness

Standard : Less than 0.03 mm (0.0012 in)

Limit : 0.1 mm (0.004 in)

   - If beyond the specified limit, replace or resurface it.
   - Resurfacing limit:
     The limit for cylinder head resurfacing is determined by the amount of cylinder block resurfacing.
     Amount of cylinder head resurfacing is “A”.
     Amount of cylinder block resurfacing is “B”.

The maximum limit is as follows : A + B = 0.2 mm (0.008 in)

After resurfacing cylinder head, check that camshaft rotates freely by hand. If resistance is felt, replace cylinder head.

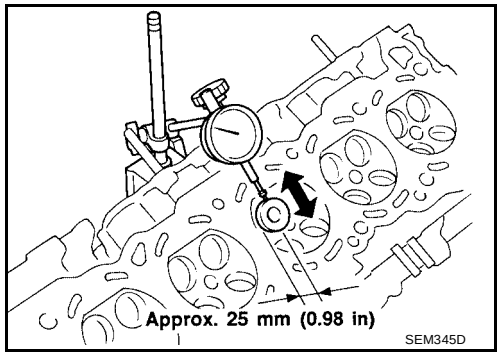
Nominal cylinder head height : 117.8 - 118.0 mm (4.638 - 4.646 in)

VALVE GUIDE CLEARANCE

1. Measure valve deflection as shown in figure. (Valve and valve guide wear the most in this direction.)

Valve deflection limit (dial gauge reading)

Intake & Exhaust : 0.2 mm (0.008 in)

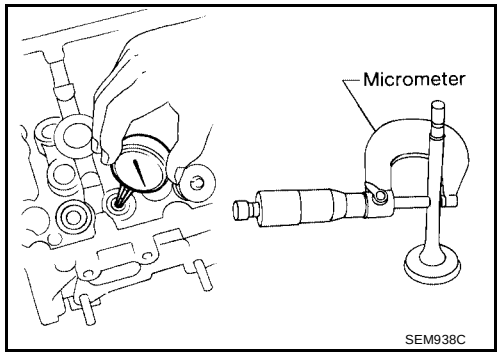


2. If it exceeds the limit, check valve to valve guide clearance.

a. Measure valve stem diameter and valve guide inner diameter.

b. Calculate valve to valve guide clearance.
   Valve stem to valve guide clearance = valve guide inner diameter – valve stem diameter.

c. Check that clearance is within specification.



Unit: mm (in)

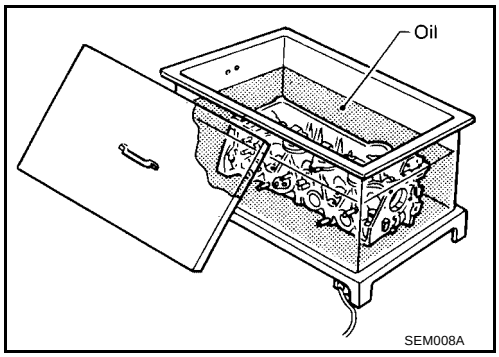
	Standard	Limit
Intake	0.020 - 0.050 (0.0008 - 0.0020)	0.1 (0.004)
Exhaust	0.040 - 0.070 (0.0016 - 0.0028)	0.1 (0.004)

- If it exceeds the limit, replace valve and remeasure clearance.

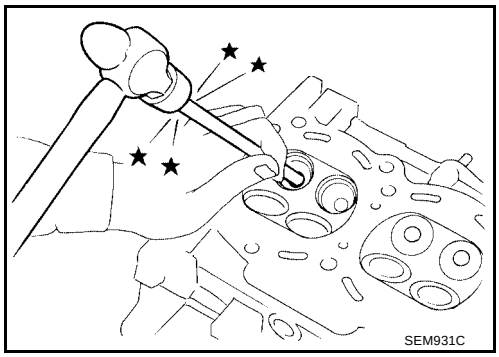
- If limit is still exceeded after replacing valve, replace valve guide.

VALVE GUIDE REPLACEMENT

1. To remove valve guide, heat cylinder head to 110° to 130°C (230° to 266°F).



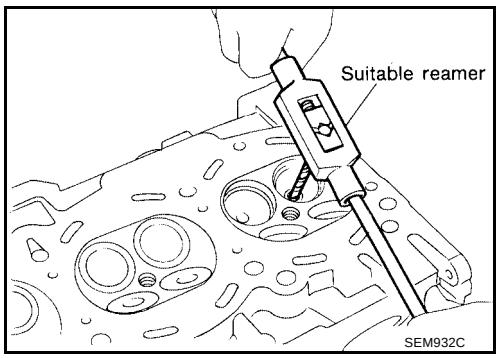
2. Drive out valve guide with a press [under a 20 kN (2 ton, 2.2 US ton, 2.0 Imp ton) pressure] or hammer and suitable tool.



3. Ream cylinder head valve guide hole.

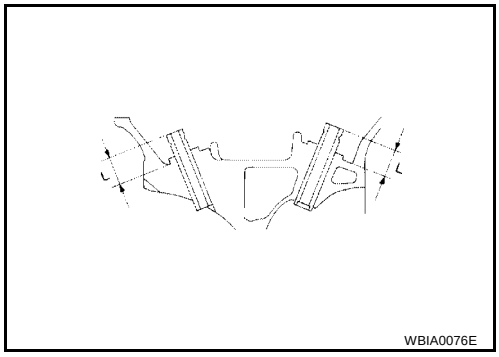
Valve guide hole diameter (for service parts)

Intake & Exhaust : 9.685 - 9.696 mm (0.3813 - 0.3817 in)



4. Heat cylinder head to 110° to 130°C (230° to 266°F) and press service valve guide into cylinder head at specified height.

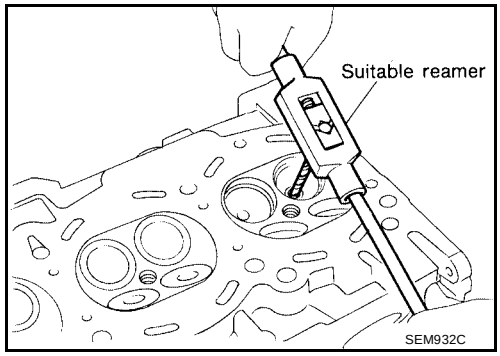
Projection "L" : 11.5 - 11.7 mm (0.453 - 0.461 in)



5. Ream the new valve guide to the specified inner diameter.

Inner diameter finished size

Intake & Exhaust : 5.500 - 5.515 mm (0.2165 - 0.2171 in)

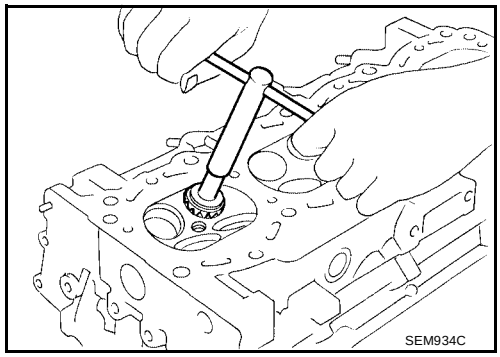


VALVE SEATS

Check valve seats for pitting at contact surface. Resurface or replace if excessively worn.

NOTE:

- Before repairing valve seats, check valve and valve guide for wear. If they have worn, replace them. Then correct valve seat.
- Use both hands to cut uniformly.

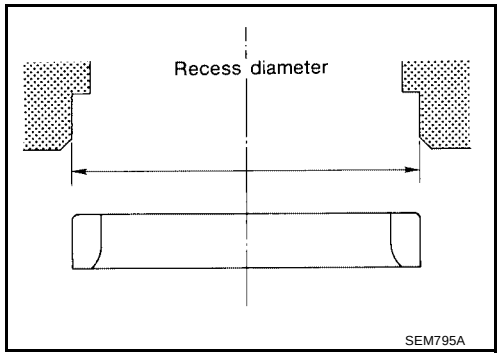


REPLACING VALVE SEAT FOR SERVICE PARTS

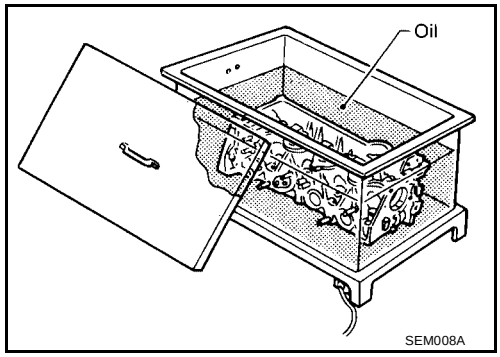
1. Bore out old seat until it collapses. Set machine depth stop so that boring cannot contact the bottom face of seat recess in cylinder head.
2. Ream cylinder head recess. Refer to EM-88, "VALVE SEAT" for the reaming bore for the service valve seat.

NOTE:

Use the valve guide center for reaming to ensure valve seat will have the correct fit.

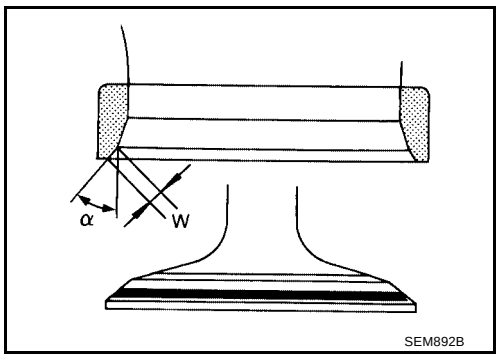


3. Heat cylinder head to 110° to 130°C (230° to 266°F).
4. Press fit valve seat until it seats on the bottom.
5. Cut or grind valve seat using suitable tool to the specified dimensions. Refer to EM-85, "Valve" .
6. After cutting, lap valve seat with abrasive compound.



7. Check valve seating condition.

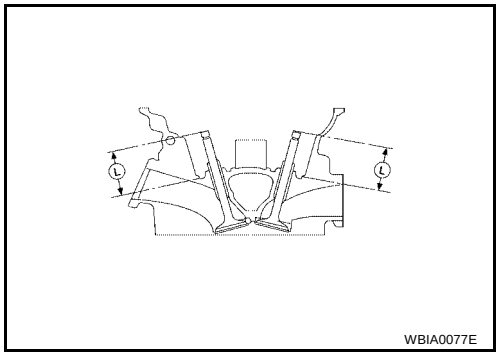
Seat face angle "α"	**: 44°53′ - 45°07′**
Contacting width "W"	
Intake	**: 1.06 - 1.34 mm (0.0417 - 0.0528 in)**
Exhaust	**: 1.34 - 1.63 mm (0.0528 - 0.0642 in)**



8. Use a depth gauge to measure the distance "L" between the mounting surface of the cylinder head spring seat and the valve stem end. If the distance is shorter than specified, repeat step 5 above to correct it. If the distance is longer, replace the valve seat.

Valve seat resurface limit

Intake	**: 35.95 - 36.55 mm (1.4154 - 1.4390 in)**
Exhaust	**: 35.92 - 36.52 mm (1.4142 - 1.4378 in)**



VALVE DIMENSIONS

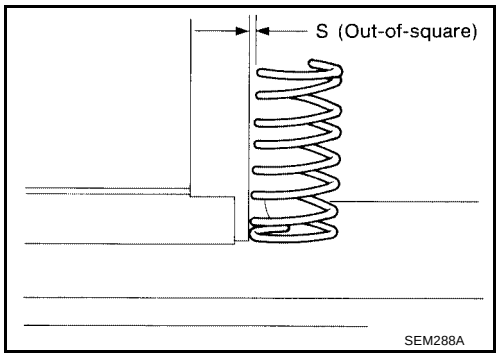
Check dimensions of each valve. Refer to EM-85, "Valve" .

VALVE SPRING

Squareness

1. Measure dimension "S".

Out-of-square "S"	**: Less than 1.75 mm (0.0689 in)**



2. If it exceeds the limit, replace the spring.

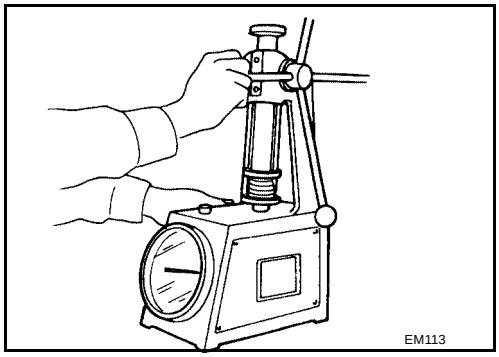
Pressure

Check valve spring pressure at specified spring height.

Valve spring pressure

Standard	**: 370.0 N (37.73 kg, 83.19 lb) at 23.64 mm (0.9307 in)**
Limit	**: More than 347.8 N (35.46 kg, 78.19 lb) at 23.64 mm (0.9307 in)**

If not within specification, replace the spring.



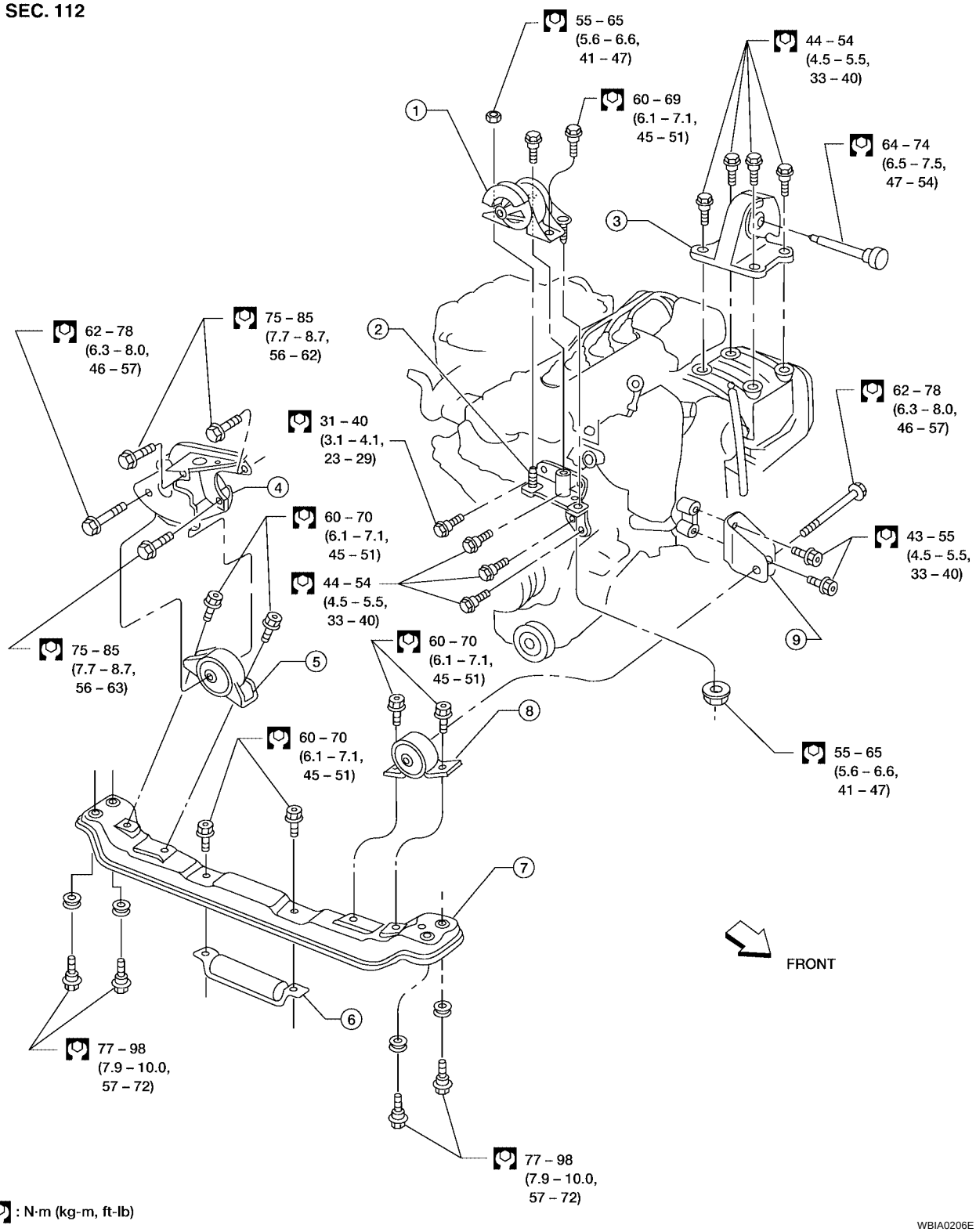
ENGINE ASSEMBLY

PFP:10001

Removal and Installation

EBS00CET

SEC. 112



: N·m (kg-m, ft-lb)

WBIA0206E

1. RH engine mounting
2. RH engine mounting bracket
3. LH engine mounting
4. Rear engine mounting bracket
5. Rear engine mounting
6. Dynamic damper
7. Center member
8. Front engine mounting
9. Front engine mounting bracket

WARNING:

- **Position vehicle on a flat and solid surface.**
- **Place chocks at front and back of rear wheels.**
- **Do not remove engine until exhaust system has completely cooled off, otherwise, you may burn yourself and/or fire may break out in fuel line.**
- **Before disconnecting fuel hose, release pressure.**
  Refer to EC-94, "FUEL PRESSURE RELEASE" .
- **Be sure to lift engine and transaxle in a safe manner.**
- **For engines not equipped with engine slingers, attach proper slingers and bolts described in PARTS CATALOG.**

CAUTION:

- **When lifting engine, be sure to clear surrounding parts. Use special care near accelerator wire casing, brake lines and brake master cylinder.**
- **When lifting the engine, always use engine slingers in a safe manner.**
- **When removing drive shaft, be careful not to damage grease seal of transaxle.**
- **Before separating engine and transaxle, remove crankshaft position sensor (POS) from the cylinder block assembly.**
- **Always be extra careful not to damage edge of crankshaft position sensor (POS), or signal plate teeth.**

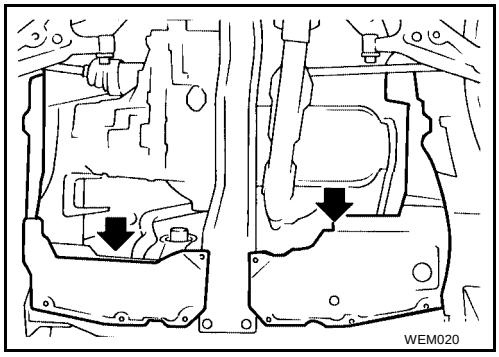
REMOVAL

NOTE:
Engine cannot be removed separately from transaxle. Remove engine with transaxle as an assembly.

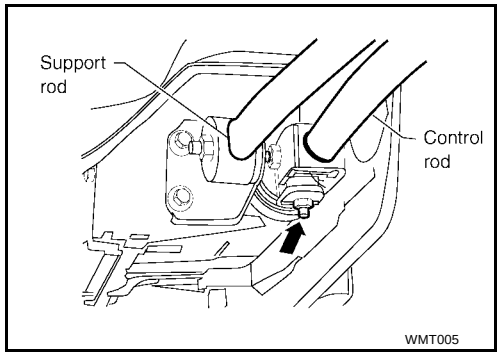
1. Refer to EC-94, "FUEL PRESSURE RELEASE" .
2. Drain coolant from radiator and cylinder block. Refer to MA-16, "DRAINING ENGINE COOLANT" .
3. Remove coolant reservoir tank.
4. Drain engine oil. Refer to MA-20, "Changing Engine Oil" .
5. Remove battery and battery tray. Refer to SC-4, "BATTERY" .
6. Remove air cleaner and air duct.
7. Remove drive belts.
8. Remove generator from engine and position aside. Refer to SC-31, "Removal" .
9. Remove air conditioner compressor from engine and position aside. Refer to MTC-64, "Removal and Installation" .
10. Remove power steering oil pump from engine and position aside. Refer to PS-21, "Removal and Installation" .

    NOTE:
    Power steering oil pump does not need to be disconnected from power steering tubes.
11. Remove the following parts:
    - RH and LH front tires
    - Front splash undercovers
    - RH and LH drive shaft. Refer to FAX-14, "Removal" .

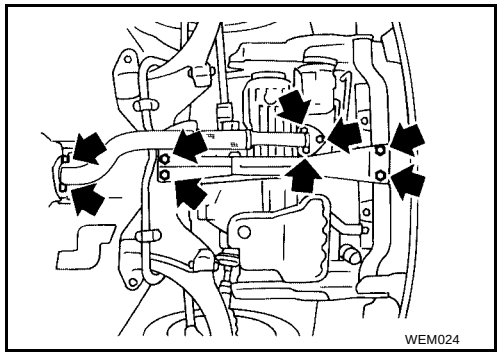
    CAUTION:
    When removing the drive shaft, be careful not to damage transaxle side grease seal.



- Disconnect control rod and support rod from transaxle (M/T models).
- Disconnect control cable from transaxle (A/T models). Refer to AT-262, "Control Cable Adjustment" .



- Center member
- Front exhaust tube. Refer to EX-3, "Removal and Installation" .
- Stabilizer bar. Refer to FSU-11, "Removal and Installation" .
- Radiator/Cooling fan. Refer to CO-14, "Removal" .
- Fuel injector tube quick connectors (Refer to EM-21, "FUEL INJECTOR AND FUEL TUBE" .)
- Ground harness



Harness connectors for:

- Electric throttle control actuator
- Swirl control valve (SULEV only)
- Swirl control position sensor (SULEV only)
- Air fuel ratio (A/F) sensor 1
- Water hoses from collector
- Heater hoses
- PCV hose
- Intake valve timing control solenoid

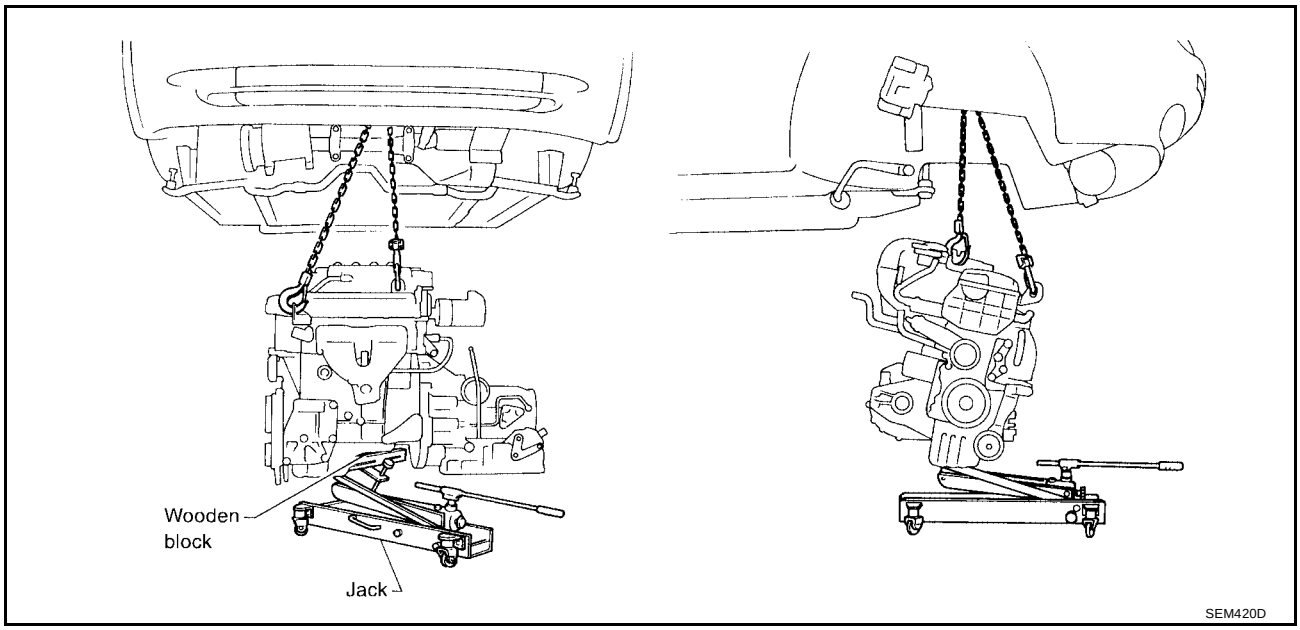
Vacuum hoses for:

- EVAP canister
- Power brake booster

12. If necessary, install engine slingers and support engine from above with a hoist.
13. Lift up engine slightly and disconnect or remove all engine mountings.

CAUTION:
When lifting engine, be sure to clear surrounding parts. Use special care near brake tubes and brake master cylinder.

14. Lower engine and transaxle as shown.



INSTALLATION

- Installation is in the reverse order of removal.

INSPECTION AFTER INSTALLATION

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .
- Use procedure below to check for fuel leakage.
- Turn ignition switch ON (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
- Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.
- Warm up engine thoroughly to make sure there is no leakage of fuel, exhaust gas, or any oils/fluids including engine oil and engine coolant.
- Bleed air from passages in lines and hoses, such as in cooling system.
- After cooling down engine, again check oils/fluids including engine oil and engine coolant. Refill to specified level, if necessary.
- Summary of the inspection items:

Item	Before starting engine	Engine running	After engine stopped
Engine coolant	Level	Leakage	Level
Engine oil	Level	Leakage	Level
Other oils and fluids*	Level	Leakage	Level
Fuel	Leakage	Leakage	Leakage
Exhaust gas	—	Leakage	—

*Transmission/transaxle/CVT fluid, power steering fluid, brake fluid, etc.

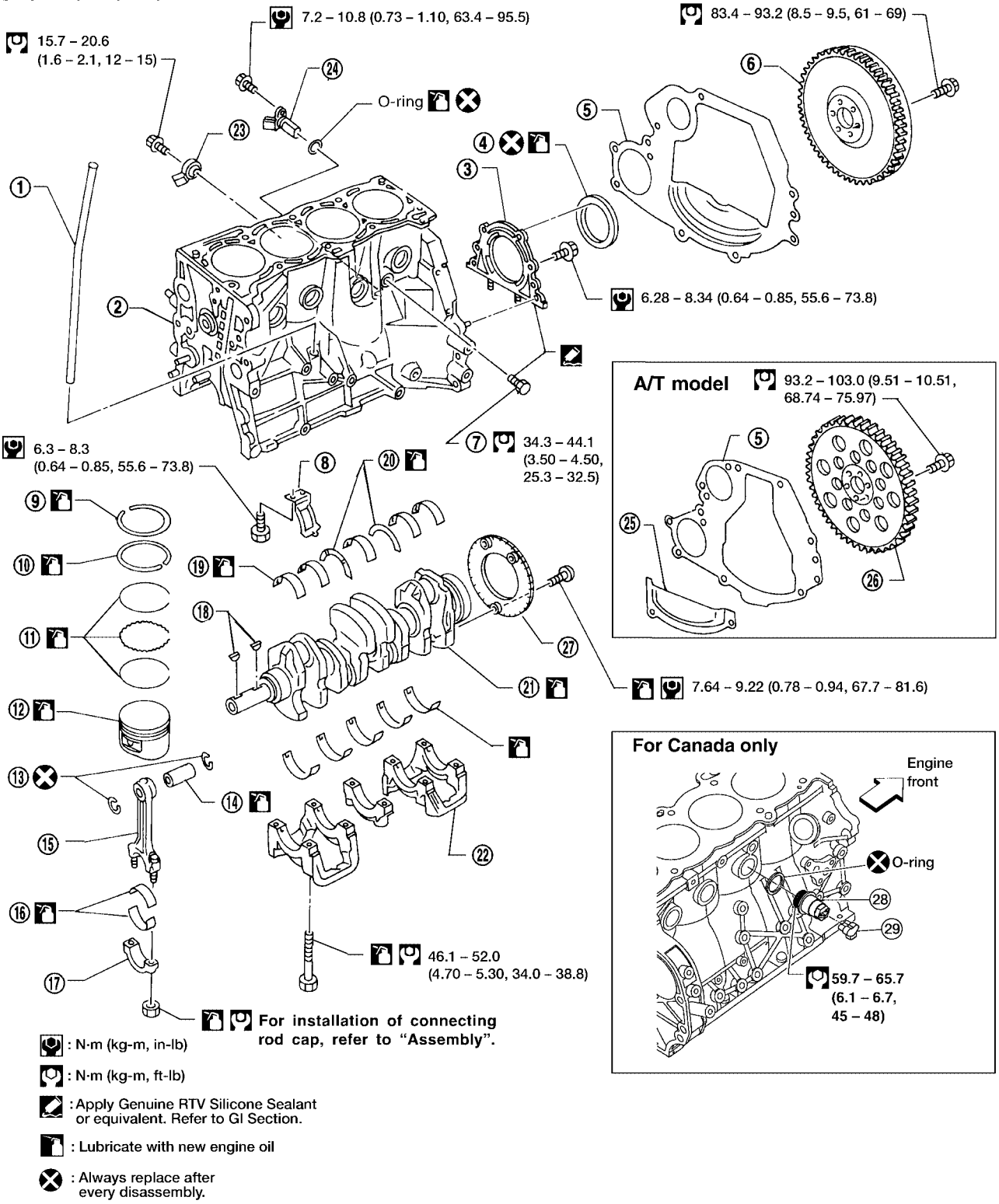
CYLINDER BLOCK

PFP:11010

Components

EBS00CEU

SEC. 110•120•226



WBIA0135E

1. Dipstick tube
2. Cylinder block
3. Rear oil seal retainer
4. Rear oil seal
5. Rear plate
6. Flywheel
7. Drain plug
8. Baffle plate
9. Top ring
10. 2nd ring
11. Oil ring
12. Piston

13. Snap ring
14. Piston pin
15. Connecting rod
16. Connecting rod bearing
17. Connecting rod cap
18. Key
19. Main bearing
20. Thrust bearing
21. Crankshaft
22. Main bearing cap
23. Knock sensor
24. Crankshaft position sensor (POS)
25. Rear lower plate
26. Drive plate
27. Signal plate
28. Block heater (Canada only)
29. Connector protective cap (Canada only)

Removal and Installation

EBS00CEV

CAUTION:

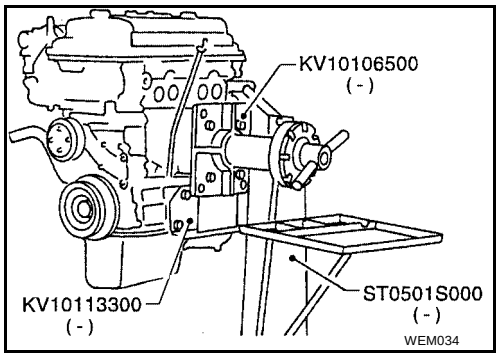
- **When installing sliding parts such as bearings and pistons, apply engine oil on the sliding surfaces.**
- **Place removed parts, such as bearings and bearing caps, in their proper order and direction.**
- **When installing connecting rod nuts and main bearing cap bolts, apply new engine oil to threads and seating surfaces.**
- **Do not allow any magnetic materials to contact the signal plate teeth of flywheel or drive plate, and rear plate.**
- **Remove the crankshaft position sensor (POS).**
- **Be careful not to damage sensor edges and signal plate teeth.**

Disassembly

EBS00CEW

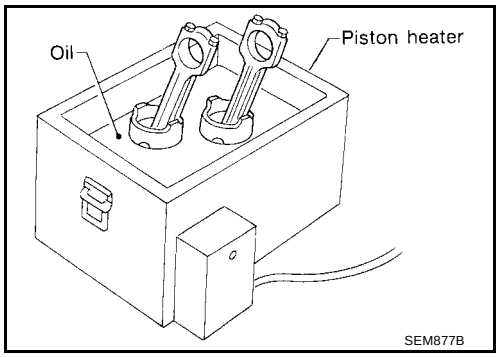
PISTON AND CRANKSHAFT

1. Attach engine to Tools as shown.
2. Drain any remaining engine coolant and oil.
3. Remove timing chain. Refer to EM-43, "Removal" .

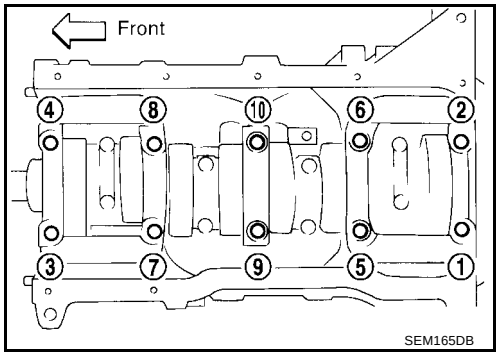


4. Remove pistons with connecting rod.
   - When disassembling piston and connecting rod, remove snap ring first. Then heat piston to 60° to 70°C (140° to 158°F) or use piston pin press stand at room temperature.

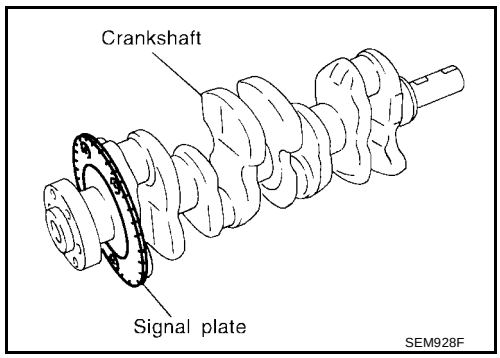
   CAUTION:
   - **When piston rings are not replaced, make sure that piston rings are mounted in their original positions.**
   - **When replacing piston rings, if there is no punch mark, install with either side up.**
5. Measure crankshaft end play. Refer to EM-74, "Crankshaft" .



6. Loosen main bearing caps in numerical order as shown in two or three steps.
7. Remove bearing caps, main bearings and crankshaft.



8. Remove signal plate from crankshaft.



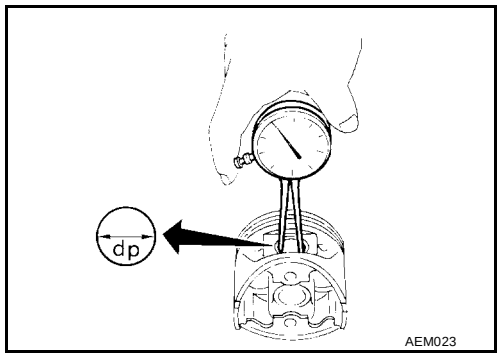
Inspection

PISTON AND PISTON PIN CLEARANCE

EBS00CEX

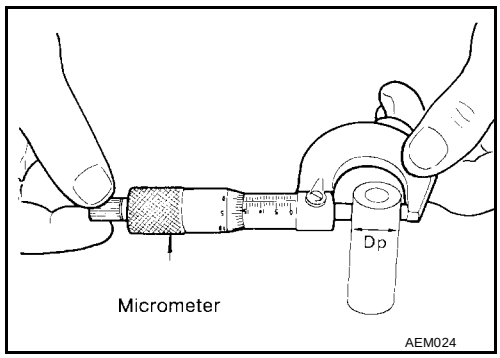
1. Measure inner diameter of piston pin hole inner diameter “dp”.

Piston pin hole inner diameter “dp”	**:18.993 - 19.005 mm (0.7478 - 0.7482 in)**



2. Measure piston pin outer diameter “Dp”.

Piston pin outer diameter “Dp”	**:18.989 - 19.001 mm (0.7476 - 0.7481 in)**



3. Calculate piston pin clearance Dp – dp.

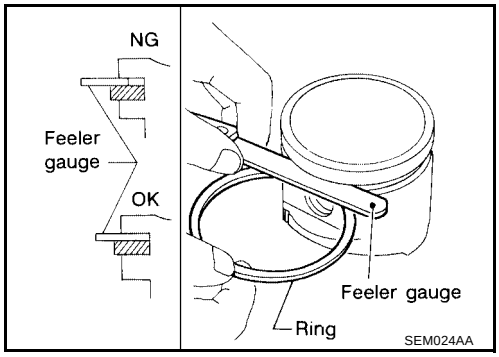
Piston pin to piston clearance : 0.002 - 0.006 mm (0.0001 - 0.0002 in)

If it exceeds the above value, replace piston assembly with pin.

PISTON RING SIDE CLEARANCE

Side clearance

Top ring	**: 0.045 - 0.080 mm (0.0018 - 0.0031 in)**
2nd ring	**: 0.030 - 0.070 mm (0.0012 - 0.0028 in)**
Oil ring	**: 0.065 - 0.135 mm (0.0026 - 0.0053 in)**
Limit	**: 0.2 mm (0.008 in)**



If out of specification, replace piston and/or piston ring assembly.

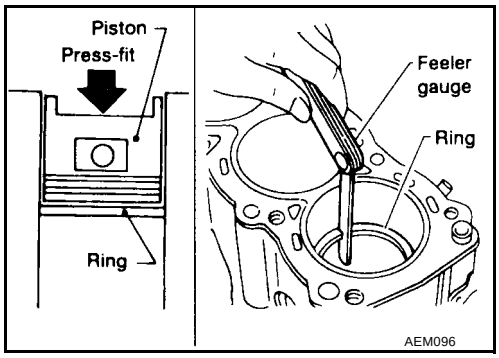
PISTON RING END GAP

End gap

Top ring	**: 0.20 - 0.39 mm (0.0079 - 0.0154 in)**
2nd ring	**: 0.32 - 0.56 mm (0.0126 - 0.0220 in)**
Oil ring	**: 0.20 - 0.69 mm (0.0079 - 0.0272 in)**

Limit of end gap

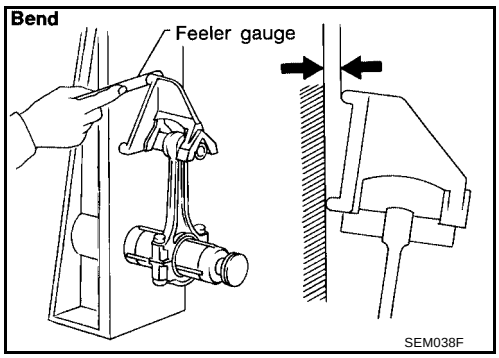
Top ring	**: 0.49 mm (0.0193 in)**
2nd ring	**: 0.64 mm (0.0252 in)**
Oil ring	**: 1.09 mm (0.0429 in)**



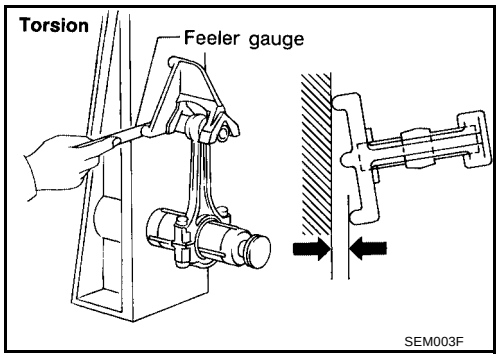
- If out of specification, replace piston ring. If gap exceeds maximum limit with a new ring, rebore cylinder and use oversized piston and piston rings. Refer to EM-90, "Piston, Piston Ring and Piston Pin" .
- When replacing the piston, check the cylinder block surface for scratches or seizure. If scratches or seizure is found, hone or replace the cylinder block.

CONNECTING ROD BEND AND TORSION

Bend Limit	**: 0.15 mm (0.0059 in) per 100 mm (3.94 in) length**
Torsion Limit	**: 0.3 mm (0.012 in) per 100 mm (3.94 in) length**

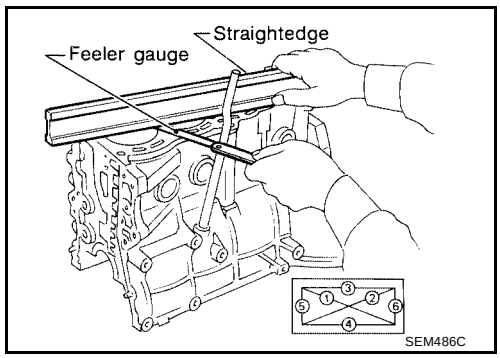


If it exceeds the limit, replace connecting rod assembly.



CYLINDER BLOCK DISTORTION AND WEAR

1. Clean upper surface of cylinder block.
2. Use a reliable straightedge and feeler gauge to check the flatness of cylinder block surface. Check along six positions shown in figure.

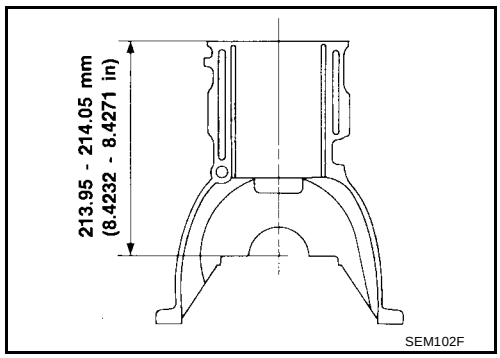


Block surface flatness

Standard	**: Less than 0.03 mm (0.0012 in)**
Limit	**: 0.1 mm (0.004 in)**

- If out of specification, resurface it.

- The limit for cylinder block resurfacing is determined by the amount of cylinder head resurfacing.
  Amount of cylinder head resurfacing is "A".
  Amount of cylinder block resurfacing is "B".

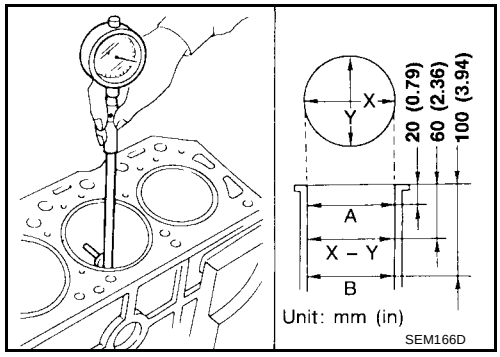


The maximum limit is as follows A + B	**: 0.2 mm (0.008 in)**
Nominal cylinder block height from crankshaft center	**213.95 - 214.05 mm (8.4232 - 8.4271 in)**

- If necessary, replace cylinder block.

PISTON-TO-BORE CLEARANCE

1. Using a bore gauge, measure cylinder bore for wear, out-of-round and taper. The Y axis is in the longitudinal direction of the engine.

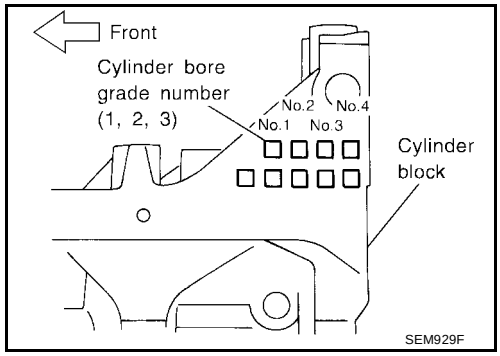


Standard inner diameter (Grade No. 1)	**: 80.000 - 80.010 mm (3.1496 - 3.1500 in)**
Wear limit	**: 0.2 mm (0.008 in)**
Out-of-round (X – Y) standard	**: Less than 0.015 mm (0.0006 in)**
Taper (B – A) standard	**: Less than 0.01 mm (0.0004 in)**

If it exceeds the limit, rebore all cylinders. Replace cylinder block if necessary.

2. Check for score and seizure. If seizure is found, hone it.

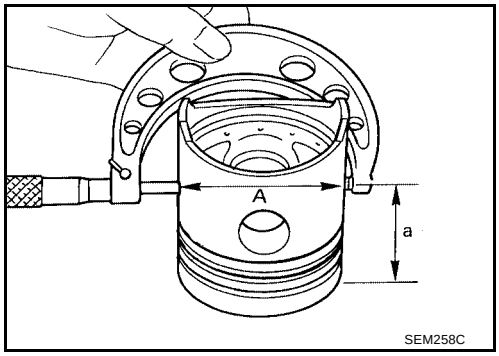
NOTE:
If cylinder block or piston is replaced, match piston grade with grade number on cylinder block lower surface.



3. Measure piston skirt diameter.

Piston diameter "A" : Refer to EM-90, "Piston, Piston Ring and Piston Pin" .

Measuring point "a" (Distance from the top) : 42.3 mm (1.665 in)



4. Check that piston-to-bore clearance is within specification.

Piston-to-bore clearance = cylinder bore measurement "B" – Piston diameter "A" : 0.025 - 0.045 mm (0.0010 - 0.0018 in)

5. Determine piston oversize according to amount of cylinder wear.
   - Oversize pistons are available for service. Refer to EM-90, "Piston, Piston Ring and Piston Pin" .
6. Cylinder bore size is determined by adding piston-to-bore clearance to piston diameter "A".

Rebored size calculation

D = A + B – C

where:

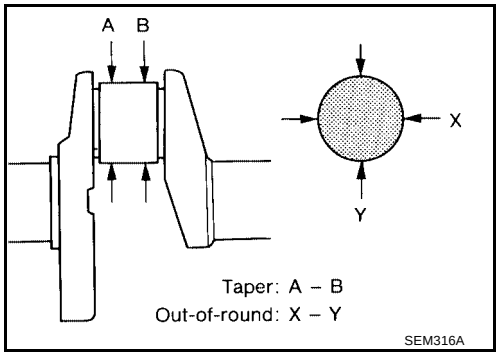
D : Bored diameter
A : Piston diameter as measured
B : Piston-to-bore clearance
C : Honing allowance 0.02 mm (0.0008 in)

7. Install main bearing caps and tighten bolts to the specified torque. This will prevent distortion of cylinder bores.
8. Cut cylinder bores.
   - When any cylinder needs boring, all other cylinders must also be bored.
   - Do not cut too much out of cylinder bore at a time. Cut only 0.05 mm (0.0020 in) or so at a time.
9. Hone cylinders to obtain specified piston-to-bore clearance.
10. Measure finished cylinder bore for out-of-round and taper.
    - Measurement should be done after cylinder bore cools down.

CRANKSHAFT

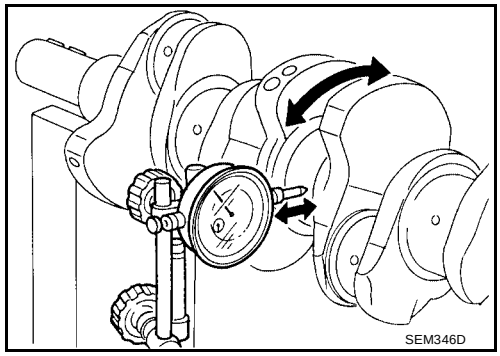
1. Check crankshaft main and pin journals for score, wear or cracks.
2. With a micrometer, measure journals for taper and out-of-round.

Out-of-round, (X – Y)
Standard : Less than 0.003 mm (0.0001 in)
Limit : Less than 0.005 mm (0.0002 in)
Taper, (A – B)
Standard : Less than 0.004 mm (0.0002 in)
Limit : Less than 0.005 mm (0.0002 in)



3. Measure crankshaft runout.

Runout, Standard (Total indicator reading) : **Less than 0.04 mm (0.0016 in)**
Limit : **Less than 0.05 mm (0.0020 in)**

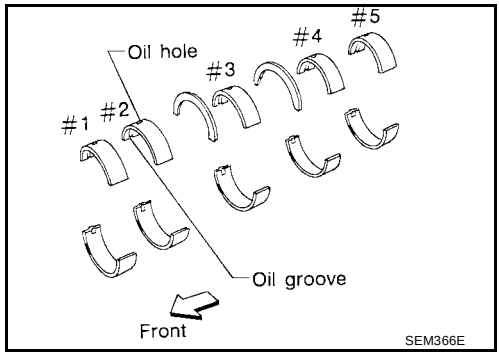


BEARING CLEARANCE

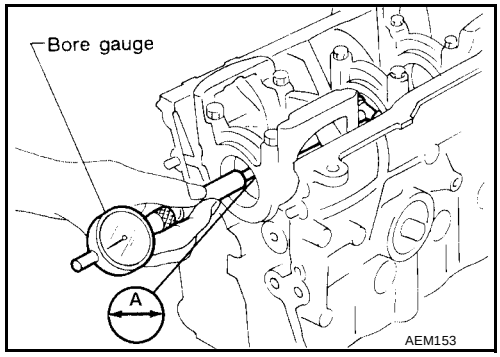
Use Method A or Method B. Method A is preferred because it is more accurate.
Method A (Using bore gauge and micrometer)

Main bearing

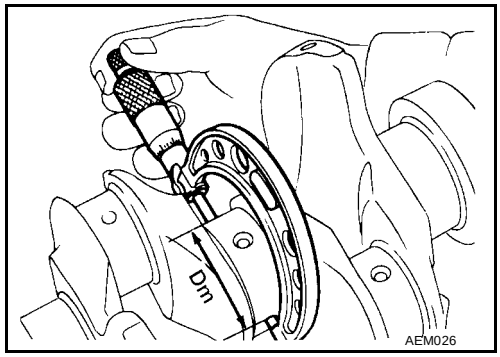
1. Set main bearings in their proper positions on cylinder block and main bearing cap.
2. Install main bearing cap to cylinder block.
Tighten all bolts in correct order in two or three steps. Refer to EM-79, "Assembly" .



3. Measure inner diameter “A” of each main bearing.



4. Measure outer diameter “Dm” of each main journal in crankshaft.



5. Calculate main bearing clearance.

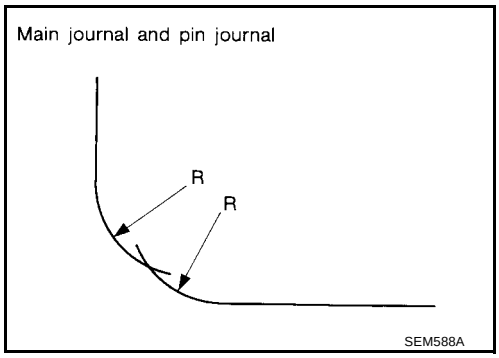
Main bearing clearance = A – Dm
Standard : **0.018 - 0.042 mm (0.0007 - 0.0017 in)**
Limit : **0.1 mm (0.004 in)**

- If it exceeds the limit, replace bearing.
- If clearance cannot be adjusted within standard of any bearing, grind crankshaft journal and use undersized bearing.

When grinding crank pin and crank journal:

- Grind until clearance is within specified standard bearing clearance.
- Fillets should be finished as shown in the figure. R: 2.3 - 2.5 mm (0.091 - 0.098 in)

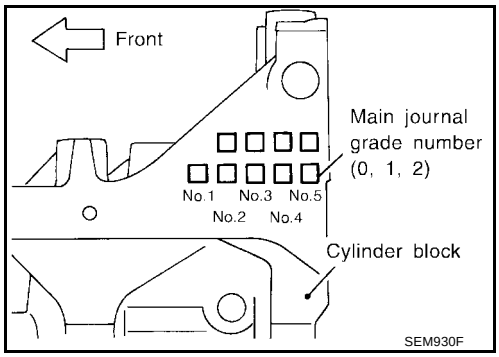
Refer to EM-93, "Bearing Clearance" for standard bearing clearance and available spare parts.

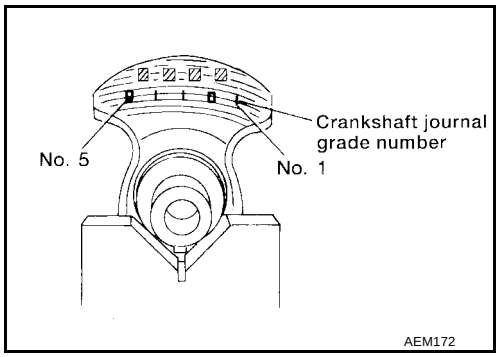


6. If the crankshaft is replaced, select thickness of main bearings as follows:

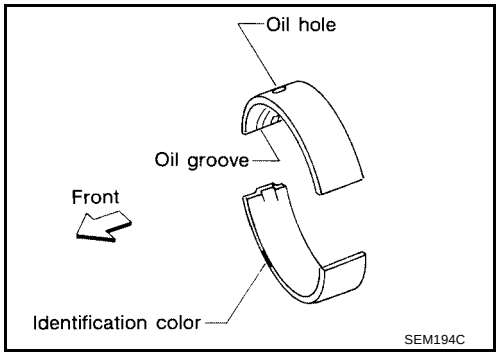
a. Grade number of each cylinder block main journal is punched on the respective cylinder block. These numbers are punched in either Arabic or Roman numerals.

b. Grade number of each crankshaft main journal is punched on the respective crankshaft. These numbers are punched in either Arabic or Roman numerals.





c. Select main bearing with suitable thickness according to the following table.



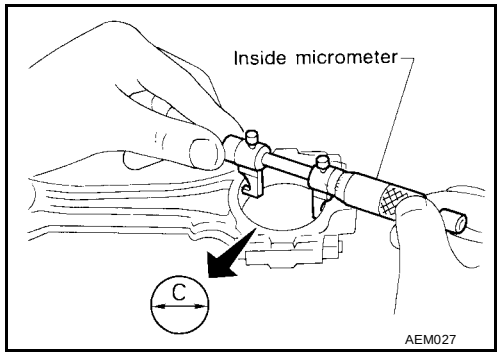
Main bearing grade color:

Crankshaft main journal grade number	Cylinder block main journal grade number		
	0	1 or I	2 or II
0	0 (Black)	1 (Brown)	2 (Green)
1 or I	1 (Brown)	2 (Green)	3 (Yellow)
2 or II	2 (Green)	3 (Yellow)	4 (Blue)

For example:
Cylinder block main journal grade number: 1
Crankshaft main journal grade number: 2
Main bearing grade number = 1 + 2 = 3 (Yellow)

Connecting Rod Bearing (Big End)

1. Install connecting rod bearing to connecting rod and cap.
2. Install connecting rod cap to connecting rod.



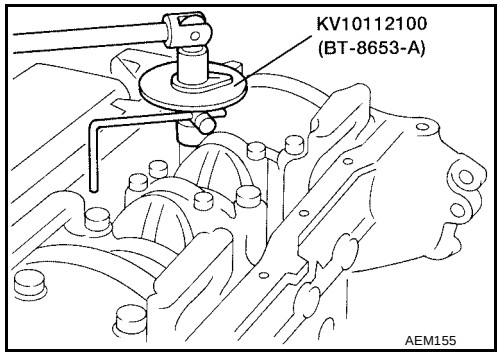
3. Install connecting rod caps.

a. Apply new engine oil to bolt threads and nut seating surfaces.

b. Tighten connecting rod cap nuts in two steps:

Step 1 : 13.72 - 15.68 N·m (1.399 - 1.599 kg-m, 10.120 - 11.566 ft-lb)

Step 2 : 35 - 40 degrees clockwise, or 23 - 28 N·m (2.3 - 2.9 kg-m, 17 - 21 ft-lb)



4. Measure inner diameter “C” of each bearing.

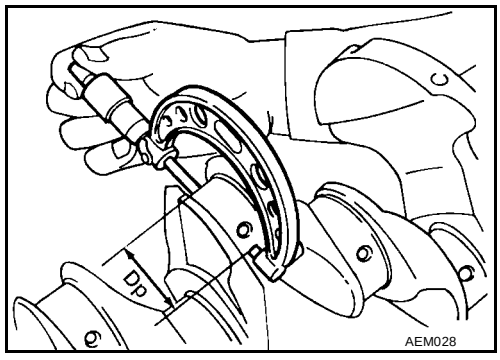
5. Measure outer diameter “Dp” of each crankshaft pin journal.
6. Calculate connecting rod bearing clearance.

Connecting rod bearing clearance = C – Dp

Standard : 0.014 - 0.039 mm (0.0006 - 0.0015 in)

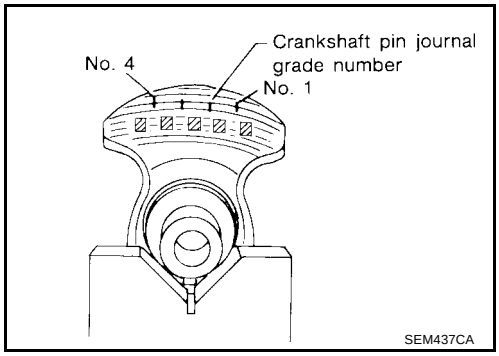
Limit : 0.1 mm (0.004 in)

- If it exceeds the limit, replace bearing.
- If clearance cannot be adjusted using any standard bearing grade, grind crankshaft journal and use undersized bearing. Refer to EM-93, "Bearing Clearance" .



- If a new bearing, crankshaft or connecting rod is replaced, select connecting rod bearing according to the following table.

NOTE:
These numbers are punched in either Arabic or Roman numerals.



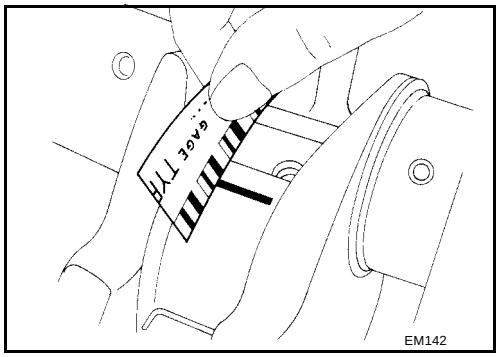
Connecting rod bearing grade number:

Crankshaft pin journal grade number	Connecting rod bearing grade color
0	—
1or I	Brown
2 or II	Green

Method B (Using Plastigage)

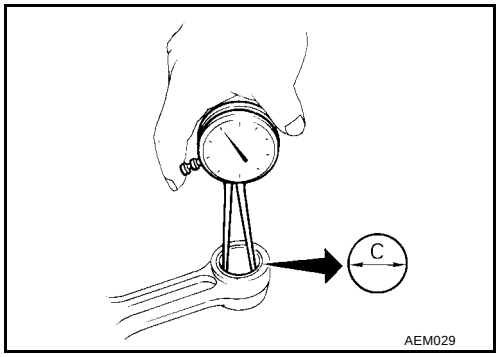
CAUTION:

- **Do not turn crankshaft or connecting rod while Plastigage is being inserted.**
- **If incorrect bearing clearance exists, use a thicker or under-sized main bearing to ensure specified clearance.**



CONNECTING ROD BUSHING CLEARANCE (SMALL END)

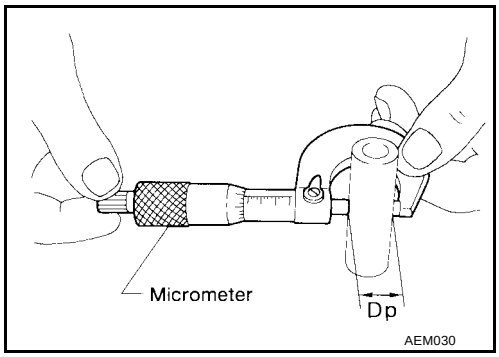
1. Measure inner diameter “C” of bushing.



2. Measure outer diameter “Dp” of piston pin.
3. Calculate piston pin to connecting rod bushing clearance.

Piston pin to connecting rod bushing clearance = C – Dp
Standard : 0.005 - 0.017 mm (0.0002 - 0.0007 in)
Limit : 0.023 mm (0.0009 in)

- If it exceeds the limit, replace connecting rod assembly or connecting rod bushing and/or piston pin.



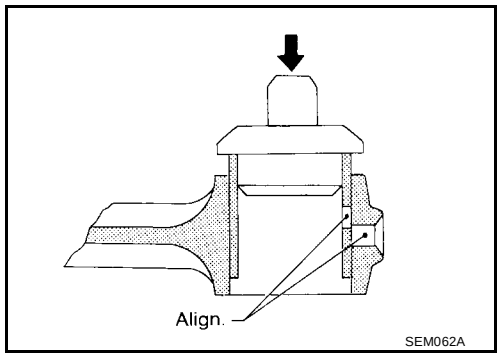
REPLACEMENT OF CONNECTING ROD BUSHING (SMALL END)

1. Drive in small end bushing until it is flush with end surface of rod.

   CAUTION:
   Be sure to align the oil holes.

2. Ream the bushing so that clearance with piston pin is within specification.

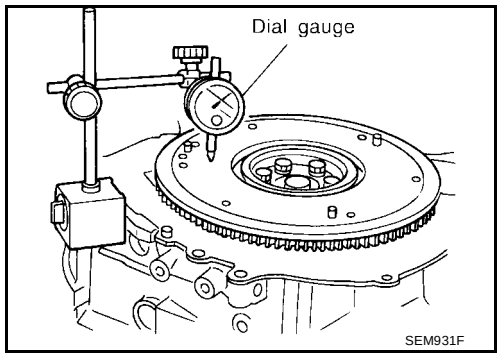
   Piston pin to connecting rod bushing clearance
   Standard : 0.005 - 0.017 mm (0.0002 - 0.0007 in)
   Limit : 0.023 mm (0.0009 in)



FLYWHEEL RUNOUT

Runout (Total indicator reading)
Flywheel (M/T models) :Less than 0.15 mm (0.0059 in)

CAUTION:
- **Do not allow any magnetic materials to contact the ring gear teeth and rear plate.**
- **Do not resurface flywheel. Replace as necessary.**

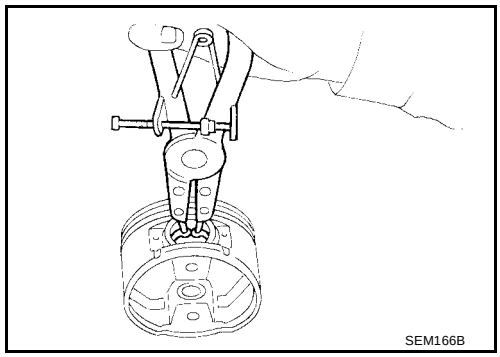


EBS00CEY

Assembly

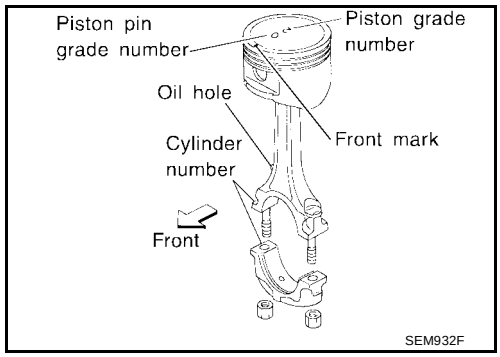
PISTON

1. Install new snap ring on one side of piston pin hole.



2. Heat piston to 60° - 70°C (140° - 158°F) and assemble piston, piston pin, connecting rod and new snap ring.

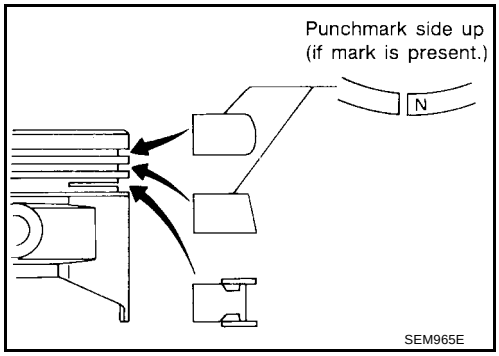
   NOTE:
   - Align the direction of piston and connecting rod.
   - Numbers stamped on connecting rod and cap correspond to each cylinder.
   - After assembly, make sure connecting rod swings smoothly.



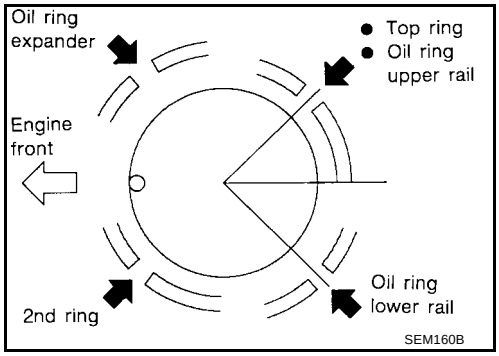
3. Set piston rings as shown.

CAUTION:

- **When piston rings are not replaced, make sure that piston rings are mounted in their original position.**
- **Install new piston rings either side up if there is no punch mark.**



- **Align piston rings so that end gaps are positioned as shown.**

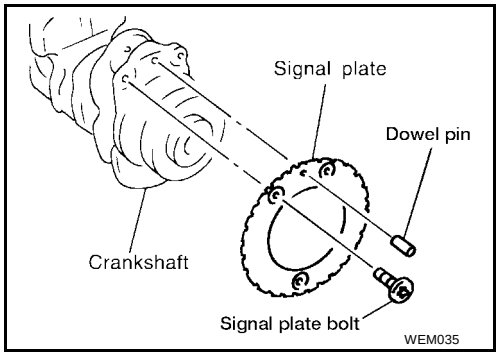


CRANKSHAFT

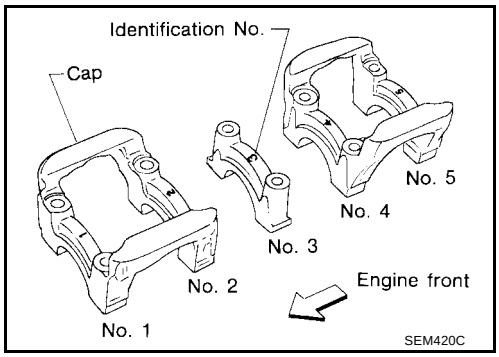
1. Install signal plate to crankshaft using dowel pin to properly position the signal plate. Remove the dowel pin after the signal plate bolts are tightened. Tighten the signal plate bolts.

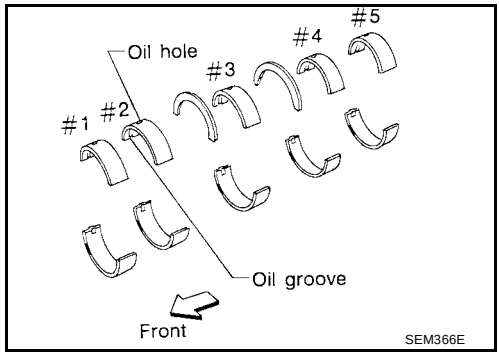
Signal plate bolts : 7.64 - 9.22 N·m (0.78 - 0.94 kg-m, 67.7 - 81.6 in-lb

Dowel pin diameter : 6 mm (0.24 in)



2. Set main bearings in their proper positions on cylinder block and main bearing cap.
   - Confirm that correct main bearings are selected by using Method A or Method B. Refer to EM-93, "Bearing Clearance" .
   - Apply new engine oil to bearing surfaces.

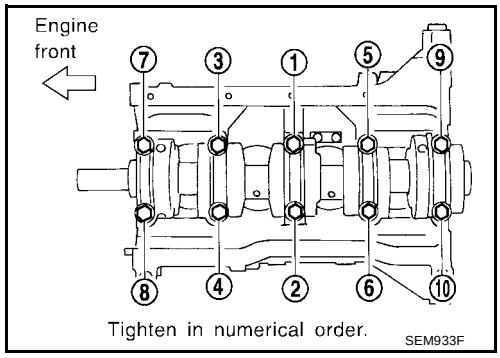




3. Install crankshaft and main bearing caps and tighten bolts in the order shown.

Main bearing cap bolts **: 46.1 - 52.0 N·m (4.780 - 5.30 kg-m, 34.0 - 38.8 ft-lb)**

- Apply new engine oil to the bolt thread and seat surface.
- Prior to tightening bearing cap bolts, shift crankshaft back and forth to properly seat the bearing caps.
- Tighten bearing cap bolts gradually in two or three stages. Start with center bearing and move outward as shown in figure.
- After securing bearing cap bolts, make sure crankshaft turns smoothly by hand.



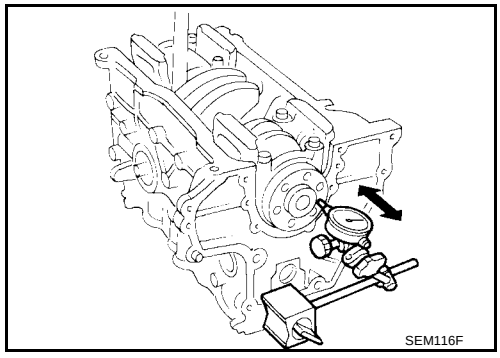
4. Measure crankshaft free end play.

Crankshaft free end play

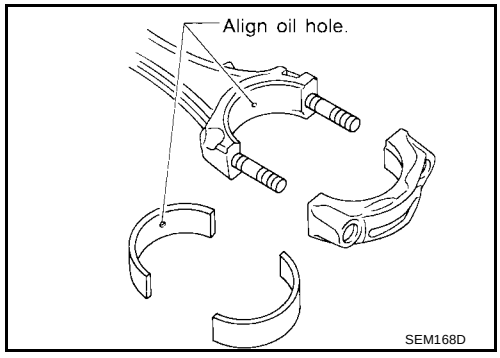
Standard **0.060 - 0.220 mm (0.0024 - 0.0087 in)**

Limit **0.3 mm (0.012 in)**

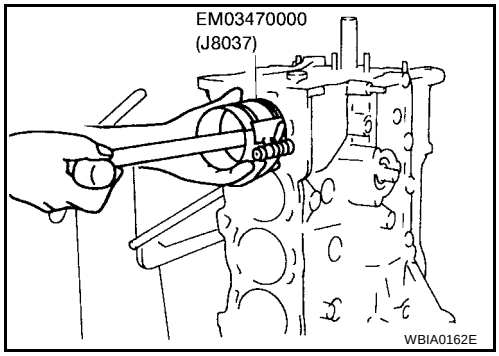
- If beyond the limit, replace thrust bearing with new ones.



5. Install connecting rod bearings in connecting rods and connecting rod caps.
- Confirm that correct bearings are used. Refer to EM-93, "Connecting Rod Bearing" .
- Install bearings so that oil hole in connecting rod aligns with oil hole of bearing.
- Apply new engine oil to bolt threads and bearing surfaces.

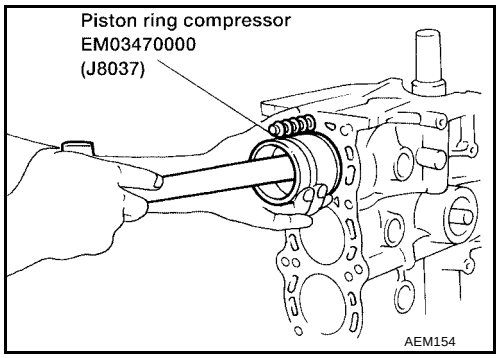


6. Install the piston and connecting rod assembly to the crankshaft. Assemble the components in their original positions.
   - Rotate the crankshaft so the pin corresponding to the connecting rod to be installed is at the bottom dead center position.
   - Apply engine oil sufficiently to the cylinder bore, piston, and crankshaft pin.
   - Match the cylinder position number with the cylinder No. on the connecting rod for installation.
   - Using a piston ring compressor, install the piston with the front mark on the piston crown facing the front of the engine.



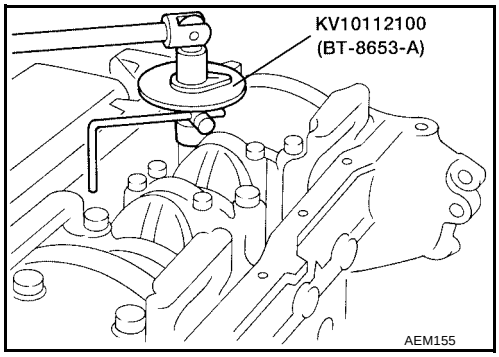
CAUTION:
Be careful not to damage the crankshaft pin, resulting from an interference of the connecting rod big end.

7. Install connecting rod caps.



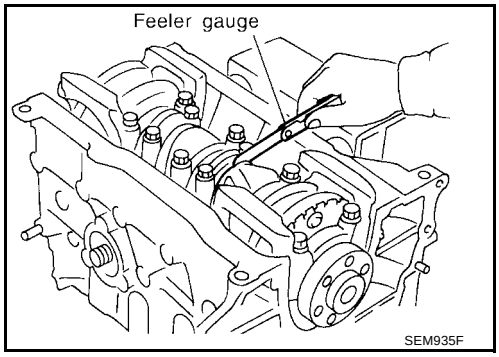
8. Install connecting rod caps.
   - Apply new engine oil to bolt threads and nut seating surfaces.
   - Tighten connecting rod cap nuts in two steps using Tool.

   Step 1 **: 13.72 - 15.68 N·m (1.399 - 1.599 kg-m, 10.120 - 11.566 ft-lb)**
   Step 2 **: 35 - 40 degrees clockwise, or 23 - 28 N·m (2.3 - 2.9 kg-m, 17 - 21 ft-lb)**



9. Measure connecting rod side clearance.

   Connecting rod side clearance
   Standard **: 0.200 - 0.470 mm (0.0079 - 0.0185 in)**
   Limit **: 0.52 mm (0.0205 in)**
   - If beyond the limit, replace connecting rod and/or crankshaft.

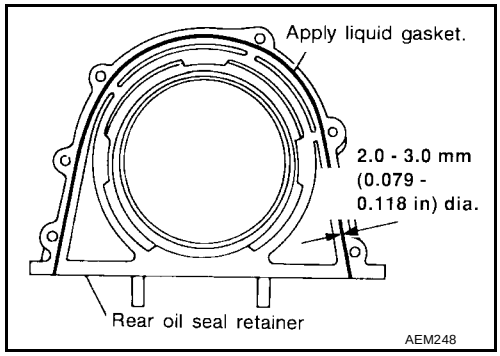


10. Install rear oil seal retainer.

a. Before installing rear oil seal retainer, remove old Silicone RTV Sealant from cylinder block and retainer.

b. Apply a continuous bead of Silicone RTV Sealant to rear oil seal retainer.

- Use Genuine Silicone RTV Sealant, or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .
- Apply around inner side of bolt holes.



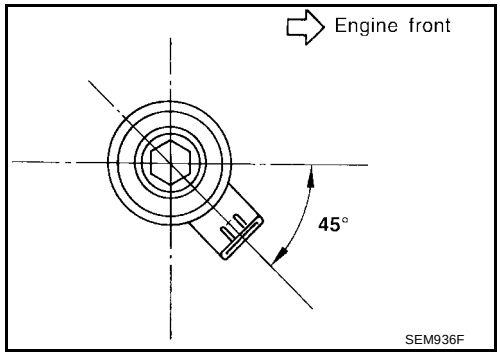
Rear oil seal retainer bolts : **6.28 - 8.34 N·m (0.64 - 0.85 kg-m, 55.6 - 73.8 in-lb)**

11. Install crankshaft position sensor (POS).

Crankshaft position sensor bolt : **7.2 - 10.8 N·m (0.73 - 1.10 kg-m, 63.4 - 95.5 in-lb)**

12. Install knock sensor at correct angle.

Knock sensor bolt : **15.7 - 20.6 N·m (1.6 - 2.1 kg-m, 12 - 15 ft-lb)**



SERVICE DATA AND SPECIFICATIONS (SDS)

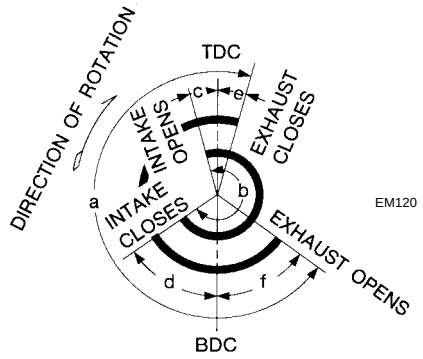
PFP:00030

General Specifications

EBS00CEZ

Engine		QG18DE
Classification		Gasoline
Cylinder arrangement		4, in-line
Displacement cm^3 (cu in)		1,769 (107.94)
Bore × stroke mm (in)		80.0 x 88.0 (3.150 x 3.465)
Valve arrangement		DOHC
Firing order		1-3-4-2
Number of piston rings	Compression	2
	Oil	1
Number of main bearings		5
Compression ratio		9.5

Valve timing
(Intake valve timing control - OFF)



EM120

						Unit: degree
	a	b	c	d	e	f
	204	236	5	51	-2	26

Compression Pressure

EBS00CF0

Unit: kPa (kg/cm^2 , psi)/350 rpm

Standard	1,324 (13.5, 192)
Minimum	1,157 (11.5, 168)
Difference limit between cylinders	98 (1.0, 14)

Cylinder Head

EBS00CF1

Unit: mm (in)

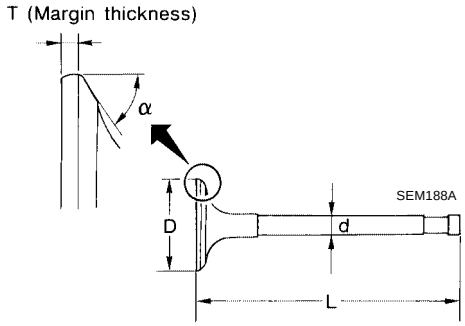
	Standard	Limit
Head surface flatness	Less than 0.03 (0.0012)	0.1 (0.004)
Nominal height	117.8 - 118.0 (4.638 - 4.646)	—

Valve

VALVE

EBS00CF2

Unit: mm (in)



Valve head diameter “D”	Intake	29.9 - 30.2 (1.177 - 1.189)
	Exhaust	24.9 - 25.2 (0.980 - 0.992)
Valve length “L”	Intake	92.00 - 92.50 (3.6220 - 3.6417)
	Exhaust	92.37 - 92.87 (3.6366 - 3.6563)
Valve stem diameter “d”	Intake	5.465 - 5.480 (0.2152 - 0.2157)
	Exhaust	5.445 - 5.460 (0.2144 - 0.2150)
Valve face angle “α”		44°53′ - 45°07′
Valve face contact width	Intake	1.06 - 1.34 (0.0417 - 0.0528)
	Exhaust	1.34 - 1.63 (0.0528 - 0.0642)
Valve margin “T” limit		1.05 - 1.35 (0.0413 - 0.0531)
Valve stem end surface grinding limit		0.2 (0.008)

VALVE SPRING

Free height mm (in)		41.19 (1.622)
Pressure N (kg, lb) at height mm (in)	Standard	370.0 (37.73, 83.19) at 23.64 (0.9307)
	Limit	More than 347.8 (35.46, 78.19) at 23.64 (0.9307)
Out-of-square mm (in)		Less than 1.75 (0.0689)

VALVE LIFTER

Unit: mm (in)

Valve lifter outer diameter	29.960 - 29.975 (1.1795 - 1.1801)
Valve lifter guide bore	30.000 - 30.021 (1.1811 - 1.1819)
Clearance between valve lifter and valve lifter guide	0.025 - 0.065 (0.0010 - 0.0026)

VALVE CLEARANCE

Unit: mm (in)

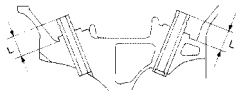
	For adjusting (Standard)		For checking (Reference)
	Hot	Cold* (reference data)	Hot
Intake	0.32 - 0.40 (0.013 - 0.016)	0.25 - 0.33 (0.010 - 0.013)	0.21 - 0.47 (0.008 - 0.019)
Exhaust	0.37 - 0.45 (0.015 - 0.018)	0.32 - 0.40 (0.013 - 0.016)	0.30 - 0.56 (0.012 - 0.022)

*: At a temperature of approximately 20°C (68°F)

Whenever valve clearances are adjusted to cold specifications, check that the clearances satisfy hot specifications and adjust again if necessary.

VALVE GUIDE

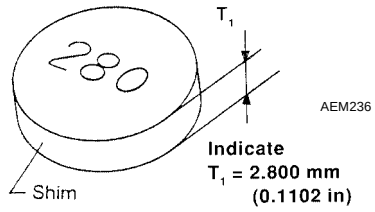
Unit: mm (in)



MEM096A

		Intake		Exhaust	
		Standard	Service	Standard	Service
Valve guide	Outer diameter	9.523 - 9.534 (0.3749 - 0.3754)	9.723 - 9.734 (0.3828 - 0.3832)	9.523 - 9.534 (0.3749 - 0.3754)	9.723 - 9.734 (0.3828 - 0.3832)
	Inner diameter [Finished size]	5.500 - 5.515 (0.2165 - 0.2171)		5.500 - 5.515 (0.2165 - 0.2171)	
Cylinder head valve guide hole diameter		9.475 - 9.496 (0.3730 - 0.3739)	9.685 - 9.696 (0.3813 - 0.3817)	9.475 - 9.496 (0.3730 - 0.3739)	9.685 - 9.696 (0.3813 - 0.3817)
Interference fit of valve guide		0.027 - 0.059 (0.0011 - 0.0023)	0.027 - 0.049 (0.0011 - 0.0019)	0.027 - 0.059 (0.0011 - 0.0023)	0.027 - 0.049 (0.0011 - 0.0019)
Stem to guide clearance		0.020 - 0.050 (0.0008 - 0.0020)		0.040 - 0.070 (0.0016 - 0.0028)	
Stem to guide clearance limit		0.1 (0.004)		0.1 (0.004)	
Valve deflection limit (Dial gauge reading)		0.2 (0.008)			
Projection length “L”		11.5 - 11.7 (0.453 - 0.461)			

AVAILABLE SHIMS



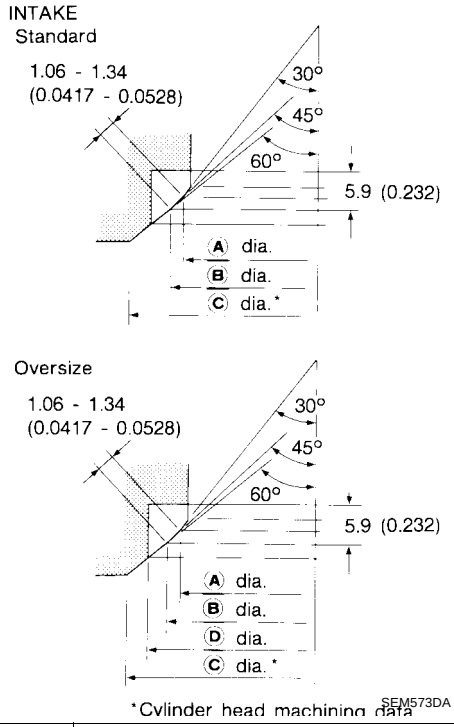
Thickness mm (in)	Identification mark
2.00 (0.0787)	200
2.02 (0.0795)	202
2.04 (0.0803)	204
2.06 (0.0811)	206
2.08 (0.0819)	208
2.10 (0.0827)	210
2.12 (0.0835)	212
2.14 (0.0843)	214
2.16 (0.0850)	216
2.18 (0.0858)	218
2.20 (0.0866)	220

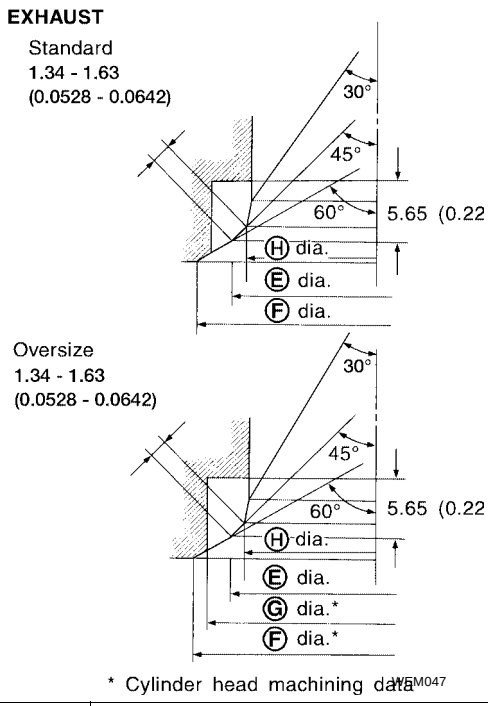
2.21 (0.0870)	221
2.22 (0.0874)	222
2.23 (0.0877)	223
2.24 (0.0882)	224
2.25 (0.0885)	225
2.26 (0.0890)	226
2.27 (0.0893)	227
2.28 (0.0898)	228
2.29 (0.0901)	229
2.30 (0.0906)	230
2.31 (0.0909)	231
2.32 (0.0913)	232
2.33 (0.0917)	233
2.34 (0.0921)	234
2.35 (0.0925)	235
2.36 (0.0929)	236
2.37 (0.0933)	237
2.38 (0.0937)	238
2.39 (0.0940)	239
2.40 (0.0945)	240
2.41 (0.0948)	241
2.42 (0.0953)	242
2.43 (0.0956)	243
2.44 (0.0961)	244
2.45 (0.0964)	245
2.46 (0.0969)	246
2.47 (0.0972)	247
2.48 (0.0976)	248
2.49 (0.0980)	249
2.50 (0.0984)	250
2.51 (0.0988)	251
2.52 (0.0992)	252
2.53 (0.0996)	253
2.54 (0.1000)	254
2.55 (0.1003)	255
2.56 (0.1008)	256
2.57 (0.1011)	257
2.58 (0.1016)	258
2.59 (0.1019)	259
2.60 (0.1024)	260
2.61 (0.1027)	261
2.62 (0.1031)	262
2.63 (0.1035)	263
2.64 (0.1039)	264
2.65 (0.1043)	265

2.66 (0.1047)	266
2.68 (0.1055)	268
2.70 (0.1063)	270
2.72 (0.1071)	272
2.74 (0.1079)	274
2.76 (0.1087)	276
2.78 (0.1094)	278
2.80 (0.1102)	280
2.82 (0.1110)	282
2.84 (0.1118)	284
2.86 (0.1126)	286
2.88 (0.1134)	288
2.90 (0.1142)	290
2.92 (0.1150)	292
2.94 (0.1157)	294
2.96 (0.1165)	296
2.98 (0.1173)	298

VALVE SEAT

Unit: mm (in)

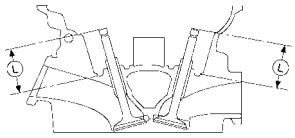




Dia.	Specification	Dia.	Specification
A	27.8 - 28.0 (1.094 - 1.102)	E	24.5 - 24.7 (0.965 - 0.972)
B	29.5 - 29.7 (1.161 - 1.169)	F	26.500 - 26.516 (1.0433 - 1.0439)
C	31.9 - 32.1 (1.256 - 1.264)	G	26.2 - 26.4 (1.031 - 1.039)
D	31.500 - 31.516 (1.2402 - 1.2408)	H	22.4 - 22.6 (0.8819 - 0.8898)

VALVE SEAT RESURFACE LIMIT

Unit: mm (in)



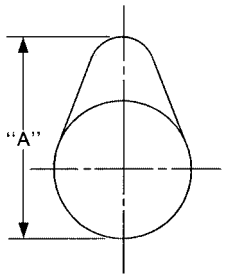
AEM343

Depth (L)	Intake	35.95 - 36.55 (1.4154 - 1.4390)
	Exhaust	35.92 - 36.52 (1.4142 - 1.4378)

Camshaft and Camshaft Bearing

EBS00CF3

Unit: mm (in)



SEM671

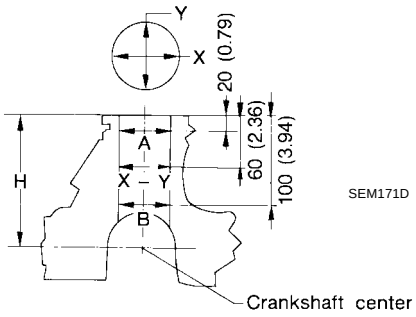
Cam height "A"	Intake	40.61 - 40.80 (1.599 - 1.606)	
	Exhaust	38.965 - 39.155 (1.534 - 1.542)	
Cam wear limit		0.20 (0.0079)	
		Standard	Limit
Camshaft journal clearance		Intake: 0.030 - 0.071 (0.0012 - 0.0028) Exhaust: 0.045 - 0.086 (0.0018 - 0.0034)	Intake: 0.135 (0.0053) Exhaust: 0.150 (0.0059)
Inner diameter of camshaft bracket	No. 1	28.000 - 28.021 (1.1024 - 1.1032)	—
	No. 2, 3, 4, 5	Intake: 23.985 - 24.006 (0.9443 - 0.9451) Exhaust: 24.000 - 24.021 (0.9449 - 0.9457)	
Outer diameter of camshaft journal	No. 1	27.935 - 27.955 (1.0998 - 1.1006)	—
	No. 2, 3, 4, 5	23.935 - 23.955 (0.9423 - 0.9431)	
Camshaft runout [TIR*]		Less than 0.02 (0.0008)	0.1 (0.004)
Camshaft sprocket runout [TIR*]		Less than 0.15 (0.0059)	
Camshaft end play		0.115 - 0.188 (0.0045 - 0.0074)	0.20 (0.0079)

*Total indicator reading

Cylinder Block

EBS00CF4

Unit: mm (in)



SEM171D

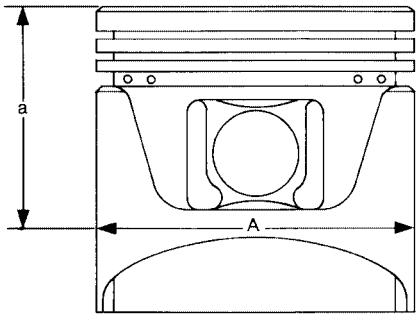
			Standard	Limit
Surface flatness			Less than 0.03 (0.0012)	0.1 (0.004)
Height “H” (nominal)			213.95 - 214.05 (8.4232 - 8.4271)	—
Cylinder bore inner diameter	Standard	Grade No. 1	80.000 - 80.010 (3.1496 - 3.1500)	0.2 (0.008)
		Grade No. 2	80.010 - 80.020 (3.1500 - 3.1504)	
		Grade No. 3	80.020 - 80.030 (3.1504 - 3.1508)	
	Out-of-round (X – Y)		Less than 0.015 (0.0006)	—
	Taper (B – A)		Less than 0.01 (0.0004)	—
	Difference in inner diameter between cylinders		0.05 (0.0020)	0.2 (0.008)

Piston, Piston Ring and Piston Pin

PISTON

EBS00CF5

Unit: mm (in)



SEM882E

Piston skirt diameter “A”	Standard	Grade No. 1	79.965 - 79.975 (3.1482 - 3.1486)
		Grade No. 2	79.975 - 79.985 (3.1486 - 3.1490)
		Grade No. 3	79.985 - 79.995 (3.1490 - 3.1494)
	0.25 (0.0098) oversize (service)		80.215 - 80.245 (3.1581 - 3.1592)
	0.5 (0.020) oversize (service)		80.465 - 80.495 (3.1679 - 3.1691)
“a” distance from the top			42.3 (1.665)
Piston pin hole inner diameter			18.993 - 19.005 (0.7478 - 0.7482)
Piston-to-bore clearance			0.025 - 0.045 (0.0010 - 0.0018)

PISTON RING

Unit: mm (in)

		Standard	Limit
Side clearance	Top	0.045 - 0.080 (0.0018 - 0.0031)	0.2 (0.008)
	2nd	0.030 - 0.070 (0.0012 - 0.0028)	
	Oil	0.065 - 0.135 (0.0026 - 0.0053)	
End gap	Top	0.20 - 0.39 (0.0079 - 0.0154)	0.49 (0.0193)
	2nd	0.32 - 0.56 (0.0126 - 0.0220)	0.64 (0.0252)
	Oil	0.20 - 0.69 (0.0079 - 0.0272)	1.09 (0.0429)

PISTON PIN

Unit: mm (in)

Piston pin outer diameter		18.989 - 19.001 (0.7476 - 0.7481)
Piston pin to piston clearance		0.002 - 0.006 (0.0001 - 0.0002)
Piston pin to connecting rod bushing clearance (small end)	Standard	0.005 - 0.017 (0.0002 - 0.0007)
	Limit	0.023 (0.0009)

Connecting Rod

EBS00CF6

Unit: mm (in)

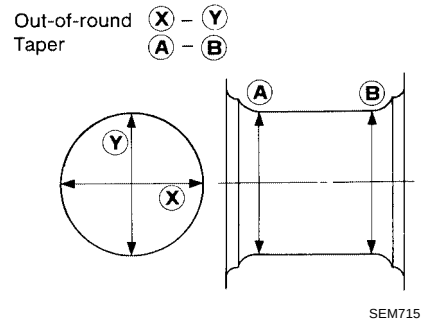
Center distance		140.45 - 140.55 (5.5295 - 5.5335)
Bend limit [per 100 (3.94) length]		0.15 (0.0059)
Torsion limit [per 100 (3.94) length]		0.3 (0.012)
Connecting rod bushing inner diameter* (small end)		19.000 - 19.012 (0.7480 - 0.7485)
Connecting rod big end inner diameter		43.000 - 43.013 (1.6929 - 1.6934)
Side clearance	Standard	0.200 - 0.470 (0.0079 - 0.0185)
	Limit	0.52 (0.0205)

*After installing in connecting rod

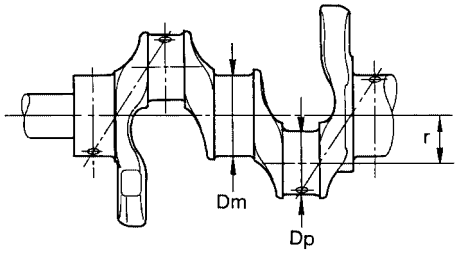
Crankshaft

EBS00CF7

Unit: mm (in)



SEM715



SEM645

Main journal dia. “Dm”	Grade No. 0	49.956 - 49.964 (1.9668 - 1.9671)
	Grade No. 1	49.948 - 49.956 (1.9665 - 1.9668)
	Grade No. 2	49.940 - 49.948 (1.9661 - 1.9665)
Pin journal dia. “Dp”	Grade No. 0	39.968 - 39.974 (1.5735 - 1.5738)
	Grade No. 1	39.962 - 39.968 (1.5733 - 1.5735)
	Grade No. 2	39.956 - 39.962 (1.5731 - 1.5733)
Center distance “r”		43.95 - 44.05 (1.7303 - 1.7342)
Out-of-round (X – Y)	Standard	Less than 0.003 (0.0001)
	Limit	Less than 0.005 (0.0002)
Taper (A – B)	Standard	Less than 0.004 (0.0002)
	Limit	Less than 0.005 (0.0002)
Runout [TIR*]	Standard	Less than 0.04 (0.0016)
	Limit	Less than 0.05 (0.0020)
Free end play	Standard	0.060 - 0.220 (0.0024 - 0.0087)
	Limit	0.3 (0.012)

*: Total indicator reading

Main Bearing

EBS00CF8

STANDARD

Grade No.	Thickness “T” mm (in)	Identification color
0	1.827 - 1.831 (0.0719 - 0.0720)	Black
1	1.831 - 1.835 (0.0720 - 0.0722)	Brown
2	1.835 - 1.839 (0.0722 - 0.0724)	Green
3	1.839 - 1.843 (0.0724 - 0.0725)	Yellow
4	1.843 - 1.847 (0.0725 - 0.0727)	Blue

UNDERSIZE

Unit: mm (in)

	Thickness “T”
0.25 (0.0098)	1.960 - 1.964 (0.0772 - 0.0773)
0.50 (0.0197)	2.085 - 2.089 (0.0821 - 0.0822)

Connecting Rod Bearing

EBS00CF9

STANDARD SIZE

Unit: mm (in)

Grade No.	Thickness	Identification color or number
0	1.503 - 1.506 (0.0592 - 0.0593)	—
1	1.506 - 1.509 (0.0593 - 0.0594)	Brown
2	1.509 - 1.512 (0.0594 - 0.0595)	Green

UNDERSIZE

Unit: mm (in)

Grade No.	Thickness	Identification color or number
0.08 (0.0031)	1.542 - 1.546 (0.0607 - 0.0609)	—
0.12 (0.0047)	1.562 - 1.566 (0.0615 - 0.0617)	—
0.25 (0.0098)	1.627 - 1.631 (0.0641 - 0.0642)	—

Bearing Clearance

EBS00CFA

Unit: mm (in)

Main bearing clearance	Standard	0.018 - 0.042 (0.0007 - 0.0017)
	Limit	0.1 (0.004)
Connecting rod bearing clearance	Standard	0.014 - 0.039 (0.0006 - 0.0015)
	Limit	0.1 (0.004)

Miscellaneous Components

EBS00CFB

Unit: mm (in)

Flywheel runout [TIR*]	Less than 0.15 (0.0059)
Camshaft sprocket runout [TIR*]	Less than 0.15 (0.0059)

*: Total indicator reading at measuring point 115 mm (4.53 in) from crankshaft center.

PRECAUTIONS

PFP:00001

Precautions for Draining Coolant

EBS00CFC

- Drain coolant when engine is cooled.

Precautions for Disconnecting Fuel Piping

EBS00CFD

- Before starting work, make sure no fire or spark producing items are in the work area.
- Release fuel pressure before any removal or disassembly.
- After disconnecting pipes, plug openings to stop fuel leakage.

Precautions for Removal and Disassembly

EBS00CFE

- When instructed to use special service tools, use the specified tools. Always be careful to work safely, avoid forceful operations.
- Use maximum care to avoid damage to mating or sliding surfaces.
- Cover openings of engine system with tape or equivalent, if necessary, to seal out foreign materials.
- Mark and arrange disassembly parts in an organized way for easy troubleshooting and assembly.
- When loosening nuts and bolts, as a basic rule, start with the one furthest outside, then the one diagonally opposite, and so on. If the order of loosening is specified, follow the specifications.

Precautions for Inspection, Repair and Replacement

EBS00CFF

- Before repairing or replacing, thoroughly inspect parts. Inspect new replacement parts in the same way, and replace if necessary.

Precautions for Assembly and Installation

EBS00CFG

- Use torque wrench to tighten bolts or nuts.
- When tightening nuts and bolts, as a basic rule, equally tighten in several different steps starting with the ones in center, then ones on inside and outside diagonally in this order. If the order of tightening is specified, follow the specifications.
- Always replace the old with a new gasket, packing, oil seal or O-ring.
- Thoroughly wash, clean, and air-blow each part. Carefully check oil or coolant passages for any restriction and blockage.
- Avoid damaging sliding or mating surfaces. Completely remove foreign materials such as cloth lint or dust. Before assembly, oil sliding surfaces well.
- Bleed the air trapped within the system after draining the coolant.
- Before starting engine, apply fuel pressure to fuel lines with turning ignition switch ON (with engine stopped). Then make sure that there are no leaks at fuel line connections.
- After repairing, start engine and increase engine speed to check coolant, fuel, oil, and exhaust systems for leakage or rattles.

Parts Requiring Angular Tightening

EBS00CFH

- Use an angle wrench for the final tightening of the following engine parts.
  - Cylinder head bolts
  - Lower cylinder block bolts
  - Connecting rod cap bolts
  - Crankshaft pulley bolt (No angle wrench is required as the bolt flange is provided with notches for angular tightening)
- Do not use a torque value for final tightening.
- The torque value for these parts are for a preliminary step.
- Ensure thread and seat surfaces are clean and coated with engine oil.

Precautions for Liquid Gasket

EBS00GJR

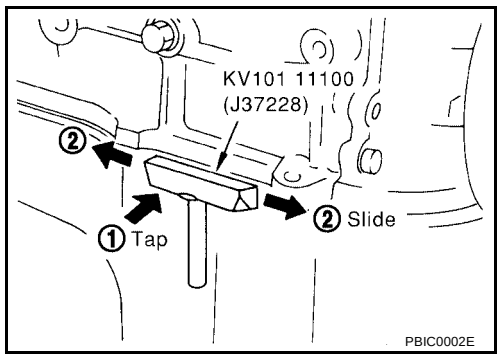
REMOVAL OF LIQUID GASKET SEALING

- After removing the mounting bolts and nuts, separate the mating surface using Tool and remove the liquid gasket sealing.

  Tool number : KV10111100 (J-37228)

  CAUTION:
  Be careful not to damage the mating surfaces.

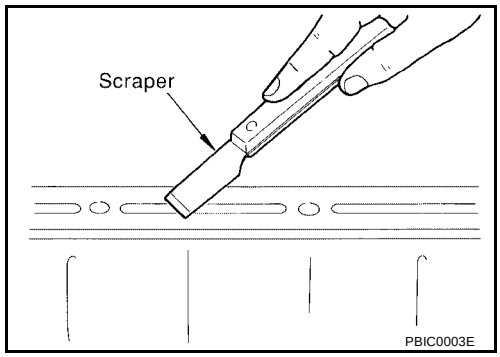
- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap (1) the cutter where the Silicone RTV Sealant is applied. Use a plastic hammer to slide the cutter (2) by tapping on the side.



CAUTION:
If for some unavoidable reason a tool such as a flat-bladed screwdriver is used, be careful not to damage the mating surfaces.

LIQUID GASKET APPLICATION PROCEDURE

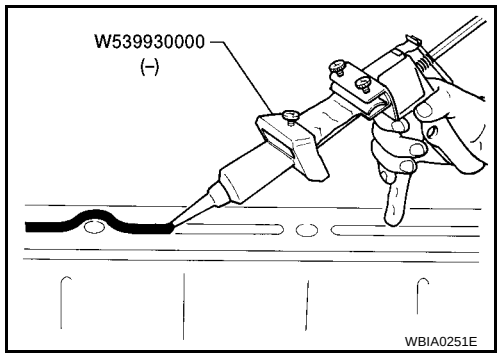
1. Using a scraper, remove the old Silicone RTV Sealant adhering to the gasket application surface and the mating surface.
   - Remove the sealant completely from the groove of the gasket application surface, mounting bolts, and bolt holes.
2. Thoroughly clean the gasket application surface and the mating surface and remove adhering moisture, grease and foreign materials.
3. Attach the sealant tube to Tool.
   - Use Genuine Silicone RTV Sealant or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .



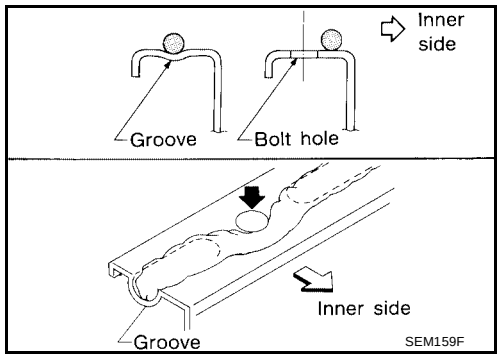
4. Apply the sealant using Tool without breaks to the specified location.

   Tool number : WS39930000 (–)

   - If there is a groove for the sealant application, apply the sealant to the groove.
   - As for the bolt holes, normally apply the sealant inside the holes. If specified, it should be applied outside the holes. Make sure to read the text of this manual.
   - Within five minutes of the sealant application, install the mating component.
   - If the sealant protrudes, wipe it off immediately.
   - Do not retighten after the installation.
   - After 30 minutes or more have passed from the installation, fill the engine with the specified oil and coolant. Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .



CAUTION:
Follow all specific instructions in this manual.



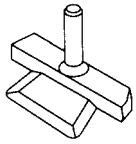
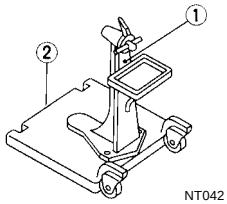
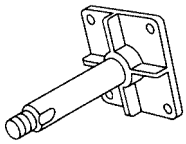
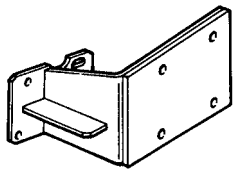
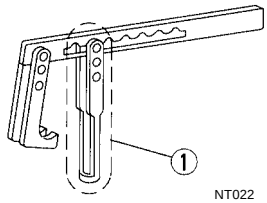
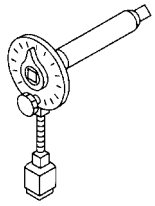
PREPARATION

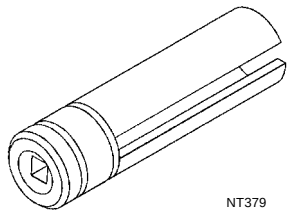
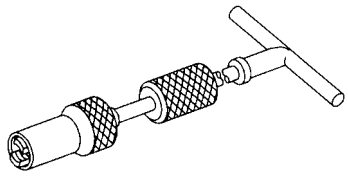
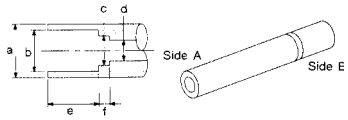
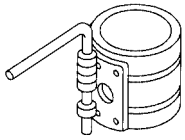
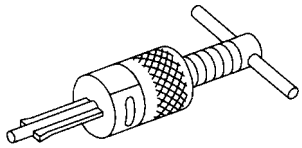
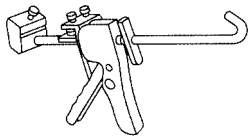
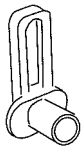
PFP:00002

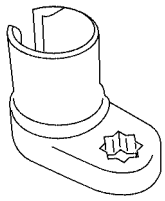
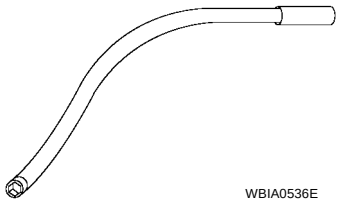
Special Service Tools

EBS00CFJ

The actual shapes of the Kent-Moore tools may differ from those of the special service tools illustrated here.

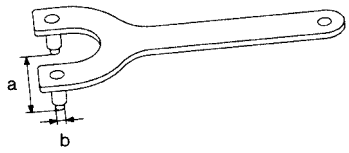
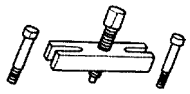
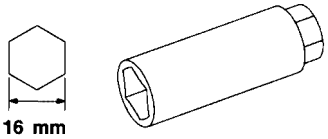
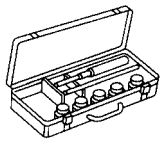
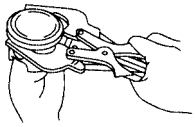
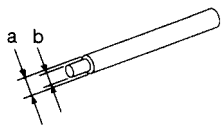
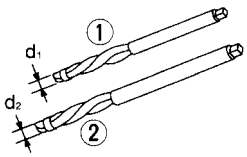
Tool number (Kent-Moore No.) Tool name	Description
KV10111100 (J-37228) Seal cutter  S-NT046	Removing oil pan and timing chain case
ST0501S000 Engine stand assembly 1. ST05011000 (—) Engine stand 2. ST05012000 (—) Base  NT042	Disassembling and assembling
KV10106500 (—) Engine stand shaft  NT028	Disassembling and assembling
KV10115300 (—) Engine sub-attachment  ZZA1078D	Disassembling and assembling
KV10116200 (J-26336-B) Valve spring compressor 1. KV10115900 (J-26336-20) Attachment 2. KV10109220 (—) Adapter  NT022	Disassembling valve mechanism
KV10112100 (BT-8653-A) Angle wrench  S-NT014	Tightening bolts for bearing cap, cylinder head, etc in angle.

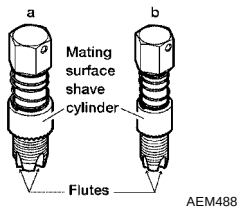
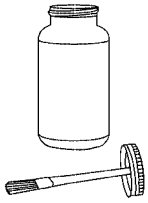
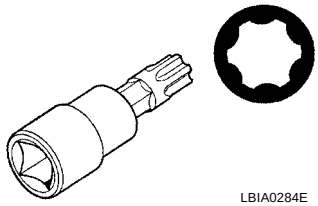
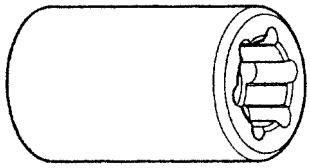
Tool number (Kent-Moore No.) Tool name	Description
KV10117100 (J-36471-A) Heated oxygen sensor wrench  NT379	Loosening or tightening heated oxygen sensors with 22 mm 80.87 in) hexagon nut
KV10107902 (J-38959) Valve oil seal puller  S-NT011	Removing valve oil seal
KV10115600 (J-38958) Valve oil seal drift  S-NT603	Installing valve oil seal **Use side A.** **a: 20 (0.79) dia.** **d: 8 (0.31) dia.** **b: 13 (0.51) dia.** **e: 10.7 (0.421) dia.** **c: 10.3 (0.406) dia.** **f: 5 (0.20) dia.** Unit: mm (in)
EM03470000 (J-8037) Piston ring compressor  S-NT044	Installing piston assembly into cylinder bore
ST16610001 (J-23907) Pilot bushing puller  S-NT045	Removing crankshaft pilot bushing
WS39930000 (—) Tube presser  S-NT052	Pressing the tube of liquid gasket
— (J-45488) Quick connector release  PBIC0198E	Removing fuel tube quick connectors in engine room

Tool number (Kent-Moore No.) Tool name	Description
— (J-44626) Air fuel ratio (A/F) sensor wrench  LEM054	Loosening or tightening air fuel ratio (A/F) sensor 1
— (J-46535) Drive belt tension releaser  WBIA0536E	Releasing drive belt tension

Commercial Service Tools

EBS00CFK

(Kent-Moore No.) Tool name	Description
Pulley holder  NT628	Crankshaft pulley removing and installing **a: 68 mm (2.68 in) dia.** **b: 8mm (0.31 in) dia.**
Crank puller  ZZA0010D	Crankshaft pulley removing
Spark plug wrench  S-NT047	Removing and installing spark plug
Valve seat cutter set  S-NT048	Finishing valve seat dimensions
Piston ring expander  S-NT030	Removing and installing piston ring
Valve guide drift  S-NT015	Removing and installing valve guide **Intake & Exhaust:** **a: 9.5 mm (0.374 in) dia.** **b: 5.5 mm (0.217 in) dia.**
Valve guide reamer  S-NT016	1: Reaming valve guide inner hole 2: Reaming hole for oversize valve guide **Intake & Exhaust:** **d_1 : 6.0 mm (0.236 in) dia.** **d_2 : 10.2 mm (0.402 in) dia.**

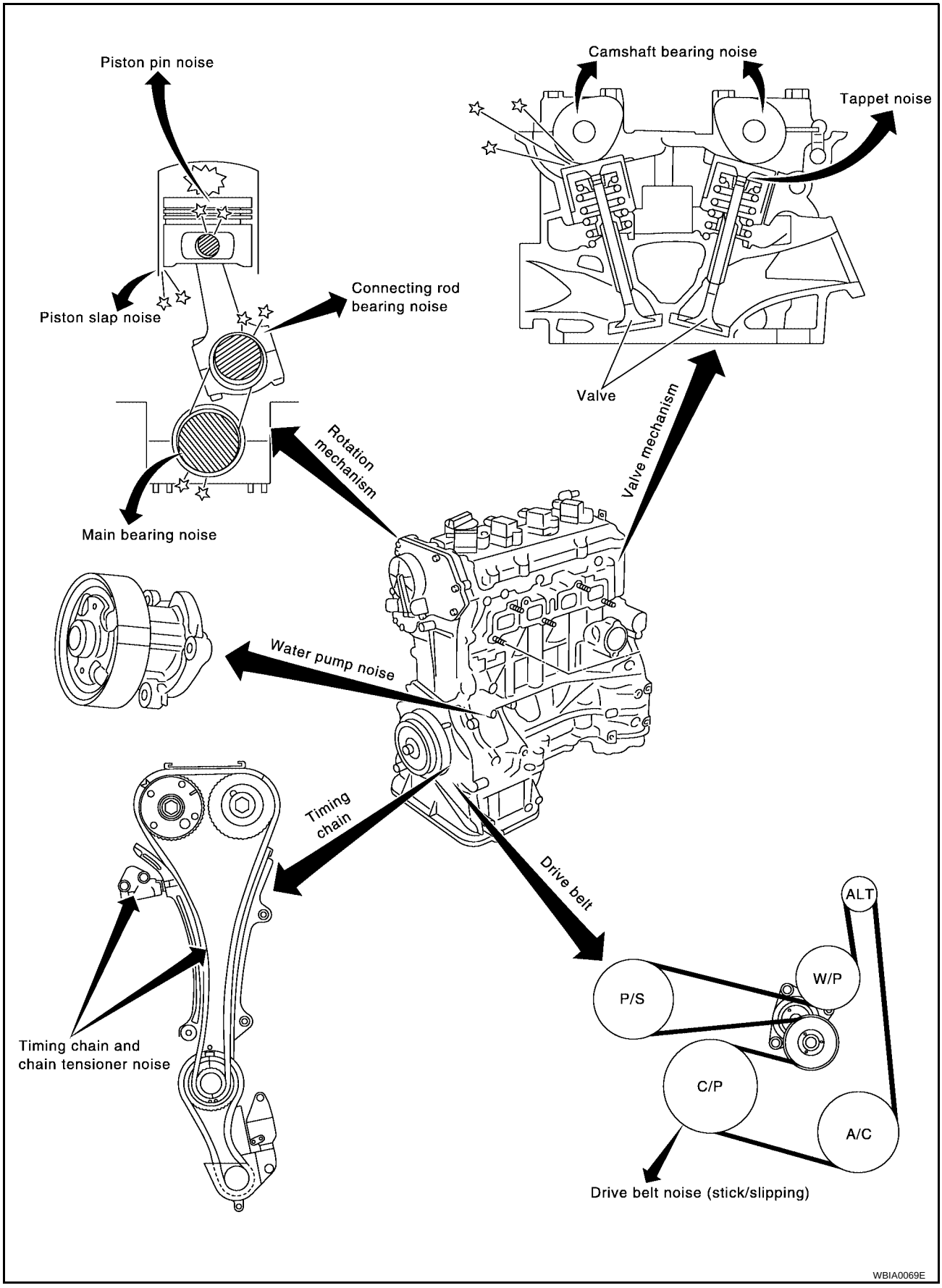
(Kent-Moore No.) Tool name		Description
Oxygen sensor thread cleaner a: (J-43897-18) b: (J-43897-12)	 AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor (Use with anti-seize lubricant shown below.) **a: 18 mm 0.71 in) for zirconia oxygen sensor** **b: 12 mm (0.47 in) for titania oxygen sensor**
Anti-seize lubricant (Permatex 133AR or equivalent meeting MIL specification MIL-A-907)	 AEM489	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads
TP50 Torx® plus Bit (J-45737)	 LBIA0284E	Removing and installing M/T flywheel bolts
E20 Torx® Socket (J-45816)	 LBIA0285E	Removing and installing A/T drive plate bolts

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting —Engine Noise

EBS00CFL



Use the Chart Below to Help You Find the Cause of the Symptom.

EBS00CFM

1. Locate the area where noise occurs.
2. Confirm the type of noise.
3. Specify the operating condition of engine.
4. Check specified noise source.

If necessary, repair or replace these parts.

Location of noise	Type of noise	Operating condition of engine						Source of noise	Check item	Reference page
		Before warm-up	After warm-up	When starting	When idling	When racing	While driving			
Top of engine Rocker cover Cylinder head	Ticking or clicking	C	A	—	A	B	—	Tappet noise	Valve clearance	EM-134
	Rattle	C	A	—	A	B	C	Camshaft bearing noise	Camshaft journal clearance Camshaft runout	EM-129 EM-128
Crankshaft pulley Cylinder block (Side of engine) Oil pan	Slap or knock	—	A	—	B	B	—	Piston pin noise	Piston and piston pin clearance Connecting rod bushing clearance	EM-182 EM-182
	Slap or rap	A	—	—	B	B	A	Piston slap noise	Piston-to-bore clearance Piston ring side clearance Piston ring end gap Connecting rod bend and torsion	EM-182 EM-181 EM-181 EM-182
	Knock	A	B	C	B	B	B	Connecting rod bearing noise	Connecting rod bushing clearance (Small end) Connecting rod bearing clearance (Big end)	EM-182 EM-182
	Knock	A	B	—	A	B	C	Main bearing noise	Main bearing oil clearance Crankshaft runout	EM-187 EM-186
Front of engine Timing chain cover	Tapping or ticking	A	A	—	B	B	B	Timing chain and chain tensioner noise	Timing chain cracks and wear Timing chain tensioner operation	EM-136
Front of engine	Squeaking or fizzing	A	B	—	B	—	B	Drive belts (Sticking or slipping)	Drive belts deflection	EM-103
	Creaking	A	B	A	B	A	B	Drive belts (Slipping)	Idler pulley bearing operation	
	Squall Creak	A	B	—	B	A	B	Water pump noise	Water pump operation	CO-25

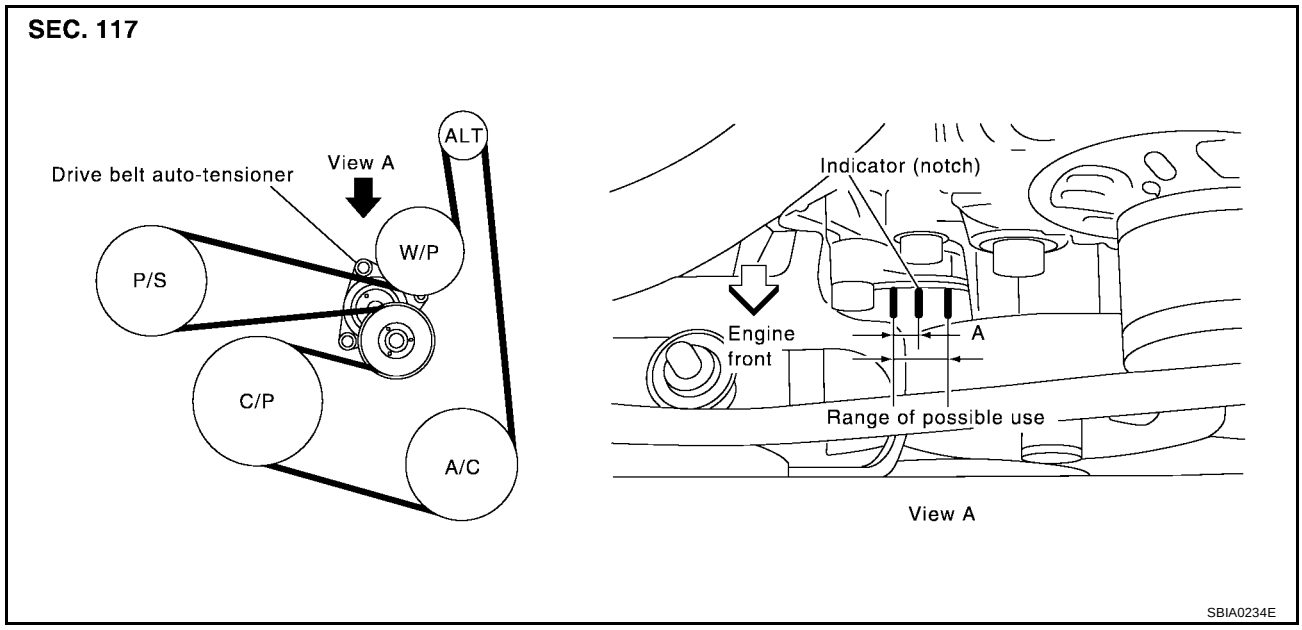
A: Closely related B: Related C: Sometimes related —: Not related

DRIVE BELTS

PFP:02117

Checking Drive Belts

EBS00CFN



NOTE:
On vehicles not equipped with A/C, there is an idler pulley in the position for the drive belt routing.

WARNING:
Inspect the drive belt only when the engine is stopped.

- Make sure that the stamp mark of drive belt auto-tensioner is within the usable range.

  NOTE:
  - Check the drive belt auto-tensioner indication when the engine is cold.
  - When the new drive belt is installed, the range should be A.
  - Visually check entire belt for wear, damage or cracks.
  - If the indicator is out of allowable use range or belt is damaged, replace the belt.

Tension Adjustment

EBS00CFO

- Belt tension is not manually adjustable, it is automatically adjusted by the drive belt auto-tensioner.

Removal and Installation

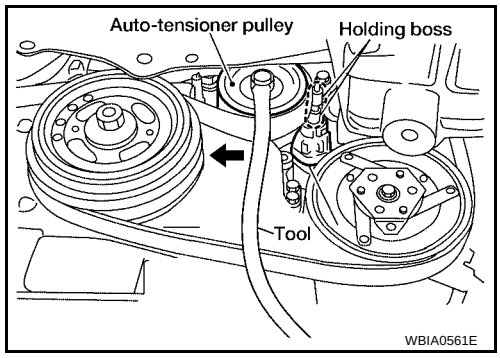
EBS00M49

REMOVAL

1. Remove front RH engine side cover.
2. While securely holding the hexagonal part in pulley center of drive belt auto-tensioner, move in the direction of arrow (loosening direction of tensioner) using Tool.

   Tool number : — (J-46535)

   CAUTION:
   - **Avoid placing hand in a location where pinching may occur if the holding tool accidentally comes off.**
   - **Do not loosen the auto-tensioner pulley bolt. (Do not turn it counterclockwise.) If turned counterclockwise, the complete auto-tensioner must be replaced as a unit, including pulley.**



3. Insert a rod approximately 6 mm (0.24 in) in diameter through the rear of tensioner into retaining boss to lock tensioner pulley.

   NOTE:
   Leave tensioner pulley arm locked until belt is installed again.
4. Loosen auxiliary drive belt from water pump pulley in sequence, and remove it.

INSTALLATION

Installation is in the reverse order of removal.

CAUTION:

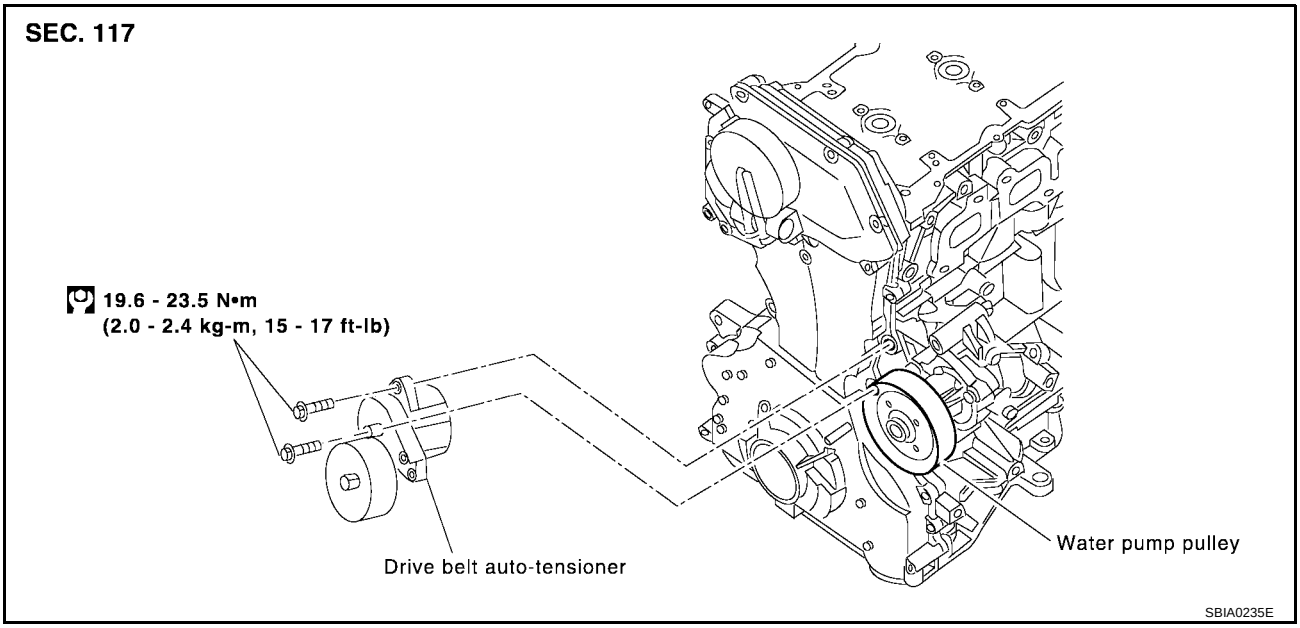
- **Do not loosen the auto-tensioner pulley bolt. (Do not turn it counterclockwise.) If turned counterclockwise, the complete auto-tensioner must be replaced as a unit, including pulley.**
- **Avoid placing hand in a location where pinching may occur if the holding tool accidentally comes off.**
- **Confirm belts are completely set on the pulleys.**

NOTE:

- Turn crankshaft pulley clockwise several times to equalize tension between each pulley.
- Confirm tension of drive belt at indicator (notch on fixed side) is within the possible use range. Refer to EM-103, "Checking Drive Belts" .

Removal and Installation of Drive Belt Auto-tensioner

EBS00M4A



CAUTION:

The complete auto-tensioner must be replaced as a unit, including the pulley.

REMOVAL

1. Remove the front RH engine side cover.
2. Remove the drive belt. Refer to EM-103, "REMOVAL" .
3. Remove the alternator. Refer to SC-32, "Removal" .
4. Remove the drive belt auto-tensioner, using power tool.

CAUTION:

Do not loosen the auto-tensioner pulley bolt. (Do not turn it counterclockwise.) If turned counterclockwise, the complete auto-tensioner must be replaced as a unit, including pulley.

INSTALLATION

1. Install drive belt auto-tensioner.
2. While securely holding the hexagonal part in pulley center of drive belt auto-tensioner, move in the direction of arrow (loosening direction of tensioner) using Tool.

Tool number : — (J-46535)

CAUTION:

- **Avoid placing hand in a location where pinching may occur if the holding tool accidentally comes off.**

- **Do not loosen the auto-tensioner pulley bolt. (Do not turn it counterclockwise.) If turned counterclockwise, the complete auto-tensioner must be replaced as a unit, including pulley.**

3. Insert a rod approximately 6 mm (0.24 in) in diameter through the rear of tensioner into retaining boss to lock tensioner pulley.

   NOTE:
   Leave tensioner pulley arm locked until belt is installed.

CAUTION:

- **Install the drive belt auto-tensioner carefully so not to damage the water pump pulley.**
- **If there is damage greater than peeled paint, replace the drive belt auto-tensioner.**
- **Do not swap the pulley between the new and old auto-tensioner unit.**

4. Installation of the remaining components is in the reverse order of removal.

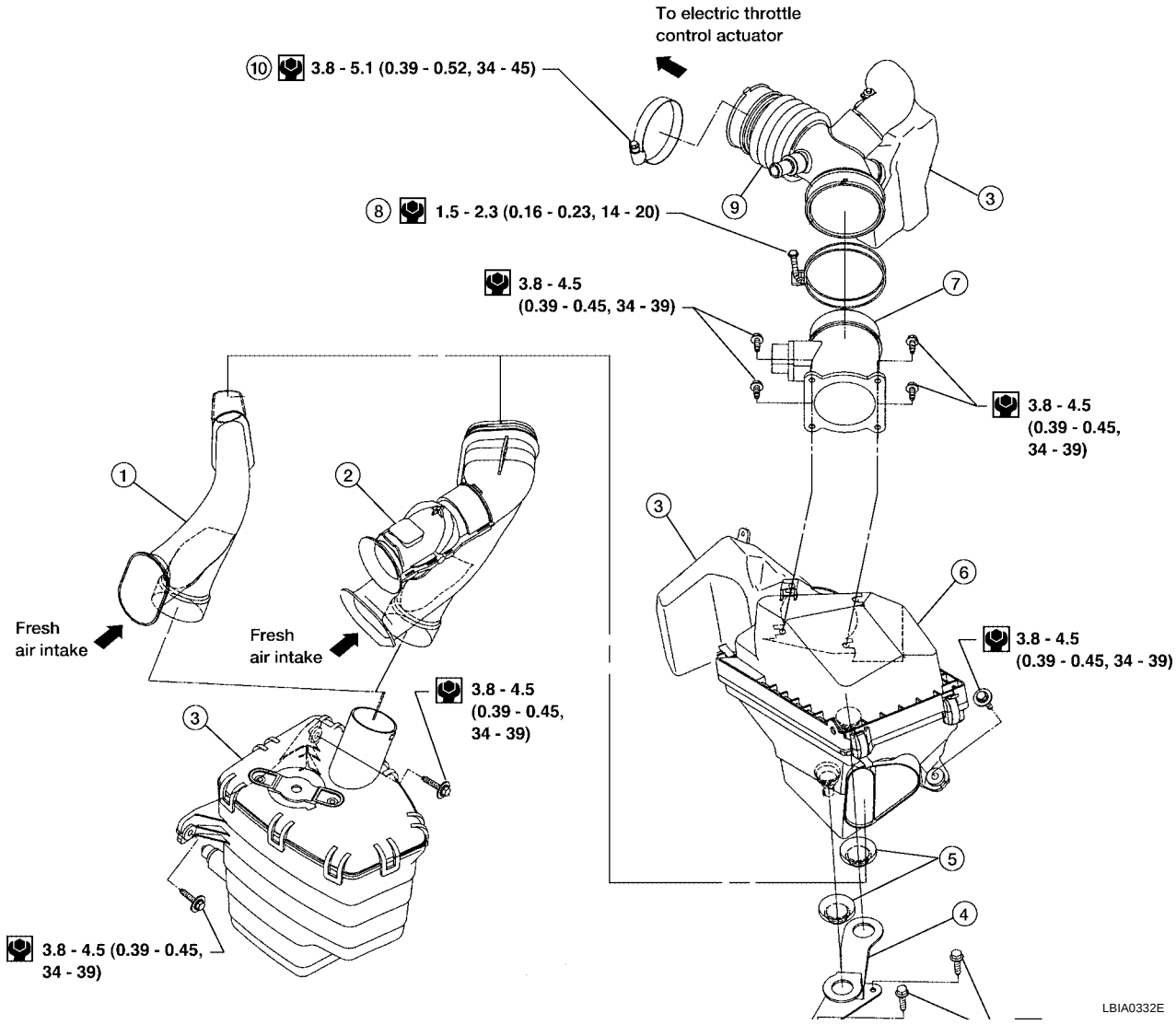
AIR CLEANER AND AIR DUCT

PFP:16500

Removal and Installation

EBS00CFR

SEC. 165



1. Fresh air intake tube (SE-R Spec V models only)
2. Fresh air intake tube (all models except SE-R Spec V)
3. Resonator
4. Mounting bracket
5. Grommets
6. Air cleaner case (upper and lower)
7. Mass air flow sensor
8. Mass air flow sensor clamp
9. Air cleaner to electric throttle control actuator tube
10. Air cleaner to electric throttle control actuator tube clamp

REMOVAL

1. Disconnect the mass air flow sensor electrical connector.
2. Disconnect the tube clamp at the electric throttle control actuator.

3. Remove air cleaner to electric throttle control actuator tube and air cleaner case (upper) with the mass air flow sensor attached.
4. Remove mass air flow sensor from air cleaner case (upper), as necessary.

CAUTION:
Handle the mass air flow sensor with care:
- **Do not shock it.**
- **Do not disassemble it.**
- **Do not touch the internal sensor.**

5. Remove the air cleaner element, as necessary and replace it with a new element.
6. Remove the air cleaner case (lower).

INSTALLATION

Installation is in the reverse order of removal.

- Attach each joint according to the alignment marks made during removal. Screw all clamps firmly.

CHANGING THE AIR CLEANER ELEMENT

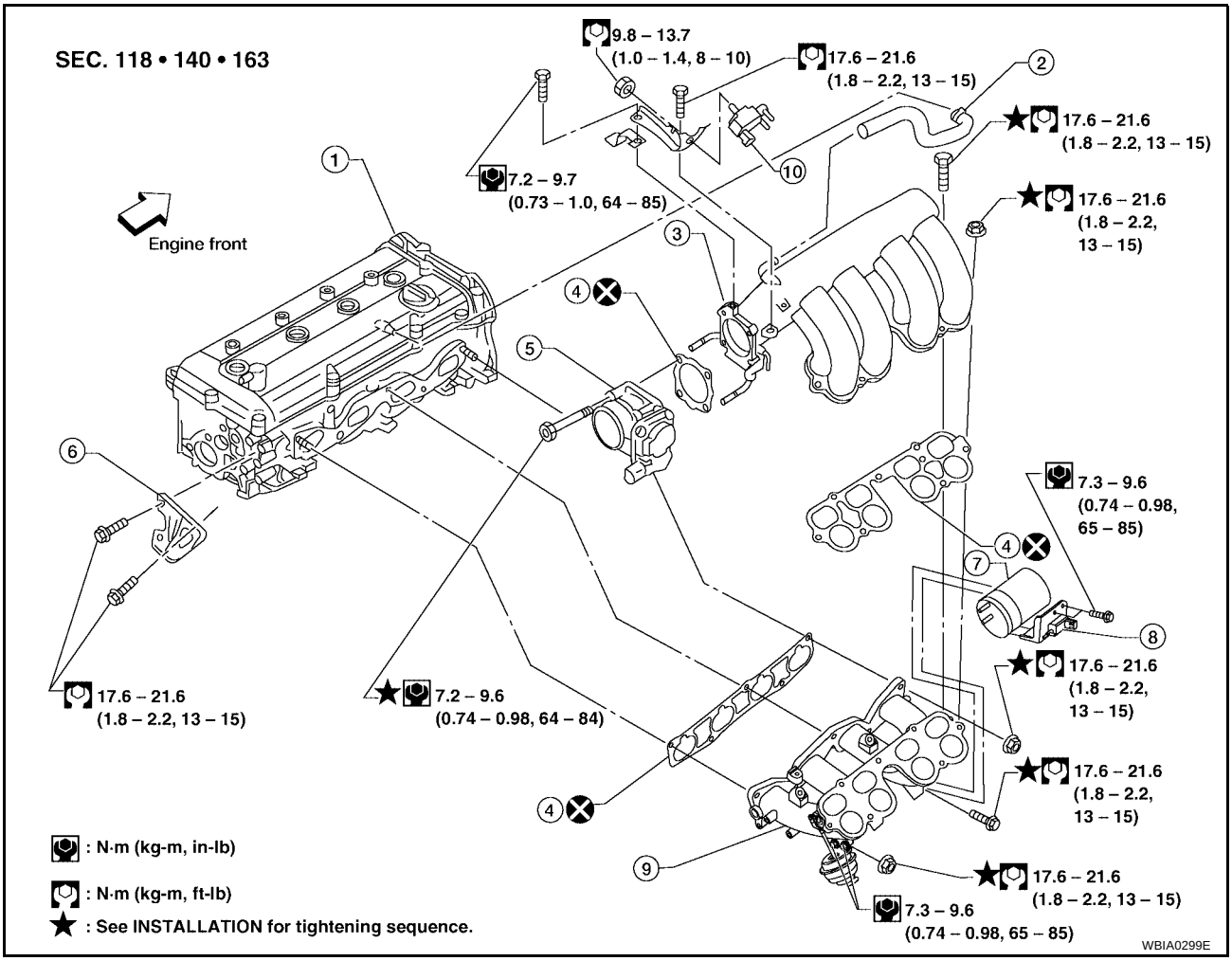
1. Unhook the air cleaner case side clips and raise the air cleaner case (upper).
2. Remove the air cleaner element.
3. Replace the air cleaner element with a new element and install the air cleaner case (upper).

INTAKE MANIFOLD

PFP:14003

Removal and Installation

EBS00CFS



1. Cylinder head assembly
2. PCV hose
3. Intake manifold collector
4. Gasket
5. Electric throttle control actuator
6. Intake manifold support
7. Vacuum reservoir tank
8. VIAS control solenoid valve
9. Intake manifold
10. EVAP canister purge volume control solenoid

REMOVAL

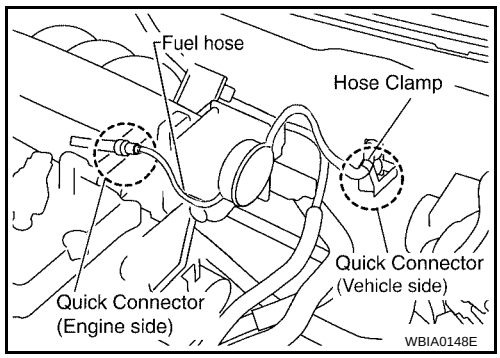
WARNING:

To avoid the danger of being scalded, never drain the coolant when the engine is hot.

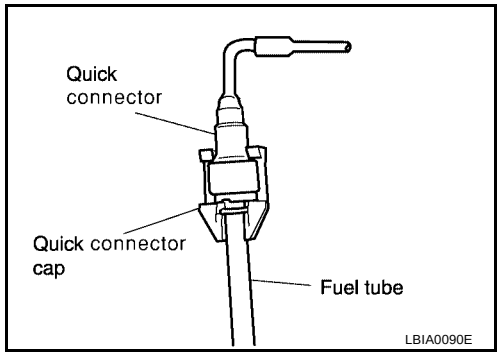
1. Disconnect the battery negative terminal.
2. Release the fuel pressure. Refer to EC-751, "FUEL PRESSURE RELEASE" .
3. Drain coolant when engine is cooled. Refer to MA-23, "DRAINING ENGINE COOLANT" .
4. Disconnect the mass air flow sensor electrical connector.
5. Remove air cleaner case and air duct assembly. Refer to EM-106, "Removal and Installation" .
6. Disconnect the following components at the intake side:
   - PCV hose
   - EVAP canister purge volume control solenoid
   - Power valve actuator
   - Electric throttle control actuator
   - Brake booster vacuum hose

7. Disconnect the fuel quick connector on the engine side.
   - Using Tool perform the following steps to disconnect the quick connector.

   Tool number : — (J-45488)



a. Remove quick connector cap.

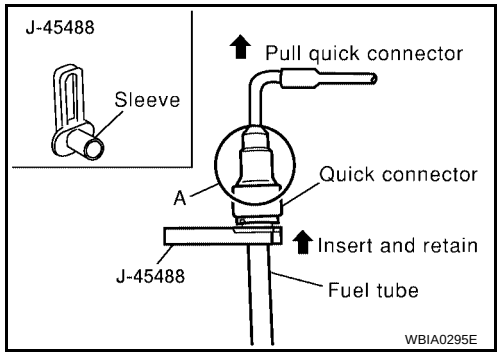


b. With the sleeve side of Tool facing quick connector, install Tool onto fuel tube.

c. Insert Tool into quick connector until sleeve contacts and goes no further. Hold the Tool on that position.

CAUTION:
Inserting the Tool hard will not disconnect quick connector. Hold Tool where it contacts and goes no further.

d. Pull the quick connector straight out from the fuel tube.

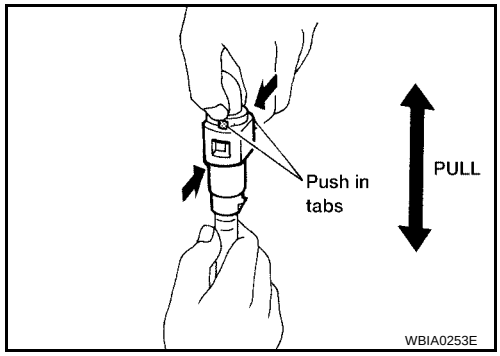


CAUTION:
- **Pull quick connector holding it at the "A" position, as shown.**
- **Do not pull with lateral force applied. O-ring inside quick connector may be damaged.**
- **Prepare container and cloth beforehand as fuel will leak out.**
- **Avoid fire and sparks.**
- **Be sure to cover openings of disconnected pipes with plug or plastic bag to avoid fuel leakage and entry of foreign materials.**

8. When removing fuel hose quick connector at vehicle piping side, perform as follows.

a. Remove quick connector cap.

b. Hold the sides of the connector, push in tabs and pull out the tube.
   - If the connector and the tube are stuck together, push and pull several times until they start to move. Then disconnect them by pulling.



CAUTION:
- **The tube can be removed when the tabs are completely depressed. Do not twist it more than necessary.**
- **Do not use any tools to remove the quick connector.**
- **Keep the resin tube away from heat. Be especially careful when welding near the tube.**
- **Prevent acid liquid such as battery electrolyte etc. from getting on the resin tube.**
- **Do not bend or twist the tube during installation and removal.**
- **Do not remove the remaining retainer on tube.**

- **When the tube is replaced, also replace the retainer with a new one.**
  Retainer color: Green.
- **To keep clean the connecting portion and to avoid damage and foreign materials, cover them completely with plastic bags or something similar.**

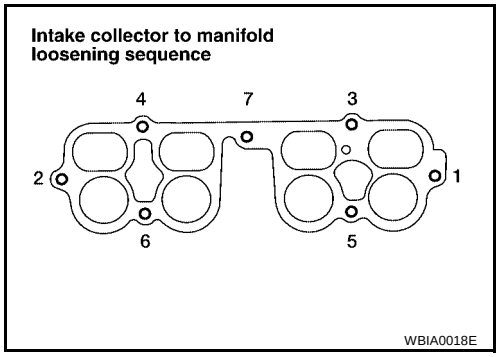
9. Loosen mounting bolts diagonally, and remove the electric throttle control actuator.

   CAUTION:
   Handle carefully to avoid any damage.

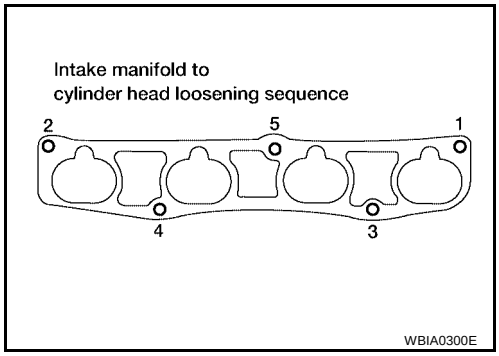
10. Disconnect intake manifold collector harness, and vacuum hose.

    CAUTION:
    Cover engine openings to avoid entry of foreign materials.

11. Remove intake manifold collector bolts on the support.
12. Loosen the intake manifold collector bolts and nuts in the order shown to remove the intake manifold collector.



13. Loosen the intake manifold bolts in the order shown to remove the intake manifold.

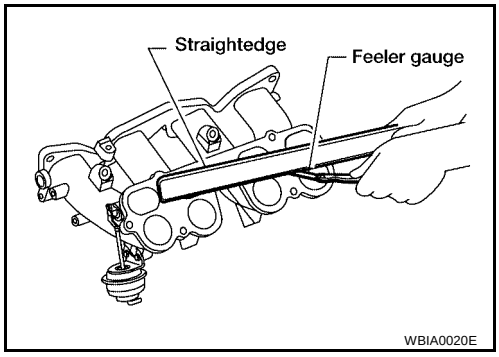


INSPECTION AFTER REMOVAL

Surface Distortion

- Using straightedge and feeler gauge, inspect surface distortion of intake manifold collector and intake manifold surface.

  Standard : 0.1 mm (0.004 in)



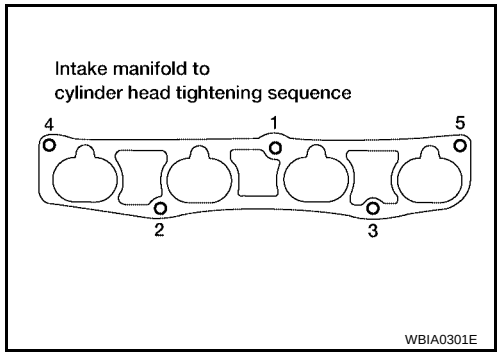
INSTALLATION

Installation is in the reverse order of removal.

Tightening Intake Manifold Bolts and Nuts

- Install the intake manifold bolts and nuts in the numerical order of the tightening sequence as shown.

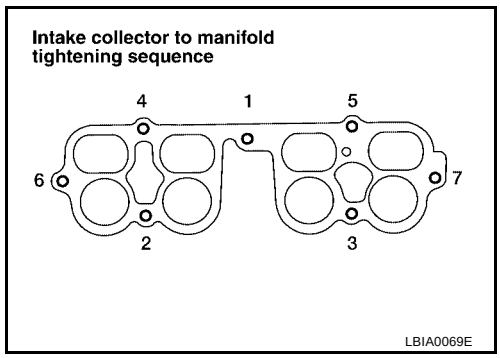
CAUTION:
After tightening No.5, retighten the No.1 mounting bolt to specification.



Tightening Intake Manifold Collector Bolts and Nuts

- Tighten in numerical order as shown.

CAUTION:
After tightening No.7, retighten the No.1 mounting bolt to specification.



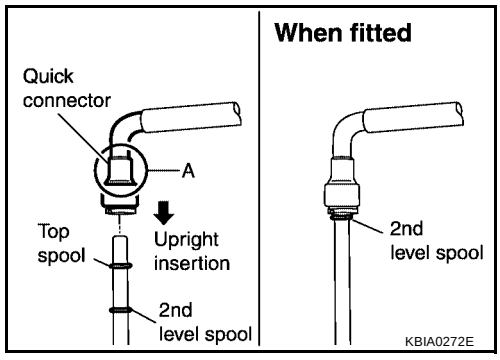
Installation of Electric Throttle Control Actuator:

- Tighten the mounting bolts of electric throttle control actuator equally and diagonally in several steps.
- After installation perform procedure in EM-112, "INSPECTION AFTER INSTALLATION" .

CONNECTING QUICK CONNECTOR ON THE FUEL HOSE (ENGINE SIDE)

1. Make sure no foreign substances are deposited in and around the fuel tube and quick connector, and there is no damage to them.
2. Thinly apply new engine oil around the fuel tube tip end.
3. Align center to insert quick connector straight into fuel tube.
   - Insert fuel tube into quick connector until the top spool on fuel tubes is inserted completely and the second level spool is positioned slightly below the quick connector bottom end.

CAUTION:
- **Hold at position "A" as shown, when inserting the fuel tube into the quick connector.**
- **Carefully align to center to avoid inclined insertion to prevent damage to the O-ring inside the quick connector.**
- **Insert the fuel tube until you hear a “click” sound and actually feel the engagement.**
- **To avoid misidentification of engagement with a similar sound, be sure to perform the next step.**



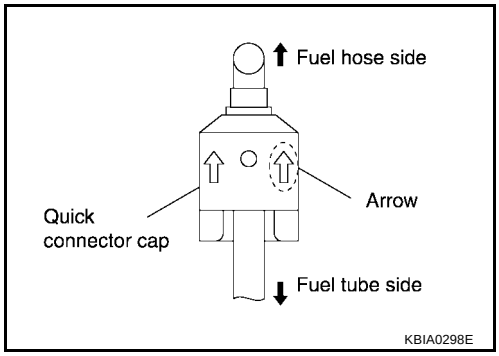
4. Before clamping the fuel hose with the hose clamp, pull the quick connector hard by hand, holding at the "A" position, as shown. Make sure it is completely engaged (connected) so that it does not come off of the fuel tube.

NOTE:
Recommended pulling force is 50 N (5.1 kg, 11.2 lb).

5. Install quick connector cap on quick connector joint.

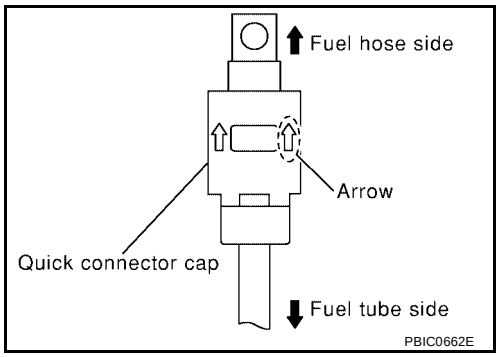
- Direct arrow mark on quick connector cap to upper side (fuel hose side).

6. Install fuel hose to hose clamp.



CONNECTING QUICK CONNECTOR ON THE FUEL HOSE (VEHICLE PIPING SIDE)

1. Make sure no foreign substances are deposited in and around the fuel tube and quick connector, and there is no damage to them.
2. Align center to insert quick connector straight into fuel tube.
   - Insert fuel tube until a click is heard.
   - Install quick connector cap on quick connector joint. Direct arrow mark on quick connector cap upper side.
   - Install fuel hose to hose clamp.



INSPECTION AFTER INSTALLATION

Make sure there is no fuel leakage at connections as follows:

1. Apply fuel pressure to fuel lines by turning ignition switch ON (with engine stopped). Then check for fuel leaks at connections.
2. Start the engine and rev it up and check for fuel leaks at connections.

   NOTE:
   Use mirrors for checking on connections out of the direct line of sight.

   CAUTION:
   Do not touch engine immediately after stopping as engine is extremely hot.

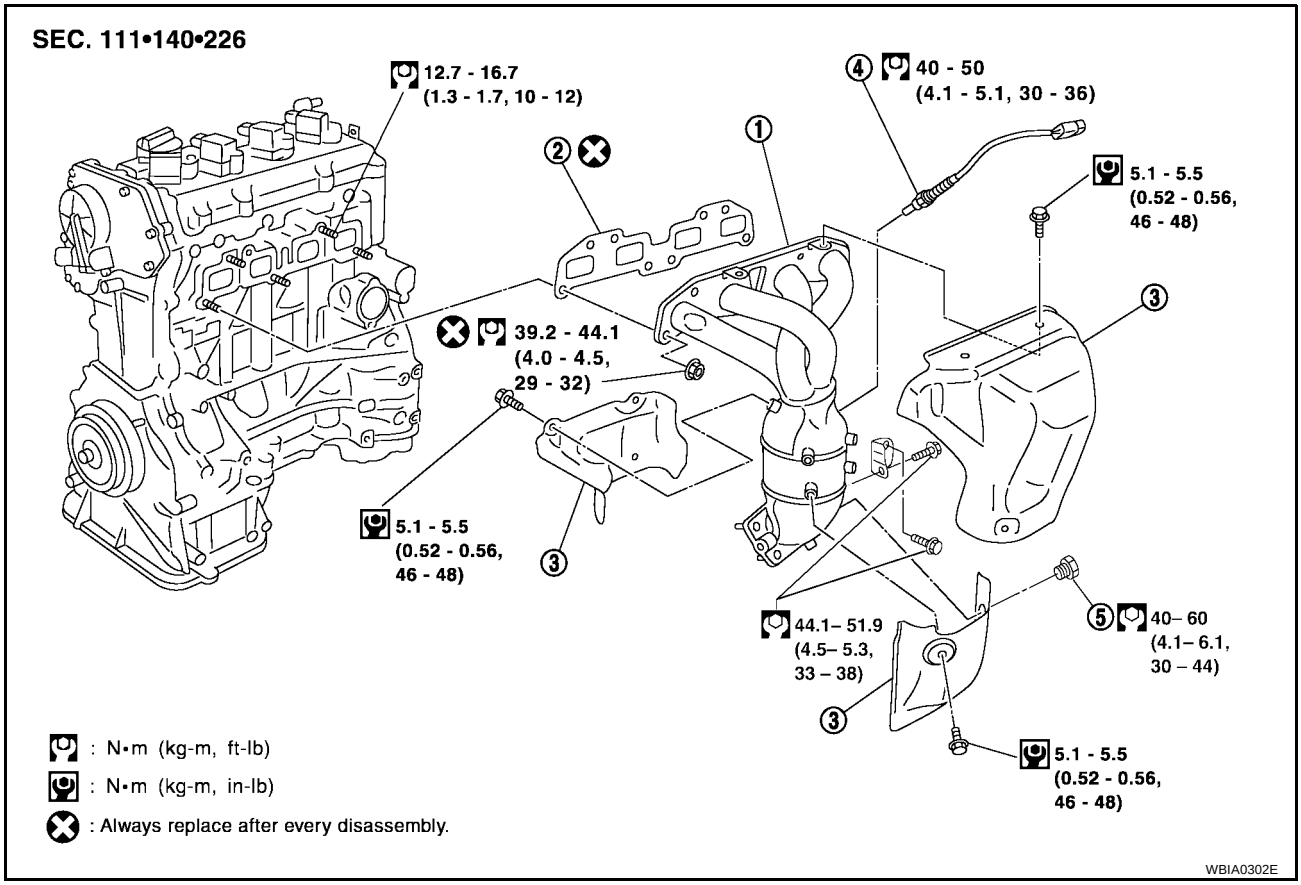
   - Perform procedures for “Throttle Valve Closed Position Learning” after finishing repairs. Refer to EC-748, "Throttle Valve Closed Position Learning" .
   - If electric throttle control actuator is replaced, perform procedures for “Idle Air Volume Learning” after finishing repairs. Refer to EC-749, "Idle Air Volume Learning" .

EXHAUST MANIFOLD AND THREE WAY CATALYST

PFP:14004

Removal and Installation

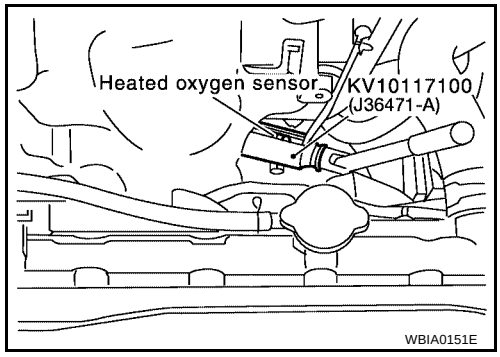
EBS00CFT



1. Exhaust manifold and three way catalyst assembly
2. Exhaust manifold gasket
3. Exhaust manifold covers (upper and lowers)
4. Heated oxygen sensor 1 (ULEV only) Air fuel ratio (A/F) sensor 1
5. Plug

REMOVAL

1. Remove the engine undercover.
2. Disconnect the electrical connector of heated oxygen sensor 1 or air fuel ratio (A/F) sensor 1, and unhook the harness from the bracket and middle clamp on the cover.
3. Remove the heated oxygen sensor 1 or air fuel ratio (A/F) sensor 1 using Tool.



Tool numbers

Air fuel ratio (A/F) sensor wrench : J44626

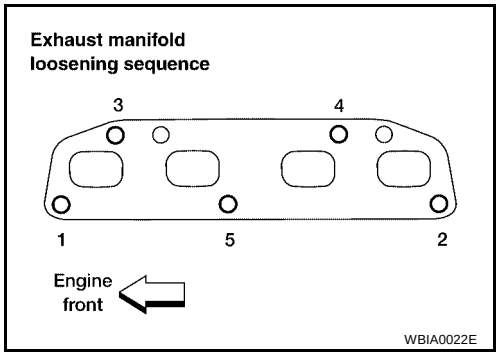
Heated oxygen sensor wrench : KV10117100 (J36471-A)

CAUTION:

- **Be careful not to damage heated oxygen sensor or air fuel ratio (A/F) sensor.**
- **Discard any heated oxygen sensor or air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

4. Remove the lower exhaust manifold covers.
5. Remove the exhaust front tube. Refer to EX-3, "Removal and Installation" .
6. Remove the upper exhaust manifold cover.

7. Loosen the nuts in the sequence shown, on the exhaust manifold and three way catalyst.
8. Remove the exhaust manifold and three way catalyst assembly and gasket. Discard the gasket.

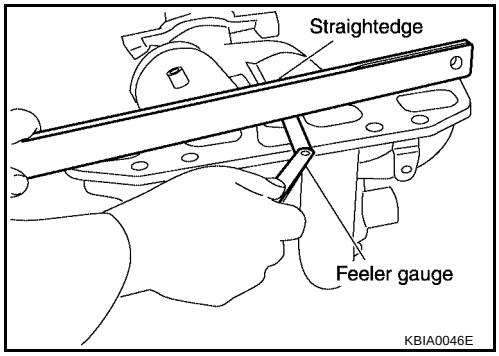


INSPECTION AFTER REMOVAL

Surface Distortion

- Use a reliable straightedge and feeler gauge to check the flatness of exhaust manifold fitting surface.

Standard : 0.3 mm (0.012 in)

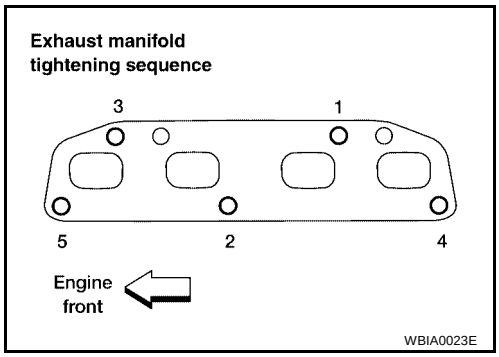


INSTALLATION

Installation is in the reverse order of removal.

Tightening Exhaust Manifold Nuts

- Tighten the nuts in the numerical order shown, to specification. After tightening No.5, retighten No.1 and then No.3 to specification.



Installation of Heated Oxygen Sensor or Air Fuel Ratio (A/F) Sensor

Clean the sensor threads using Tool, then apply the anti-seize lubricant to the threads before installing.

- Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"

Tool number : J43897-18, J43897-12

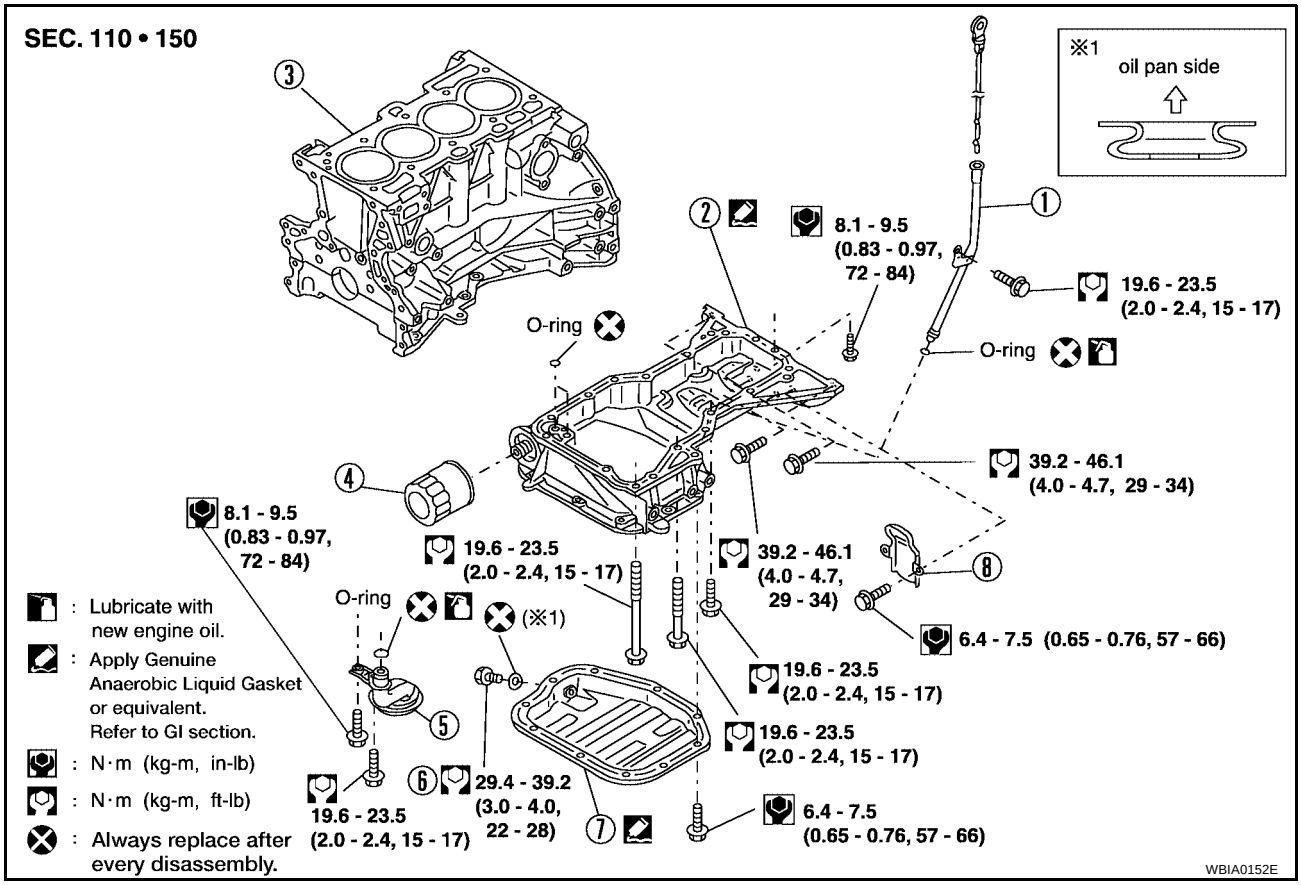
CAUTION:
Do not over-tighten. Doing so may cause damage, resulting in a malfunction and the MIL coming on.

OIL PAN AND OIL STRAINER

PFP:11110

Removal and Installation

EBS00CFU



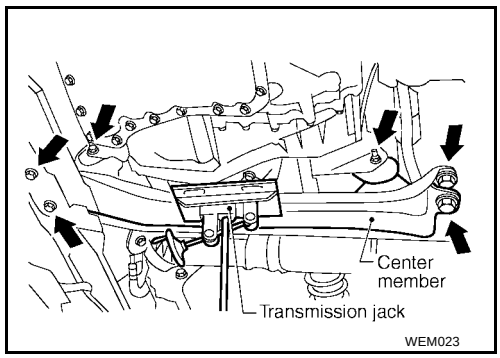
1. Oil level gauge tube
2. Oil pan, upper
3. Cylinder block
4. Oil filter
5. Oil pickup screen
6. Drain plug
7. Oil pan, lower
8. Rear plate cover

REMOVAL

WARNING:

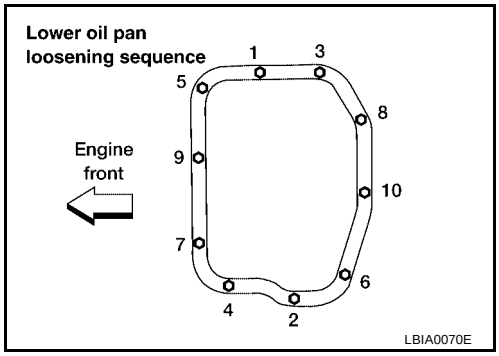
To avoid the danger of being scalded, never drain the engine oil when the engine is hot.

1. Remove the engine under covers on both sides.
2. Drain engine oil. Refer to LU-17, "Changing Engine Oil" .
3. Remove the front exhaust tube. Refer to EX-3, "Removal and Installation" .
4. Set a suitable transmission jack under the transaxle. Lift the engine slightly from above by the engine slingers.
5. Remove the center member.
   - Remove the front and rear engine mount through bolts and center member bolts. Refer to EM-159, "Removal and Installation" .

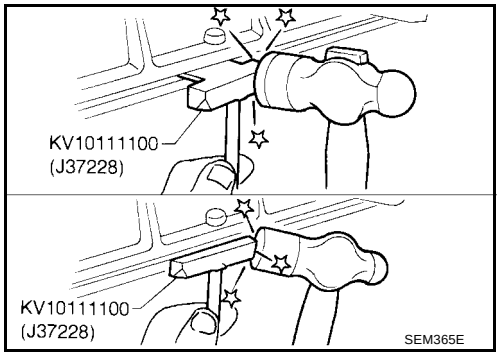


6. Disconnect the A/C compressor with piping connected from the mounting bracket and suspend with a strong wire. Refer to MTC-64, "Removal and Installation" .

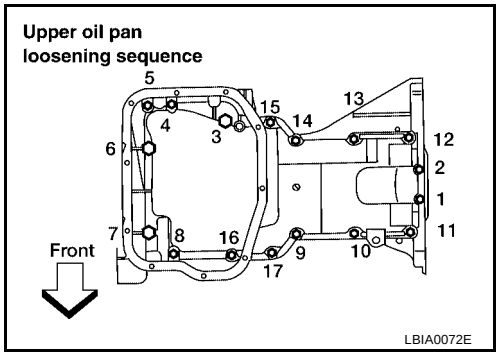
7. Remove the lower oil pan bolts. Loosen the bolts in the order shown.



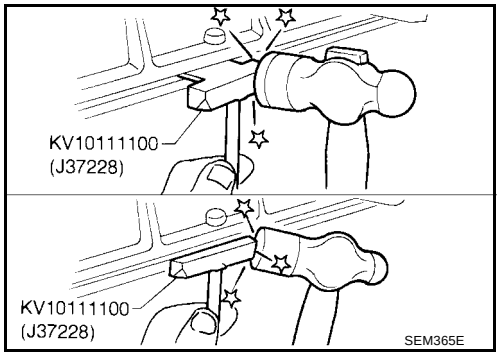
8. Insert the Tool between lower oil pan and the upper oil pan to separate them. Tap gently on the side to move the Tool around the pan; do not damage the mating surface.
9. Remove the lower oil pan.
10. Remove the oil pickup screen.
11. Remove rear plate cover, and four engine to transaxle bolts.



12. Loosen the upper oil pan bolts in the numerical order shown.



13. Insert the Tool between the upper oil pan and the cylinder block to separate them. Tap gently on the side to move the Tool around the pan; do not damage the mating surface.



14. Remove the upper oil pan.

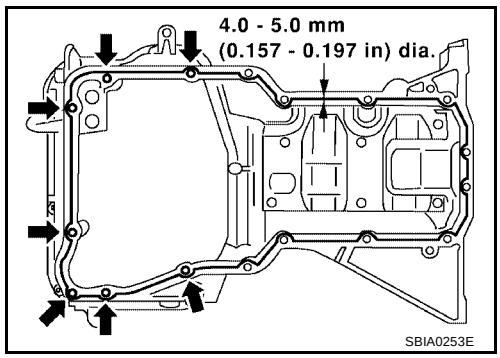
INSPECTION AFTER REMOVAL

- Clean the oil pickup screen to remove any foreign material.

INSTALLATION

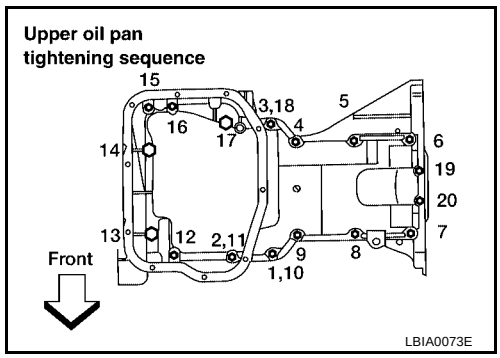
1. Installation is in the reverse order of removal.

a. Apply Genuine Silicone RTV Sealant, or equivalent, to the upper oil pan.
- Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" , and EM-95, "Precautions for Liquid Gasket" .
- Install the two new O-rings in the upper oil pan.

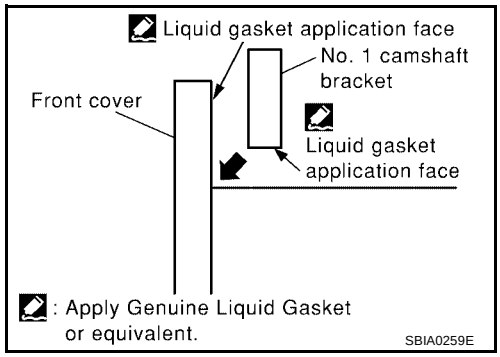


b. Tighten the upper oil pan bolts in the order as shown.
- Bolt No. 10, 11, 18 indicate a double tightening in the sequence of bolt No.s 1, 2, 3.

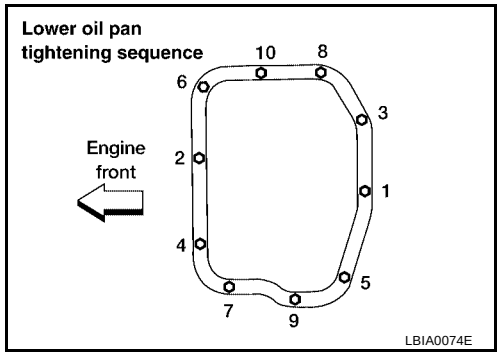
NOTE:
Refer below for specified bolt sizes:
M6 × 20 mm (0.79 in): No. 19, 20
M8 × 25 mm (0.98 in): No. 1, 3, 4, 9
M8 x 45 mm (1.77 in): No. 2, 5, 6, 7, 8, 17
M8 x100 mm (3.97 in): No. 12, 13, 14, 15, 16



c. Apply Genuine Silicone RTV Sealant, or equivalent to the lower oil pan.
- Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" , and EM-95, "Precautions for Liquid Gasket" .



d. Tighten the lower oil pan bolts in the numerical order shown.
- Wait at least 30 minutes after the oil pans are installed before filling the engine with oil.



INSPECTION AFTER INSTALLATION

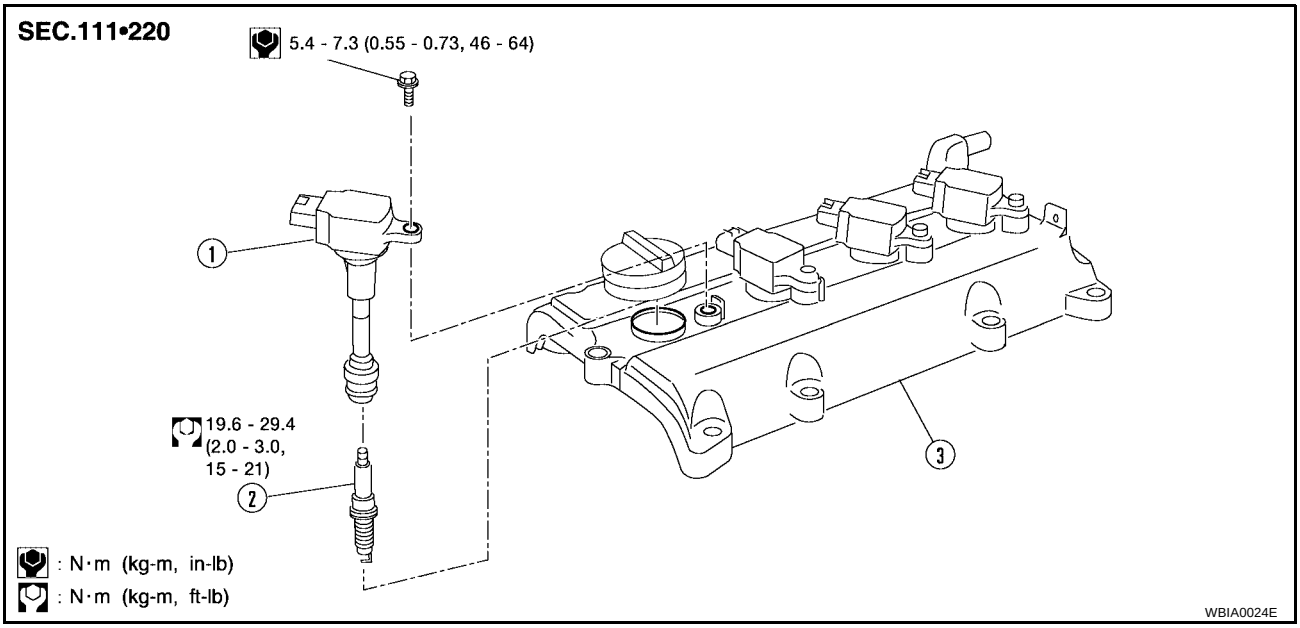
- Check for any engine oil leaks with the engine at full operating temperature and running at idle.

IGNITION COIL

PFP:22448

Removal and Installation

EBS00CFV



1. Ignition coil
2. Spark plug
3. Rocker cover

REMOVAL

1. Remove the engine cover using power tool.
2. Disconnect the harness connector from the ignition coil.
3. Remove the ignition coil.

CAUTION:
Do not drop or shock it.

INSTALLATION

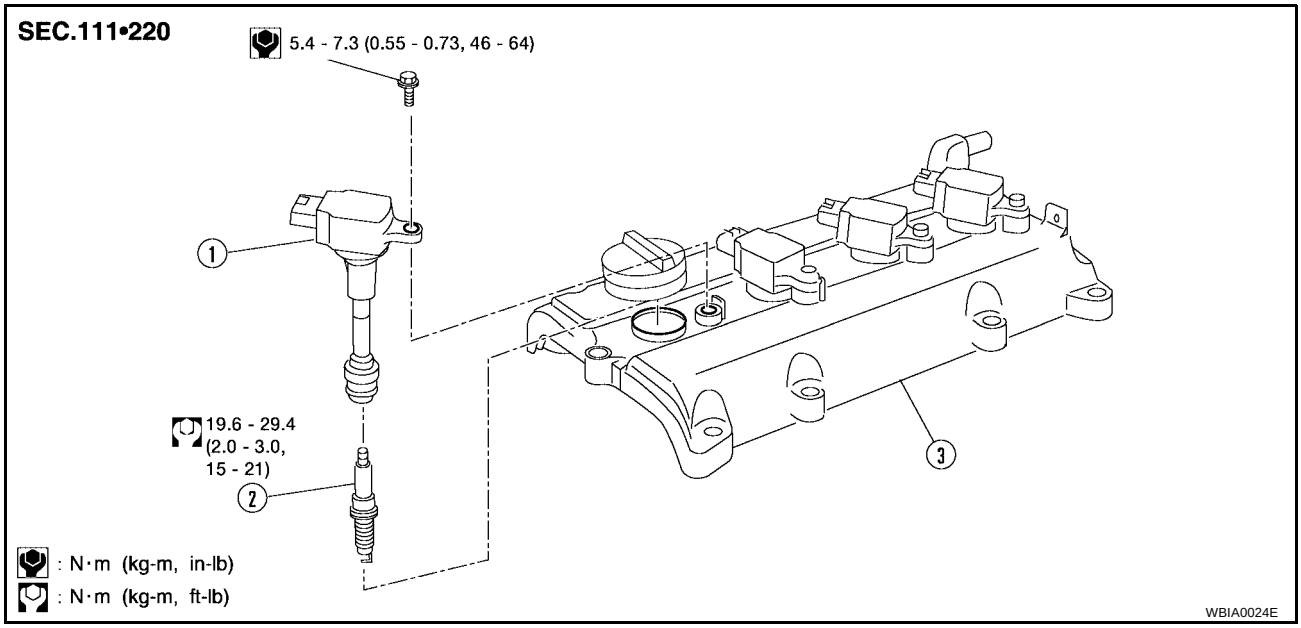
Installation is in the reverse order of removal.

SPARK PLUG

PFP:22401

Removal and Installation

EBS00CFW

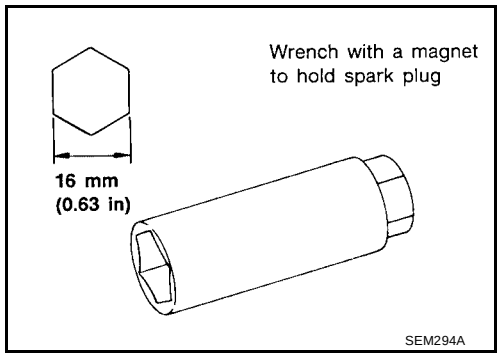


1. Ignition coil
2. Spark plug
3. Rocker cover

REMOVAL

1. Remove the ignition coil. Refer to EM-118, "Removal and Installation" .
2. Remove the spark plug with a suitable spark plug wrench.

Temperature range	NGK
Standard type	PLFR5A-11 (Platinum tipped)
Hot type	PLFR4A-11(Platinum tipped)
Cold type	PLFR6A-11(Platinum tipped)



INSPECTION AFTER REMOVAL

- Use standard type spark plug for normal conditions.

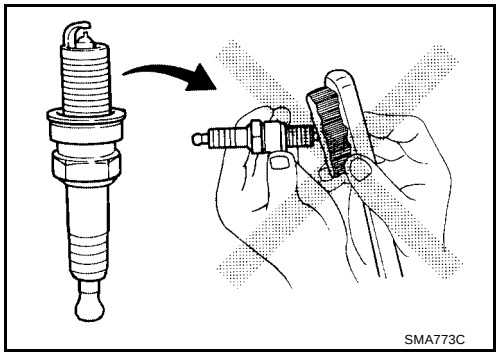
The hot type spark plug is suitable when fouling occurs with the standard type spark plug under conditions such as:

- Frequent engine starts.
- Low ambient temperatures.

The cold type spark plug is suitable when spark plug knock occurs with the standard type spark plug under conditions such as:

- Extended highway driving.
- Frequent high engine revolution.

Do not use a wire brush for cleaning the spark plugs. Replace as necessary.


SMA773C

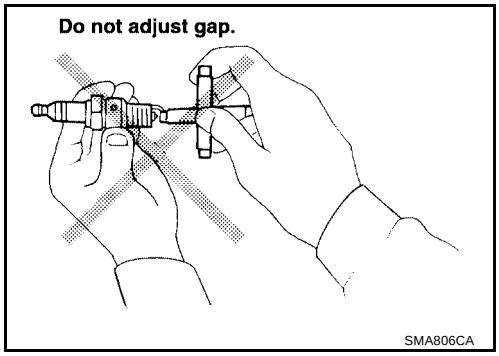
If plug is covered with carbon, a spark cleaner may be used.

Cleaner air pressure : less than 588 kPa (6kg/cm2, 85 psi)

Cleaning time : less than 20 seconds

Checking and adjusting plug gap is not required between change intervals.

Gap nominal : 1.1 mm (0.043 in)



SMA806CA

INSTALLATION

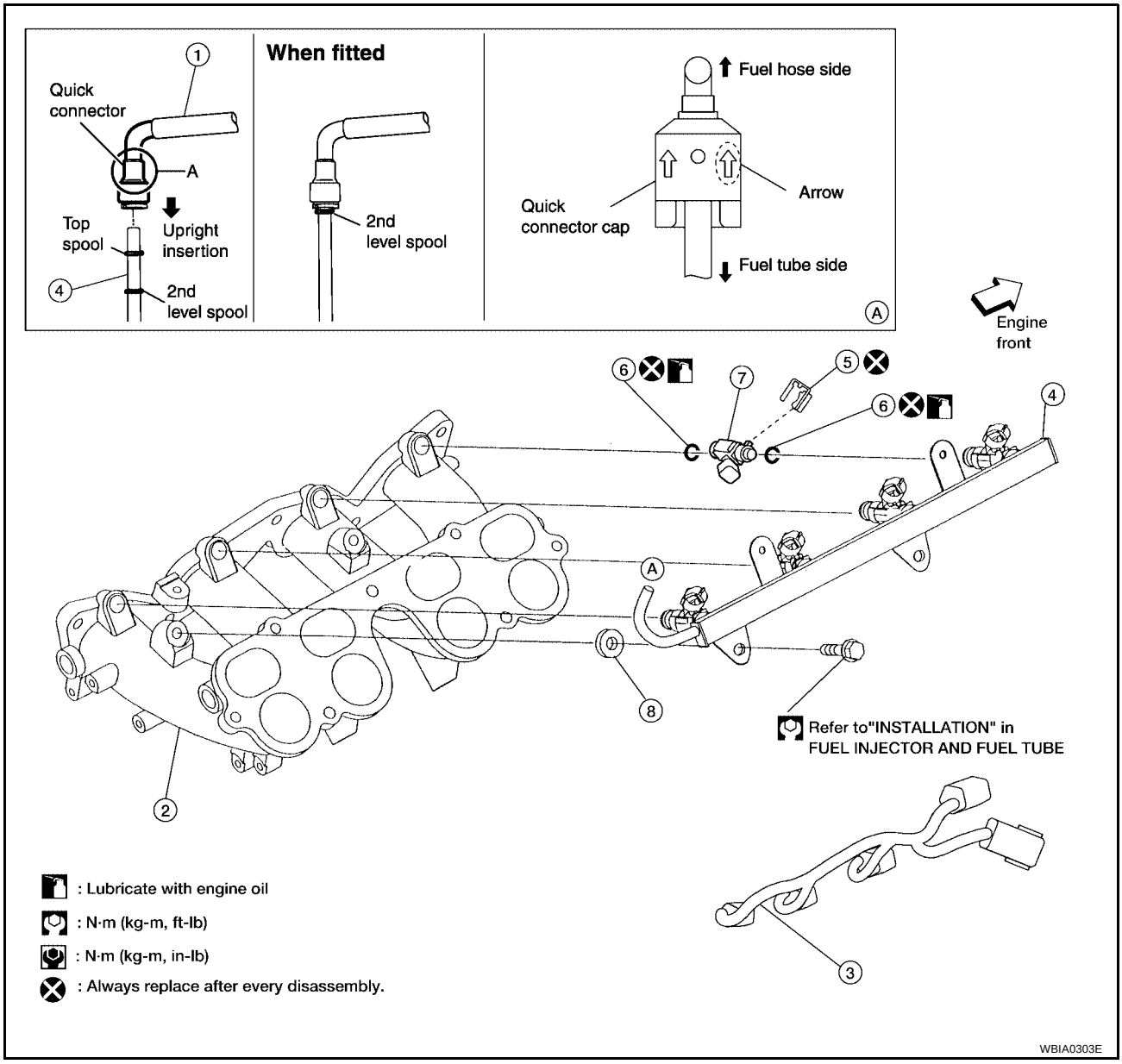
- Installation is in the reverse order of removal.

FUEL INJECTOR AND FUEL TUBE

PFP:16600

Removal and Installation

EBS00CFX



1. Fuel hose
2. Intake manifold
3. Sub-harness
4. Fuel tube
5. Clip
6. O-ring
7. Fuel injector
8. Insulator

CAUTION:

- **Apply new engine oil to parts before installing the parts, as shown above.**
- **Do not remove or disassemble parts unless instructed as shown in the figure.**

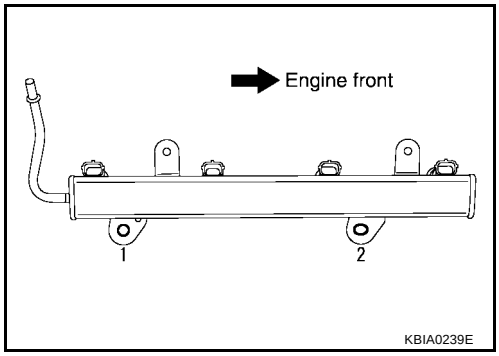
REMOVAL

1. Release the fuel pressure. Refer to EC-751, "FUEL PRESSURE RELEASE" .
2. Remove the intake air duct. Refer to EM-106, "Removal and Installation" .
3. Partially drain the engine coolant. Refer to MA-23, "DRAINING ENGINE COOLANT" .
4. Remove the intake collector. Refer to EM-108, "INTAKE MANIFOLD" .
5. Disconnect the fuel hose quick connector at the fuel tube side.
   - For how to disconnect and connect the quick connector, refer to EM-108, "INTAKE MANIFOLD" .

CAUTION:
- **Prepare a container and cloth for catching any spilled fuel.**
- **This operation should be performed in a place that is free from any open flames.**
- **While hoses are disconnected seal their openings with vinyl bag or similar material to prevent foreign material from entering them.**

6. Disconnect sub-harness for injector at engine front side, and remove it from bracket.
7. Loosen the fuel tube bolts in the order shown, then remove fuel tube and fuel injectors as an assembly.
8. Remove the fuel injectors from the fuel tube.

a. Release the clip and remove the fuel injector.
b. Pull fuel injector straight out of the fuel tube.



CAUTION:
- **Be careful not to damage the nozzle.**
- **Avoid any impact, such as dropping the fuel injector.**
- **Do not disassemble or adjust the fuel injector.**

INSTALLATION

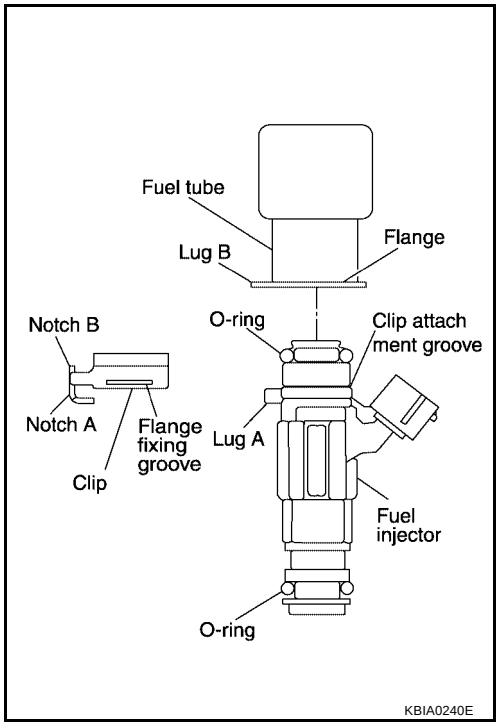
1. Install new O-rings on the fuel injector.

NOTE:
Lubricate the O-rings lightly with new engine oil.

CAUTION:
Be careful not to scratch it during installation. Also be careful not to twist or stretch the O-ring. If the O-ring was stretched while it is attached, do not insert it into the fuel tube immediately.

2. Install the fuel injector into the fuel tube with the following procedure:
   - Do not reuse the clip, replace it with a new one.
   - Insert the new clip into the clip mounting groove on fuel injector.
   - Insert the clip so that the projection on "Lug A" of fuel injector matches notch "A" of the clip.
3. Insert fuel injector into fuel tube with clip attached.
   - Insert it while matching it to the axial center.
   - Insert fuel injector so that the projection on "Lug B" of fuel injector matches notch "B" of the clip.
   - Make sure that fuel tube flange is securely fixed in flange fixing groove on the clip.
   - Make sure that installation is complete by checking that fuel injector does not rotate or come off.
4. Install fuel tube assembly.

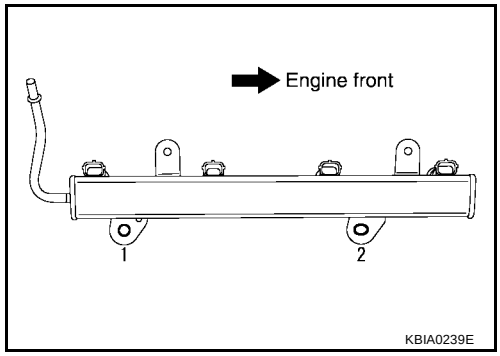
a. Insert the tip of each fuel injector into intake manifold.



b. Tighten the fuel tube bolts in two steps in the numerical order shown.

Step 1 : 12 - 13 N·m (1.2 - 1.4 kg-m, 105 - 121 in-lb)

Step 2 : 17 - 23 N·m (1.7 - 2.4 kg-m, 13 - 17 ft-lb)



CAUTION:
After properly connecting fuel tube assembly to injector and fuel hose, check connection for fuel leakage.

5. Connect the fuel hose quick connector. Refer to EM-108, "INTAKE MANIFOLD" .
6. Install the intake collector. Refer to EM-108, "INTAKE MANIFOLD" .
7. Installation of the remaining components is in reverse order of removal.

INSPECTION AFTER INSTALLATION

Make sure there is no fuel leakage at connections as follows:

1. Apply fuel pressure to fuel lines by turning ignition switch ON (with engine stopped). Then check for fuel leaks at connections.
2. Start the engine and rev it up and check for fuel leaks at connections.

NOTE:
Use mirrors for checking on connections out of the direct line of sight.

CAUTION:
Do not touch engine immediately after stopping as engine is extremely hot.

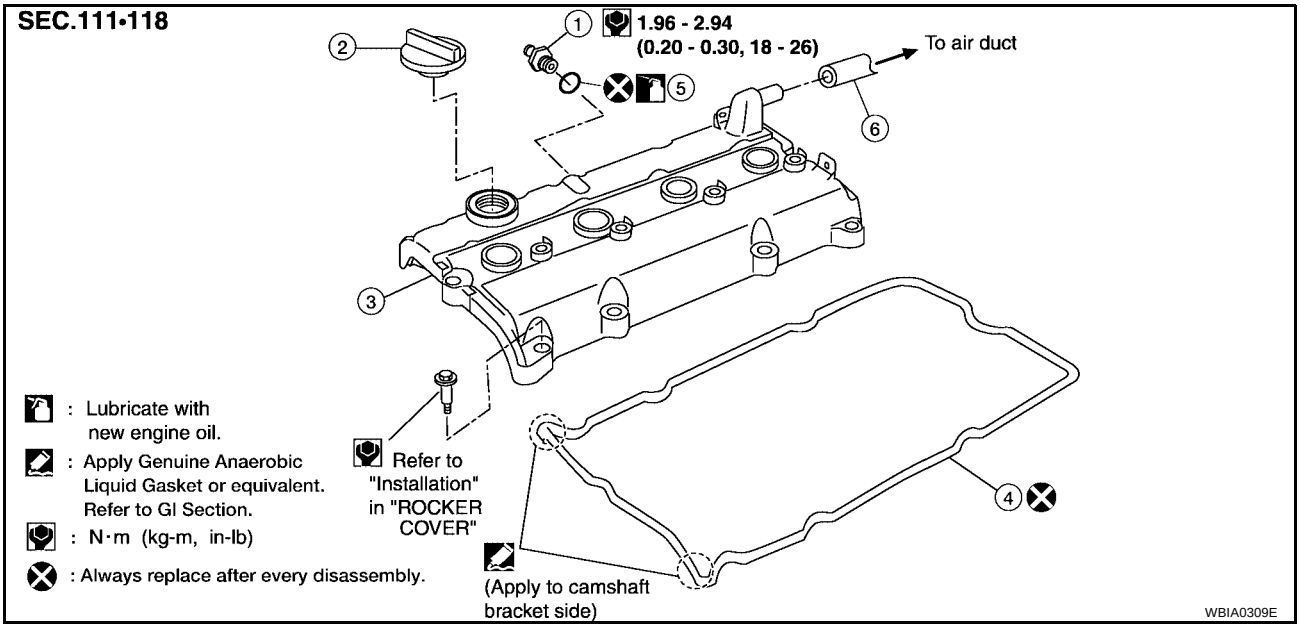
- Perform procedures for “Throttle Valve Closed Position Learning” after finishing repairs. Refer to EC-748, "Throttle Valve Closed Position Learning" .
- If electric throttle control actuator is replaced, perform procedures for “Idle Air Volume Learning” after finishing repairs. Refer to EC-749, "Idle Air Volume Learning" .

ROCKER COVER

PFP:13264

Removal and Installation

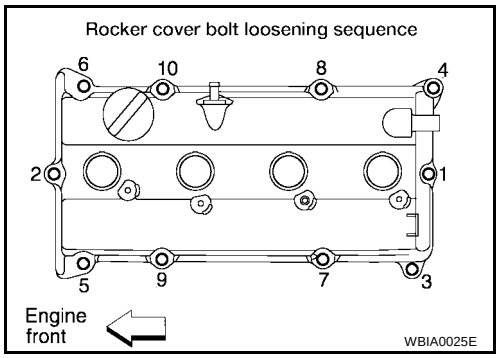
EBS00CFY



1. PCV valve
2. Oil filler cap
3. Rocker cover
4. Rocker cover gasket
5. O-ring
6. Breather hose

REMOVAL

1. Remove the ignition coils. Refer to EM-118, "Removal and Installation" .
2. Disconnect the PCV hose and breather hose from the rocker cover.
3. Loosen the rocker cover bolts in the order shown.
4. Remove the rocker cover. Remove the oil filler cap and PCV valve if necessary, to transfer to the new rocker cover.



INSTALLATION

1. Apply Silicone RTV Sealant to the joint part of the cylinder head and camshaft bracket following the steps below:

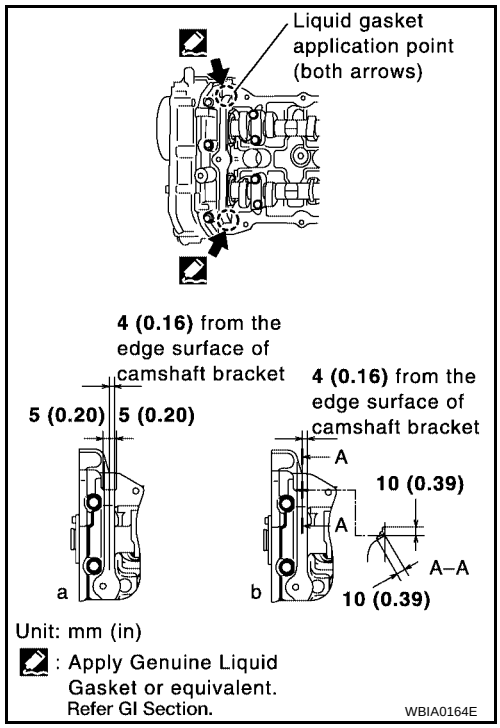
a. Refer to illustration “a” to apply sealant to joint part of No.1 camshaft bracket and cylinder head.

b. Refer to illustration “b” to apply sealant in a 90° degree angle to the illustration “a”.

- Use Genuine Silicone RTV Sealant, or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .

2. Install the rocker cover.

- The rocker cover gasket must be securely installed in the groove in the rocker cover.

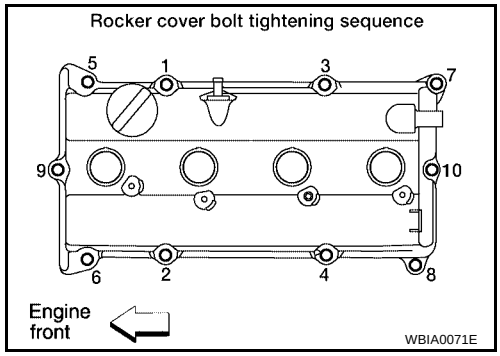


3. Tighten the rocker cover bolts in two steps, in the order shown.

Step 1 : 1.0 - 2.9 N·m (0.1 - 0.3 kg-m, 9 - 26 in-lb)

Step 2 : 7.4 - 9.3 N·m (0.75 - 0.95 kg-m, 65 - 82 in-lb)

4. If necessary, install the oil filler cap and PCV valve. Lubricate the PCV valve O-ring with new engine oil.
5. Connect the PCV hose and breather hose to the rocker cover.
6. Install the ignition coils. Refer to EM-118, "Removal and Installation" .

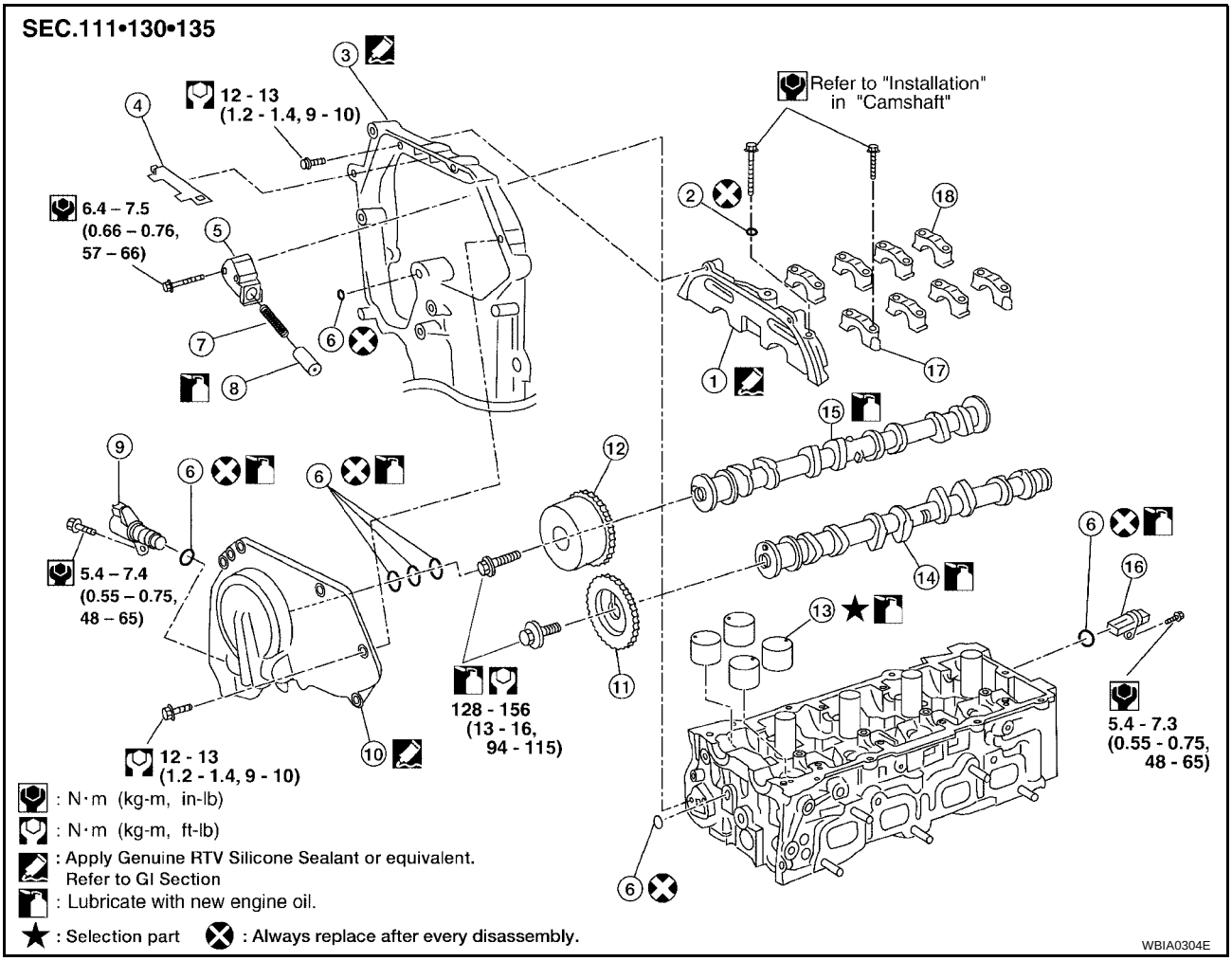


CAMSHAFT

PFP:13001

Removal and Installation

EBS00CFZ



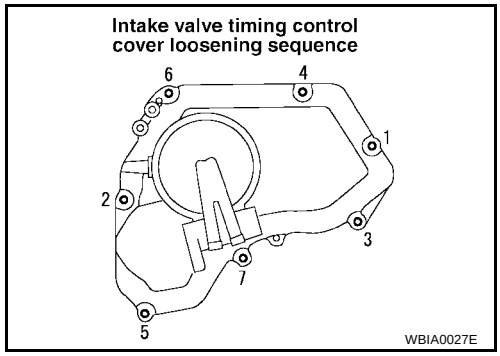
1. No. 1 Camshaft bracket	2. Washer	3. Front cover (partial view)
4. Chain guide	5. Chain tensioner	6. O-ring(s)
7. Chain tensioner spring	8. Chain tensioner plunger	9. IVT control solenoid valve
10. IVT control cover	11. Camshaft sprocket (EXH)	12. Camshaft sprocket (INT)
13. Valve lifter	14. Camshaft (EXH)	15. Camshaft (INT)
16. Camshaft position sensor (PHASE)	17. Camshaft bracket (EXH)	18. Camshaft bracket (INT)

REMOVAL

1. Remove the rocker cover. Refer to EM-124, "Removal and Installation" .
2. Remove the front right side tire and wheel. Refer to WT-4, "Removal" .
3. Remove the RH splash shield.
4. Remove the drive belt. Refer to EM-103, "REMOVAL" .
5. Remove the coolant overflow reservoir tank.
6. Disconnect and remove the camshaft position sensor (PHASE).
7. Disconnect the IVT control solenoid electrical connector.
8. Disconnect the ground electrical connections from the front cover.

9. Remove IVT control cover bolts in the order shown.
10. Remove the IVT control cover by cutting the sealant using Tool.

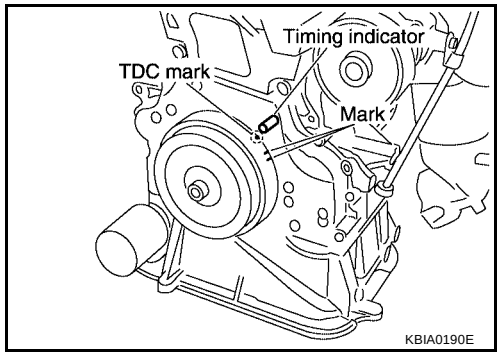
Tool number : KV10111100 (J-37228)



11. Set the No.1 cylinder at TDC on its compression stroke with the following procedure:

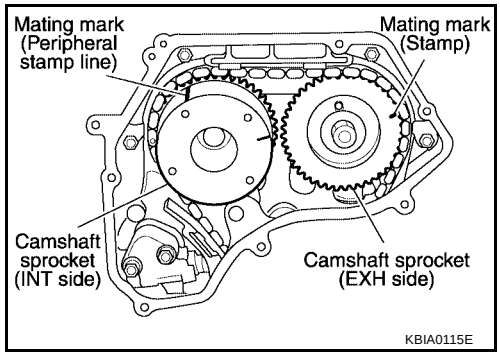
a. Open the access cover on RH undercover.

b. Rotate crankshaft pulley clockwise, and align mating marks for TDC with timing indicator on front cover, as shown.



c. At the same time, make sure that the mating marks on camshaft sprockets are lined up with the yellow links in the timing chain, as shown.

- If not, rotate crankshaft pulley one more turn to line up the mating marks to the yellow links, as shown.



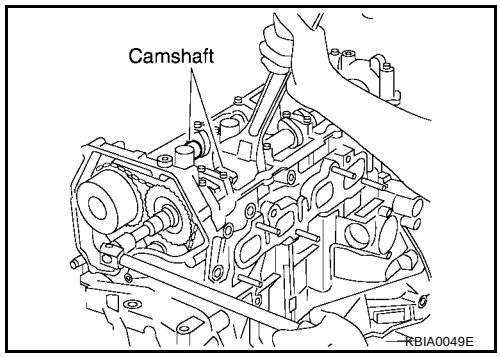
12. Pull the timing chain guide out between the camshaft sprockets through front cover.

13. Remove camshaft sprockets as follows:

CAUTION:
Do not rotate the crankshaft or camshaft while the timing chain is removed. It causes interference between valve and piston.

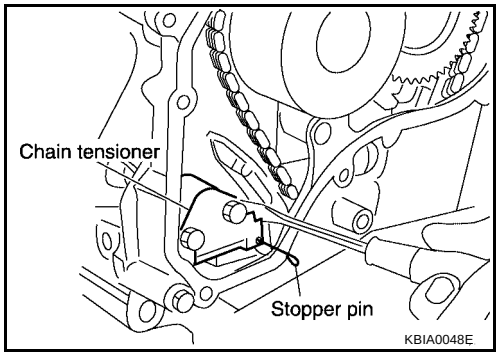
NOTE:
Chain tension holding work is not necessary. Crankshaft sprocket and timing chain do not disconnect structurally while front cover is attached.

a. Line up the mating marks on camshaft sprockets with the yellow links in the timing chain, and paint an indelible mating mark on the sprocket and timing chain link plate.

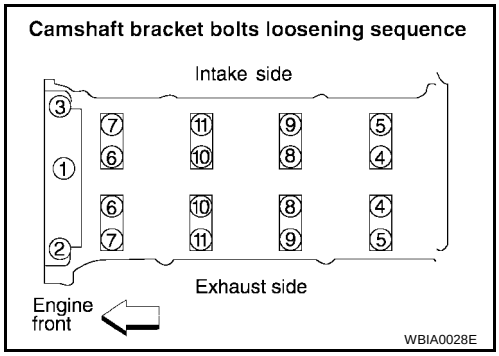


b. Push in the tensioner plunger and hold. Insert a stopper pin into the hole on tensioner body to hold the chain tensioner. Remove the timing chain tensioner.
   - Use a wire with 0.5 mm (0.02 in) diameter for a stopper pin.

c. Secure the hexagonal part of camshaft with a suitable tool. Loosen the camshaft sprocket bolts and remove the camshaft sprockets.



14. Loosen the camshaft bracket bolts in the order shown, and remove the camshaft brackets and camshafts.
    - Remove No.1 camshaft bracket by slightly tapping it with a rubber mallet.
    - Note mounting positions, and set them aside in the order removed.
15. Remove the valve lifters.
    - Note mounting positions, and set them aside in the order removed.

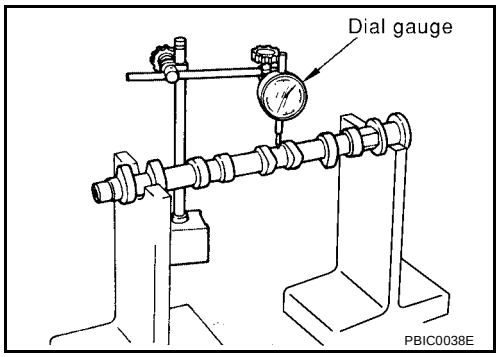


INSPECTION AFTER REMOVAL

Camshaft Runout

1. Put the camshaft on a V-block supporting the No.2 and No.5 journals.
2. Set the dial gauge vertically on the No.3 journal.
3. Turn camshaft in one direction by hand, and measure the camshaft runout on the dial gauge total indicator reading.

Standard : Less than 0.04 mm (0.0016 in)



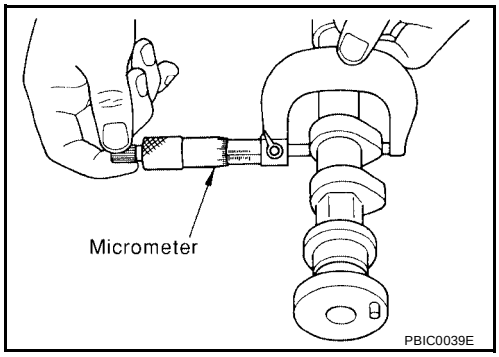
Camshaft Cam Height

1. Measure the camshaft cam height.

Standard intake cam height : 45.665 - 45.855 mm (1.7978 - 1.8053 in)

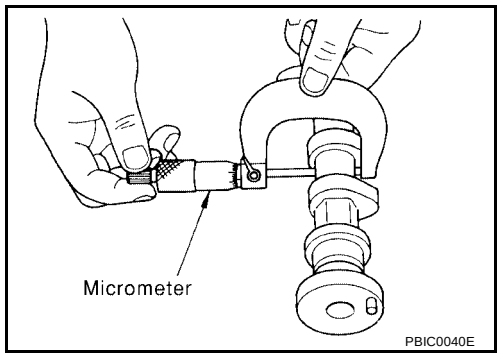
Standard exhaust cam height : 43.975 - 44.165 mm (1.7313 - 1.7388 in)

2. If wear is beyond the limit, replace the camshaft.



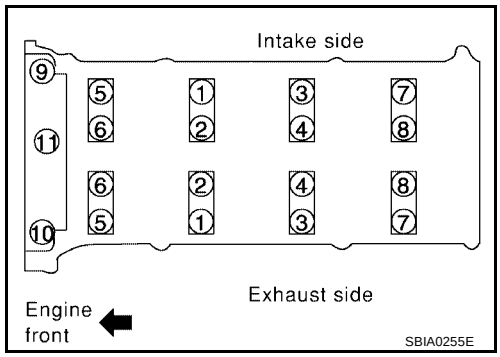
Camshaft Journal Clearance

1. Measure the outer diameter of the camshaft journal.

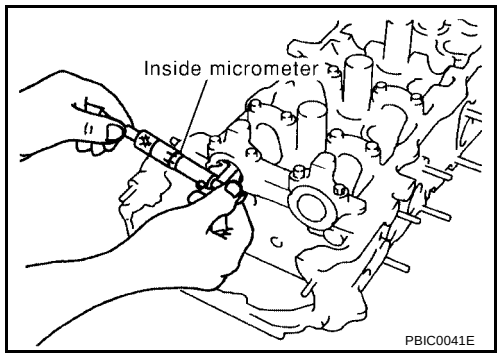


Standard No.1 outer diameter	**: 27.935 - 27.955 mm (1.0998 - 1.1006 in)**
Standard No.2, 3, 4, 5, outer diameter	**: 23.435 - 23.455 mm (0.9226 - 0.9234 in)**

2. Tighten the camshaft bracket bolts to the specified torque following the tightening pattern as shown. Refer to EM-131, "INSTALLATION" .



3. Using inside micrometer, measure inner diameter of camshaft bracket.



Standard No.1	**: 28.000 - 28.021 mm (1.1024 - 1.1032 in)**
Standard No.2, 3, 4, 5	**: 23.500 - 23.521 mm (0.9252 - 0.9260 in)**

4. Calculate camshaft journal clearance.
   - (Journal clearance) = (inner diameter of camshaft bracket) – (outer diameter of camshaft journal)

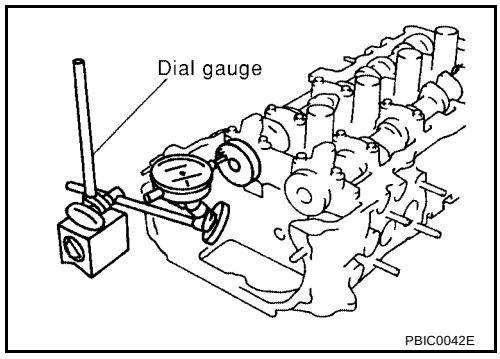
   Standard : 0.045 - 0.086 mm (0.0018 - 0.0034 in)

   - When out of the specified range above, replace either or both the camshaft and the cylinder head assembly.

   NOTE:
   Inner diameter of the camshaft bracket is manufactured together with the cylinder head. If the camshaft bracket is out of specification, replace the entire cylinder head assembly.

Camshaft End Play

1. Install a dial gauge in the thrust direction on the front end of the camshaft. Measure the end play with the dial gauge while moving the camshaft forward and backward (in direction to axis).



Standard end play : 0.115 - 0.188 mm (0.0045 - 0.0074 in)

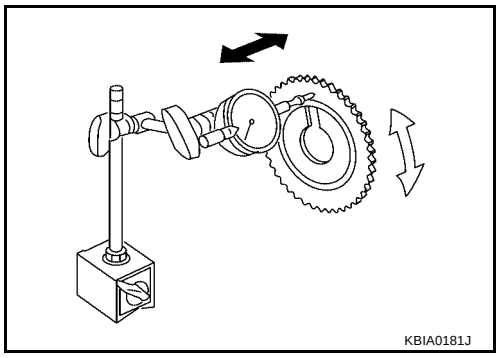
2. If out of the specified range, replace with new camshaft and measure again.
3. If out of the specified range again, replace with new cylinder head assembly.

Camshaft Sprocket Runout

1. Install the camshaft in the cylinder head.
2. Install the camshaft sprocket on the camshaft.
3. Measure camshaft sprocket runout while turning the camshaft by hand.

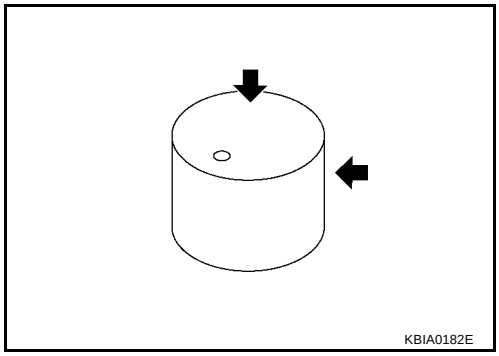
Runout : Less than 0.15 mm (0.0059 in)

4. If it exceeds the specification, replace camshaft sprocket.



Valve Lifter

Check if the surface of the valve lifter has any excessive wear or cracks, replace as necessary.



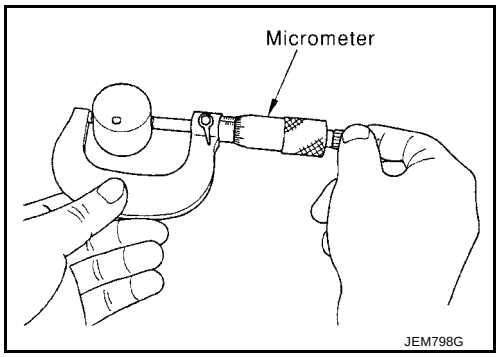
Valve Lifter Clearance

Outer Diameter of Valve Lifter

- Measure the valve lifter outer diameter.

Valve lifter outer diameter : 33.965 - 33.980 mm (1.3372 - 1.3378 in)

- If out of the specified range, replace the valve lifter.

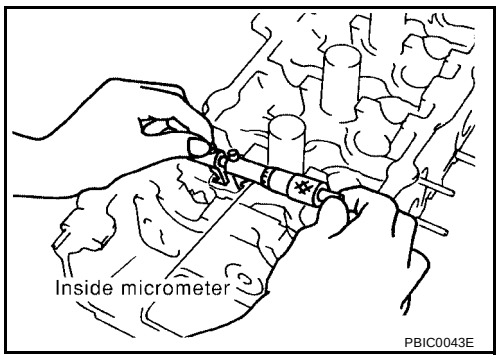


Valve Lifter Hole Diameter

- Using inside micrometer, measure valve lifter guide bore diameter of cylinder head.

Standard : 34.000 - 34.021 mm (1.3386 - 1.3394 in)

- If out of the specified range, replace the cylinder head assembly.



Calculation of Valve Lifter Clearance

- (Valve lifter clearance) = (valve lifter bore diameter) – (valve lifter outer diameter)

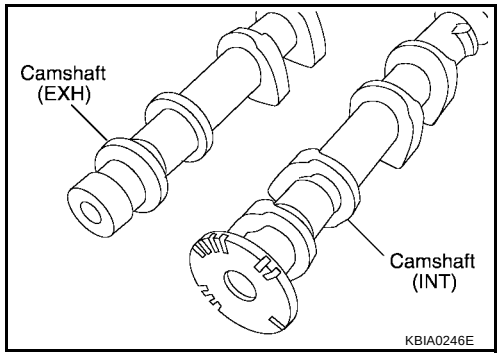
Standard : 0.020 - 0.056 mm (0.0008 - 0.0022 in)

- If out of specified range, replace either or both valve lifter and cylinder head assembly.

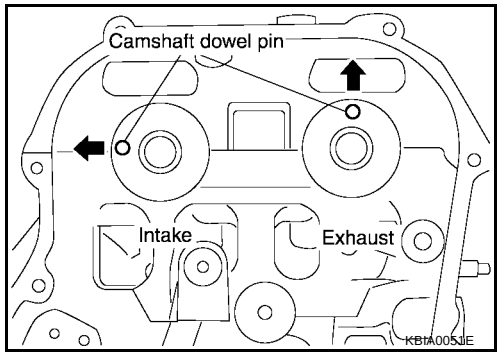
INSTALLATION

1. Install the valve lifter.
   - Install them in the same position from which they were removed.
2. Install the camshafts.
   - The distinction between the intake and exhaust camshafts is in a difference of shapes of the back end:

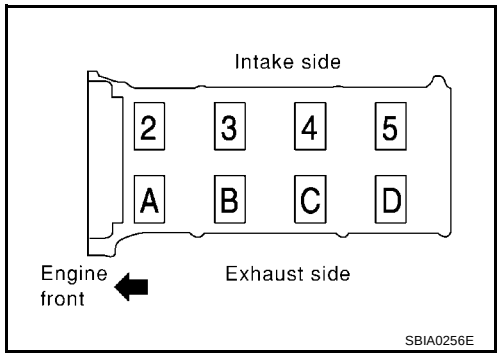
     Intake: Signal plate for the camshaft position sensor (PHASE)
     Exhaust: Cone end shape



   - Install camshafts so that the dowel pins on the front side are positioned as shown.

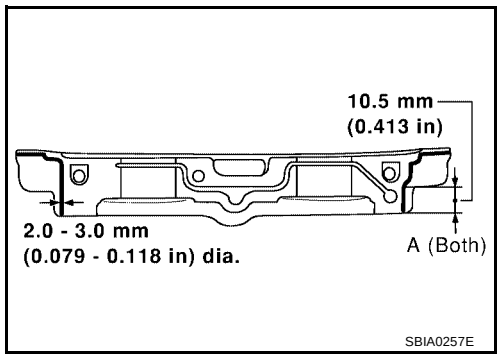


3. Install camshaft brackets.
   - Install by referring to identification mark on upper surface mark.
   - Install so that identification mark can be correctly read when viewed from the exhaust side.
   - Install No. 1 camshaft bracket as follows.
   - Apply sealant to No.1 camshaft bracket as shown.

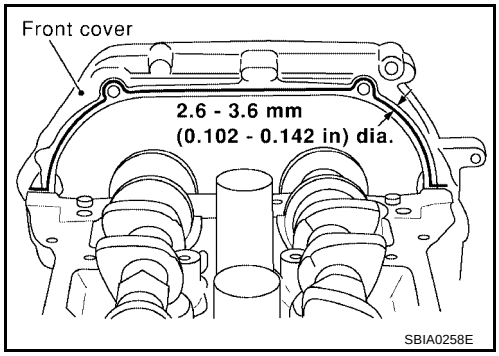


   - Use Genuine Silicone RTV Sealant, or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .

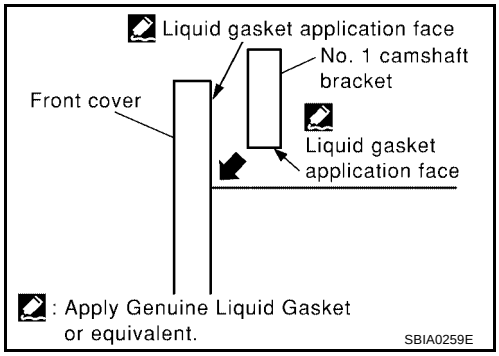
     CAUTION:
     - **After installation, be sure to wipe off any excessive sealant leaking from part “A” (both on right and left sides).**



- Apply sealant to camshaft bracket contact surface on the front cover backside.
- Apply sealant to the outside of bolt hole on front cover.

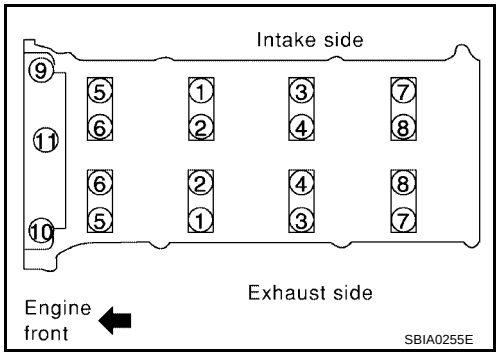


- Position the No.1 camshaft bracket near the mounting position, and install it without disturbing the sealant applied to the surfaces.



4. Tighten camshaft bracket bolts in four steps in the order shown.

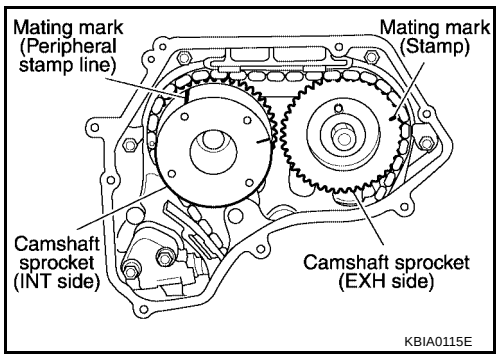
Step 1 (bolts 9 - 11)	**: 2.0 N·m (0.2 kg-m, 17 in-lb)**
Step 2 (bolts 1 - 8)	**: 2.0 N·m (0.2 kg-m, 17 in-lb)**
Step 3 (bolts 1 - 11)	**: 5.9 N·m (0.6 kg-m, 52 in-lb)**
Step 4 (bolts 1 - 11)	**: 9.0 - 11.8 N·m (0.92 - 1.2 kg-m, 80 - 104 in-lb)**



CAUTION:
After tightening camshaft bracket bolts, be sure to wipe off excessive sealant from the parts listed below.

- **Mating surface of rocker cover.**
- **Mating surface of front cover, when installed without the front cover.**

5. Install camshaft sprockets.
   - Install them by lining up the mating marks on each camshaft sprocket with the ones painted on the timing chain during removal.
   - Before installation of chain tensioner, it is possible to re-match the marks on timing chain with the ones on each sprocket.



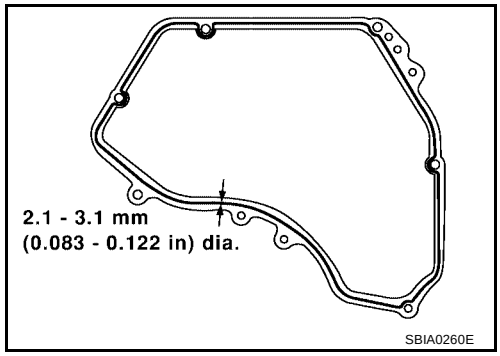
CAUTION:
- **Aligned mating marks could slip. Therefore, after matching them, hold the timing chain in place by hand.**
- **Before and after installing chain tensioner, check again to make sure that mating marks have not slipped.**

6. Install chain tensioner.

CAUTION:
After installation, pull the stopper pin off completely, and make sure that the tensioner is fully released.

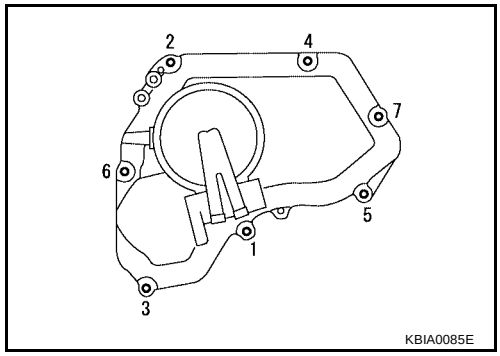
7. Install chain guide.

8. Install IVT control (intake valve timing control) cover as follows:
a. Install IVT control solenoid valve to intake valve timing control cover.
b. Install new O-ring to front cover side.
c. Apply Genuine Silicone RTV Sealant to the positions shown in the figure. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .



d. Install IVT control cover bolts in the order shown.

IVT control cover bolts	**: 12 - 13 N·m (1.2 - 1.4 kg-m, 9 - 10 ft-lb)**



9. Check and adjust valve clearances. Refer to EM-134, "Valve Clearance" .
10. Installation of the remaining components is in reverse order of removal.

Inspection After Installation

EBS00M4B

INSPECTION OF CAMSHAFT SPROCKET (INT) OIL GROOVE

CAUTION:

- **Perform this inspection only when DTC P0011 is detected in self-diagnostic results of CONSULT II and it is directed according to inspection procedure of EC section. Refer to EC-843, "DTC P0011 IVT CONTROL" .**
- **Check when engine is cold so as to prevent burns from any splashing engine oil.**

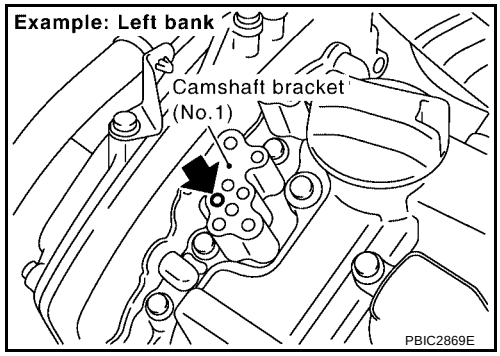
1. Check engine oil level. Refer to LU-16, "OIL LEVEL AND MUDINESS" .
2. Perform the following procedure so as to prevent the engine from being unintentionally started while checking.
a. Release fuel pressure. Refer to EC-751, "FUEL PRESSURE RELEASE" .
b. Disconnect ignition coil and injector harness connectors if practical.
3. Remove IVT control solenoid valve. Refer to EM-126, "REMOVAL" .
4. Crank engine, and then make sure that engine oil comes out from IVT control cover oil hole. End cranking after checking.

WARNING:

Be careful not to touch rotating parts (drive belts, idler pulley, and crankshaft pulley, etc.).

CAUTION:

- **Engine oil may squirt from IVT control solenoid valve installation hole during cranking. Use a shop cloth to prevent engine oil from splashing on worker, engine components and vehicle.**
- **Do not allow engine oil to get on rubber components such as drive belts or engine mount insulators. Immediately wipe off any splashed engine oil.**



5. Clean oil groove between oil strainer and IVT control solenoid valve if engine oil does not come out from IVT control cover oil hole. Refer toLU-14, "LUBRICATION SYSTEM" .
6. Remove components between IVT control solenoid valve and camshaft sprocket (INT), and then check each oil groove for clogging.
   - Clean oil groove if necessary. Refer to LU-14, "Lubrication Circuit" .
7. After inspection, installation of the remaining components is in the reverse order of removal.

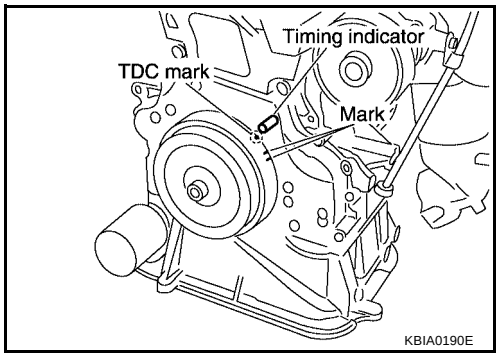
Valve Clearance

EBS00CG0

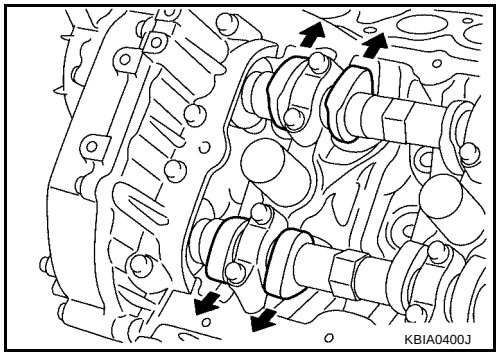
INSPECTION

- Perform this inspection as follows after removal, installation, or replacement of the camshaft or any valve-related parts, or if there are any unusual engine conditions due to changes in valve clearance over time (starting, idling, and/or noise).

1. Warm up the engine, then stop it.
2. Remove front RH engine undercover.
3. Remove the rocker cover. Refer to EM-124, "Removal and Installation" .
4. Turn crankshaft pulley in normal direction (clockwise when viewed from front) to align TDC identification mark (without paint mark) with timing indicator.

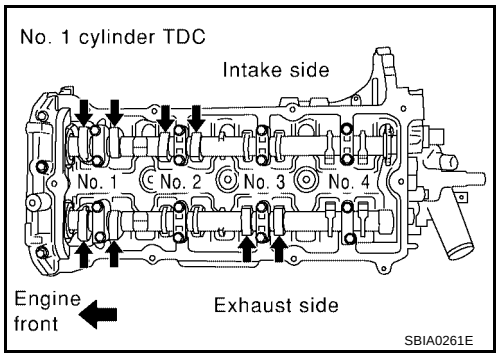


5. At this time, check that both the intake and exhaust cam noses of No. 1 cylinder face outside.
   - If they do not face outside, turn crankshaft pulley once more.



6. By referring to the figure, measure valve clearances at locations marked X as shown in the table below (locations indicated with black arrow in figure) with a feeler gauge.
   - No.1 cylinder compression TDC.

Cylinder	No.1		No.2		No.3		No.4	
Valve	INT	EXH	INT	EXH	INT	EXH	INT	EXH
Measurable	×	×	×			x		

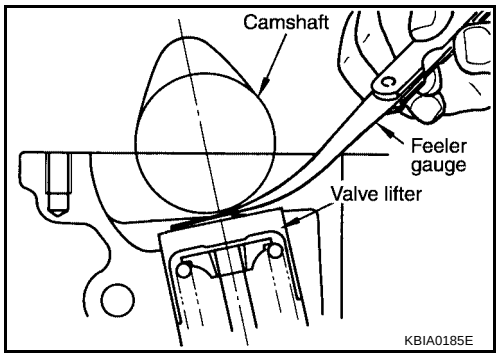


   - Use a feeler gauge, measure clearance between valve and camshaft.

Valve clearance standard:

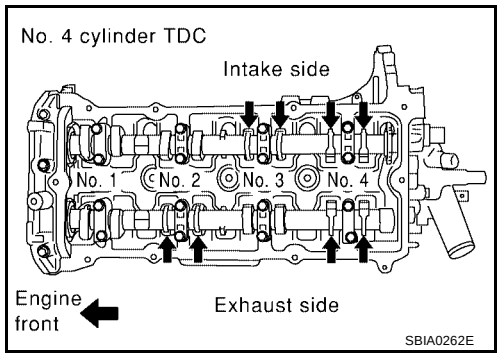
Hot	**Intake**	**: 0.32 - 0.40 mm (0.013 - 0.016 in)**
	Exhaust	**: 0.33 - 0.41 mm (0.013 - 0.016 in)**
Cold*	**Intake**	**: 0.24 - 0.32 mm (0.009 - 0.013 in)**
	Exhaust	**: 0.26 - 0.34 mm (0.010 - 0.013 in)**

*Reference data at approximately 20°C (68°F)



CAUTION:
If inspection was carried out with cold engine, check that values with fully warmed up engine are still within specifications.

7. Turn crankshaft one complete revolution (360°) and align mark on crankshaft pulley with pointer.
8. By referring to the figure, measure valve clearances at locations marked X as shown in the table below (locations indicated with black arrow in figure).
   - No.4 cylinder compression TDC.



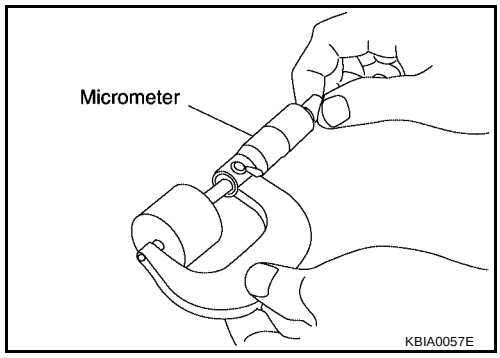
Cylinder	No.1		No.2		No.3		No.4	
Valve	INT	EXH	INT	EXH	INT	EXH	INT	EXH
Measurable				x	×		x	×

9. If out of specifications, adjust. Refer to EM-135, "VALVE ADJUSTMENT" .

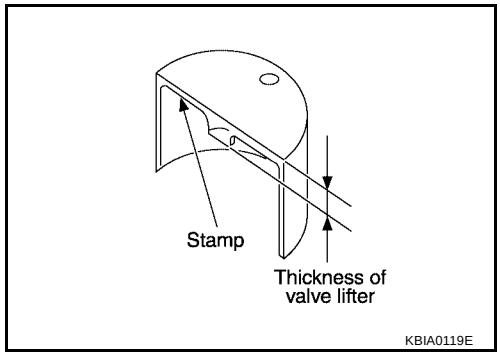
VALVE ADJUSTMENT

- Perform adjustment depending on selected head thickness of valve lifter.
- The specified valve lifter thickness is the dimension at normal temperatures. Ignore dimensional differences caused by temperature. Use the specifications for hot engine condition to adjust.

1. Remove camshaft. Refer to EM-126, "Removal and Installation" .
2. Remove the valve lifters at the locations that are outside the standard.
3. Measure the center thickness of the removed valve lifters with a micrometer.



4. Use the equation below to calculate valve lifter thickness for replacement.
   - Valve lifter thickness calculation.
     t = t1 + (C1 - C2)
     t = Thickness of replacement valve lifter.
     t1 = Thickness of removed valve lifter.
     C1 = Measured valve clearance.
     C2 = Standard valve clearance.
   - Thickness of a new valve lifter can be identified by stamp marks on the reverse side (inside the cylinder).
     Stamp mark 696 indicates a thickness of 6.96 mm (0.2740 in)
     Available thickness of valve lifter, refer to EM-191, "Available Valve Lifter" .



5. Install the selected valve lifter.
6. Install camshaft. Refer to EM-131, "INSTALLATION" .
7. Manually turn crankshaft pulley a few turns.
8. Check that valve clearances for cold engine are within specifications, refer to EM-190, "Valve Clearance" .
9. After completing the repair, check valve clearances again with the specifications for warmed engine. Use a feeler gauge to measure the clearance between the valve and camshaft. Make sure the values are within specifications. Refer to EM-190, "Valve Clearance"

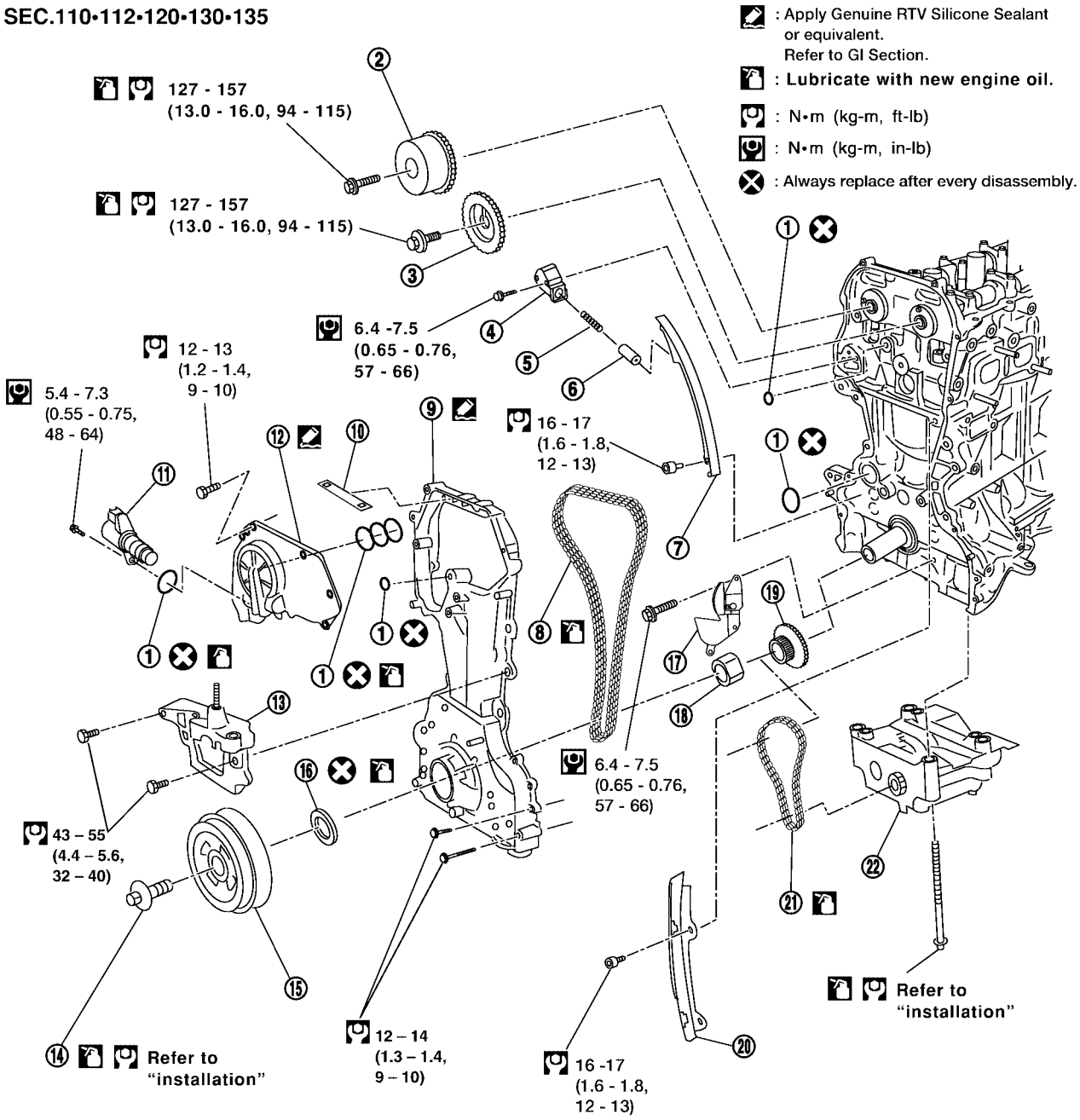
TIMING CHAIN

PFP:13028

Removal and Installation

EBS00CG1

SEC.110•112•120•130•135



WBIA0305E

1. O rings
2. Camshaft sprocket (INT)
3. Camshaft sprocket (EXH)
4. Chain tensioner
5. Spring
6. Chain tensioner plunger
7. Timing chain slack guide
8. Timing chain
9. Front cover
10. Chain guide
11. IVT control solenoid valve
12. IVT control cover
13. Engine mounting bracket
14. Crankshaft pulley bolt
15. Crankshaft pulley
16. Front oil seal
17. Balancer unit timing chain tensioner
18. Oil pump drive spacer
19. Crankshaft sprocket
20. Timing chain tension guide
21. Balancer unit timing chain
22. Balancer unit

CAUTION:

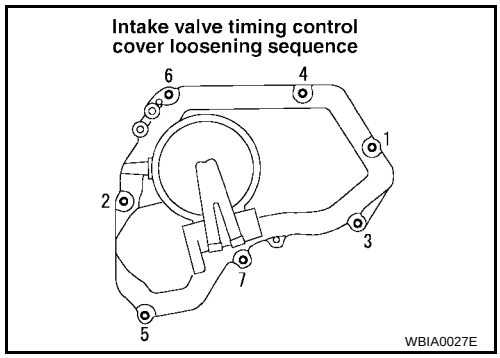
Apply new engine oil to parts marked in illustration before installation.

REMOVAL

1. Release the fuel pressure. Refer to EC-751, "FUEL PRESSURE RELEASE" .
2. Remove the air cleaner and air duct assembly. Refer to EM-106, "Removal and Installation" .
3. Remove the spark plugs. Refer to EM-119, "Removal and Installation" .
4. Remove the rocker cover. Refer to EM-124, "Removal and Installation" .
5. Remove the coolant overflow reservoir tank.
6. Remove the auxiliary drive belt auto-tensioner. Refer to EM-104, "Removal and Installation of Drive Belt Auto-tensioner" .
7. Remove the generator. Refer to SC-31, "Removal and Installation" .
8. Remove the strut tower brace. Refer to FSU-5, "Components" .
9. Dismount and position aside the A/C compressor with the piping attached.
10. Dismount and position aside the power steering pump and reservoir tank with the piping attached.
11. Remove the upper and lower oil pan, and oil strainer. Refer to EM-115, "Removal and Installation" .
12. Remove IVT control cover bolts in the order shown.
13. Remove the IVT control cover by cutting the sealant using Tool.

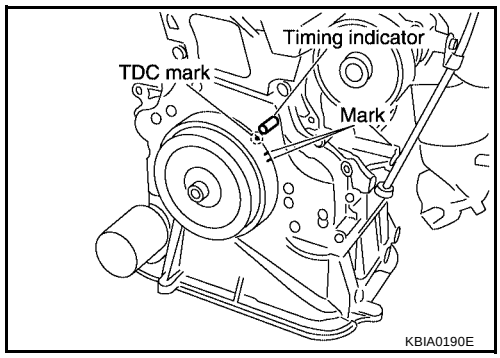
Tool number : KV10111100 (J-37228)

14. Pull chain guide between camshaft sprockets out through front cover.



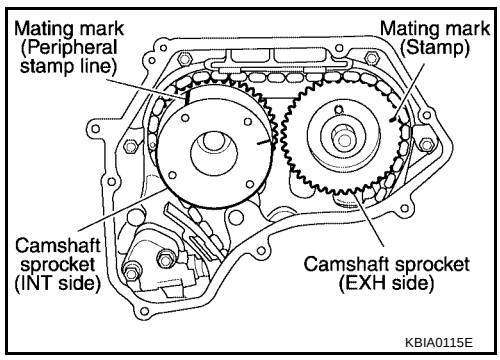
15. Set the No.1 cylinder at TDC on the compression stroke with the following procedure:

a. Rotate the crankshaft pulley clockwise and align the mating marks to the timing indicator on the front cover.



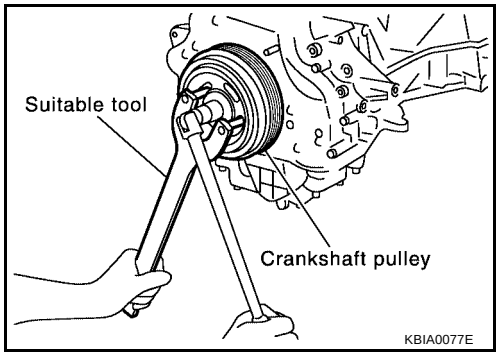
b. At the same time, make sure that the mating marks on the camshaft sprockets are lined up as shown.

- If not lined up, rotate the crankshaft pulley one more turn to line up the mating marks to the positions as shown.

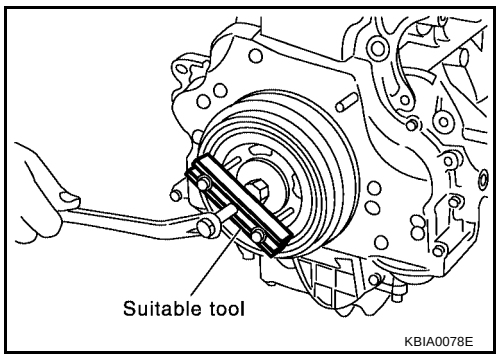


16. Remove crankshaft pulley with the following procedure:

a. Hold the crankshaft pulley with a suitable tool, then loosen the crankshaft pulley mounting bolt, and pull the pulley out about 10 mm (0.39 in). Remove the crankshaft pulley mounting bolt.



b. Attach a pulley puller in the M 6 (0.24 in diameter) thread hole on crankshaft pulley, and remove crankshaft pulley.



17. Remove the front cover with the following procedure:

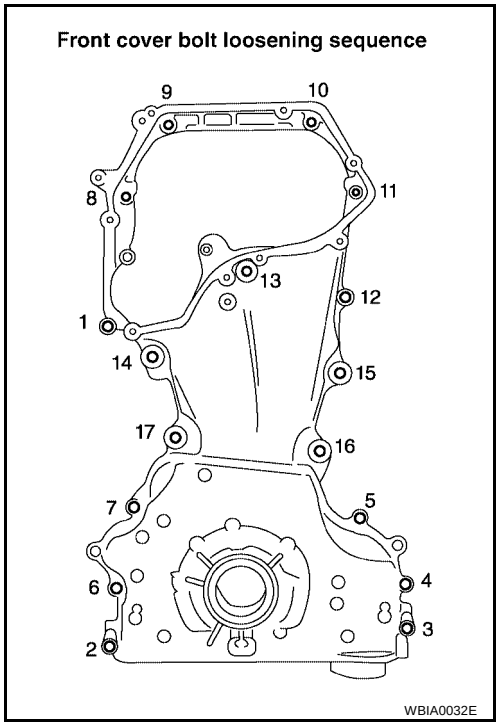
a. Loosen the front cover bolts in the order shown, and remove them.

b. Remove the front cover.

CAUTION:

- **Be careful not to damage the mounting surface.**

18. If the front oil seal needs to be replaced, lift it out with a screwdriver to remove it.

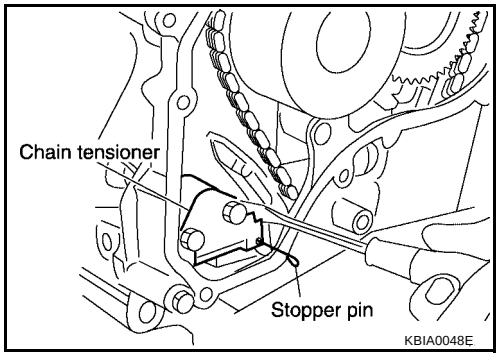


19. Remove timing chain with the following procedure:

a. Push in the tensioner plunger. Insert a stopper pin into the hole on the tensioner body to hold the chain tensioner.

- Use a wire of 0.5 mm (0.02 in) diameter as a stopper pin.

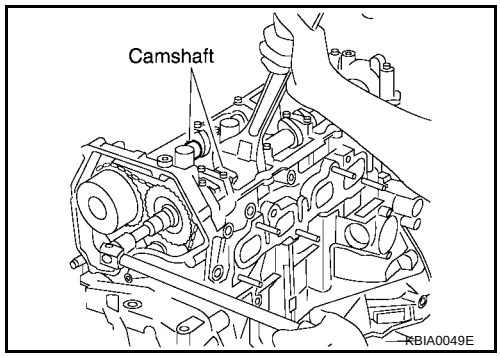
b. Remove the chain tensioner.



c. Secure hexagonal part of the camshaft with a wrench and loosen the camshaft sprocket mounting bolt and remove the camshaft sprocket for both camshafts.

CAUTION:

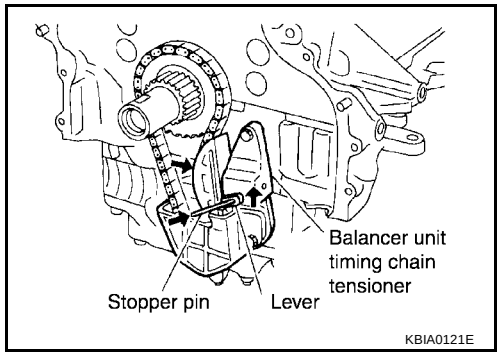
- **Do not rotate the crankshaft or camshafts while the timing chain is removed. It can cause damage to the valve and piston.**



20. Remove the chain slack guide, tension guide, timing chain, and oil pump drive spacer.
21. Remove the timing chain tensioner for the balancer unit with the following procedure:

a. Lift the tensioner lever up, and release the ratchet claw.
b. Push tensioner sleeve in, and hold it.
c. Matching the hole on lever with the one on body, insert a stopper pin to secure tensioner sleeve.
d. Remove the timing chain tensioner for the balancer unit.

22. Remove timing chain for balancer unit and crankshaft sprocket.

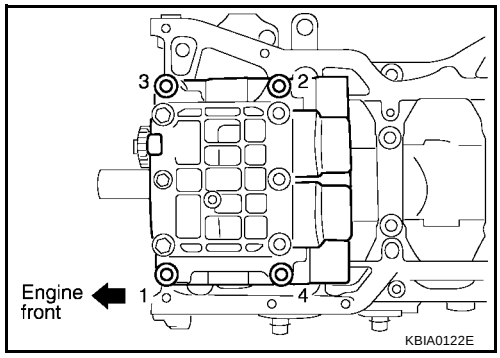


23. Loosen balancer unit bolts in order shown and remove balancer unit.

- Use Torx® socket (size E14)

CAUTION:

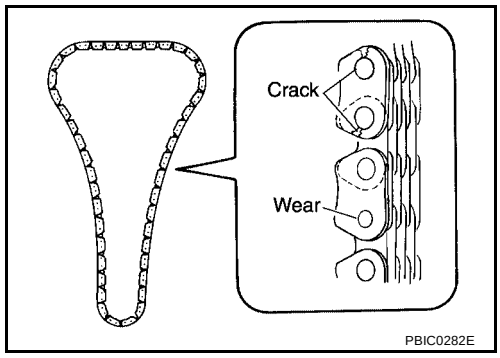
Do not disassemble balancer unit.



INSPECTION AFTER REMOVAL

Timing Chain

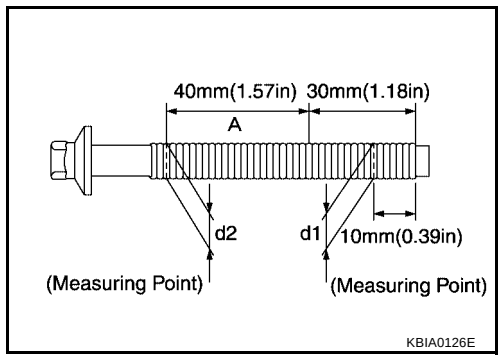
Check the timing chain for cracks or serious wear. If a defect is detected, replace it.



Balancer Unit Mounting Bolt Outer Diameter

- Measure outer diameters (d1, d2) at the two positions shown in the figure.
- Measure d2 within the range A.
- If the value difference (d1 - d2) exceeds the limit (a dimension difference is large), replace it with a new one.

Limit : 0.15 mm (0. 0059 in) or more



INSTALLATION

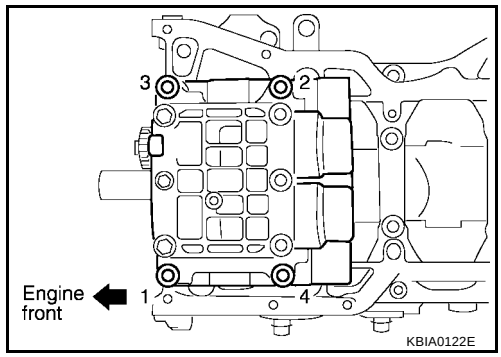
NOTE:

- There may be two color variations of the link marks (link colors) on the timing chain.
- There are 26 links between the gold/yellow mating marks on the timing chain; and 64 links between the camshaft sprocket gold/yellow link and the crankshaft sprocket orange/blue link, on the timing chain side without the tensioner.

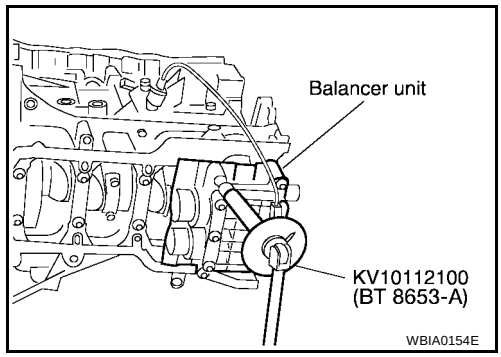
1. Make sure the crankshaft key points straight up.
2. Install the balancer unit and tighten the balancer unit bolts in five steps in the order shown.

CAUTION:
When reusing a balancer unit bolt, check its outer diameter before installation. Refer to EM-140, "Balancer Unit Mounting Bolt Outer Diameter" .

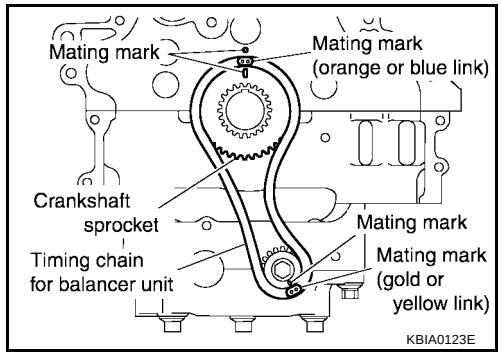
Step 1 : 45.2 - 51.0 N·m (4.6 - 5.2 kg-m, 34 - 37 ft-lb)
Step 2 : 90° - 95° degrees (Target: 90° degrees)
Step 3 : 0 N·m (0 kg-m, 0 ft-lb) (loosen)
Step 4 : 45.2 - 51.0 N·m (4.6 - 5.2 kg-m, 34 - 37 ft-lb)
Step 5 : 90° - 95° degrees (Target: 90° degrees)



CAUTION:
Check tightening angle with an angle wrench or a protractor. Do not make judgment by visual check alone.



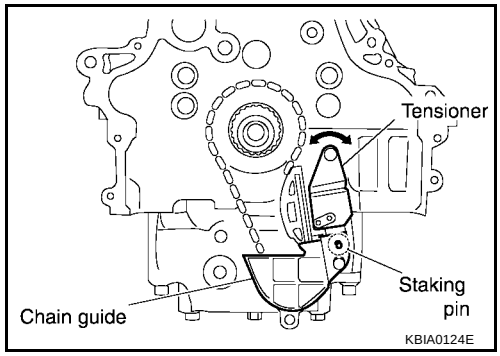
3. Install the crankshaft sprocket and timing chain for the balancer unit.
   - Make sure that the crankshaft sprocket is positioned with mating marks on the block and sprocket meeting at the top.
   - Install it by lining up mating marks on each sprocket and timing chain.



4. Install timing chain tensioner for balancer unit.

NOTE:
Chain guide and tensioner move freely with the caulking pin as the axle. Therefore, bolt hole position of the three points could be changed during removal. If points change, temporarily fix the two mounting bolts on the chain guide and move the tensioner to match the bolt holes.

- Be careful not to let mating marks of each sprocket and timing chain slip.
- After installation, make sure the mating marks have not slipped, then remove stopper pin and release tensioner.



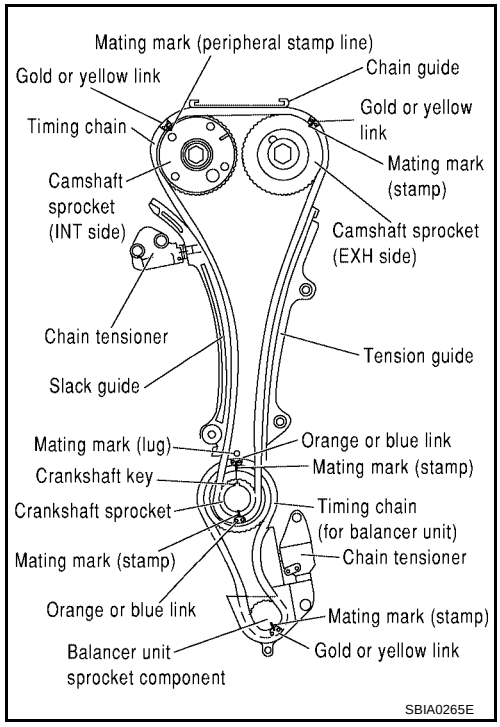
5. Install timing chain and related parts.

- Install by lining up mating marks on each sprocket and timing chain as shown.

NOTE:
Before installing chain tensioner, it is possible to change the position of mating mark on timing chain for that of each sprocket for alignment.

CAUTION:
For the above reason, after the mating marks are aligned, keep them aligned by holding them with a hand.

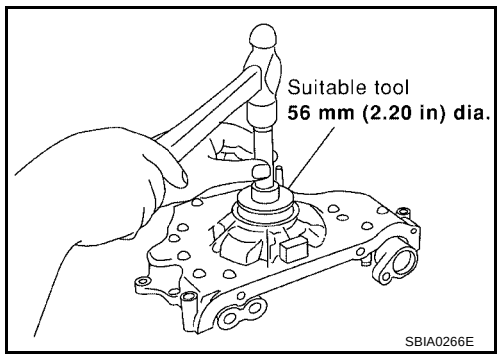
- Before and after installing chain tensioner, check again to make sure that mating marks have not slipped.
- After installing chain tensioner, remove stopper pin, and make sure the tensioner moves freely.
- To avoid skipped teeth, do not move crankshaft and camshaft until front cover is installed.



6. Install front oil seal to front cover.

- Using a drift of 56 mm (2.20 in) diameter, press oil seal in until it is flush with front end surface of front cover.

CAUTION:
- **Be careful not to cause damage to circumference of oil seal.**



7. Install front cover as follows:

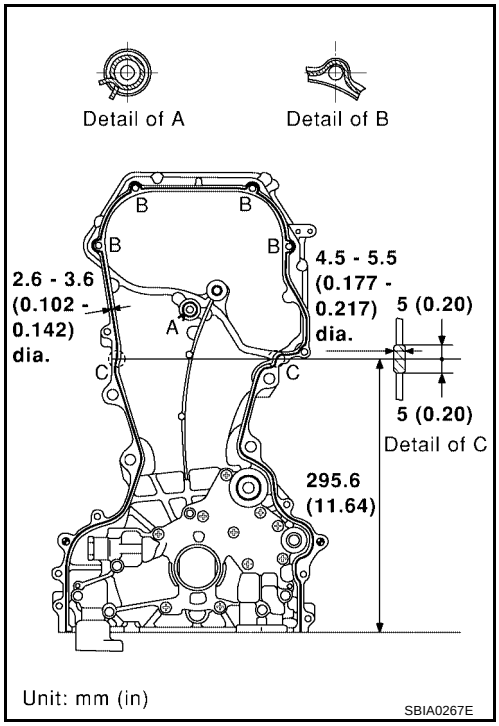
a. Install new O-rings to cylinder head and cylinder block.

b. Apply Genuine Silicone RTV Sealant or equivalent, to positions shown. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .

c. Make sure the mating marks on the timing chain and each sprocket are still aligned. Then install the front cover.

CAUTION:

- **Be careful not to damage the front oil seal during installation with the front end of the crankshaft.**



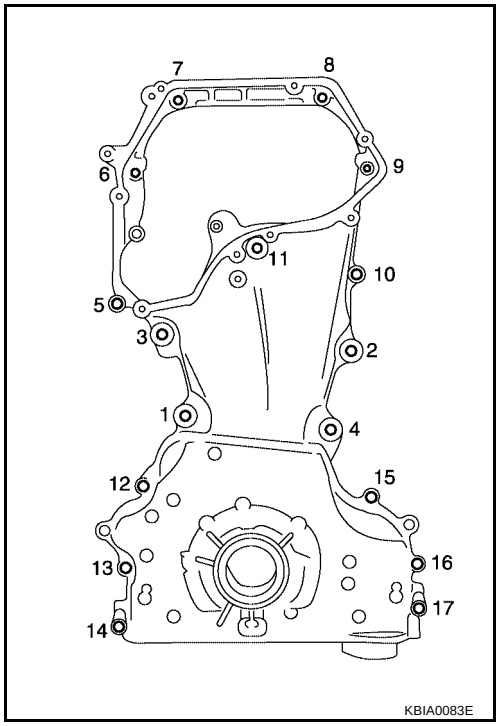
d. Tighten front cover bolts in two steps in the order shown.

Front cover bolts : 12 - 14 N·m (1.3 - 1.4 kg-m, 9 - 10 ft-lb)

CAUTION:

Wipe off any excess sealant leaking at the surface for installing the oil pan.

8. Install the chain guide between the camshaft sprockets.



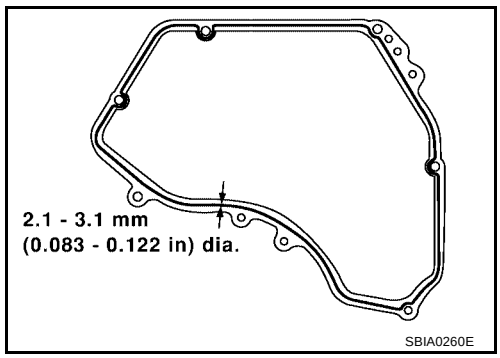
9. Install IVT control cover as follows:

a. Install IVT control solenoid valves to IVT control cover.

b. Install new oil rings to the intake camshaft sprocket insertion points on IVT control backside cover.

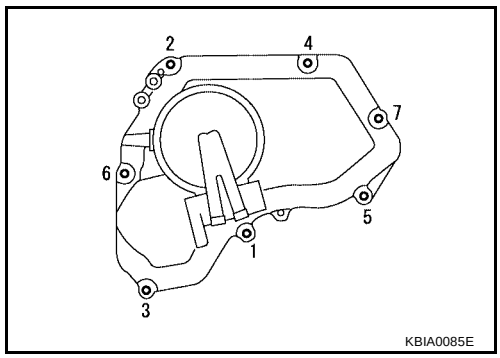
c. Install new O-ring to front cover.

d. Apply Genuine Silicone RTV Sealant or equivalent, to positions shown.
   - Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .



e. Tighten the IVT control cover bolts in the order shown.

IVT control cover bolts	**: 12 - 13 N·m (1.2 - 1.4 kg-m, 9 - 10 ft-lb)**

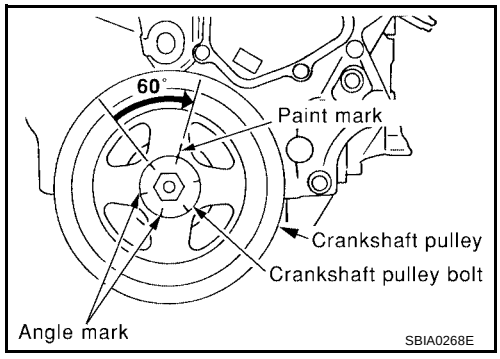


10. Insert crankshaft pulley by aligning with crankshaft key.
    - Tap its center with a plastic hammer to insert.
11. Tighten crankshaft pulley bolt.
    - Secure crankshaft pulley with a pulley holder to tighten the bolt.
    - Perform angle tightening with the following procedure:

a. Apply new engine oil to threads and seat surfaces of bolt.
b. Tighten to initial specifications:·

Crankshaft pulley bolt initial tightening	**: 37.3 - 47.1 N·m (3.8 - 4.8 kg-m, 28 - 34 ft-lb)**

c. Apply a paint mark on the front cover, mating with any one of six easy to recognize stamp marks on bolt flange.
d. Turn crankshaft pulley bolt another 60° to 66° degrees [Target: 60° degrees].
   - Check vertical mounting angle with movement of one stamp mark.
12. Installation of the remaining parts is in reverse order of removal.



OIL SEAL

PFP:00100

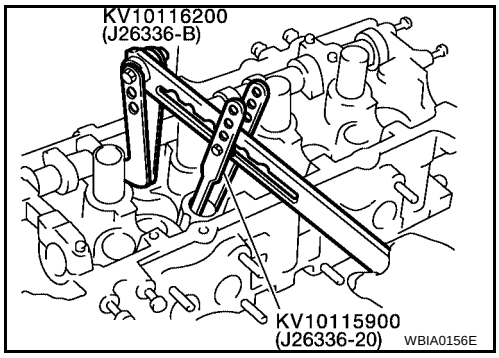
Removal and installation of Valve Oil Seal

EBS00EX1

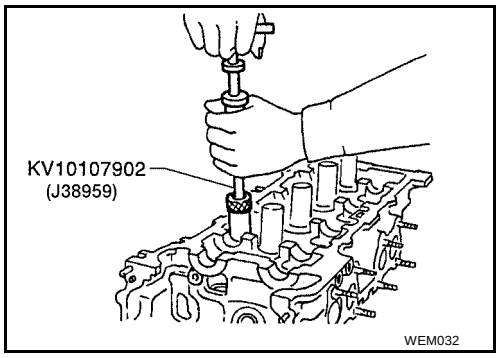
REMOVAL

1. Remove camshaft and valve lifter. Refer to EM-126, "REMOVAL" .
2. Rotate crankshaft, and set piston whose oil seal is to removed to top dead center. This prevents valve from dropping inside cylinder.

   CAUTION:
   When rotating crankshaft, be careful to avoid scarring the front cover with the timing chain.
3. Remove valve collet, valve spring retainer and valve spring using Tool.

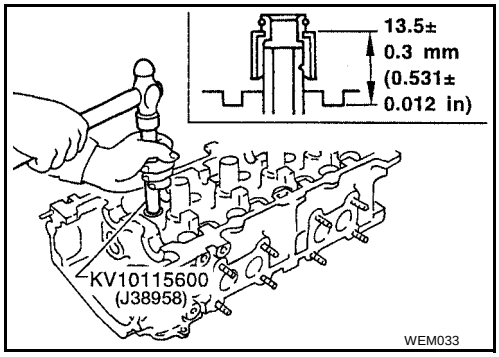


4. Remove valve oil seal using Tool.



INSTALLATION

1. Apply new engine oil to new valve oil seal joint surface and seal lip.
2. Press in valve oil seal to the position shown using Tool.
3. Installation of the remaining components is in reverse order of removal.



Removal and Installation of Front Oil Seal

EBS00EX2

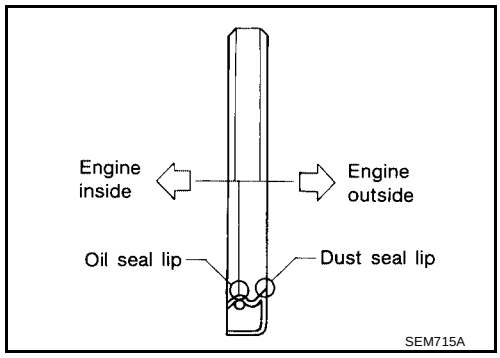
REMOVAL

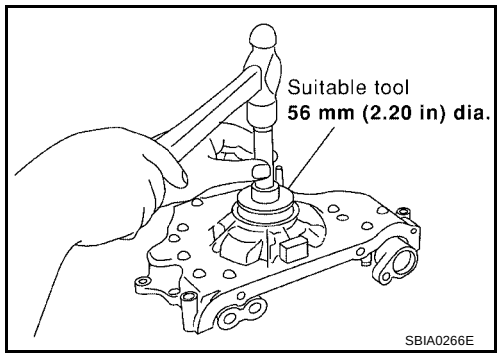
1. Remove the following parts:
   - Engine under cover
   - Drive belts. Refer to EM-103, "REMOVAL" .
   - Crankshaft pulley. Refer to EM-136, "TIMING CHAIN"
2. Remove front oil seal from front cover using suitable tool.

   CAUTION:
   Be careful not to scratch front cover.

INSTALLATION

1. Apply new engine oil to new oil seal and install it using a suitable tool.
   - Install new oil seal in the direction shown.





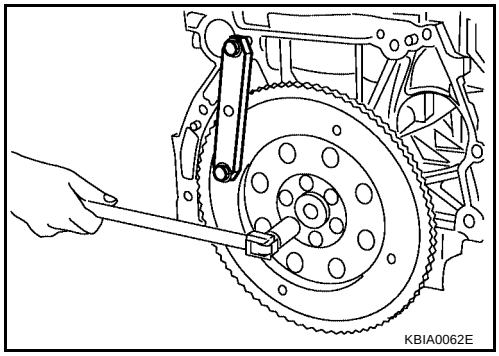
2. Installation of the remaining components is in reverse order of removal.

Removal and Installation of Rear Oil Seal

EBS00EX3

REMOVAL

1. Remove the transaxle. Refer to MT-79, "Removal and Installation" (RS6F51A M/T), or AT-644, "REMOVAL AND INSTALLATION" (RE4F04B A/T).
2. Remove the flywheel (M/T models) or drive plate (A/T models). Hold the crankshaft with a stopper plate and remove the mounting bolts using Tool.



Tool numbers

Flywheel bolt tool (TP50 Torx® plus bit) : J-45737

Drive plate bolt tool (E20 Torx® socket) : J45816

CAUTION:

- **Be careful not to damage the flywheel contact surface for the clutch disc.**

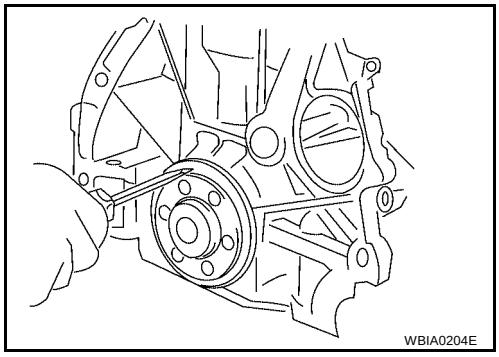
NOTE:

- The flywheel two-block construction allows movement in response to transmission side pressure, or when twisted in its rotational direction, therefore, some amount of noise is normal.

3. Remove rear oil seal using suitable tool.

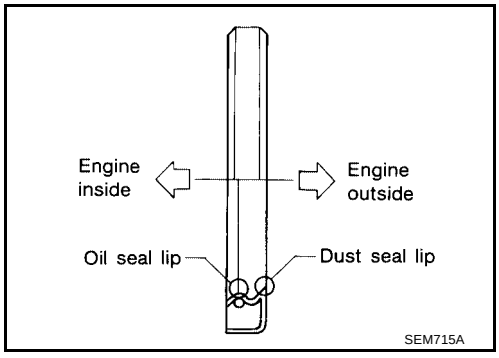
CAUTION:

Be careful not to damage crankshaft and/or cylinder block.



INSTALLATION

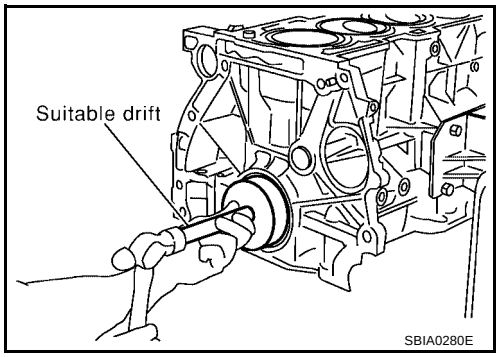
1. Apply new engine oil to new oil seal and install it using a suitable tool.
   - Install new oil seal in the direction shown.

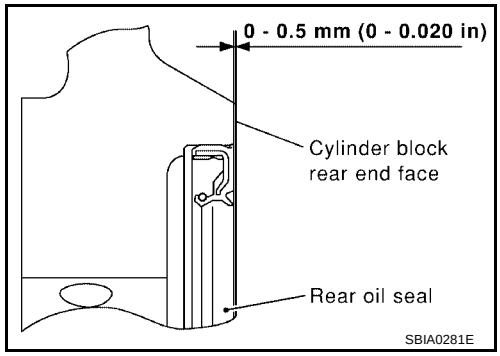


2. Install rear oil seal using a suitable drift.

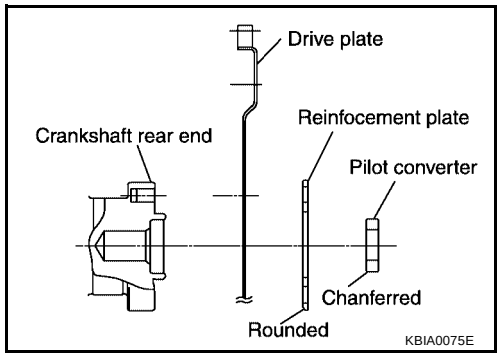
CAUTION:

- **Do not touch grease applied onto oil seal lip.**
- **Be careful not to damage crankshaft and/or cylinder block.**
- **Press fit oil seal straight to avoid causing burrs or tilting.**





3. Install flywheel (M/T Models), or drive plate (A/T Models).
   - Install drive plate, reinforcement plate and pilot converter as shown in figure.
   - Using a drift with 33 mm (1.30 in) diameter, push pilot converter into the end of the crankshaft.
4. Installation of the remaining components is in reverse order of removal.



CYLINDER HEAD

PFP:11041

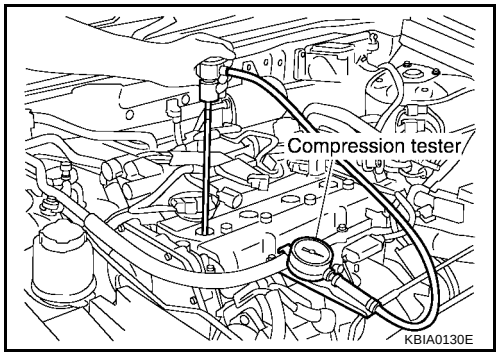
On-Vehicle Service

EBS00CG2

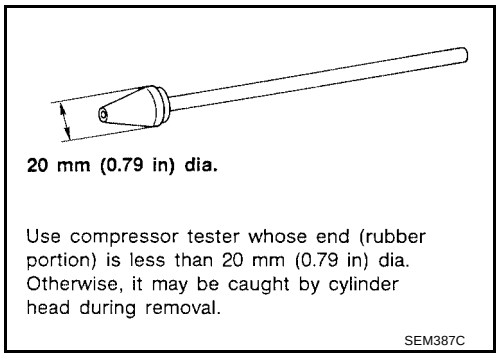
CHECKING COMPRESSION PRESSURE

1. Warm up the engine to full operating temperature.
2. Turn ignition switch OFF.
3. Release the fuel pressure. Refer to EC-751, "FUEL PRESSURE RELEASE" .
4. Remove the ignition coil and spark plug from each cylinder. Refer to EM-119, "Removal and Installation" .
5. Connect engine tachometer (not required in use of CONSULT-II).
6. Disconnect the fuel injector harness connector to avoid any residual fuel injection during the measurement.

7. Install the compression tester with the adapter into the spark plug hole.



- Use compression gauge whose picking up end inserted to spark plug hole is smaller than 20 mm (0.79 in) in diameter. Otherwise, it may be caught by cylinder head during removal.



8. With the accelerator pedal fully depressed, turn the ignition switch to the “START” position to crank over the engine. When the gauge pointer stabilizes, read the compression pressure and engine rpm. Perform these steps to check each cylinder.

Unit: kPa (kg/cm^2 , psi) / rpm

Standard	Minimum	Difference limit between cylinders
1,250 (12.8, 181.3) / 250	1,060 (10.8, 153.7) / 250	100 (1.0, 14) / 250

CAUTION:

Always use a fully charged battery to obtain specified engine cranking speed.

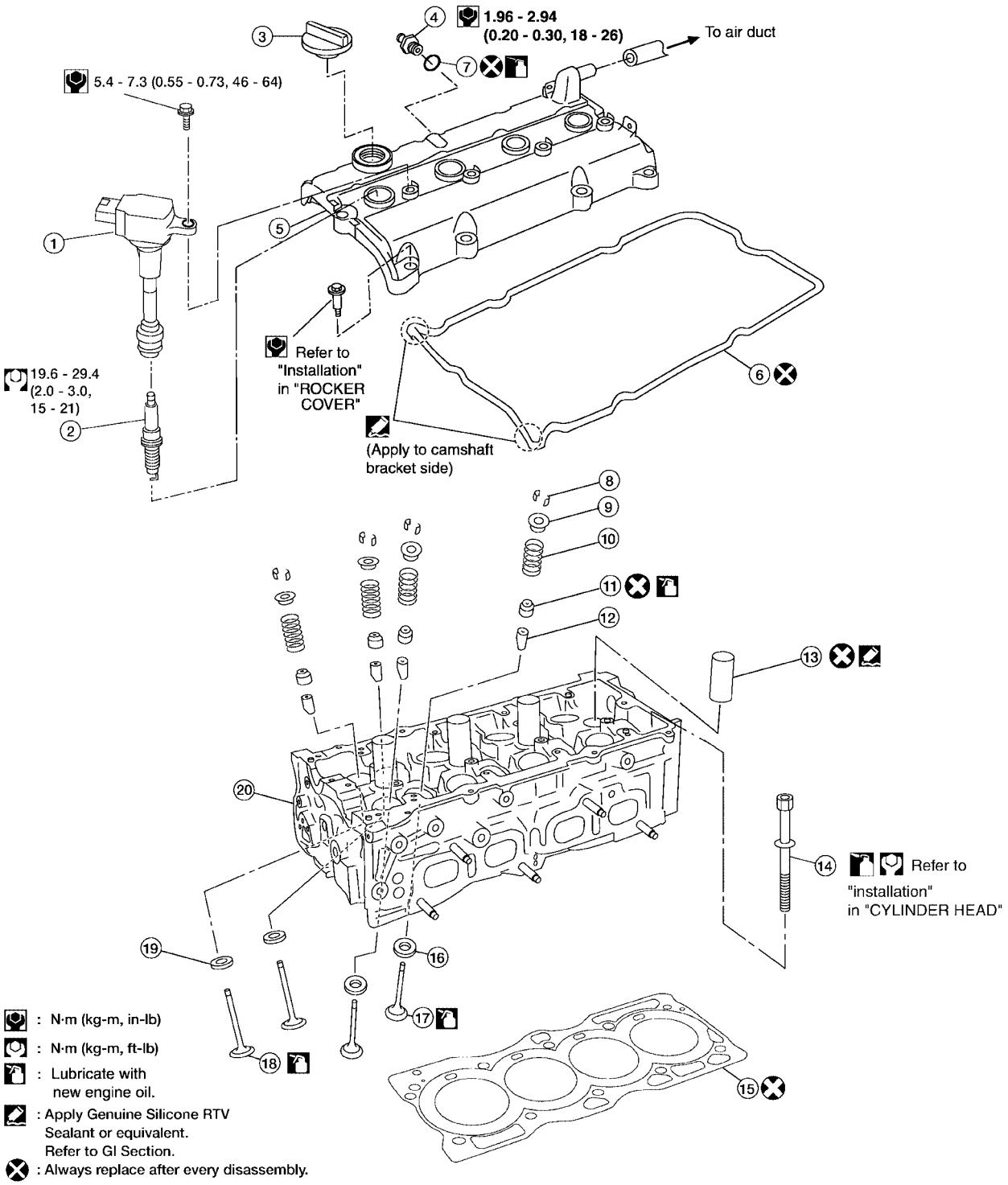
- If the engine speed is out of specified rpm range, check the battery. Check engine speed again with a fully charged battery.
- If compression pressure is below minimum value, check valve clearances and parts associated with combustion chamber (valve, valve seat, piston, piston ring, cylinder bore, cylinder head, cylinder head gasket). After the checking, measure compression pressure again.
- If some cylinders have low compression pressure, pour small amount of engine oil into the spark plug hole of the cylinder to re-check it for compression.
  - If the added engine oil improves the compression, the piston rings may be worn or damaged. Check the piston rings and replace if necessary.
  - If the compression pressure remains at low level despite the addition of engine oil, the valves may be malfunctioning. Check the valves for damage. Replace the valve or valve seat accordingly.

- If two adjacent cylinders have respectively low compression pressure and their compression remains low even after the addition of engine oil, the head gasket is leaking. In such a case, replace the cylinder head gasket.

9. Install spark plug, ignition coil and harness connectors.

Removal and Installation

EBS00CG3



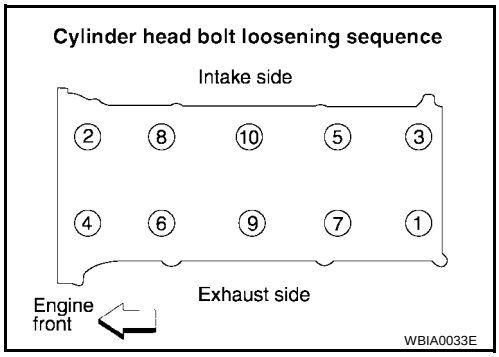
WBIA0225E

1. Ignition coil
2. Spark plug
3. Oil filler cap
4. PCV valve
5. Rocker cover
6. Rocker cover gasket

7. O-ring
8. Valve collet
9. Valve spring retainer
10. Valve spring
11. Valve oil seal
12. Valve guide
13. Spark plug tube
14. Cylinder head bolt
15. Cylinder head gasket
16. Valve seat (EXH)
17. Valve (EXH)
18. Valve (INT)
19. Valve seat (INT)
20. Cylinder head

REMOVAL

1. Release fuel pressure. Refer to EC-751, "FUEL PRESSURE RELEASE" .
2. Remove the strut tower brace. Refer to FSU-5, "Components" .
3. Drain engine coolant and engine oil. Refer to MA-16, "DRAINING ENGINE COOLANT" , MA-20, "Changing Engine Oil" .
4. Remove the engine undercover.
5. Remove the timing chain. Refer to EM-136, "Removal and Installation" .
6. Remove the camshafts. Refer to EM-126, "CAMSHAFT" .
7. Remove the exhaust manifold. Refer to EM-113, "REMOVAL" .
8. Support the engine with suitable hoist and floor jack.
9. Remove cylinder head bolts in the order shown.
10. If necessary to transfer to new cylinder head or remove for reconditioning, remove the intake manifold collector, intake manifold, and fuel tube assembly. Refer to EM-108, "Removal and Installation" .



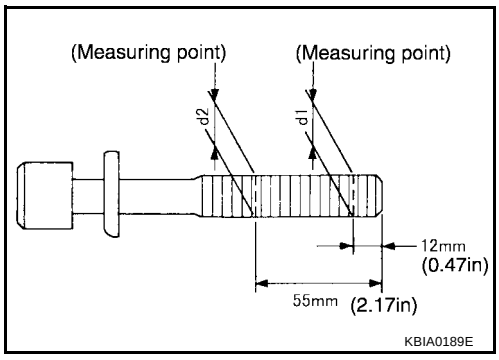
INSPECTION AFTER REMOVAL

Outer Diameter of Cylinder Head Bolts

- Cylinder head bolts are tightened by plastic zone tightening method. Whenever the size difference between d1 and d2 exceeds the limit, replace the bolts with new ones.

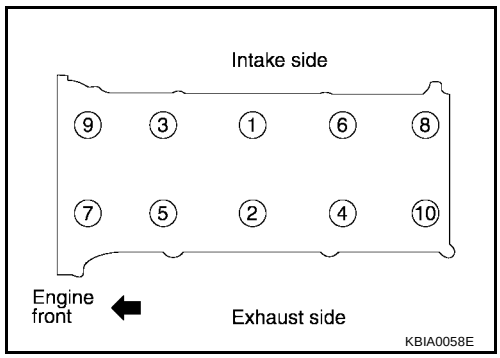
  Limit (d1 - d2) : 0.23 mm (0.0091 in) or less

- If reduction of outer diameter appears in a position other than d2, use it as d2 point.



INSTALLATION

1. Install a new cylinder head gasket.
2. Tighten the cylinder head bolts in six steps in the order shown.



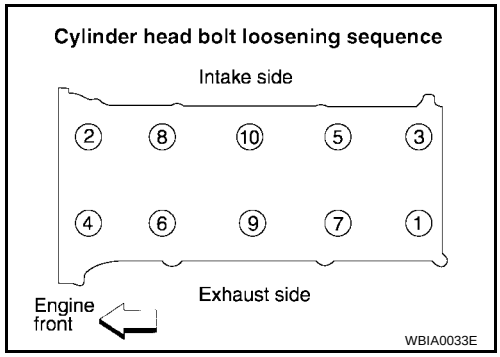
CAUTION:

- **If cylinder head bolts are re-used, check their outer diameters before installation. Refer to EM-150, "Outer Diameter of Cylinder Head Bolts" .**

NOTE:
Apply new engine oil to the threads and the seating surfaces of cylinder head bolts.

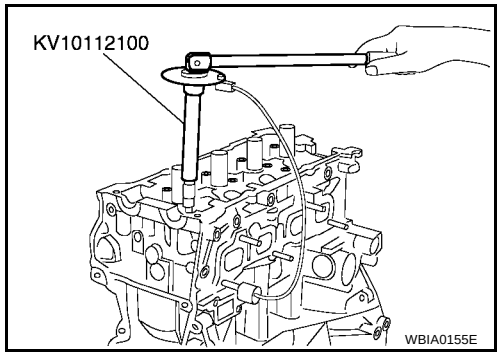
Cylinder head bolts

Step 1	**: 50.0 N·m (5.1 kg-m, 37 ft-lb)**
Step 2	**: 60° clockwise**
Step 3	**: 0 N·m (0 kg-m, 0 ft-lb) (loosen)**
Step 4	**: 34.3 - 44.1 N·m (3.5 - 4.4 kg-m, 26 - 32 ft-lb)**
Step 5	**: 75° - 80° (target: 75°) clockwise**
Step 6	**: 75° - 80° (target: 75°) clockwise**



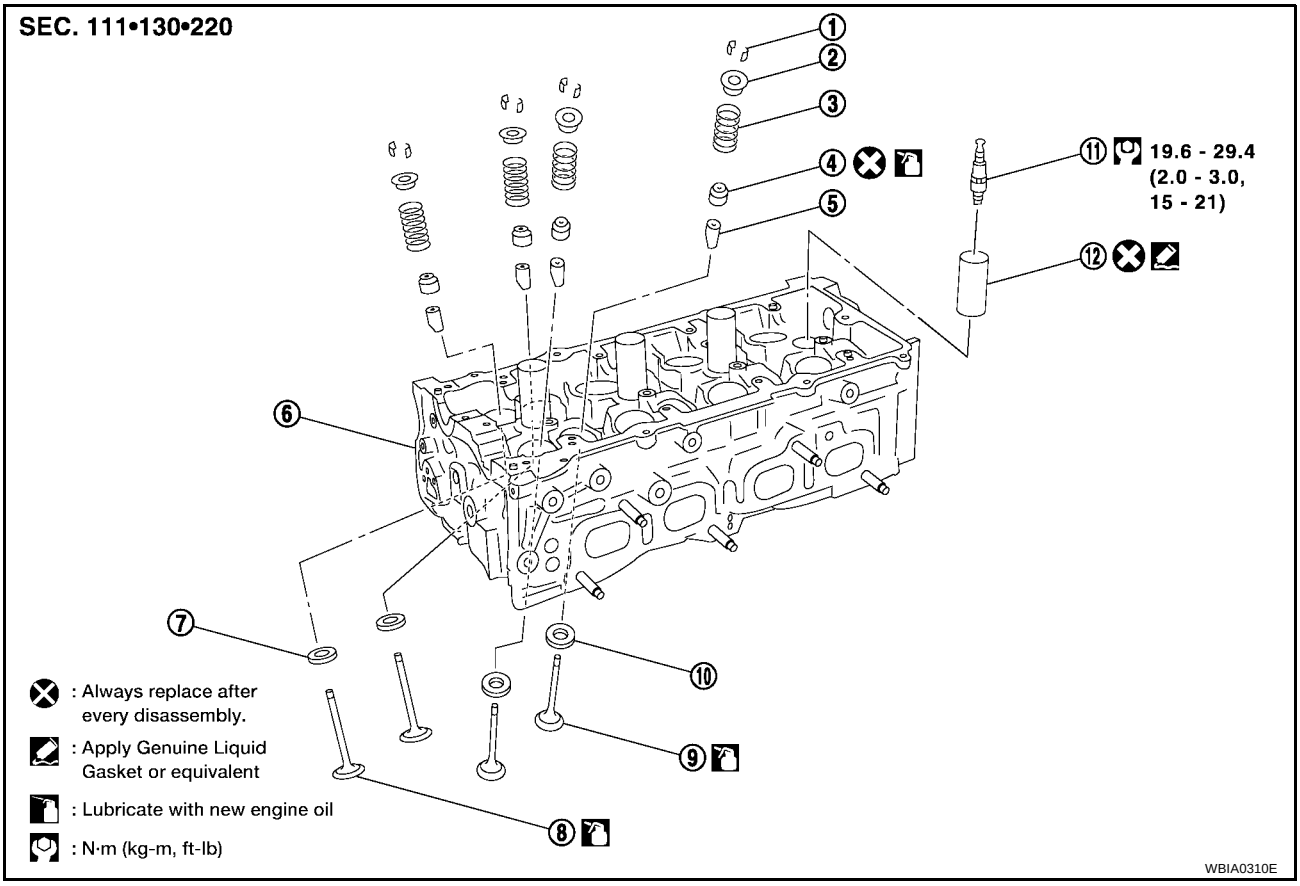
CAUTION:
Check and confirm the tightening angle by using an angle wrench or protractor. Avoid judgement by visual inspection without the tool.

3. Installation of the remaining components is in reverse order of removal.



Disassembly and Assembly

EBS00CG4



1. Valve collet
2. Valve spring retainer
3. Valve spring (with valve spring seat)
4. Valve oil seal
5. Valve guide
6. Cylinder head
7. Valve seat (INT)
8. Valve (INT)
9. Valve (EXH)
10. Valve seat (EXH)
11. Spark plug
12. Spark plug tube

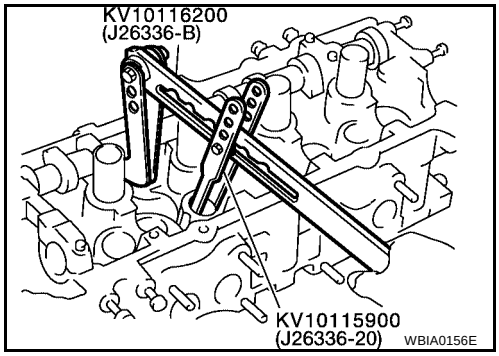
CAUTION:

- **When installing camshafts, chain tensioners, oil seals or other sliding parts, lubricate contacting surfaces with new engine oil.**
- **Apply new engine oil to threads and seat surfaces when installing the cylinder head, camshaft sprocket, crankshaft pulley and camshaft bracket.**
- **Attach tags to valve lifters so all parts are assembled in their original position.**

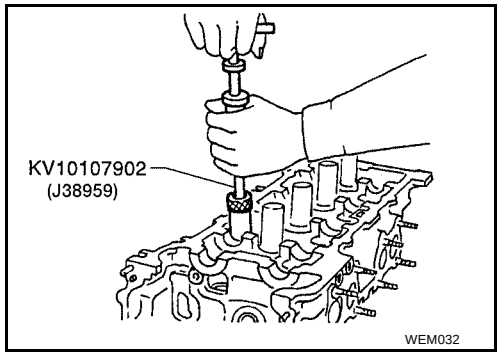
DISASSEMBLY

1. Remove the valve collet using Tool.
   - Compress valve spring with Tool. Remove valve collet with magnet driver.
2. Remove valve spring retainer and valve spring.

   CAUTION:
   Do not remove valve spring seat from valve spring.
3. Push valve stem to combustion chamber side, and remove valve.
   - Inspect valve guide clearance before removal. Refer to EM-154, "VALVE GUIDE CLEARANCE" .
   - Note installation point.



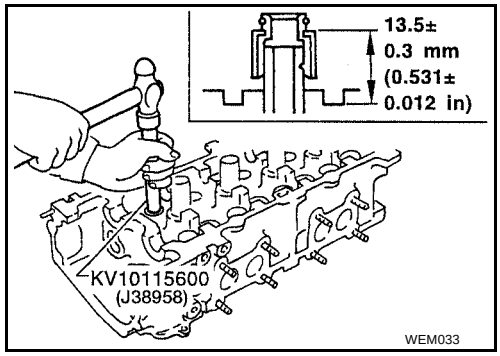
4. Remove valve oil seal using Tool.
5. When valve seat must be replaced, refer to EM-156, "VALVE SEAT REPLACEMENT" .
6. When valve guide must be replaced, refer to EM-155, "VALVE GUIDE REPLACEMENT" .
7. Remove spark plug with spark plug wrench.
8. Remove spark plug tube, if necessary using pliers.



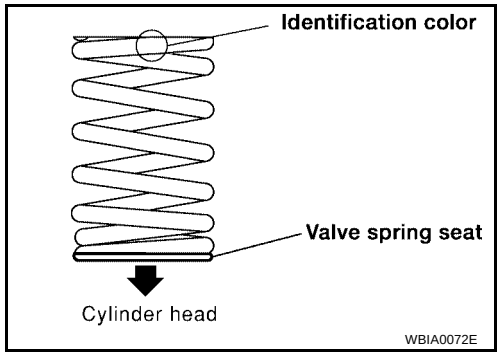
CAUTION:
- **Be careful not to damage cylinder head.**
- **Do not remove spark plug tube if not necessary. Once removed, the spark plug tube cannot be reused because of deformation.**

ASSEMBLY

1. Install valve guide. Refer to EM-155, "VALVE GUIDE REPLACEMENT" .
2. Install valve seat. Refer to EM-156, "VALVE SEAT REPLACEMENT" .
3. Install valve oil seal using Tool.
   - Install valve oil seal to specification shown.
4. Install valve.
   - Install larger diameter to intake side.



5. Install valve spring.
   - Install smaller pitch (valve spring seat side) to cylinder head side.
   - Note the identification color of the valve spring:
     Intake: blue
     Exhaust: yellow
6. Install valve spring retainer.
7. Install valve collet.
   - Compress valve spring with valve spring compressor. Install valve collet with magnet wand.
   - Tap stem edge lightly with plastic hammer after installation to check its installed condition.

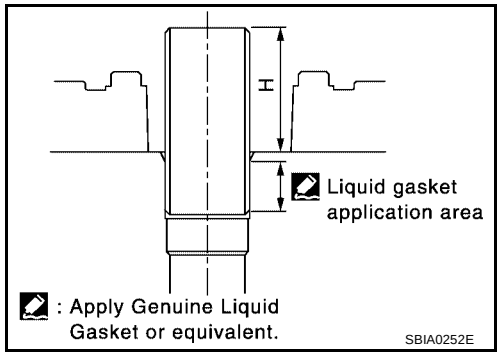


8. Install spark plug tube.

a. Remove old liquid gasket from cylinder head side mounting hole.

b. Apply liquid gasket all around on spark plug tube with a 12 mm (0.47 in) width from edge of spark plug tube on the press fit side.
   - Use Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .

c. Press fit spark plug tube so that height is to "H" as shown.



Press fit height "H" standard value	**: 38.55 - 38.65 mm (1.518 - 1.522 in)**

CAUTION:
- **When press fitting be careful not to deform spark plug tube.**
- **After press fitting, wipe off any protruding liquid gasket on top surface of cylinder head.**

9. Install spark plug.

Inspection After Disassembly

EBS00CG5

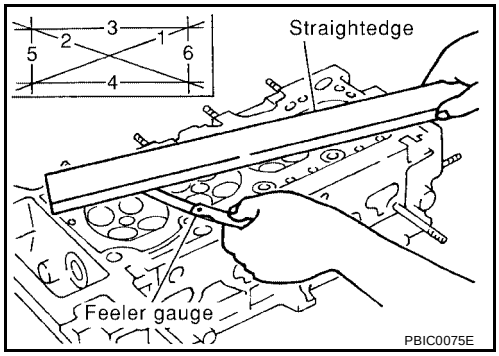
CYLINDER HEAD DISTORTION

1. Wipe off oil and remove water scale deposits, old gasket, old sealer, and carbon with a scraper.

   CAUTION:
   Use care not to allow gasket debris to enter passages for oil or water.

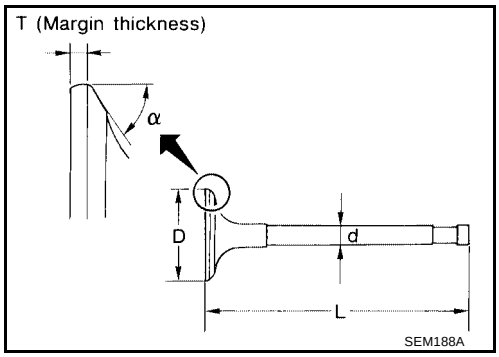
2. At each of several locations on bottom surface of cylinder head, measure distortion in six directions.

   Standard : 0.1 mm (0.004 in) or less



VALVE DIMENSIONS

Check dimensions of each valve. Refer to EM-190, "VALVE" .



VALVE GUIDE CLEARANCE

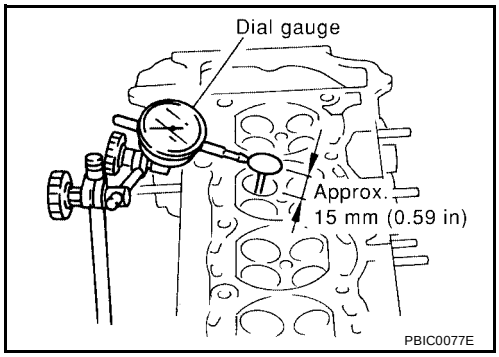
Perform this inspection before removing the valve guide.

1. Make sure that the valve stem diameter is within the specification.
2. Push the valve out by approximately 15 mm (0.59 in) toward the combustion chamber side to measure the valve's run-out volume (in the direction of dial gauge) with dial gauge.
3. Half of the run-out volume accounts for the valve guide clearance.

Valve to guide clearance

Intake : 0.020 - 0.053 mm (0.0008 - 0.0021 in)

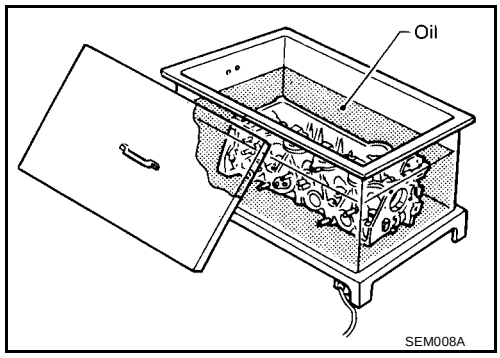
Exhaust : 0.030 - 0.063 mm (0.0012 - 0.0025 in)



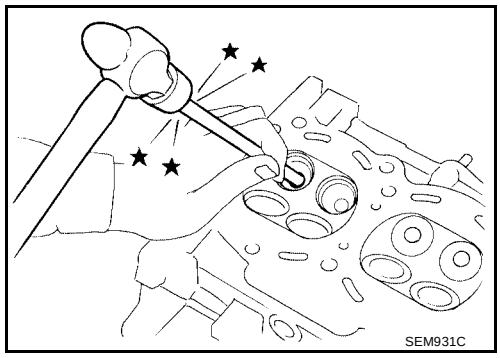
VALVE GUIDE REPLACEMENT

When valve guide is removed, replace with oversized (0.2 mm, 0.008 in) valve guide.

1. To remove valve guide, heat cylinder head to 110° - 130°C (230° - 266°F) by soaking in heated oil.



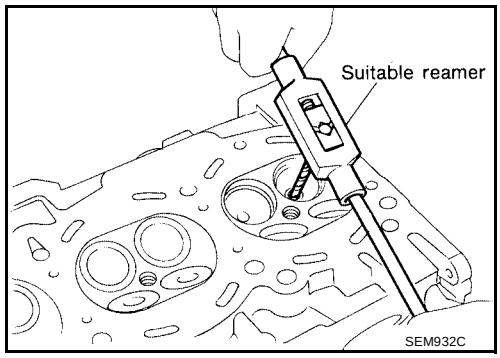
2. Drive out valve guide with a press [under a 20 kN (2.2 ton-force) pressure] or hammer and suitable tool.



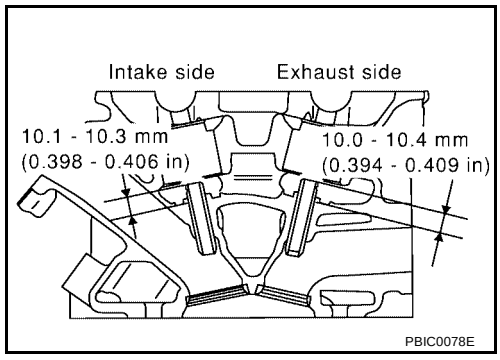
3. Ream cylinder head valve guide hole.

Valve guide hole diameter for intake and exhaust	**: 10.175 - 10.196 mm (0.4006 - 0.4014 in)**

4. Heat cylinder head to 110° - 130°C (230° - 266°F) by soaking in heated oil.

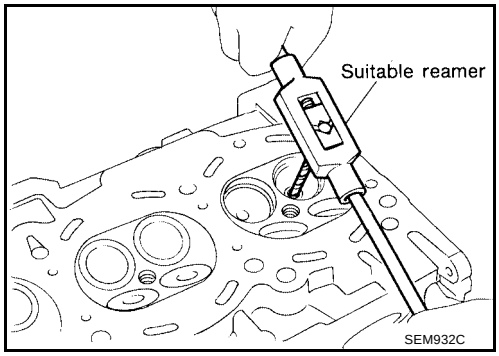


5. Press valve guide from camshaft side to dimensions as in illustration.



6. Using valve guide reamer, apply reamer finish to valve guide.

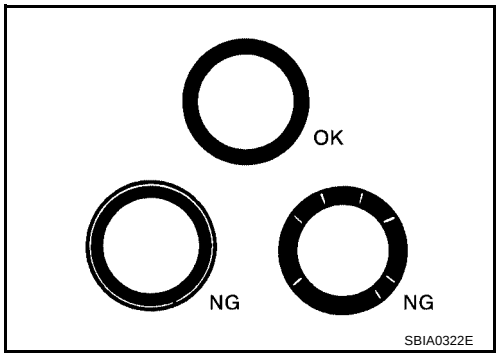
Intake and exhaust : 6.000 - 6.018 mm (0.2362 - 0.2369 in)



VALVE SEAT CONTACT

After confirming that the dimensions of valve guides and valves are within specifications, perform this procedure:

- Apply prussian blue (or white lead) onto contacting surface of valve seat to check the condition of the valve contact on the seat surface.
- Check if the contact area band is continuous all around the circumference.
- If not, grind to adjust valve fitting and check again. If the contacting surface still has NG conditions even after the re-check, replace the valve seat.



VALVE SEAT REPLACEMENT

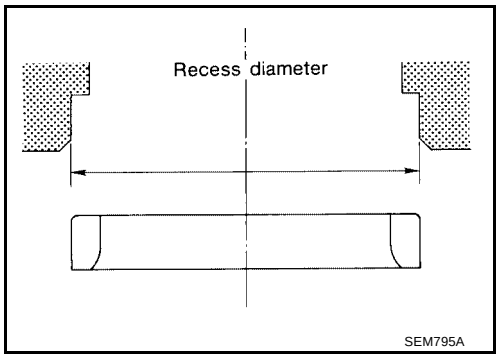
When valve seat is removed, replace with an oversized [0.5 mm, (0.020 in)] valve seat.

1. Bore out old seat until it collapses. Boring should not continue beyond the bottom face of the seat recess in the cylinder head. Set the machine depth stop to ensure this.
2. Ream cylinder head recess diameter for service valve seat.

Intake : 37.000 - 37.016 mm (1.4567 - 1.4573 in)

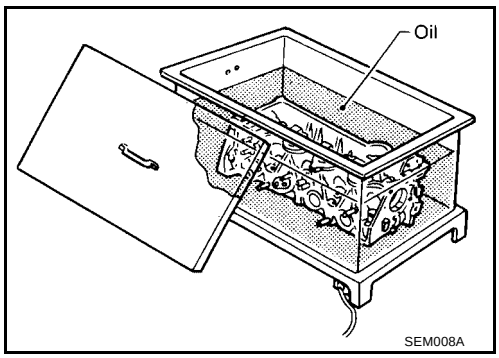
Exhaust : 32.000 - 32.016 mm (1.2598 - 1.2605 in)

- Be sure to ream in circles concentric to the valve guide center. This will enable the valve seat to fit correctly.

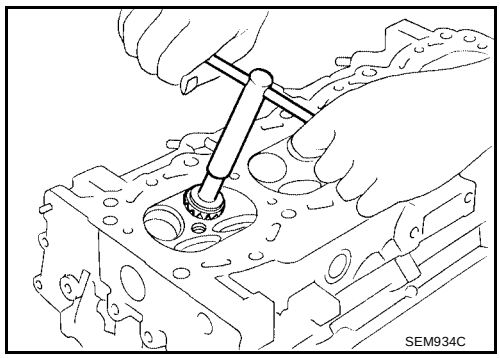


3. Heat cylinder head to 110° - 130°C (230° - 266°F) by soaking in heated oil.
4. Provide valve seats cooled well with dry ice. Force fit valve seat into cylinder head.

CAUTION:
Avoid directly touching the cold valve seats.

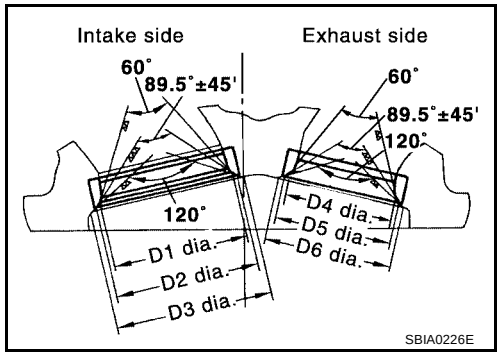


5. Using a valve seat cutter set or a valve seat grinder, finish the seat to the specified dimensions.



CAUTION:
When using valve seat cutter, firmly grip the cutter handle with both hands. Then, press on the contacting surface all around the circumference to cut in a single drive. Improper pressure on the cutter or cutting many different times may result in a defective valve seat.

Grind to obtain the dimensions indicated as shown.



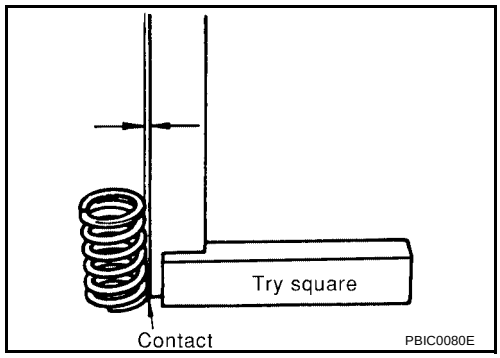
Standard

D1 dia.	**: 33.5 mm (1.3189 in)**
D2 dia.	**: 35.1 - 35.3 mm (1.382 - 1.390 in)**
D3 dia.	**: 39.0 - 39.2 mm (1.535 - 1.543 in)**
D4 dia.	**: 28 mm (1.10 in)**
D5 dia.	**: 29.9 - 30.1 mm (1.177- 1.185 in)**
D6 dia.	**: 33.5 - 33.7 mm (1.319 - 1.327 in)**

6. Using compound, grind to adjust valve fitting.
7. Check again for normal contact.

VALVE SPRING SQUARENESS

Set try square along the side of the valve spring and rotate the spring. Measure the maximum clearance between the top face of the spring and the try square.

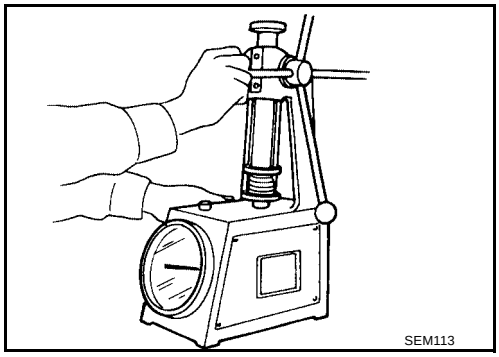


Limit : 1.9 mm (0.0748 in)

VALVE SPRING DIMENSIONS AND VALVE SPRING PRESSURE LOAD

Check valve spring pressure with valve spring seat installed at specified spring height. Replace if not within specifications.

CAUTION:
Do not remove the valve spring seat.



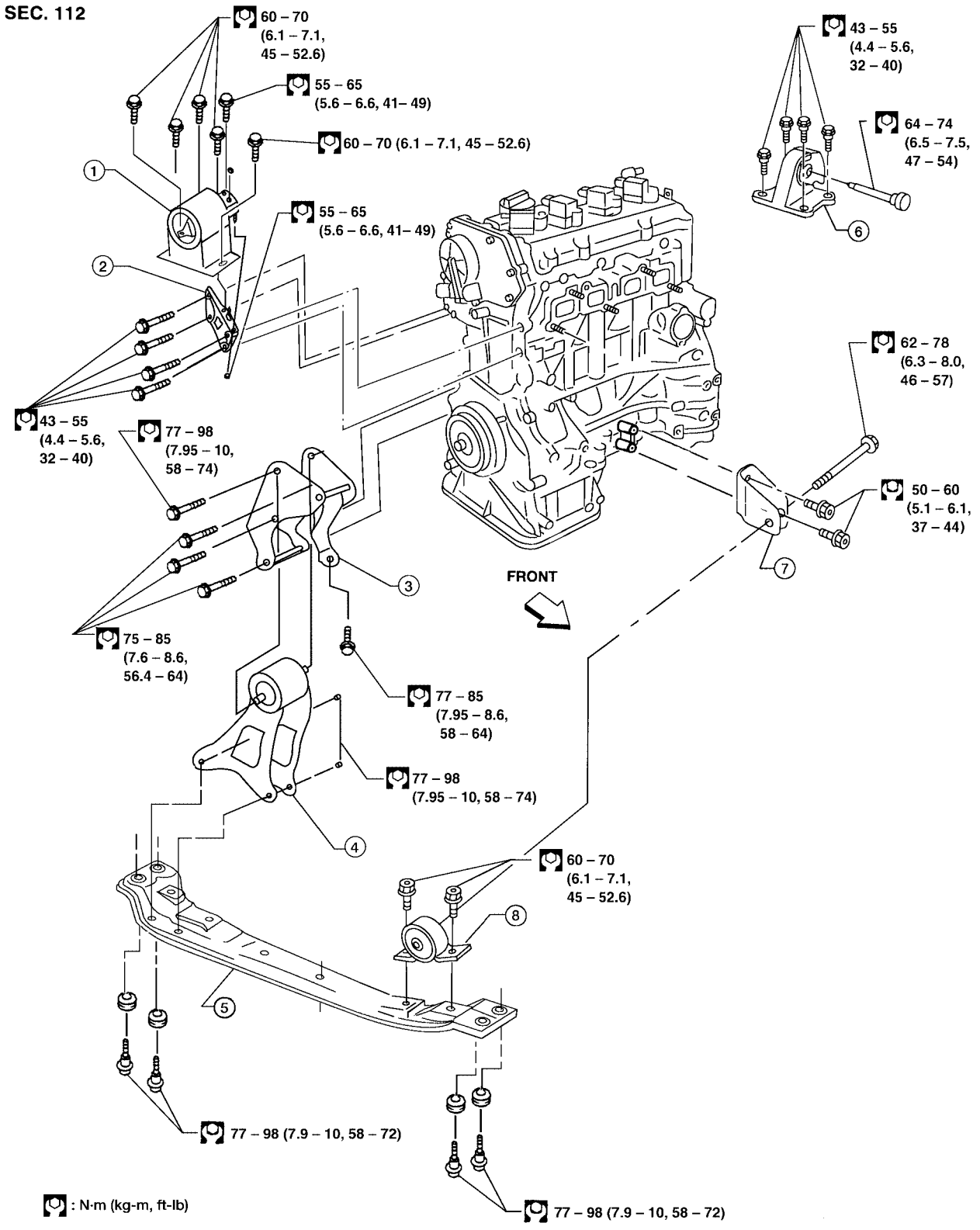
STANDARD	INTAKE (identification color: blue)	EXHAUST (identification color: yellow)
Free height	44.84 - 45.34 mm (1.7654 - 1.7850 in)	45.28 - 45.78 mm (1.7827 - 1.8024 in)
Installation height	35.30 mm (1.390 in)	35.30 mm (1.390 in)
Installation load	151 - 175 N (15.4 - 17.8 kg-force, 34 - 39 lb-force)	151 - 175 N (15.4 - 17.8 kg-force, 34 - 39 lb-force)
Height during valve open	24.94 mm (0.9819 in)	26.39 mm (1.0390 in)
Load with valve open	358 - 408 N (36.5 - 41.6 kg-force, 80 - 92 lb-force)	325 - 371 N (33.1 - 37.8 kg-force, 73 - 83 lb-force)

ENGINE ASSEMBLY

PFP:10001

Removal and Installation

EBS00CG6



1. RH engine mount insulator
2. RH engine mounting bracket
3. Rear engine mounting bracket
4. Rear engine mount insulator
5. Center member
6. LH engine mount insulator
7. Front engine mount bracket
8. Front engine mounting insulator

WARNING:

- **Place chocks at the front and back of the rear wheels.**
- **For engines not equipped with slingers, attach proper slingers and bolts as described in the Parts Catalog.**

CAUTION:

- **Do not start working until the exhaust system and coolant are cool.**
- **If items or work required are not covered by the engine main body section, refer to the applicable sections.**
- **Use the correct supporting points for lifting and jacking. Refer to GI-39, "LIFTING POINT" .**
- **In removing the drive shaft, be careful not to damage the grease seals on the transaxle.**
- **Before separating the engine and transaxle, remove the crankshaft position sensor (POS) from the assembly.**
- **Be sure not to damage the edge of the crankshaft position sensor (POS) or the ring gear teeth.**

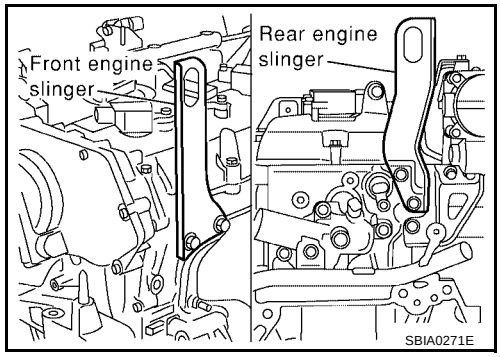
REMOVAL

1. Release fuel pressure. Refer to EC-751, "FUEL PRESSURE RELEASE" .
2. Remove engine cover using power tool.
3. Disconnect the fuel rail at the fuel hose quick connector (engine side). Refer to EM-108, "INTAKE MANIFOLD" .
4. Drain the engine oil. Refer to MA-27, "Changing Oil Filter" .
5. Drain the engine coolant. Refer to MA-23, "DRAINING ENGINE COOLANT" .
6. Remove the engine hood assembly. Refer to EI-13, "Removal and Installation" .
7. Remove the battery, battery hold downs, and battery tray. Refer to SC-4, "BATTERY" .
8. Disconnect the mass air flow sensor electrical connector.
9. Remove the air duct and air cleaner case assembly. Refer to EM-106, "Removal and Installation" .
10. Disconnect the heater hoses.
11. Remove the radiator and radiator fan assembly. Refer to CO-32, "Removal and Installation" .
12. Remove the generator. Refer to SC-32, "Removal" .
13. Remove the left and right drive shafts. Refer to FAX-14, "Removal" .
14. Remove the engine undercover.
15. Dismount the A/C compressor with piping connected and secure with wire to the radiator support.
16. Disconnect the transaxle shift control cables.
17. Disconnect the brake power booster vacuum hose.
18. Disconnect the following engine compartment electrical harness connectors:
    - Heated oxygen sensor 1 (ULEV only) or Air fuel ratio (A/F) sensor 1 (SULEV only)
    - Starter
    - Coolant temperature sensor
    - Camshaft position sensor (PHASE)
    - EVAP canister purge volume control solenoid
    - Backup lamp switch
    - Vehicle speed sensor
    - Electric throttle control actuator
    - Ignition coils
    - Fuel injector harness
    - Engine ground straps
    - Intake valve timing control solenoid
    - Transaxle sensors (A/T only)
    - Crankshaft position sensor (POS)
    - Knock sensor
    - Oil pressure switch
    - Power valve actuator

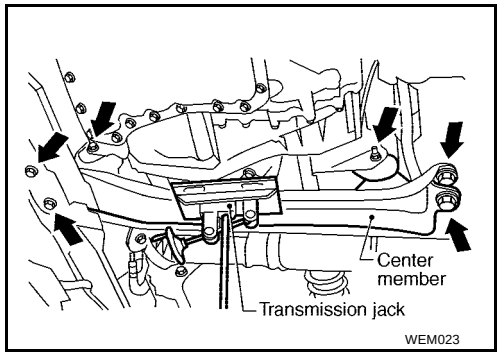
- Power steering pressure switch

19. Remove clutch operating cylinder from transaxle with line connected and position aside (M/T models).
20. Remove engine coolant reservoir tank.
21. Remove front exhaust tube. Refer to EX-3, "Removal and Installation" .
22. Dismount the power steering pump with piping connected and position it aside with wire.
23. Install engine slingers into front left cylinder head and rear right cylinder head.
    - Use generator bracket bolt holes for the front slinger.
    - Use the proper slingers and bolts as described in the Parts Catalog.

    Slinger bolts - front : 43.2 - 52.9 N·m (4.4 - 5.3 kg-m, 32- 39 ft-lb)
    Slinger bolts - rear : 24.5 - 31.4 N·m (2.5 - 3.2 kg-m, 18 - 23 ft-lb)

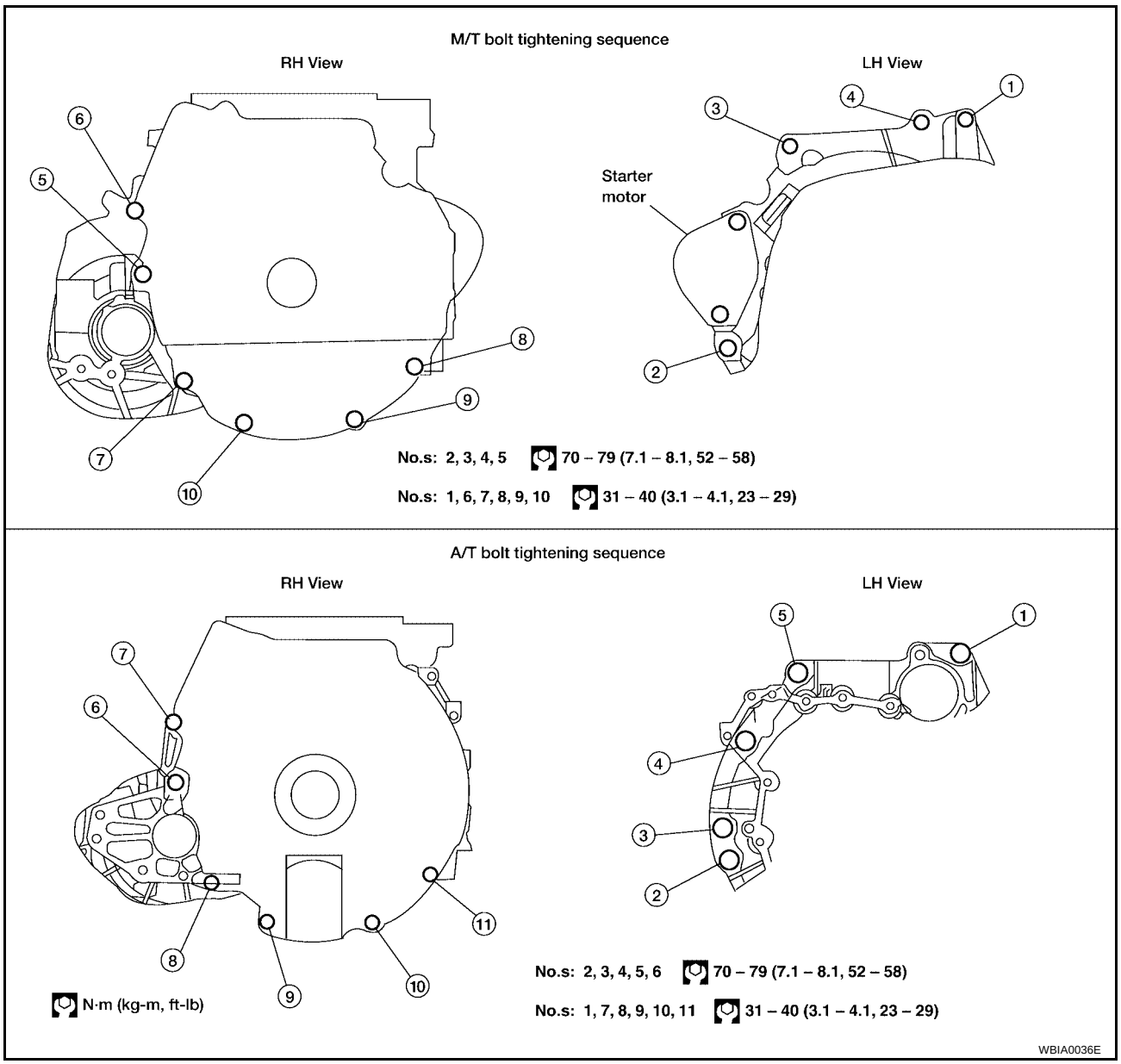


24. Support the engine/transaxle assembly with engine lifting equipment from the top with the vehicle raised on a hoist.
25. Remove the center member.
    - Remove front and rear engine mounting insulator through-bolt and the center member bolts.
26. Remove RH engine mounting insulator.
27. Remove LH transaxle mounting insulator through-bolts.
28. Lower the engine/transaxle assembly from the engine compartment.
29. Remove the starter motor. Refer to SC-21, "Removal" .
30. Separate the engine and transaxle.



INSTALLATION

Installation is in the reverse order of removal.



- Do not allow oil to get on mounting insulators. Be careful not to damage mounting insulators.
- If parts have a direction mark (arrow) this indicates front of the vehicle, and the parts must be installed according to the identification mark.

INSPECTION AFTER INSTALLATION

- Before starting engine, check oil/fluid levels including engine coolant and engine oil. If less than required quantity, fill to the specified level. Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .
- Use procedure below to check for fuel leakage.
- Turn ignition switch ON (with engine stopped). With fuel pressure applied to fuel piping, check for fuel leakage at connection points.
- Start engine. With engine speed increased, check again for fuel leakage at connection points.
- Run engine to check for unusual noise and vibration.
- Warm up engine thoroughly to make sure there is no leakage of fuel, exhaust gas, or any oils/fluids including engine oil and engine coolant.
- Bleed air from passages in lines and hoses, such as in cooling system.

- After cooling down engine, again check oils/fluids including engine oil and engine coolant. Refill to specified level, if necessary.
- Summary of the inspection items:

Item	Before starting engine	Engine running	After engine stopped
Engine coolant	Level	Leakage	Level
Engine oil	Level	Leakage	Level
Other oils and fluids*	Level	Leakage	Level
Fuel	Leakage	Leakage	Leakage
Exhaust gas	—	Leakage	—

*Transmission/transaxle/CVT fluid, power steering fluid, brake fluid, etc.

CYLINDER BLOCK

PFP:11010

Disassembly and Assembly

EBS00CG7

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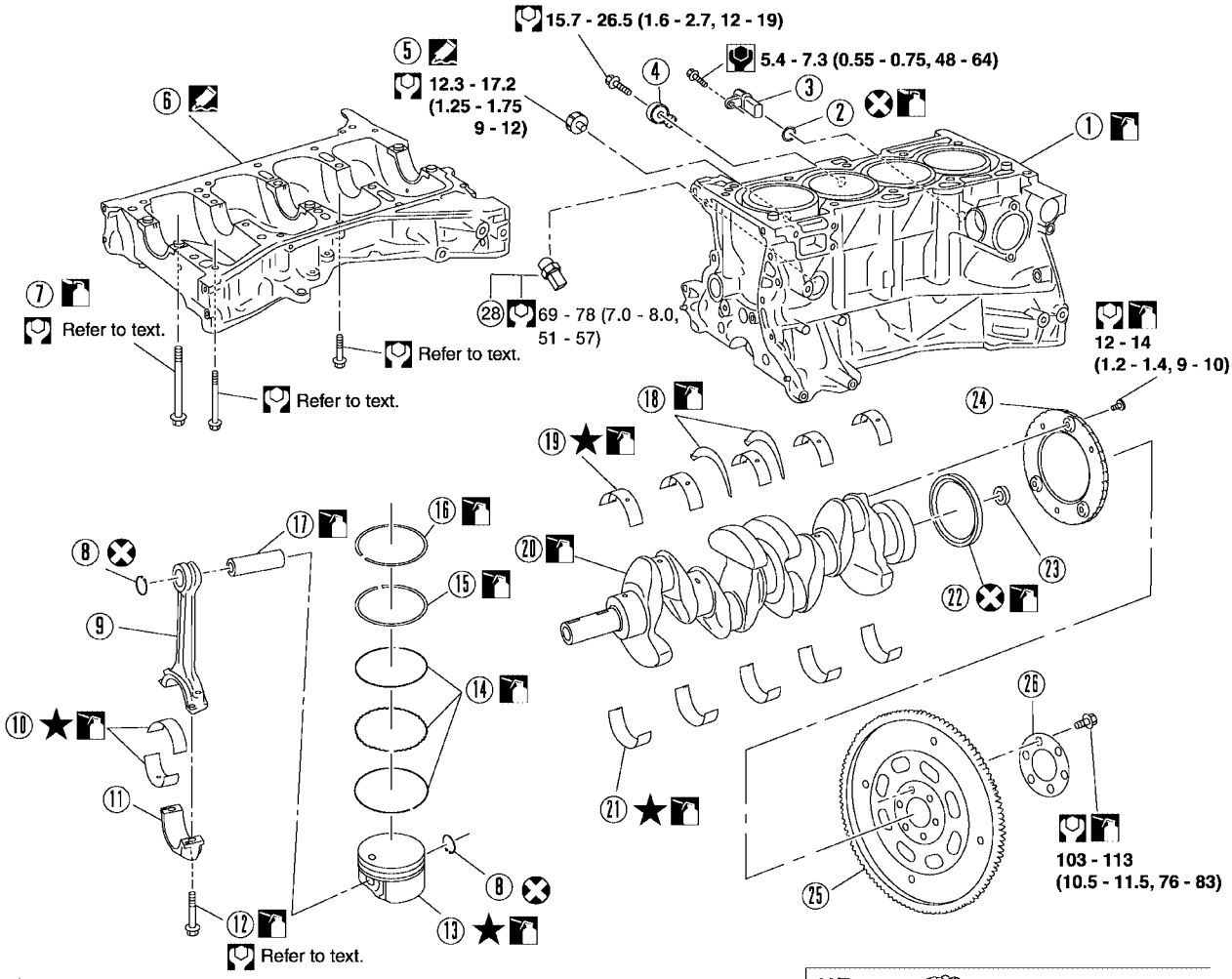


WBIA0073E

1. Cylinder block
2. O-ring
3. Crankshaft position sensor (POS)
4. Knock sensor
5. Oil pressure switch
6. Lower cylinder block
7. Lower cylinder block bolt
8. Snap ring
9. Connecting rod
10. Connecting rod bearing
11. Connecting rod bearing cap
12. Connecting rod bearing cap bolt
13. Piston
14. Oil ring
15. Second ring
16. Top ring
17. Piston pin
18. Main thrust bearing
19. Main bearing upper
20. Crankshaft
21. Main bearing lower
22. Crankshaft rear oil seal
23. Pilot converter (A/T only)
24. Crankshaft signal plate
25. Drive plate
26. Reinforcement plate
27. Flywheel
28. Cylinder block heater (if equipped)

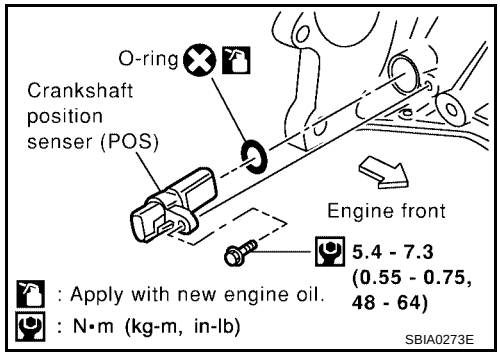
CAUTION:
Apply new engine oil to parts marked in illustration before installation.

DISASSEMBLY

1. Mount the engine on a suitable engine stand.
2. Drain any remaining engine oil and coolant from the engine.
3. Remove the following components and associated parts.
   - Exhaust manifold and three way catalyst assembly. Refer to EM-113, "Removal and Installation" .
   - Intake manifold collector. Refer to EM-108, "Removal and Installation" .
   - Intake manifold and fuel tube assembly. Refer to EM-108, "Removal and Installation" .
   - Ignition coils. Refer to EM-118, "Removal and Installation" .
   - Rocker cover. Refer to EM-124, "Removal and Installation" .
   - Front cover, timing chain, and balancer unit. Refer to EM-136, "Removal and Installation" .
   - Cylinder head. Refer to EM-149, "Removal and Installation" .
   - Water pump. Refer to CO-28, "Removal and Installation" .
4. Remove the cylinder block heater, if equipped.
5. Remove the knock sensor.

   CAUTION:
   Carefully handle the sensor and do not drop the sensor.
6. Remove crankshaft position sensor (POS).

   CAUTION:
   - **Avoid impacts such as a dropping.**
   - **Do not disassemble.**
   - **Keep it away from metal particles.**
   - **Do not place sensor close to magnetic materials.**

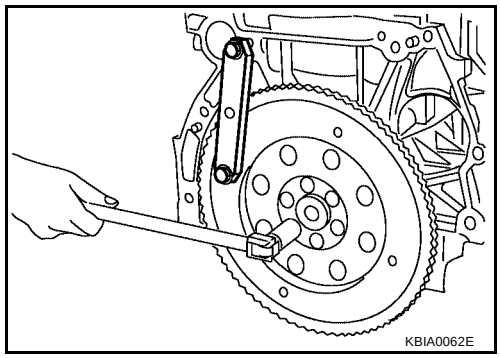


7. Remove the flywheel (M/T models) or drive plate (A/T models). Hold the crankshaft with a stopper plate and remove the mounting bolts using Tool.

   Tool numbers

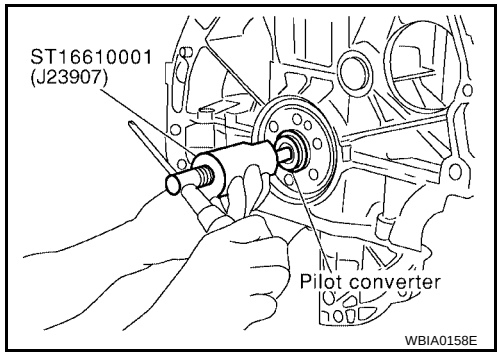
   For Flywheel bolt : J-45737

   For Drive plate bolt : J-45816

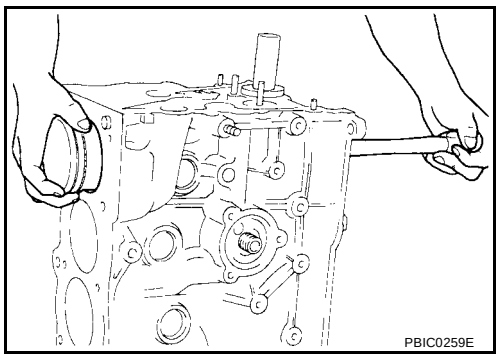


   CAUTION:
   - **Be careful not to damage the flywheel contact surface for the clutch disc.**

   NOTE:
   - The flywheel two-block construction allows movement in response to transmission side pressure, or when twisted in its rotational direction, therefore, some amount of noise is normal.
8. Remove pilot converter using Tool (A/T models).



9. Remove the piston and connecting rod assemblies.

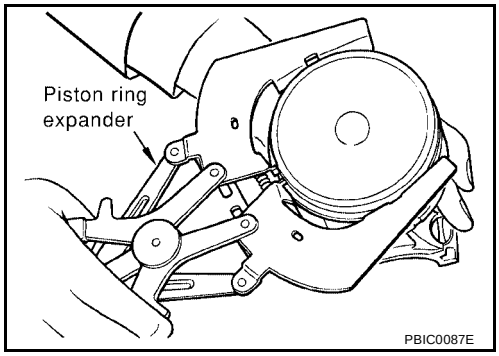


a. Position the crankshaft and corresponding connecting rod, to be removed, to the bottom dead center stroke.
b. Remove the connecting rod cap. Number the cap so it can be assembled in the same position.
c. Using a hammer handle or similar tool, push the piston and connecting rod assembly out of the top of the cylinder block. Number the piston and rod so it can be assembled in the same position.
   - Before removing the piston and connecting rod assembly, check the connecting rod side clearance. Refer to EM-180, "CONNECTING ROD SIDE CLEARANCE" .

10. Remove the connecting rod bearings. If reusing, number them so they can be assembled in the same position and direction.

CAUTION:
- **When removing them, note the installation position. Keep them in the correct order.**

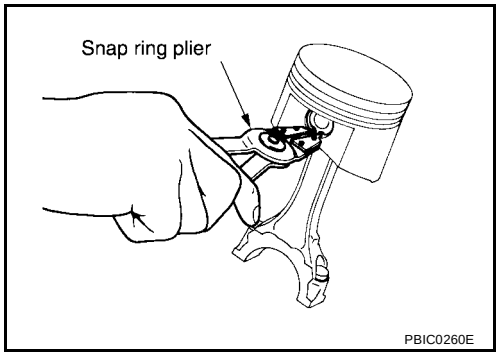
11. Remove the piston rings from the piston.
   - Use a piston ring expander.
   - Before removing the piston rings, check the piston ring side clearance. Refer to EM-181, "PISTON RING SIDE CLEARANCE" .



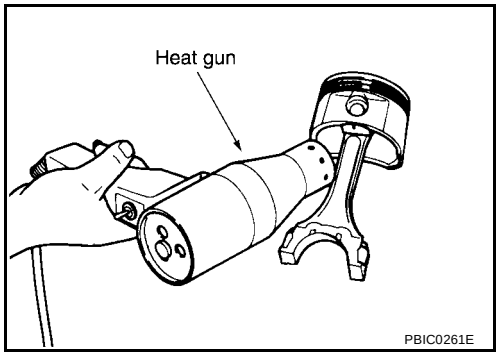
CAUTION:
- **When removing the piston rings, be careful not to damage the piston.**
- **Be careful not to damage piston rings by expanding them excessively, if reusing them.**

12. Remove the piston from the connecting rod as follows:

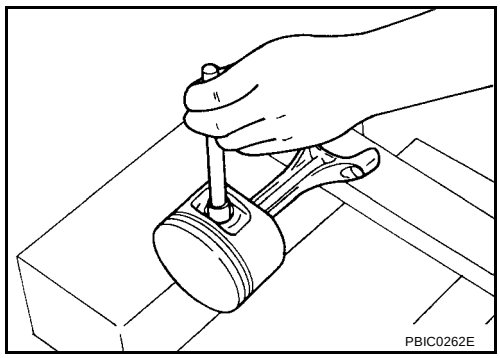
a. Using a snap ring pliers, remove the two snap rings.



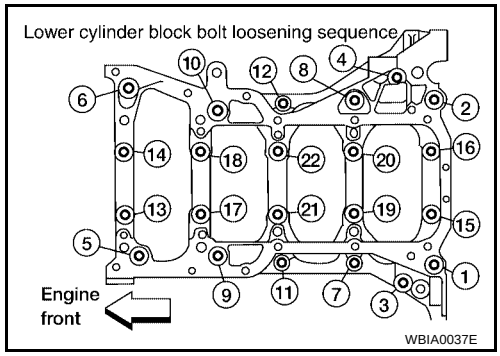
b. Heat the piston to 60° - 70°C (140° - 158°F) with a heat gun, or equivalent.



c. Push out piston pin with a punch of an outer diameter of approximately 19 mm (0.75 in).



13. Remove the lower cylinder block bolts.
    - Before loosening the lower cylinder block bolts, measure the crankshaft side clearance. Refer to EM-179, "CRANKSHAFT SIDE CLEARANCE" .
    - Loosen them in the order shown to remove them.



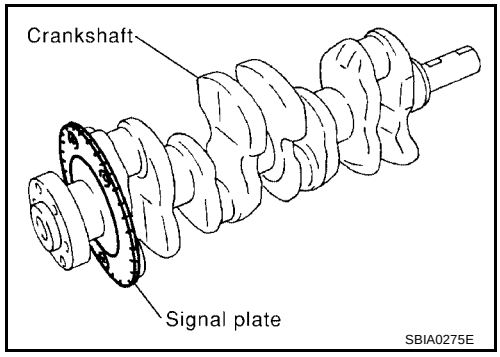
14. Remove the lower cylinder block.
    - Using Tool cut the Silicone RTV Sealant and remove the lower cylinder block from the cylinder block.

    Tool number : KV10111100 (J-37228)

    CAUTION:
    Be careful not to damage the mounting surface.

15. Remove the crankshaft.

    CAUTION:
    - **Do not damage or deform the signal plate while mounted on the crankshaft.**
    - **When setting the crankshaft on a flat surface, use a block of wood to avoid interference between the signal plate and the surface.**
    - **Do not remove signal plate unless it is necessary.**



16. Pull the rear oil seal out of the rear end of the crankshaft using suitable tool.

    CAUTION:
    Do not to damage the crankshaft or cylinder block when removing the rear oil seal.

    NOTE:
    When replacing the rear oil seal without removing the cylinder block, use a screwdriver to pull it out from between crankshaft and block.

17. Remove the main bearings and thrust bearings from the cylinder block and lower cylinder block.

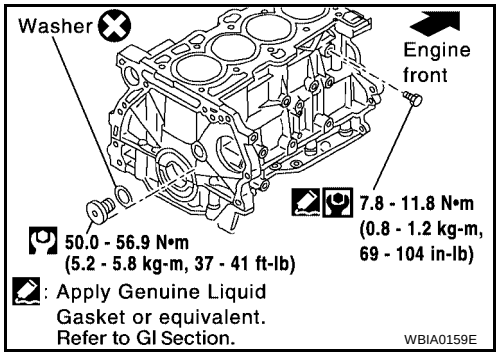
    CAUTION:
    Identify and number the bearings, if reusing them, so that they are assembled in the same position and direction.

ASSEMBLY

1. Using compressed air, clean out the coolant and oil passages in the cylinder block, the cylinder bore and the crankcase to remove any foreign material.

    CAUTION:
    Use approved safety glasses to protect your eyes.

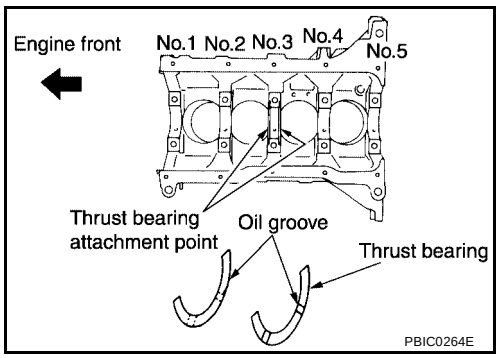
2. Apply Silicone RTV Sealant to the drain plugs. Install the drain plugs on the cylinder block.
   - Use Genuine Silicone RTV Sealant, or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .
   - Replace the copper washers with new ones.



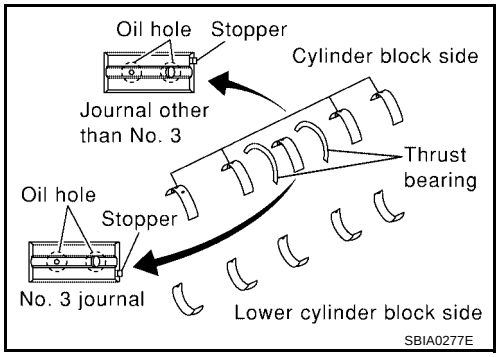
3. Install the main bearings and the thrust bearings.

a. Remove dust, dirt, and oil from the bearing mating surfaces of the cylinder block and lower cylinder block.

b. Install the thrust bearings to both sides of the No. 3 main bearing journal on the cylinder block.
   - Install the thrust bearings with the oil groove facing the crankshaft arm (outside).



c. Install the main bearings paying attention to their position and direction.
   - The main bearing with an oil hole and groove goes on the cylinder block. The one without them goes on the lower cylinder block.
   - Only the main bearing (on the cylinder block) for No. 3 journal has different specifications.
   - Before installing the bearings, apply engine oil to the bearing friction surface (inside). Do not apply oil to the back surface, but thoroughly clean it.
   - When installing, align the bearing stopper to the notch.
   - Make sure that the oil holes on the cylinder block and those on the corresponding bearing are aligned.



4. Install the signal plate to the crankshaft.

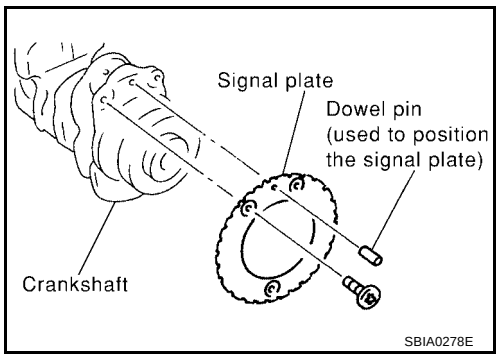
a. Position the crankshaft and signal plate using a positioning dowel pin, and tighten the signal plate bolts to specification.

Signal plate bolts	**: 12 - 14 N·m (1.22 - 1.43 kg-m, 9 - 10 ft-lb)**

b. Remove the dowel pin.

CAUTION:
Be sure to remove dowel pin before installing the crankshaft.

NOTE:
Dowel pins for the crankshaft and signal plate are supplied as a set for each.

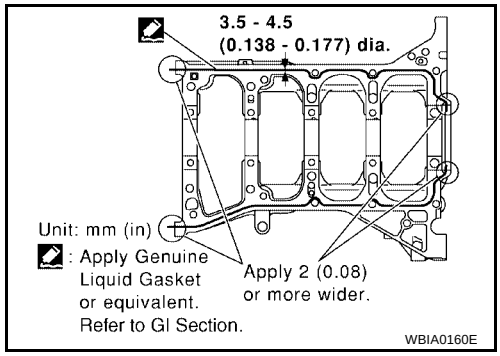


5. Install the crankshaft onto the cylinder block.
   - While turning the crankshaft by hand, check that it turns smoothly.

6. Apply Silicone RTV Sealant to positions shown and install the lower cylinder block.
   - Use Genuine Silicone RTV Sealant, or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .

   NOTE:
   Cylinder block and lower cylinder block are machined together. Neither of them can be replaced separately.

   CAUTION:
   After the Silicone RTV Sealant is applied, the lower cylinder block installation must be finished within 5 minutes.

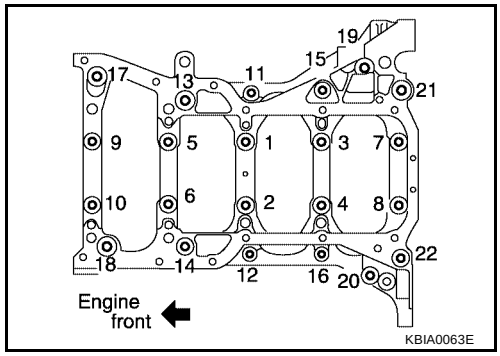


7. Tighten lower cylinder block bolts in three steps in the order shown.

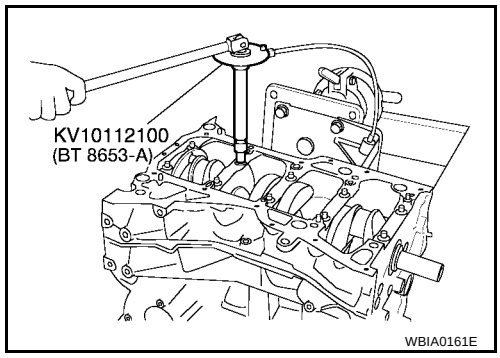
   NOTE:
   Apply new engine oil to threads and seat surfaces of the mounting bolts.

   Lower cylinder block bolts

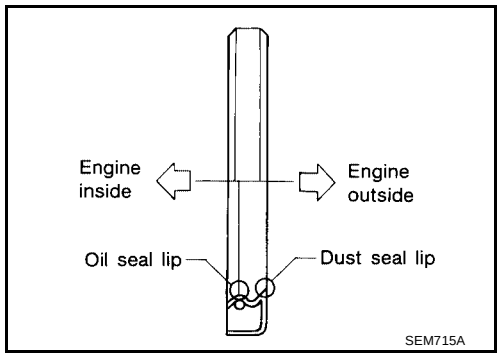
Step 1 (bolts 11 - 22)	**: 22.6 - 27.5 N·m (2.3 - 2.8 kg-m, 17 - 20 ft-lb)**
Step 2 (bolts 1 - 10)	**: 36.3 - 42.1 N·m (3.7 - 4.3 kg-m, 27 - 31 ft-lb)**
Step 3 (bolts 1 - 10)	**: 60° - 65° (target: 60°)**



   CAUTION:
   Use an angle wrench (special service tool) or protractor to check tightening angle. Do not tighten by visual inspection.
   - Wipe off completely any protruding Silicone RTV Sealant on the exterior of engine.
   - Check crankshaft side clearance. Refer to EM-179, "CRANKSHAFT SIDE CLEARANCE" .
   - After installing the mounting bolts, make sure that the crankshaft can be rotated smoothly by hand.



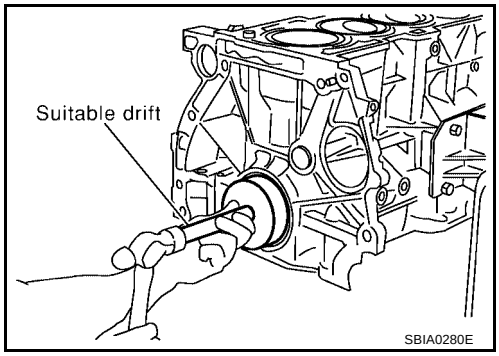
8. Apply new engine oil to new oil seal and install it using a suitable tool.
   - Install new oil seal in the direction shown.

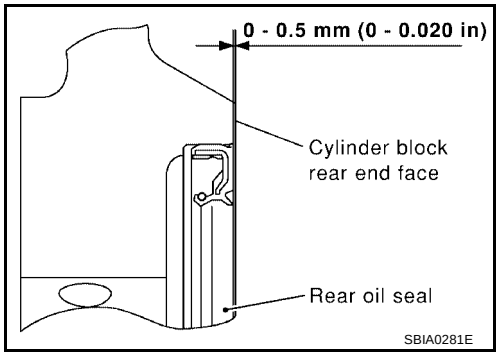


9. Install rear oil seal using a suitable drift.

CAUTION:

- **Do not touch grease applied onto oil seal lip.**
- **Be careful not to damage crankshaft and/or cylinder block.**
- **Press fit oil seal straight to avoid causing burrs or tilting.**





10. Install the piston to the connecting rod. Assemble the components in their original positions.

a. Using a snap ring pliers, install the snap ring into the grooves of the piston's rear side.

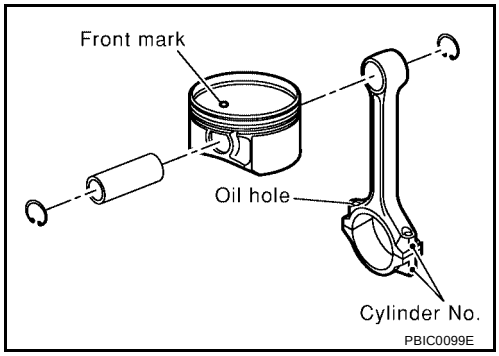
- Insert the piston pin snap ring fully into groove.

b. Install the piston to the connecting rod.

- Using a heat gun, heat the piston [approximately 60° - 70° C (140° - 158° F)] until the piston pin can be pushed in by hand without excessive force. From the front to the rear, insert the piston pin into the piston and the connecting rod.
- Assemble so that the front mark on the piston crown and the oil holes and the cylinder No. on the connecting rod are positioned as shown in the figure.

c. Install the piston pin snap ring into the front of the piston.

- Check that the connecting rod moves smoothly.



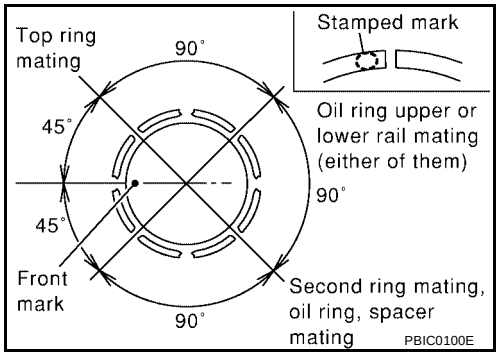
11. Using a piston ring expander, install the piston rings. Assemble the components in their original positions.

CAUTION:

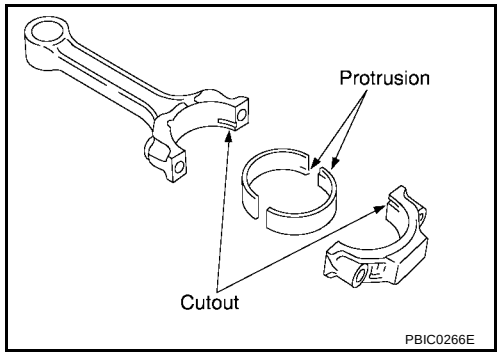
Be careful not to damage the piston.

- Position each ring with the gap as shown in the figure, referencing the piston front mark as the starting point.
- Install the top ring and the second ring with the stamped surface facing upward.

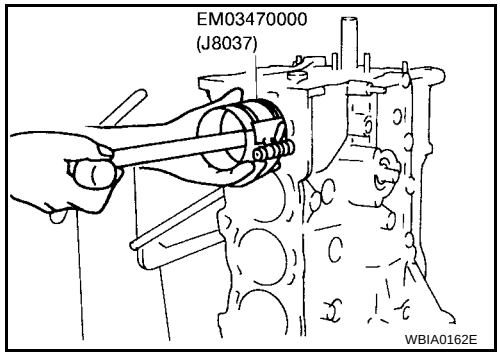
Stamped mark : A (top ring)
: 2A (second ring)



12. Install the connecting rod bearings to the connecting rod and the connecting rod cap. Assemble the components in their original positions.
    - When installing the connecting rod bearings, apply engine oil to the bearing friction surface (inside). Do not apply oil to the back surface, but thoroughly clean the back.
    - When installing, align the connecting rod bearing stopper protrusion with the notch of the connecting rod to install.
    - Check the oil holes on the connecting rod and those on the corresponding bearing are aligned.

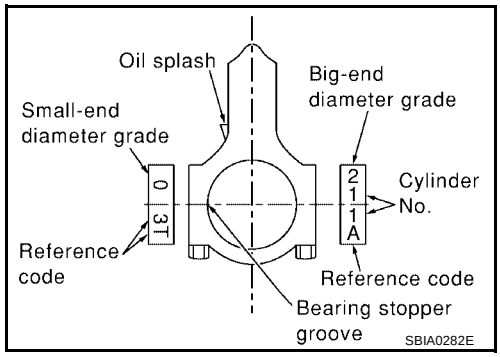


13. Install the piston and connecting rod assembly to the crankshaft. Assemble the components in their original positions.
    - Rotate the crankshaft so the pin corresponding to the connecting rod to be installed is at the bottom dead center position.
    - Apply engine oil sufficiently to the cylinder bore, piston, and crankshaft pin.
    - Match the cylinder position number with the cylinder No. on the connecting rod for installation.
    - Install the piston with the front mark on the piston crown facing the front of the engine using Tool.



CAUTION:
Be careful not to damage the crankshaft pin, resulting from an interference of the connecting rod big end.

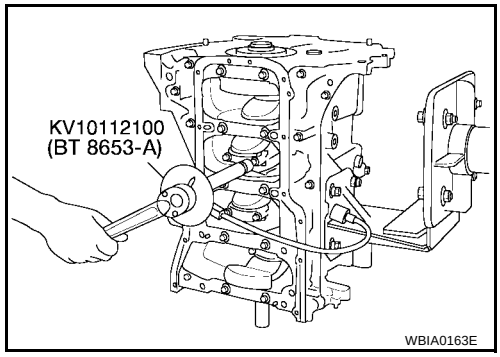
14. Install the connecting rod caps. Assemble the components in their original positions.
    - Match the stamped cylinder number marks on the connecting rod with those on the cap to install.



15. Tighten the connecting rod bolts using Tool in four steps as follows:
    - Apply engine oil to the threads and seats of the connecting rod bolts.

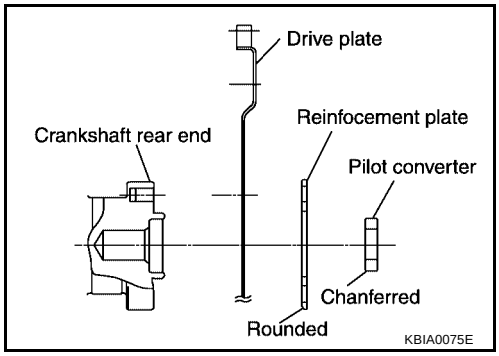
CAUTION:
Always use either an angle wrench or protractor. Avoid tightening based on visual check alone.

Step 1 : 18.6 - 20.6 N·m (1.9 - 2.1 kg-m, 14 - 15 ft-lb)
Step 2 : 85° - 95° (target 90° degrees)



    - Check the connecting rod side clearance. Refer to EM-180, "CONNECTING ROD SIDE CLEARANCE" .
    - After tightening the bolts, make sure that the crankshaft rotates smoothly.

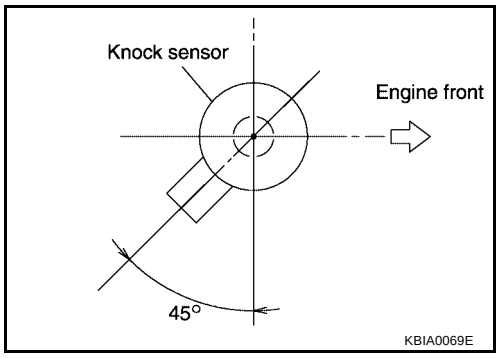
16. Install flywheel (M/T Models), or drive plate (A/T Models).
    - Install drive plate, reinforcement plate and pilot converter as shown in figure.
    - Using a drift with 33 mm (1.30 in) diameter, push pilot converter into the end of the crankshaft.



17. Install the cylinder block heater.

    Cylinder block heater : 69 - 78 N·m (7.0 - 8.0 kg-m, 51 - 57 ft-lb)

18. Install the knock sensor.
    - Make sure that there is no foreign material on the cylinder block mating surface and the back surface of the knock sensor.
    - Install the knock sensor with the connector facing lower left by 45° as shown.
    - Do not tighten the knock sensor bolt while holding the connector.
    - Make sure that the knock sensor does not interfere with other components.



    Knock sensor bolt : 15.7 - 26.5 N·m (1.6 - 2.7 kg-m, 12 - 19 ft-lb)

    CAUTION:
    If the knock sensor is dropped, replace it with new one.

19. Install the crankshaft position sensor (POS).

    Crankshaft position sensor bolt : 5.4 - 7.3 N·m (0.55 - 0.75 kg-m, 48 - 65 in-lb)

20. Installation of remaining components is in reverse order of removal.

How to Select Piston and Bearing

EBS00CG8

DESCRIPTION

Selection points	Selection parts	Selection items	Selection methods
Between cylinder block to crankshaft	Main bearing	Main bearing grade (bearing thickness)	Determined by match of cylinder block bearing housing grade (inner diameter of housing) and crankshaft journal grade (outer diameter of journal)
Between crankshaft to connecting rod	Connecting rod bearing	Connecting rod bearing grade (bearing thickness)	Combining service grades for connecting rod big end inner diameter and crankshaft pin outer diameter determine connecting rod bearing selection
Between cylinder block to piston	Piston and piston pin assembly (The piston is available together with piston pin as an assembly)	Piston grade (piston outer diameter)	Piston grade = cylinder bore grade (inner diameter of bore)
*Between piston to connecting rod	—	—	—

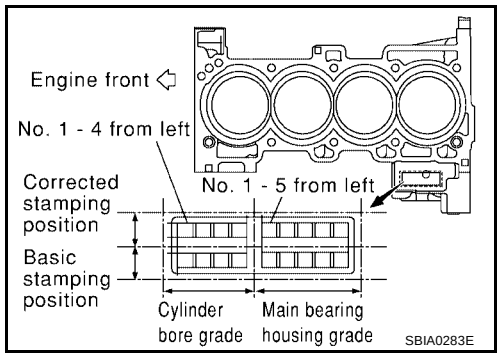
*For the service parts, the grade for fitting cannot be selected between a piston pin and a connecting rod. (Only 0 grade is available.) The information at the shipment from the plant is described as a reference.

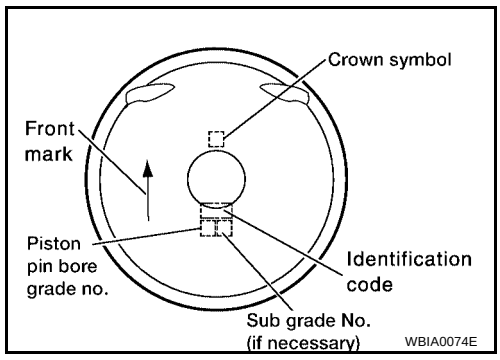
- The identification grade stamped on each part is the grade for the dimension measured in new condition. This grade cannot apply to reused parts.
- For reused or repaired parts, measure the dimension accurately. Determine the grade by comparing the measurement with the values of each selection table.
- For details of the measurement method of each part, the reuse standards, and the selection method of the selective fitting parts, refer to the text.

HOW TO SELECT A PISTON

When New Cylinder Block is Used:

- Check the cylinder bore grade on rear left side of cylinder block, and select a piston of the same grade.
- If there is a corrected stamp mark on the cylinder block, use it as a correct reference.





When a Cylinder Block is Reused:

1. Measure the cylinder block bore inner diameter.
2. Determine the bore grade by comparing the measurement with the values under the cylinder bore inner diameter of the "Piston Selection Table". Select the piston of the same grade.

Piston Selection Table

Unit: mm (in)

Grade number (Mark)	2 (or no mark)	3
Inner diameter of cylinder bore	89.010-89.020 (3.5043-3.5047)	89.020-89.030 (3.5047-3.5051)
Outer diameter of piston	88.990-89.000 (3.5035-3.5039)	89.000-89.010 (3.5039-3.5043)

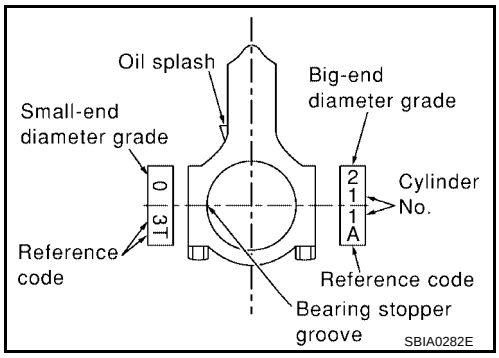
NOTE:

- The piston is available together with piston pin as an assembly.
- The piston pin (piston pin bore) grade is provided only for the parts installed at the plant. For service parts, no grades can be selected. Only 0 grade is available.

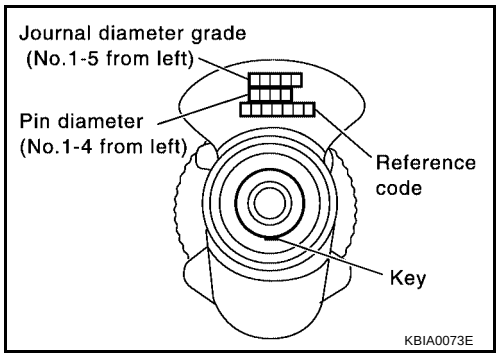
HOW TO SELECT A CONNECTING ROD BEARING

When New Connecting Rod and Crankshaft are Used:

1. Apply big end inside diameter grade stamped on connecting rod side face to the row in the "Connecting Rod Bearing Selection Table".



2. Apply pin diameter grade stamped on crankshaft front side to the column in the "Connecting Rod Bearing Selection Table".
3. Read the symbol at the cross point of selected row and column in the "Connecting Rod Bearing Selection Table".
4. Apply the symbol obtained to connecting rod bearing grade table to select.



When Crankshaft and Connecting Rod are Reused:

1. Measure dimensions of the big end inner diameter of connecting rod and outer diameter of crankshaft pin individually.
2. Apply the dimension measured to the "Connecting Rod Bearing Selection Table" below.

Connecting Rod Bearing Selection Table

Crankshaft pin outer diameter: Mark	Crankshaft pin outer diameter: Outer diameter Unit: mm (in)	Connecting rod big end. inner diameter: Mark: 0	1	2	3	4	5	6	7	8	9	A	B	C
	Connecting rod big end. inner diameter: Inner diameter Unit: mm (in)	48.000 – 48.001 (1.8898 – 1.8898)	48.001 – 48.002 (1.8898 – 1.8898)	48.002 – 48.003 (1.8898 – 1.8899)	48.003 – 48.004 (1.8899 – 1.8899)	48.004 – 48.005 (1.8899 – 1.8900)	48.005 – 48.006 (1.8900 – 1.8900)	48.006 – 48.007 (1.8900 – 1.8900)	48.007 – 48.008 (1.8900 – 1.8901)	48.008 – 48.009 (1.8901 – 1.8901)	48.009 – 48.010 (1.8901 – 1.8902)	48.010 – 48.011 (1.8902 – 1.8902)	48.011 – 48.012 (1.8902 – 1.8902)	48.012 – 48.013 (1.8902 – 1.8903)
A	44.974 – 44.973 (1.7706 – 1.7706)	0	0	0	0	0	0	0	0	1	1	1	1	1
B	44.973 – 44.972 (1.7706 – 1.7705)	0	0	0	0	0	0	0	1	1	1	1	1	1
C	44.972 – 44.971 (1.7705 – 1.7705)	0	0	0	0	0	0	1	1	1	1	1	1	1
D	44.971 – 44.970 (1.7705 – 1.7705)	0	0	0	0	0	1	1	1	1	1	1	1	1
E	44.970 – 44.969 (1.7705 – 1.7704)	0	0	0	0	1	1	1	1	1	1	1	1	2
F	44.969 – 44.968 (1.7704 – 1.7704)	0	0	0	1	1	1	1	1	1	1	1	2	2
G	44.968 – 44.967 (1.7704 – 1.7704)	0	0	1	1	1	1	1	1	1	1	2	2	2
H	44.967 – 44.966 (1.7704 – 1.7703)	0	1	1	1	1	1	1	1	1	2	2	2	2
J	44.966 – 44.965 (1.7703 – 1.7703)	1	1	1	1	1	1	1	1	2	2	2	2	2
K	44.965 – 44.964 (1.7703 – 1.7702)	1	1	1	1	1	1	1	2	2	2	2	2	2
L	44.964 – 44.963 (1.7702 – 1.7702)	1	1	1	1	1	1	2	2	2	2	2	2	2
M	44.963 – 44.962 (1.7702 – 1.7702)	1	1	1	1	1	2	2	2	2	2	2	2	2
N	44.962 – 44.961 (1.7702 – 1.7701)	1	1	1	1	2	2	2	2	2	2	2	2	3
P	44.961 – 44.960 (1.7701 – 1.7701)	1	1	1	2	2	2	2	2	2	2	2	3	3
R	44.960 – 44.959 (1.7701 – 1.7700)	1	1	2	2	2	2	2	2	2	2	3	3	3
S	44.959 – 44.958 (1.7700 – 1.7700)	1	2	2	2	2	2	2	2	2	3	3	3	3
T	44.958 – 44.957 (1.7700 – 1.7700)	2	2	2	2	2	2	2	2	3	3	3	3	3
U	44.957 – 44.956 (1.7700 – 1.7699)	2	2	2	2	2	2	2	3	3	3	3	3	3

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Connecting Rod Bearing Grade Table

Grade	0	1	2	3
Upper / Lower thickness mm (in)	1.499 / 1.495 (0.0590/0.0589)	1.503 / 1.499 (0.0592 / 0.0590)	1.507 / 1.503 (0.0593 / 0.0592)	1.511 / 1.507 (0.0595 / 0.0593)
Identification color	Black	Brown	Green	Yellow

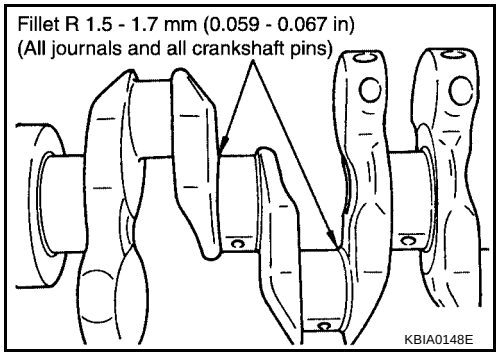
Undersize Bearing Usage Guide

- When the specified oil clearance is not obtained with standard size connecting rod bearing, use undersize (U.S.) bearing.
- When using undersize bearing, measure the bearing inner diameter with bearing installed, and grind the crankshaft pin so that the oil clearance satisfies the standard.

Bearing Undersize Table

Unit: mm (in)

Size U.S.	Thickness
0.25 (0.0098)	1.624 - 1.632 (0.0639 - 0.0643)

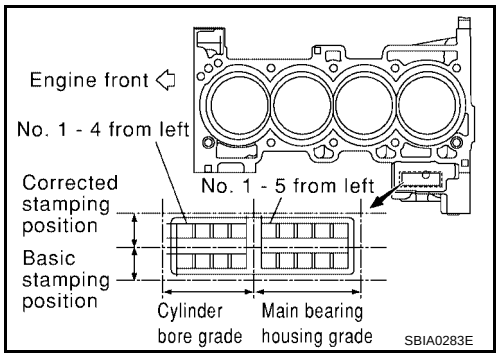


CAUTION:
In grinding the crankshaft pin to use undersize bearings, do not damage the fillet R (All crankshaft pins).

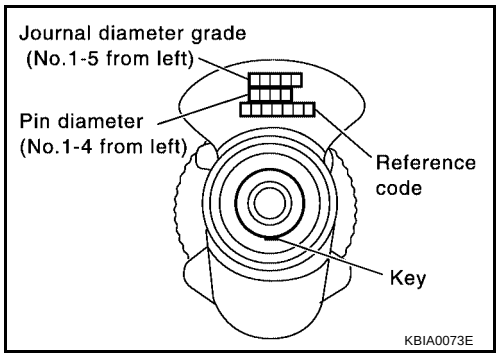
HOW TO SELECT A MAIN BEARING

When New Cylinder Block and Crankshaft are Used:

1. "Main Bearing Selection Table" rows correspond to bearing housing grade on rear left side of cylinder block.
   - If there is a corrected stamp mark on the cylinder block, use it as a correct reference.



2. Apply journal diameter grade stamped on crankshaft front side to column in "Main Bearing Selection Table".



3. Find value at crossing of row and column in "Main Bearing Selection Table".

   CAUTION:
   - **There are two main bearing selection tables. One is for odd-numbered journals (1, 3, and 5) and the other is for even-numbered journals (2 and 4). Make certain to use the appropriate table. This is due to differences in the specified clearances.**

4. Apply the symbol obtained to "Main Bearing Grade Table" to select.

   NOTE:
   - Service parts are available as a set of both upper and lower.

When Cylinder Block and Crankshaft are Reused:

1. Measure inner diameter of cylinder block main bearing housing and outer diameter of crankshaft journal.
2. Apply measurement in above step 1 to the "Main Bearing Selection Table".
3. Follow steps 3 and 4 in “When New Cylinder Block and Crankshaft are Used”.

Main Bearing Selection Table (No.1, 3, and 5 journals)

Crankshaft journal outer diameter: Mark	Crankshaft journal outer diameter: Outer diameter Unit: mm (in)	Cylinder block main bearing housing inner diameter: Mark	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W	X	Y	4	7
		Inner diameter Unit: mm (in)	58.944 – 58.945 (2.3206 – 2.3207)	58.945 – 58.946 (2.3207 – 2.3207)	58.946 – 58.947 (2.3207 – 2.3207)	58.947 – 58.948 (2.3207 – 2.3208)	58.948 – 58.949 (2.3208 – 2.3208)	58.949 – 58.950 (2.3208 – 2.3209)	58.950 – 58.951 (2.3209 – 2.3209)	58.951 – 58.952 (2.3209 – 2.3209)	58.952 – 58.953 (2.3209 – 2.3210)	58.953 – 58.954 (2.3210 – 2.3210)	58.954 – 58.955 (2.3210 – 2.3211)	58.955 – 58.956 (2.3211 – 2.3211)	58.956 – 58.957 (2.3211 – 2.3211)	58.957 – 58.958 (2.3211 – 2.3212)	58.958 – 58.959 (2.3212 – 2.3212)	58.959 – 58.960 (2.3212 – 2.3213)	58.960 – 58.961 (2.3213 – 2.3213)	58.961 – 58.962 (2.3213 – 2.3213)	58.962 – 58.963 (2.3213 – 2.3214)	58.963 – 58.964 (2.3214 – 2.3214)	58.964 – 58.965 (2.3214 – 2.3215)	58.965 – 58.966 (2.3215 – 2.3215)	58.966 – 58.967 (2.3215 – 2.3215)	58.967 – 58.968 (2.3215 – 2.3216)
A	54.979 – 54.978 (2.1645 – 2.1645)		0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4
B	54.978 – 54.977 (2.1645 – 2.1644)		0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4
C	54.977 – 54.976 (2.1644 – 2.1644)		01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4
D	54.976 – 54.975 (2.1644 – 2.1644)		01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45
E	54.975 – 54.974 (2.1644 – 2.1643)		01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45
F	54.974 – 54.973 (2.1643 – 2.1643)		1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45
G	54.973 – 54.972 (2.1643 – 2.1642)		1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5
H	54.972 – 54.971 (2.1642 – 2.1642)		1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5
J	54.971 – 54.970 (2.1642 – 2.1642)		12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5
K	54.970 – 54.969 (2.1642 – 2.1641)		12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56
L	54.969 – 54.968 (2.1641 – 2.1641)		12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56
M	54.968 – 54.967 (2.1641 – 2.1641)		2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56
N	54.967 – 54.966 (2.1641 – 2.1640)		2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6
P	54.966 – 54.965 (2.1640 – 2.1640)		2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6
R	54.965 – 54.964 (2.1640 – 2.1639)		23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6
S	54.964 – 54.963 (2.1639 – 2.1639)		23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67
T	54.963 – 54.962 (2.1639 – 2.1639)		23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67
U	54.962 – 54.961 (2.1639 – 2.1638)		3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67
V	54.961 – 54.960 (2.1638 – 2.1638)		3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7
W	54.960 – 54.959 (2.1638 – 2.1637)		3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7	7
X	54.959 – 54.958 (2.1637 – 2.1637)		34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7	7	7
Y	54.958 – 54.957 (2.1637 – 2.1637)		34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7	7	7	7
4	54.957 – 54.956 (2.1637 – 2.1636)		34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7	7	7	7	7
7	54.956 – 54.955 (2.1636 – 2.1636)		4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67	7	7	7	7	7	7

WBIA0095E

Main Bearing Selection Table (No.2 and 4 journals)

Cylinder block main bearing housing inner diameter / Crankshaft journal outer diameter	Mark	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W	X	Y	4	7
Mark	Outer diameter Unit: mm (in)	Inner diameter Unit: mm (in)																							
		58.944 – 58.945 (2.3206 – 2.3207)	58.945 – 58.946 (2.3207 – 2.3207)	58.946 – 58.947 (2.3207 – 2.3207)	58.947 – 58.948 (2.3207 – 2.3208)	58.948 – 58.949 (2.3208 – 2.3208)	58.949 – 58.950 (2.3208 – 2.3209)	58.950 – 58.951 (2.3209 – 2.3209)	58.951 – 58.952 (2.3209 – 2.3209)	58.952 – 58.953 (2.3209 – 2.3210)	58.953 – 58.954 (2.3210 – 2.3210)	58.954 – 58.955 (2.3210 – 2.3211)	58.955 – 58.956 (2.3211 – 2.3211)	58.956 – 58.957 (2.3211 – 2.3211)	58.957 – 58.958 (2.3211 – 2.3212)	58.958 – 58.959 (2.3212 – 2.3212)	58.959 – 58.960 (2.3212 – 2.3213)	58.960 – 58.961 (2.3213 – 2.3213)	58.961 – 58.962 (2.3213 – 2.3213)	58.962 – 58.963 (2.3213 – 2.3214)	58.963 – 58.964 (2.3214 – 2.3214)	58.964 – 58.965 (2.3214 – 2.3215)	58.965 – 58.966 (2.3215 – 2.3215)	58.966 – 58.967 (2.3215 – 2.3215)	58.967 – 58.968 (2.3215 – 2.3216)
A	54.979 – 54.978 (2.1645 – 2.1645)	0	0	0	0	0	0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3
B	54.978 – 54.977 (2.1645 – 2.1644)	0	0	0	0	0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3
C	54.977 – 54.976 (2.1644 – 2.1644)	0	0	0	0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3
D	54.976 – 54.975 (2.1644 – 2.1644)	0	0	0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34
E	54.975 – 54.974 (2.1644 – 2.1643)	0	0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34
F	54.974 – 54.973 (2.1643 – 2.1643)	0	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34
G	54.973 – 54.972 (2.1643 – 2.1642)	0	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4
H	54.972 – 54.971 (2.1642 – 2.1642)	0	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4
J	54.971 – 54.970 (2.1642 – 2.1642)	01	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4
K	54.970 – 54.969 (2.1642 – 2.1641)	01	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45
L	54.969 – 54.968 (2.1641 – 2.1641)	01	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45
M	54.968 – 54.967 (2.1641 – 2.1641)	1	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45
N	54.967 – 54.966 (2.1641 – 2.1640)	1	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5
P	54.966 – 54.965 (2.1640 – 2.1640)	1	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5
R	54.965 – 54.964 (2.1640 – 2.1639)	12	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5
S	54.964 – 54.963 (2.1639 – 2.1639)	12	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56
T	54.963 – 54.962 (2.1639 – 2.1639)	12	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56
U	54.962 – 54.961 (2.1639 – 2.1638)	2	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56
V	54.961 – 54.960 (2.1638 – 2.1638)	2	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6
W	54.960 – 54.959 (2.1638 – 2.1637)	2	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6
X	54.959 – 54.958 (2.1637 – 2.1637)	23	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6
Y	54.958 – 54.957 (2.1637 – 2.1637)	23	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67
4	54.957 – 54.956 (2.1637 – 2.1636)	23	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67
7	54.956 – 54.955 (2.1636 – 2.1636)	3	3	3	34	34	34	4	4	4	45	45	45	5	5	5	56	56	56	6	6	6	67	67	67

WBIA0096E

Main Bearing Grade Table (All Journals)

Unit: mm (in)

Grade number	Thickness	Identification color (UPR / LWR)	Remarks
0	1.973 - 1.976 (0.0777 - 0.0778)	Black	Grade and color are the same for upper and lower bearings.
1	1.976 - 1.979 (0.0778 - 0.0779)	Brown	
2	1.979 - 1.982 (0.0779- 0.0780)	Green	
3	1.982 - 1.985 (0.0780 - 0.0781)	Yellow	
4	1.985 - 1.988 (0.0781 - 0.0783)	Blue	
5	1.988 - 1.991 (0.0783 - 0.0784)	Pink	
6	1.991 - 1.994 (0.0784 - 0.0785)	Purple	
7	1.994 - 1.997 (0.0785 - 0.0786)	White	

01	UPR	1.973 - 1.976 (0.0777 - 0.0778)	Black/Brown	Grade and color are different for upper and lower bearings.
	LWR	1.976 - 1.979 (0.0778 - 0.0779)		
12	UPR	1.976 - 1.979 (0.0778 - 0.0779)	Brown/Green	
	LWR	1.979 - 1.982 (0.0779 - 0.0780)		
23	UPR	1.979 - 1.982 (0.0779 - 0.0780)	Green/Yellow	
	LWR	1.982 - 1.985 (0.0780 - 0.0781)		
34	UPR	1.982 - 1.985 (0.0780 - 0.0781)	Yellow/Blue	
	LWR	1.985 - 1.988 (0.0781 - 0.0783)		
45	UPR	1.985 - 1.988 (0.0781 - 0.0783)	Blue/Pink	
	LWR	1.988 - 1.991 (0.0783 - 0.0784)		
56	UPR	1.988 - 1.991 (0.0783 - 0.0784)	Pink/Purple	
	LWR	1.991 - 1.994 (0.0784 - 0.0785)		
67	UPR	1.991 - 1.994 (0.0784 - 0.0785)	Purple/White	
	LWR	1.994 - 1.997 (0.0785 - 0.0786)		

Use Undersize Bearing Usage Guide

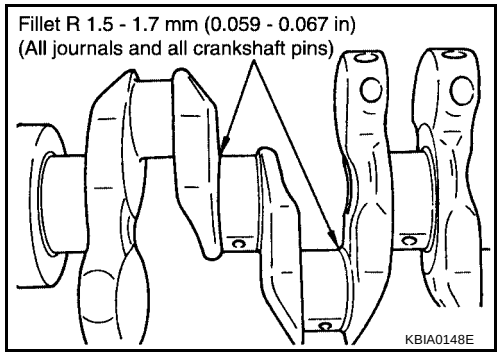
- Use undersize (U.S.) bearing when oil clearance with standard size main bearing is not within specification.
- When using undersize (U.S.) bearing, measure the bearing inner diameter with the bearing installed and grind journal until oil clearance falls within specification.

Bearing Undersize Table

Unit: mm (in)

Size U.S.	Thickness
0.25 (0.0098)	2.106 - 2.114 (0.0829 - 0.0832)

CAUTION:
Do not damage fillet R when grinding crankshaft journal in order to use an undersize bearing (all journals).



Inspection After Disassembly

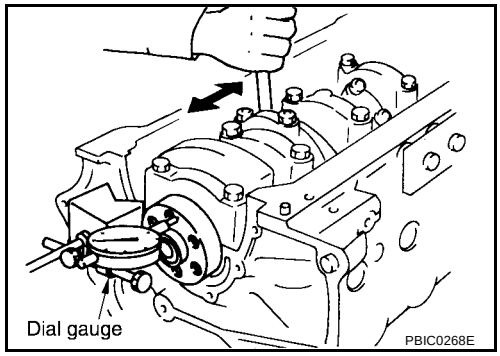
EBS00CG9

CRANKSHAFT SIDE CLEARANCE

- Using a dial gauge, measure the clearance between the thrust bearings and the crankshaft arm when the crankshaft is moved fully forward or backward.

  Standard : 0.10 - 0.26 mm (0.0039 - 0.0102 in)
  Limit : 0.30 mm (0.0118 in)

- If the measured value exceeds the limit, replace the thrust bearings, and measure again. If it still exceeds the limit, replace the crankshaft.

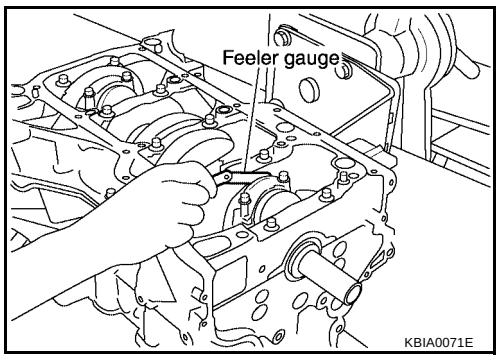


CONNECTING ROD SIDE CLEARANCE

- Measure side clearance between connecting rod and crankshaft arm with feeler gauge.

Standard : 0.20 - 0.35 mm (0.0079 - 0.0138 in)
Limit : 0.50 mm (0.0197 in)

- If the measured value exceeds the limit, replace the connecting rod bearings, and measure again. If it still exceeds the limit, replace the crankshaft also.

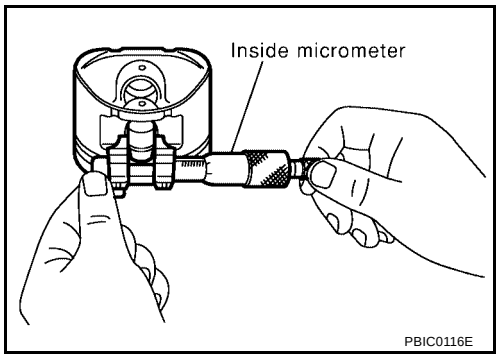


PISTON AND PISTON PIN CLEARANCE

Piston Pin Bore Diameter

- Measure the piston pin bore diameter with an inside micrometer.
- Service parts apply only to grade 0.

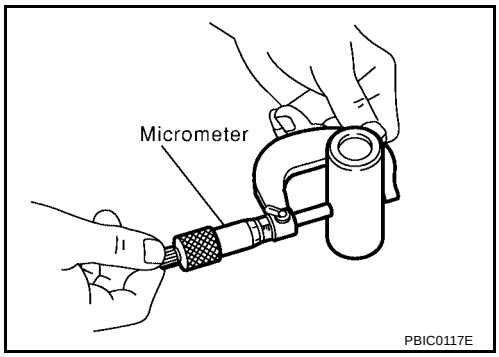
Piston pin bore diameter
Grade No. 0 : 19.993 - 19.999 mm (0.7871 - 0.7874 in)
Grade No. 1 : 19.999 - 20.005 mm (0.7874 - 0.7876 in)



Outer Diameter of Piston Pin

- Measure outer diameter of piston pin with a micrometer.

Piston pin outer diameter
Grade No. 0 : 19.989 - 19.995 mm (0.7870 - 0.7872 in)
Grade No. 1 : 19.995 - 20.001 mm (0.7872 - 0.7874 in)

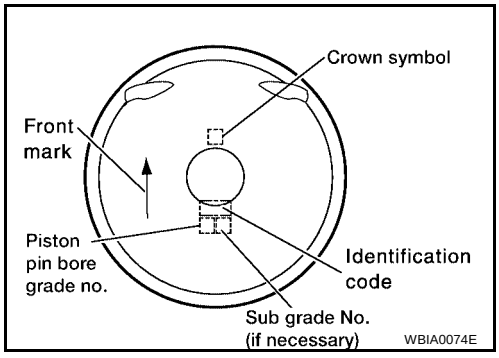


Piston to Piston Pin Clearance

(Piston to piston pin clearance) = (Piston pin bore diameter) – (Outer diameter of piston pin)

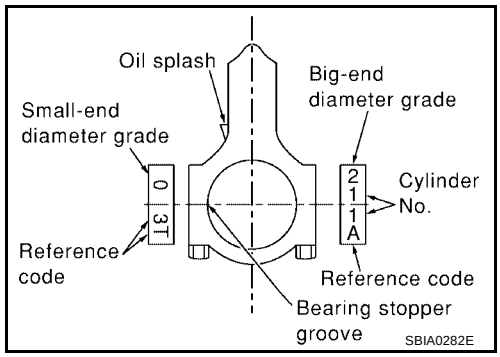
Standard : 0.002 - 0.006 mm (0.0001 - 0.0002 in)

- If clearance exceeds specification, replace either or both of piston/piston pin assembly and connecting rod assembly with reference to specification of each parts.
- Refer to piston selection table to replace piston/piston pin assembly. Refer to EM-173, "HOW TO SELECT A PISTON" .
- Refer to connecting rod bearing selection table to replace connecting rod. Refer to EM-174, "HOW TO SELECT A CONNECTING ROD BEARING" .



NOTE:

- The connecting rod small end grade and piston pin hole (piston pin) grade are provided only for the parts installed at the plant. For service parts, no grades can be selected. Only 0 grade is available.
- Refer to EM-182, "CONNECTING ROD BUSHING OIL CLEARANCE (SMALL END)" for the values for each grade at the plant.
- Regarding marks on piston head, refer to EM-173, "HOW TO SELECT A PISTON" .



PISTON RING SIDE CLEARANCE

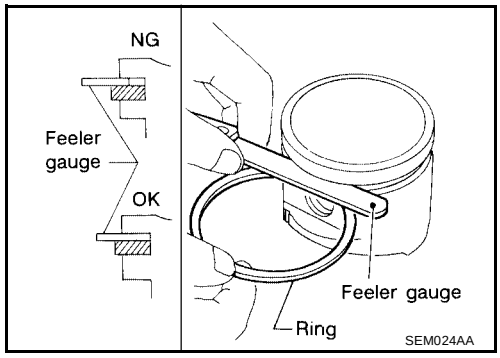
- Measure side clearance of piston ring and piston ring groove with feeler gauge.

Standard

Top ring	**: 0.040 - 0.080 mm (0.0016 - 0.0031 in)**
2nd ring	**: 0.030 - 0.070 mm (0.0012 - 0.0028 in)**
Oil ring	**: 0.065 - 0.135 mm (0.0026 - 0.0053 in)**

Limit

Top ring	**: 0.11 mm (0.0043 in)**
2nd ring	**: 0.10 mm (0.004 in)**
Oil ring	**: —**



- If out of specification, replace piston and/or piston ring assembly.

PISTON RING END GAP

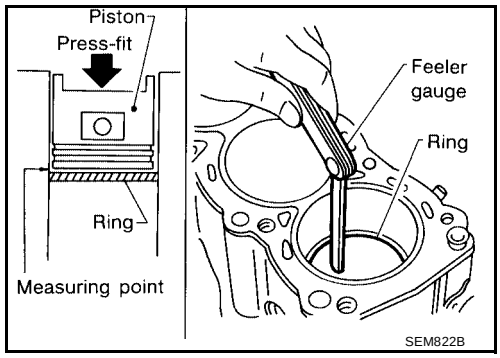
- Check if inner diameter of cylinder bore is within specification. Refer to EM-184, "PISTON TO CYLINDER BORE CLEARANCE" .
- Insert piston ring until middle of cylinder with piston, and measure gap.

Standard

Top ring	**: 0.21 - 0.31 mm (0.0083 - 0.0122 in)**
2nd ring	**: 0.32 - 0.47 mm (0.0126 - 0.0185 in)**
Oil ring	**: 0.20 - 0.60 mm (0.0079 - 0.0236 in)**

Limit

Top ring	**: 0.54 mm (0.0213 in)**
2nd ring	**: 0.67 mm (0.0264 in)**
Oil ring	**: 0.95 mm (0.0374 in)**



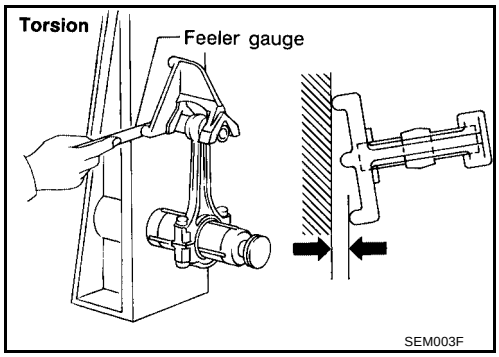
- If out of specification, replace piston ring. If gap still exceeds the limit even with a new ring, re-bore cylinder and use oversized piston and piston ring.

CONNECTING ROD BEND AND TORSION

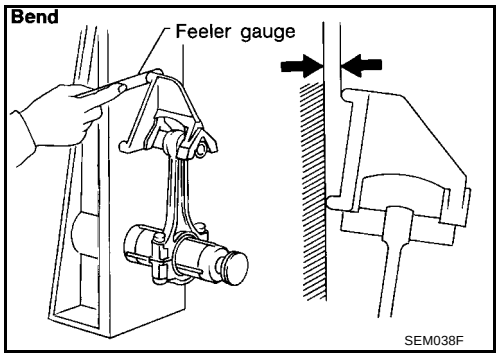
- Check with connecting rod aligner.

Bend limit : **0.15 mm (0.0059 in) per 100 mm (3.94 in) length**

Torsion limit : **0.30 mm (0.0118 in) per 100 mm (3.94 in) length**



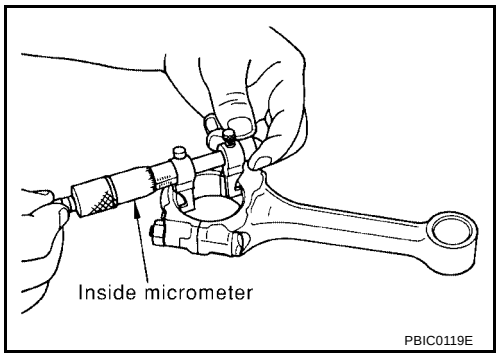
- If it exceeds the limit, replace connecting rod assembly.



CONNECTING ROD BEARING (BIG END)

- Install the connecting rod cap without the connecting rod bearing installed. After tightening the connecting rod bolt to the specified torque, measure the connecting rod big end inner diameter using an inside micrometer.

Standard : **48.000 - 48.013 mm (1.8898 - 1.8903 in)**



CONNECTING ROD BUSHING OIL CLEARANCE (SMALL END)

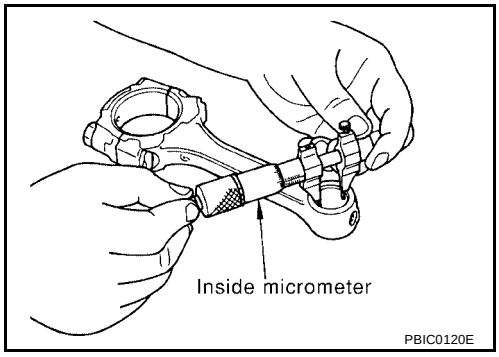
Inner Diameter of Connecting Rod (Small End)

- Measure inner diameter of bushing.

Connecting rod small end inner diameter

Grade No. 0 : **20.000 - 20.006 mm (0.7874 - 0.7876 in)**

Grade No. 1 : **20.006 - 20.012 mm (0.7876 - 0.7879 in)**

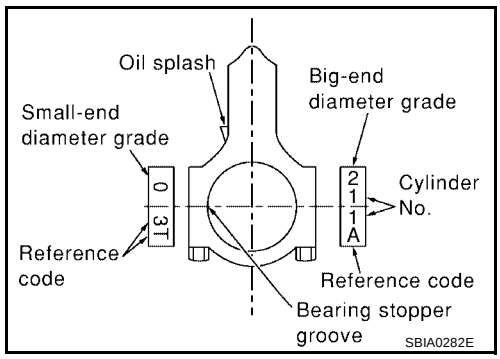


Connecting Rod Oil Clearance (Small End)

(Connecting rod small end oil clearance) = (Inner diameter of connecting rod small end) – (Outer diameter of piston pin)

Standard : 0.005 - 0.017 mm (0.0002 - 0.0007 in)

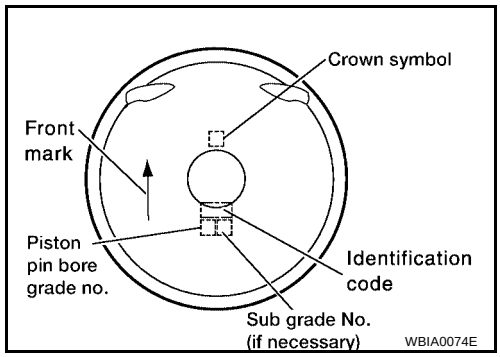
- If the measured value exceeds the standard, replace the connecting rod assembly and/or piston and piston pin assembly.
- If replacing the piston and piston pin assembly, refer to the "Piston Selection Table" to select the piston corresponding to the applicable bore grade of the cylinder block to be used. Refer to EM-173, "HOW TO SELECT A PISTON" .



Factory Installed Parts Grading:
Service parts apply only to grade 0.

Unit: mm (in)

Grade	0	1
Connecting rod small end inner diameter	20.000 - 20.006 (0.7874 - 0.7876)	20.006 - 20.012 (0.7876 - 0.7879)
Piston pin outer diameter	19.989 - 19.995 (0.7870 - 0.7872)	19.995 - 20. 001 (0.7872 - 0.7874)
Piston pin bore diameter	19.993 - 19.999 (0.7871- 0.7874)	19.999 - 20.005 (0.7874 - 0.7876)

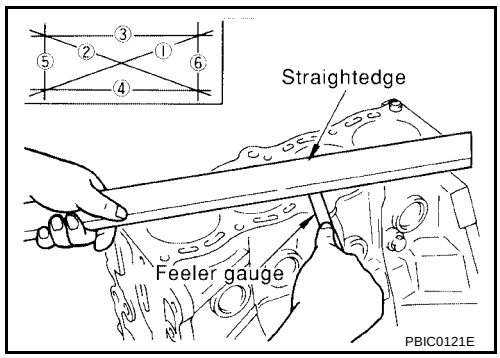


CYLINDER BLOCK DISTORTION

- Using a scraper, remove gasket on the cylinder block surface, and also remove oil, scale, carbon, or other contamination.

  CAUTION:
  Be careful not to allow gasket debris to enter the oil or coolant passages.
- Measure the distortion on the block upper face at some different points in 6 directions.

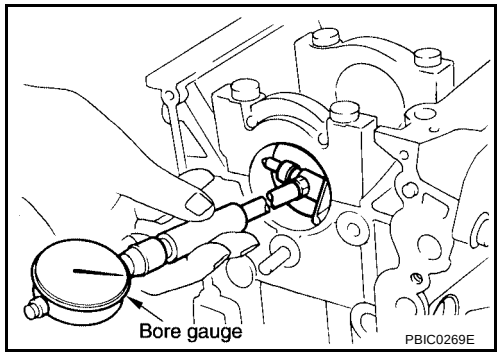
  Limit : 0.1 mm (0.004 in)
- If out of the distortion limit, replace the cylinder block.



INNER DIAMETER OF MAIN BEARING HOUSING

- Install the lower cylinder block with the main bearings removed and tighten the mounting bolts to the specified torque. Refer to EM-167, "ASSEMBLY" .
- Using a bore gauge, measure the inner diameter of the main bearing housing. Refer to EM-193, "CYLINDER BLOCK" .
- If out of the standard, replace the cylinder block and lower cylinder block assembly.

  NOTE:
  These components cannot be replaced as a single unit because they were processed together.

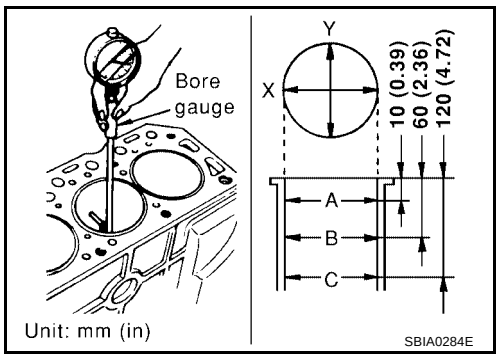


PISTON TO CYLINDER BORE CLEARANCE

Inner Diameter of Cylinder Bore

- Using a bore gauge, measure cylinder bore for wear, out-of-round and taper at 6 different points on each cylinder. (X and Y directions at A, B and C). The Y axis is in the longitudinal direction of the engine.

  NOTE:
  When determining cylinder bore grade, measure cylinder bore at B position.



Cylinder bore inner diameter

Grade No. 1	**: 89.000 - 89.010 mm (3.5039 - 3.5043 in)**
Grade No. 2	**: 89.010 - 89.020 mm (3.5043 - 3.5047 in)**
Grade No. 3	**: 89.020 - 89.030 mm (3.5047 - 3.5051 in)**
Wear limit:	**0.2 mm (0.008 in)**
Out-of-round (difference between, X – Y):	**0.015 mm (0.0006 in)**
Taper limit (difference between, C – A):	**0.01 mm (0.0004 in)**

- If the measured value rebore exceeds the limit, or if there are scratches and/or seizure on the cylinder inner wall, hone the inner wall.
- An oversize piston is provided. When using an oversize piston, rebore the cylinder so that the clearance of the piston cylinder satisfies the standard.

Piston oversize (OS)

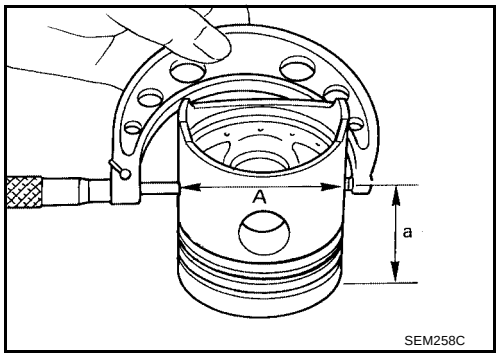
Clearance	**: 0.2 mm (0.008 in)**
Diameter	**: 89.180 - 89.210 mm (3.5110 - 3.5122 in)**

Outer Diameter of Piston

- Measure piston skirt diameter (A).

Piston skirt diameter

Grade No. 1	**: 88.980 - 88.990 mm (3.5031 - 3.5035 in)**
Grade No. 2	**: 88.990 - 89.000 mm (3.5035 - 3.5039 in)**
Grade No. 3	**: 89.000 - 89.010 mm (3.5039 - 3.5043 in)**
Oversize clearance	**0.20 mm (0.0079 in)**



- Measure point (a) (distance from the top): 42 mm (1.65 in)

Piston to Cylinder Bore Clearance

- Calculate by outer diameter of piston skirt and inner diameter of cylinder (direction X, position B).
  (Clearance) = (Inner diameter of cylinder) – (Outer diameter of piston skirt).

Standard	**: 0.010 - 0.030 mm (0.0004 - 0.0012 in)**
Limit	**: 0.08 mm (0.0031 in)**

- If it exceeds the limit, replace piston/piston pin assembly.

Reboring Cylinder Bore

1. Cylinder bore size is determined by adding piston-to-bore clearance to piston diameter “A”.

Rebored size calculation: D = A + B - C

D: Bored diameter
A: Piston diameter as measured
B: Piston-to-bore clearance (standard value)
C: Honing allowance 0.02 mm (0.0008 in)

2. Install main bearing caps, and tighten to the specified torque. Otherwise, cylinder bores may be distorted in final assembly.
3. Cut cylinder bores.

   NOTE:
   When any cylinder needs boring, all other cylinders must also be bored.

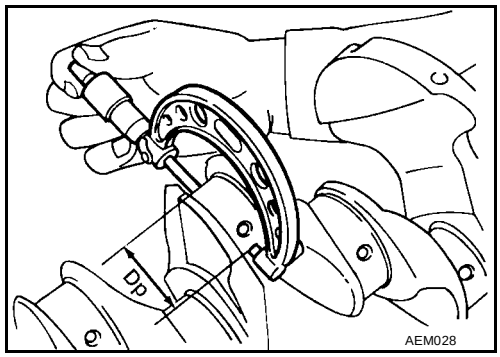
   CAUTION:
   Do not cut too much out of cylinder bore at a time. Cut only 0.05 mm (0.0020 in) or so in diameter at a time.
4. Hone cylinders to obtain specified piston-to-bore clearance.
5. Measure finished cylinder bore for out-of-round and taper.

   NOTE:
   Measurement should be done after cylinder bore cools down.

OUTER DIAMETER OF CRANKSHAFT MAIN JOURNAL

Measure outer diameter of crankshaft main journals "Dm".

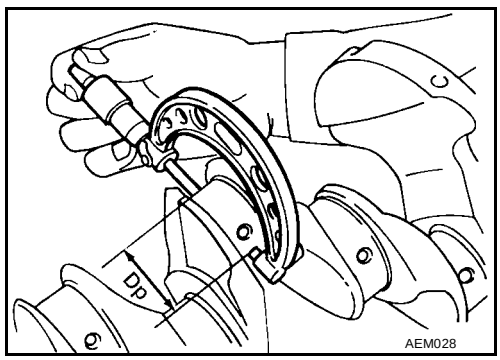
Standard "Dm" : **54.955 - 54.979 mm (2.1636 - 2.1645 in)**



OUTER DIAMETER OF CRANKSHAFT PIN JOURNAL

Measure outer diameter of crankshaft pin journals.

Standard "Dp" : **44.956 - 44.974 mm (1.7699 - 1.7706 in)**



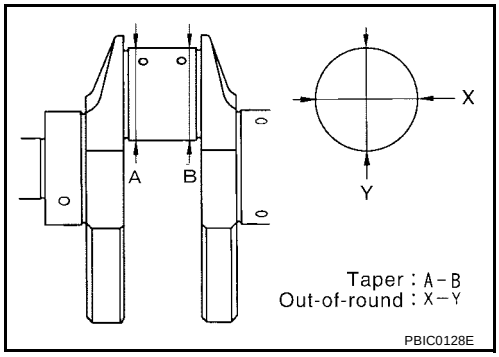
OUT-OF-ROUND AND TAPER OF CRANKSHAFT

- Using a micrometer, measure the dimensions at four different points shown in the figure on each journal and pin.
- Out-of-round is indicated by the difference in dimensions between "X" and "Y" at "A" and "B".
- Taper is indicated by the difference in dimension between "A"and "B" at "X" and "Y".

Limit

Out-of-round (X - Y) : 0.005 mm (0.0002 in)

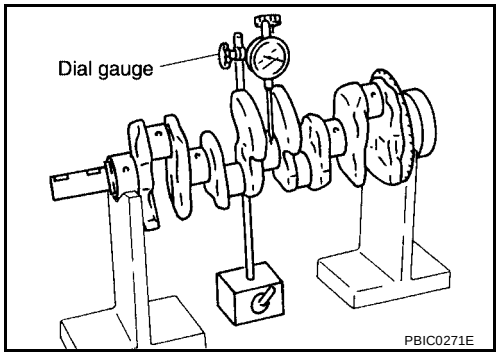
Taper (A - B) : 0.005 mm (0.0002 in)



CRANKSHAFT RUNOUT

- Place a V-block on a precise flat table to support the journals on both ends of the crankshaft.
- Place a dial gauge straight up on the No. 3 journal.
- While rotating the crankshaft, read the movement of the pointer on the dial gauge, the total indicator reading.

Limit : 0.05 mm (0.002 in)



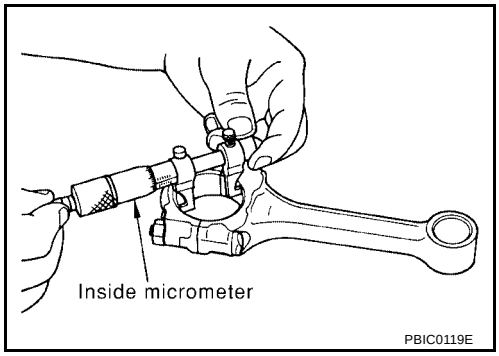
OIL CLEARANCE OF CONNECTING ROD BEARING

Method of Measurement

- Install the connecting rod bearings to the connecting rod and the cap, and tighten the connecting rod bolts to the specified torque. Using an inside micrometer measure the inner diameter of connecting rod bearing.
  (Oil clearance) = (Inner diameter of connecting rod bearing) – (Outer diameter of crankshaft pin)

Standard : 0.028 - 0.045 mm (0.0011 - 0.0018 in)

Limit : 0.10 mm (0.0039 in)



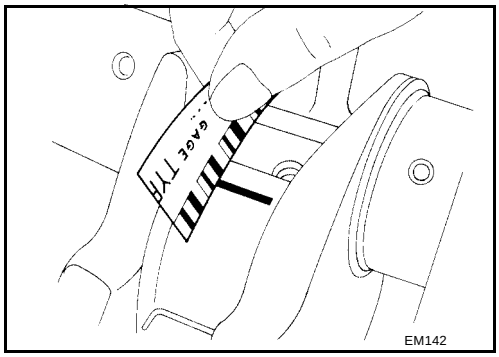
- If clearance cannot be adjusted within the standard, grind crankshaft pin and use undersized bearing. Refer to EM-174, "HOW TO SELECT A CONNECTING ROD BEARING" .

Method of Using Plastigage

- Remove oil and dust on the crankshaft pin and the surfaces of each bearing completely.
- Cut the Plastigage slightly shorter than the bearing width, and place it in crankshaft axial direction, avoiding oil holes.
- Install the connecting rod bearings to the connecting rod cap, and tighten the connecting rod bolts to the specified torque.

CAUTION:
Never rotate the crankshaft.

- Remove the connecting rod cap and bearings, and using the scale on the Plastigage bag, measure the Plastigage width.



NOTE:
The procedure when the measured value exceeds the limit is same as that described in the method by calculation.

OIL CLEARANCE OF MAIN BEARING

Method of Measurement

- Install the main bearings to the cylinder block and lower cylinder block. Measure the main bearing inner diameter with the lower cylinder block bolts tightened to the specified torque.
(Oil clearance) = (Inner diameter of main bearing) – (Outer diameter of crankshaft journal)

Standard:

No. 1, 3, and 5 journals	**: 0.012 - 0.022 mm (0.0005 - 0.0009 in)**
No. 2 and 4 journals	**: 0.018 - 0.028 mm (0.0007 - 0.0011 in)**
Limit	**: 0.1 mm (0.004 in)**

- If the measured value exceeds the limit, select main bearings referring to the main bearing inner diameter and crankshaft journal outer diameter, so that the oil clearance satisfies the standard. Refer to EM-176, "HOW TO SELECT A MAIN BEARING" .

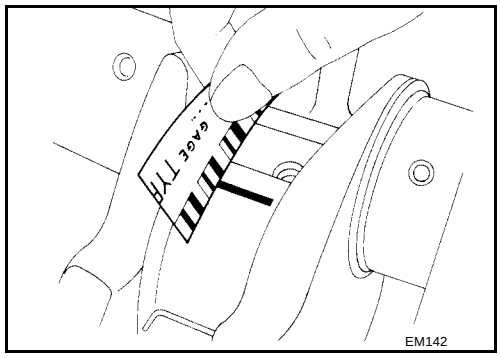
Method of Using Plastigage

- Remove oil and dust on the crankshaft journal and the surfaces of each bearing completely.
- Cut the Plastigage slightly shorter than the bearing width, and place it in crankshaft axial direction, avoiding oil holes.
- Tighten the main bearing bolts to the specified torque.

CAUTION:
Never rotate the crankshaft.

- Remove the bearing cap and bearings, and using the scale on the Plastigage bag, measure the Plastigage width.

NOTE:
The procedure when the measured value exceeds the limit is same as that described in the "Method by Calculation".

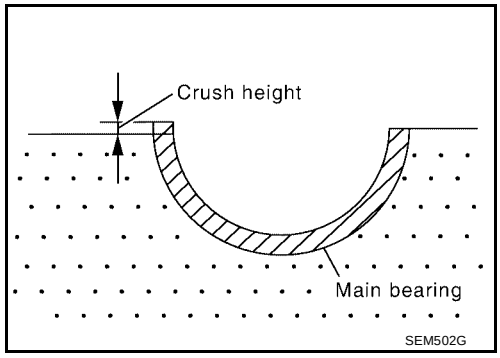


CRUSH HEIGHT OF MAIN BEARING

- When the bearing cap is removed after being tightened to the specified torque with main bearings installed, the tip end of bearing must protrude.

Standard : There must be crush height.

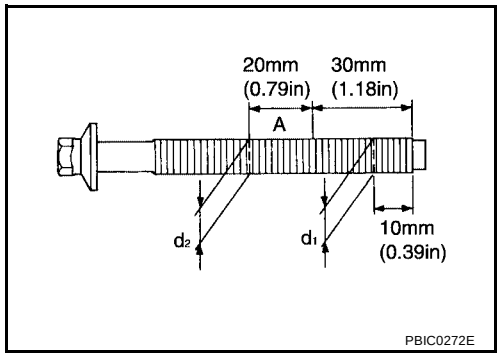
- If the standard is not met, replace main bearings.



OUTER DIAMETER OF LOWER CYLINDER BLOCK MOUNTING BOLT

- Perform only with M10 (0.39 in) bolts.
- Measure outer diameters (d1, d2) at two positions as shown.
- Measure d2 at a point within block A.
- When the value of d1- d2 exceeds the limit (a large difference in dimensions), replace the bolt with a new one.

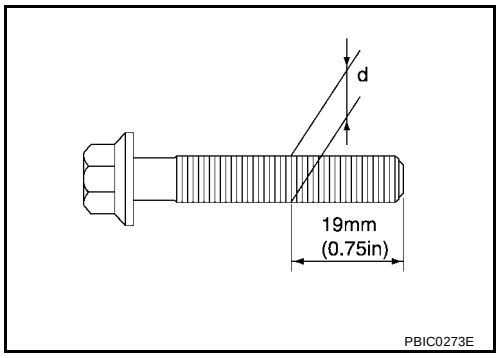
Limit : 0.13 mm (0.0051 in) or more



OUTER DIAMETER OF CONNECTING ROD BOLT

- Measure outer diameter (d) at position shown.
- When “d” exceeds the limit (when it becomes thinner), replace the bolt with a new one.

Limit : 7.75 mm (0.3051 in) or less



MOVEMENT AMOUNT OF FLYWHEEL (M/T MODEL)

NOTE:

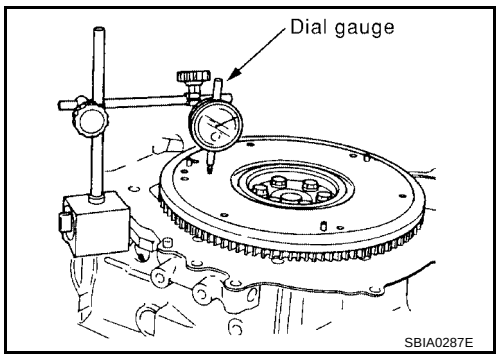
- Inspection for double mass flywheel only.
- Do not disassemble double mass flywheel.

Flywheel Runout

- Measure runout of flywheel contact surface to the clutch with a dial gauge.
- Measure runout at 210 mm (8.27 in) dia.

Standard : 0.45 mm (0.0177 in) or less
Limit : 1.3 mm (0.051 in) or less

- When measured value exceeds the limit, replace the flywheel with a new one.

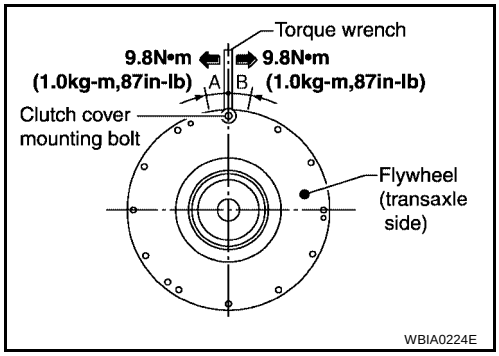


Movement Amount in Rotation Direction

1. Install a bolt to clutch cover hole, and place a torque wrench on the extended line of the flywheel center line.
   - Tighten bolt to keep it from loosening at a force of 9.8 N·m (1 kg-m, 87 in-lb).
2. Put a mating mark on circumferences of the two flywheel masses without applying any load (measurement standard points).
3. Apply a force of 9.8 N·m (1 kg-m, 87 in-lb) in each direction, and mark the movement amount on the mass on the transaxle side.
4. Measure dimensions of movement amounts A and B on circumference of the flywheel on the transaxle side.

Standard : 28.3 mm (1.114 in) or less

- When measured value is outside the standard, replace flywheel.



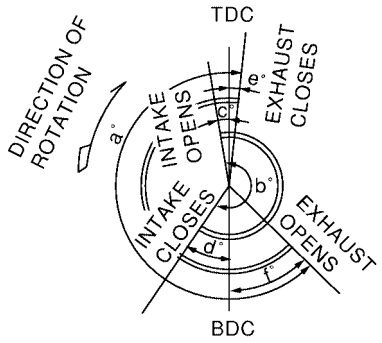
SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Standard and Limit

EBS00CGA

GENERAL SPECIFICATIONS

Cylinder arrangement		In-line 4
Displacement cm^3 (cu in)		2,488 (151.82)
Bore and stroke mm (in)		89.0 x 100 (3.50 - 3.94)
Valve arrangement		DOHC
Firing order		1-3-4-2
Number of piston rings	Compression	2
	Oil	1
Compression ratio		9.5
Compression pressure kPa (kg/cm^2 , psi) / 250 rpm	Standard	1,250 (12.8, 181.3)
	Minimum	1,060 (10.8, 153.7)
	Differential limit between cylinders	100 (1.0, 14)
Valve timing		

PBIC0187E

Unit: degree

a	b	c	d	e	f
224	244	0	64	3	41

DRIVE BELTS

Tension of drive belts	Auto adjustment by auto-tensioner

INTAKE MANIFOLD AND EXHAUST MANIFOLD

Unit: mm (in)

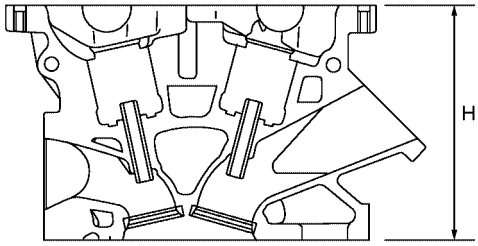
		Limit
Surface distortion	Intake manifold collector	0.1 (0.004)
	Intake manifold	0.1 (0.004)
	Exhaust manifold	0.3 (0.012)

SPARK PLUG

Make	NGK
Standard type	PLFR5A-11 (Platinum type)
Hot type	PLFR4A-11 (Platinum type)
Cold type	PLFR6A-11 (Platinum type)
Gap (nominal)	1.1 mm (0.043 in)

CYLINDER HEAD

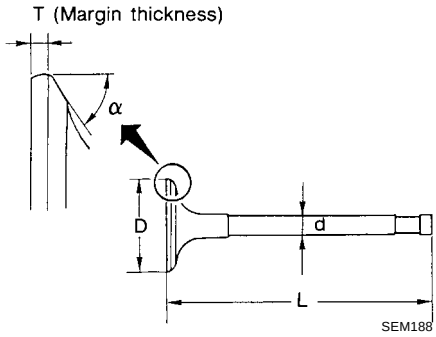
Unit: mm (in)

	Limit
 Nominal cylinder head height: H = 129.4 mm (5.09 in) PBIC0283E	
Head surface distortion	0.1 (0.004)

VALVE

Valve Dimensions

Unit: mm (in)



Valve head diameter “D”	Intake	35.5 - 35.8 (1.398 - 1.409)
	Exhaust	30.5 - 30.8 (1.201 - 1.213)
Valve length “L”	Intake	97.16 (3.8252)
	Exhaust	98.82 (3.8905)
Valve stem diameter “d”	Intake	5.965 - 5.980 (0.2348 - 0.2354)
	Exhaust	5.955 - 5.970 (0.2344 - 0.2350)
Valve seat angle “α”	Intake	45°15′ - 45°45′
	Exhaust	
Valve margin “T”	Intake	1.1 (0.043)
	Exhaust	1.3 (0.051)

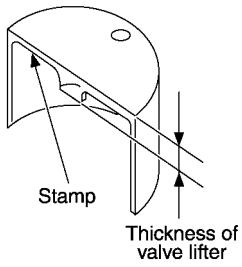
Valve Clearance

Unit: mm (in)

	Cold* (reference data)	Hot
Intake	0.24 - 0.32 (0.009 - 0.013)	0.32 - 0.40 (0.013 - 0.016)
Exhaust	0.26 - 0.34 (0.010 - 0.013)	0.33 - 0.41 (0.013 - 0.016)

*: Approximately 20°C (68 °F)

Available Valve Lifter



KBIA0119E

Thickness mm (in)	Identification mark
6.96 (0.2740)	696
6.98 (0.2748)	698
7.00 (0.2756)	700
7.02 (0.2764)	702
7.04 (0.2772)	704
7.06 (0.2780)	706
7.08 (0.2787)	708
7.10 (02795)	710
7.12 (0.2803)	712
7.14 (0.2811)	714
7.16 (0.2819)	716
7.18 (0.2827)	718
7.20 (0.2835)	720
7.22 (0.2843)	722
7.24(0.2850)	724
7.26 (0.2858)	726
7.28 (0.2866)	728
7.30(0.2874)	730
7.32 (0.2882)	732
7.34 (0.2890)	734
7.36 (0.2898)	736
7.38 (0.2906)	738
7.40 (0.2913)	740
7.42 (0.2921)	742
744 (0.2929)	744
7.46 (0.2937)	746

Valve Spring

Free height standard mm (in)	Intake (blue)	44.84 - 45.34 (1.7654 - 1.7850)
	Exhaust (yellow)	45.28 - 45.78 (1.7827 - 1.8024)
Pressure standard N (kg-force, lb-force) at height mm (in)	Intake (blue) and Exhaust (yellow)	151 - 175 (15.4 - 17.8, 34 - 39) at 35.30 (1.390)
Out-of-square mm (in)		1.9 (0.0748)
Installation height mm (in)	Intake (blue) and Exhaust (yellow)	35.30 (1.390)

Height during valve open mm (in)	Intake (blue)	24.94 (0.9819)
	Exhaust (yellow)	26.39 (1.0390)
Load with valve open N (kg-force, lb-force)	Intake (blue)	358 - 408 (36.5 - 41.6, 80 - 92)
	Exhaust (yellow)	325 - 371 (33.1 - 37.8, 73 - 83)

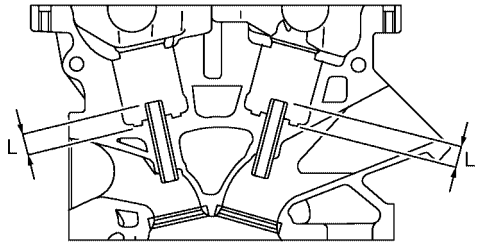
Valve Lifter

Unit: mm (in)

	Standard
Valve lifter outer diameter	33.965 - 33.980 (1.3372 - 1.3378)
Valve lifter guide bore diameter	34.000 - 34.021 (1.3386 - 1.3394)
Clearance between lifter and lifter guide bore	0.020 - 0.056 (0.0008 - 0.0022)

Valve Guide

Unit: mm (in)

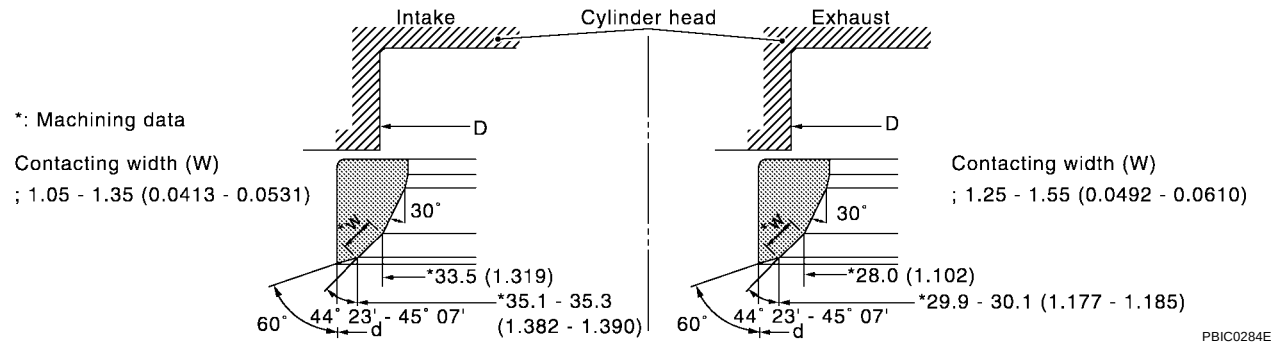


PBIC0184E

		Standard	Service
Valve guide	Outer diameter	10.023 - 10.034 (0.3946 - 0.3950)	10.223 - 10.234 (0.4025 - 0.4029)
	Inner diameter (Finished size)	6.000 - 6.018 (0.2362 - 0.2369)	
Valve guide bore diameter		9.975 - 9.996 (0.3927 - 0.3935)	10.175 - 10.196 (0.4006 - 0.4014)
Interference fit of valve guide		0.027 - 0.059 (0.0011 - 0.0023)	
		Standard	
Valve to guide clearance	Intake	0.020 - 0.053 (0.0008 - 0.0021)	
	Exhaust	0.030 - 0.063 (0.0012 - 0.0025)	
Projection length “L”	Intake	10.1 - 10.3 (0.398 - 0.406)	
	Exhaust	10.0 - 10.4 (0.394 - 0.409)	

Valve Seat

Unit: mm (in)



PBIC0284E

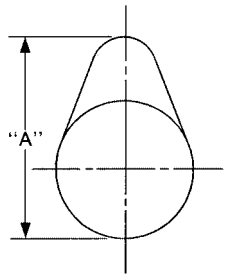
	Standard	Service

Cylinder head seat recess diameter (D)	Intake	36.500 - 36.516 (1.4370 - 1.4376)	37.000 - 37.016 (1.4567 - 1.4573)
	Exhaust	31.500 - 31.516 (1.2402 - 1.2408)	32.000 - 32.016 (1.2598 - 1.2605)
Valve seat interference fit	Intake	0.081 - 0.113 (0.0032 - 0.0044)	
	Exhaust	0.084 - 0.116 (0.0033 - 0.0046)	
Valve seat outer diameter (d)	Intake	36.597 - 36.613 (1.4408 - 1.4415)	37.097 - 37.113 (1.4605 - 1.4611)
	Exhaust	31.600 - 31.616 (1.2441 - 1.2447)	32.100 - 32.116 (1.2638 - 1.2644)

CAMSHAFT AND CAMSHAFT BEARING

Unit: mm (in)

	Standard
Camshaft runout [TIR*]	Less than 0.04 (0.0016)



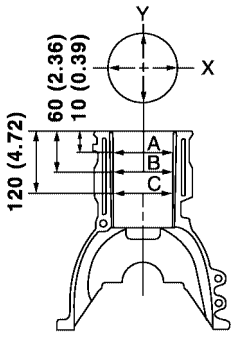
SEM671

Cam height "A"	Intake	45.665 - 45.855 (1.7978 - 1.8053)
	Exhaust	43.975 - 44.165 (1.7313 - 1.7388)
Outer diameter of camshaft journal		No. 1 27.935 - 27.955 (1.0998 - 1.1006) No. 2, 3, 4, 5 23.435 - 23.455 (0.9226 - 0.9234)
Inner diameter of camshaft bracket		No.1 28.000 - 28.021 (1.1024 - 1.1032) No.2, 3, 4, 5 23.500 - 23.521 (0.9252 - 0.9260)
Camshaft journal clearance		0.045 - 0.086 (0.0018 - 0.0034)
Camshaft end play		0.115 - 0.188 (0.0045 - 0.0074)
Camshaft sprocket runout [TIR*]		Less than 0.15 (0.0059)

*: Total indicator reading

CYLINDER BLOCK

Unit: mm (in)



PBIC0281E

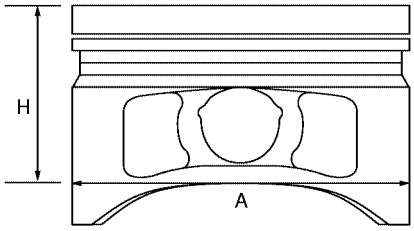
Surface distortion	Limit			0.1 (0.004)
Cylinder bore	Inner diameter	Standard	Grade No. 2	89.010 - 89.020 (3.5043 - 3.5047)
			Grade No. 3	89.020 - 89.030 (3.5047 - 3.5051)
		Wear limit		0.2 (0.008)

Out-of-round (X – Y)		Less than 0.015 (0.0006)
Taper (C – A)		Less than 0.01 (0.0004)
Main journal inner diameter grade (Without bearing)	Grade No. A	58.944 - 58.945 (2.3206 - 2.3207)
	Grade No. B	58.945 - 58.946 (2.3207 - 2.3207)
	Grade No. C	58.946 - 58.947 (2.3207 - 2.3207)
	Grade No. D	58.947 - 58.948 (2.3207 - 2.3208)
	Grade No. E	58.948 - 58.949 (2.3208 - 2.3208)
	Grade No. F	58.949 - 58.950 (2.3208 - 2.3209)
	Grade No. G	58.950 - 58.951 (2.3209 - 2.3209)
	Grade No. H	58.951 - 58.952 (2.3209 - 2.3209)
	Grade No. J	58.952 - 58.953 (2.3209 - 2.3210)
	Grade No. K	58.953 - 58.954 (2.3210 - 2.3210)
	Grade No. L	58.954 - 58.955 (2.3210 - 2.3211)
	Grade No. M	58.955 - 58.956 (2.3211 - 2.3211)
	Grade No. N	58.956 - 58.957 (2.3211 - 2.3211)
	Grade No. P	58.957 - 58.958 (2.3211 - 2.3212)
	Grade No. R	58.958 - 58.959 (2.3212 - 2.3212)
	Grade No. S	58.959 - 58.960 (2.3212 - 2.3213)
	Grade No. T	58.960 - 58.961 (2.3213 - 2.3213)
	Grade No. U	58.961 - 58.962 (2.3213 - 2.3213)
	Grade No. V	58.962 - 58.963 (2.3213 - 2.3214)
	Grade No. W	58.963 - 58.964 (2.3214 - 2.3214)
	Grade No. X	58.964 - 58.965 (2.3214 - 2.3215)
	Grade No. Y	58.965 - 58.966 (2.3215 - 2.3215)
	Grade No. 4	58.966 - 58.967 (2.3215 - 2.3215)
	Grade No. 7	58.967 - 58.968 (2.3215 - 2.3216)
Difference in inner diameter between cylinders	Standard	Less than 0.03 (0.0012)

PISTON, PISTON RING, AND PISTON PIN

Available Piston

Unit: mm (in)



PBIC0188E

Piston skirt diameter “A”	Standard	Grade No. 2	88.990 - 89.000 (3.5035 - 3.5039)
		Grade No. 3	89.000 - 89.010 (3.5039 - 3.5043)
		0.20 (0.0079) oversize clearance (service)	89.180 - 89.210 (3.5110 - 3.5122)
“H” dimension			42 (1.65)
Piston pin bore diameter		Grade No. 0	19.993 - 19.999 (0.7871 - 0.7874)
		Grade No. 1	19.999 - 20.005 (0.7874 - 0.7876)
Piston to cylinder bore clearance		Standard	0.010 - 0.030 (0.0004 - 0.0012)
		Limit	0.08 (0.0031)

Piston Ring

Unit: mm (in)

		Standard	Limit
Side clearance	Top	0.040 - 0.080 (0.0016 - 0.0031)	0.11 (0.0043)
	2nd	0.030 - 0.070 (0.0012 - 0.0028)	0.10 (0.004)
	Oil ring	0.065 - 0.135 (0.0026 - 0.0053)	—
End gap	Top	0.21- 0.31 (0.0083 - 0.0122)	0.54 (0.0213)
	2nd	0.32 - 0.47 (0.0126 - 0.0185)	0.67 (0.0264)
	Oil (rail ring)	0.20 - 0.60 (0.0079 - 0.0236)	0.95 (0.0374)

Piston Pin

Unit: mm (in)

Piston pin outer diameter	Grade No.0	19.989 - 19.995 (0.7870 - 0.7872)
	Grade No.1	19.995 - 20.001 (0.7872 - 0.7874)
Piston pin to piston clearance		0.002 - 0.006 (0.0001 - 0.0002)
Piston pin to connecting rod oil clearance	Standard	0.005 - 0.017 (0.0002 - 0.0007)

CONNECTING ROD

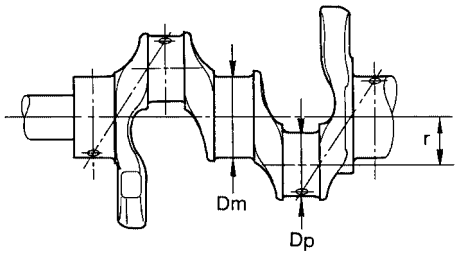
Unit: mm (in)

Center distance		143.00 - 143.10 (5.63 - 5.63)
Bend [per 100 (3.94)]	Limit	0.15 (0.0059)
Torsion [per 100 (3.94)]	Limit	0.30 (0.0118)
Connecting rod small end inner diameter		22.000 - 22.012 (0.7874 - 0.7879)
Connecting rod small end inner diameter*	Grade No. 0	20.000 - 20.006 (0.7874 - 0.7876)
	Grade No. 1	20.006 - 20.012 (0.7876 - 0.7879)
Connecting rod big end inner diameter		48.000 - 48.013 (1.8898 - 1.8903)
Side clearance	Standard	0.20 - 0.35 (0.0079 - 0.0138)
	Limit	0.50 (0.0197)
Connecting rod bearing housing	Grade No. 0	48.000 - 48.001 (1.8898 - 1.8898)
	Grade No. 1	48.001 - 48.002 (1.8898 - 1.8898)
	Grade No. 2	48.002 - 48.003 (1.8898 - 1.8899)
	Grade No. 3	48.003 - 48.004 (1.8899 - 1.8899)
	Grade No. 4	48.004 - 48.005 (1.8899 - 1.8899)
	Grade No. 5	48.005 - 48.006 (1.8899 - 1.8900)
	Grade No. 6	48.006 - 48.007 (1.8900 - 1.8900)
	Grade No. 7	48.007 - 48.008 (1.8900 - 1.8901)
	Grade No. 8	48.008 - 48.009 (1.8901 - 1.8901)
	Grade No. 9	48.009 - 48.010 (1.8901 - 1.8902)
	Grade No. A	48.010 - 48.011 (1.8902 - 1.8902)
	Grade No. B	48.011 - 48.012 (1.8902 - 1.8902)
	Grade No. C	48.012 - 48.013 (1.8902 - 1.8903)

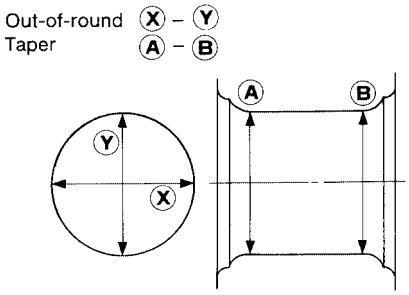
*: After installing in connecting rod

CRANKSHAFT

Unit: mm (in)



SEM645



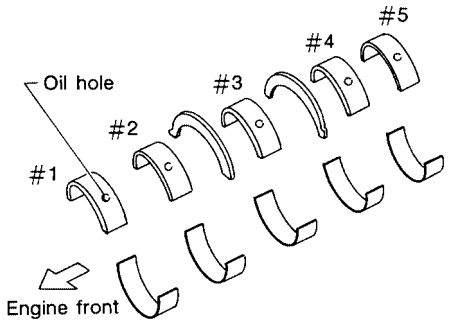
SEM715

Pin journal “DP” grade	Grade No. A	44.974 - 44.973 (1.7706 - 1.7706)
	Grade No. B	44.973 - 44.972 (1.7706 - 1.7705)
	Grade No. C	44.972 - 44.971 (1.7705 - 1.7705)
	Grade No. D	44.971 - 44.970 (1.7705 - 1.7705)
	Grade No. E	44.970 - 44.969 (1.7705 - 1.7704)
	Grade No. F	44.969 - 44.968 (1.7704 - 1.7704)
	Grade No. G	44.968 - 44.967 (1.7704 - 1.7704)
	Grade No. H	44.967 - 44.966 (1.7704 - 1.7703)
	Grade No. J	44.966 - 44.965 (1.7703 - 1.7703)
	Grade No. K	44.965 - 44.964 (1.7703 - 1.7702)
	Grade No. L	44.964 - 44.963 (1.7702 - 1.7702)
	Grade No. M	44.963 - 44.962 (1.7702 - 1.7702)
	Grade No. N	44.962 - 44.961 (1.7702 - 1.7701)
	Grade No. P	44.961 - 44.960 (1.7701 - 1.7701)
	Grade No. R	44.960 - 44.959 (1.7701 - 1.7700)
	Grade No. S	44.959 - 44.958 (1.7700 - 1.7700)
	Grade No. T	44.958 - 44.957 (1.7700 - 1.7700)
	Grade No. U	44.957 - 44.956 (1.7700 - 1.7699)
Main journal “Dm” grade	Grade No. A	54.979 - 54.978 (2.1645 - 2.1645)
	Grade No. B	54.978 - 54.977 (2.1645 - 2.1644)
	Grade No. C	54.977 - 54.976 (2.1644 - 2.1644)
	Grade No. D	54.976 - 54.975 (2.1644 - 2.1644)
	Grade No. E	54.975 - 54.974 (2.1644 - 2.1643)
	Grade No. F	54.974 - 54.973 (2.1643 - 2.1643)
	Grade No. G	54.973 - 54.972 (2.1643 - 2.1642)
	Grade No. H	54.972 - 54.971 (2.1642 - 2.1642)
	Grade No. J	54.971 - 54.970 (2.1642 - 2.1642)
	Grade No. K	54.970 - 54.969 (2.1642 - 2.1641)
	Grade No. L	54.969 - 54.968 (2.1641 - 2.1641)
	Grade No. M	54.968 - 54.967 (2.1641 - 2.1641)
	Grade No. N	54.967 - 54.966 (2.1641 - 2.1640)
	Grade No. P	54.966 - 54.965 (2.1640 - 2.1640)
	Grade No. R	54.965 - 54.964 (2.1640 - 2.1639)
	Grade No. S	54.964 - 54.963 (2.1639 - 2.1639)
	Grade No. T	54.963 - 54.962 (2.1639 - 2.1639)
	Grade No. U	54.962 - 54.961 (2.1639 - 2.1638)
	Grade No. V	54.961 - 54.960 (2.1638 - 2.1638)
	Grade No. W	54.960 - 54.959 (2.1638 - 2.1637)
	Grade No. X	54.959 - 54.958 (2.1637 - 2.1637)
	Grade No. Y	54.958 - 54.957 (2.1637 - 2.1637)
	Grade No. 4	54.957 - 54.956 (2.1637 - 2.1636)
	Grade No. 7	54.956 - 54.955 (2.1636 - 2.1636)
Center distance “r”		49.60 - 50.04 (1.9528 - 1.9701)
Out-of-round (X – Y)	Standard	Less than 0.005 (0.0002)
Taper (A – B)	Standard	Less than 0.005 (0.0002)
Runout [TIR*]	Limit	Less than 0.05 (0.002)
Free end play	Standard	0.10 - 0.26 (0.0039 - 0.0102)
	Limit	0.30 (0.0118)

*: Total indicator reading

MAIN BEARING

Unit: mm (in)



SEM685D

Grade number		Thickness	Identification color (UPR / LWR)	Remarks
0		1.973 - 1.976 (0.0777 - 0.0778)	Black	Grade and color are the same for upper and lower bearings.
1		1.976 - 1.979 (0.0778 - 0.0779)	Brown	
2		1.979 - 1.982 (0.0779 - 0.0780)	Green	
3		1.982 - 1.985 (0.0780 - 0.0781)	Yellow	
4		1.985 - 1.988 (0.0781 - 0.0783)	Blue	
5		1.988 - 1.991 (0.0783 - 0.0784)	Pink	
6		1.991 - 1.994 (0.0784 - 0.0785)	Purple	
7		1.994 - 1.997 (0.0785 - 0.0786)	White	
01	UPR	1.973 - 1.976 (0.0777 - 0.0778)	Black/Brown	Grade and color are different for upper and lower bearings.
	LWR	1.976 - 1.979 (0.0778 - 0.0779)		
12	UPR	1.976 - 1.979 (0.0778 - 0.0779)	Brown/Green	
	LWR	1.979 - 1.982 (0.0779 - 0.0780)		
23	UPR	1.979 - 1.982 (0.0779 - 0.0780)	Green/Yellow	
	LWR	1.982 - 1.985 (0.0780 - 0.0781)		
34	UPR	1.982 - 1.985 (0.0780 - 0.0781)	Yellow/Blue	
	LWR	1.985 - 1.988 (0.0781 - 0.0783)		
45	UPR	1.985 - 1.988 (0.0781 - 0.0783)	Blue/Pink	
	LWR	1.988 - 1.991 (0.0783 - 0.0784)		
56	UPR	1.988 - 1.991 (0.0783 - 0.0784)	Pink/Purple	
	LWR	1.991 - 1.994 (0.0784 - 0.0785)		
67	UPR	1.991 - 1.994 (0.0784 - 0.0785)	Purple/White	
	LWR	1.994 - 1.997 (0.0785 - 0.0786)		

Undersize

Unit: mm (in)

Size U.S.	Thickness	Main journal diameter
0.25 (0.0098)	2.106 - 2.114 (0.0829 - 0.0832)	Grind so that bearing clearance is the specified value.

Bearing Oil Clearance

Unit: mm (in)

Main bearing oil clearance	Standard	No.1, 3, and 5	0.012 - 0.022 (0.0005 - 0.0009)
		No.2 and 4	0.018 - 0.028 (0.0007 - 0.0011)
	Limit		0.1 (0.004)

CONNECTING ROD BEARING

Grade number	Thickness mm (in)	Identification color (mark)
0	1.499 - 1.495 (0.0590 - 0.0589)	Black
1	1.503 - 1.499 (0.0592 - 0.0590)	Red
2	1.507 - 1.503 (0.0593 - 0.0592)	Green
3	1.511 - 1.507 (0.0595 - 0.0593)	Yellow

Undersize

Unit: mm (in)

Size U.S.	Thickness	Crank pin journal diameter
0.25 (0.0098)	1.624 - 1.632 (0.0639 - 0.0643)	Grind so that bearing clearance is the specified value.

Bearing Oil Clearance

Unit: mm (in)

Connecting rod bearing oil clearance	Standard	0.028 - 0.045 (0.0011 - 0.0018)
	Limit	0.10 (0.0039)

Miscellaneous Components

EBS00EZ6

Unit: mm (in)

Flywheel runout [TIR*]	Less than 0.15 (0.0059)
Rotational movement 9.8 N.m (1.0 kg-m, 87 in-lb) force applied	Less than 28.3 mm (1.114 in)

*: Total indicator reading at measuring point 115 mm (4.53 in) from crankshaft center.

SECTION LU

ENGINE LUBRICATION SYSTEM

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PRECAUTIONS

PFP:00001

Precautions for Liquid Gasket

EBS00EYP

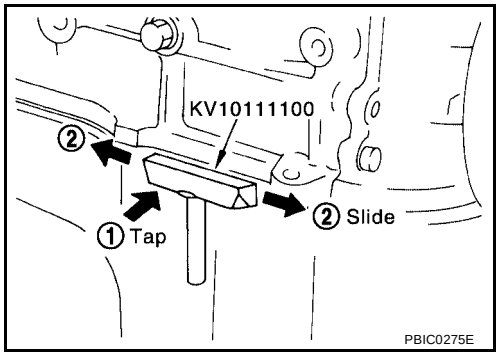
REMOVAL OF LIQUID GASKET SEALING

- After removing the mounting bolts and nuts, disconnect and remove the sealant using a seal cutter.

CAUTION:
Be careful not to damage the mating surfaces.

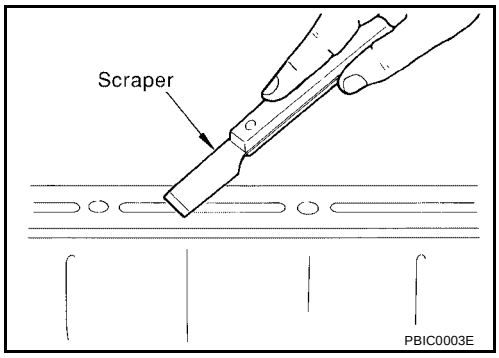
- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap the areas where the sealant is applied.

CAUTION:
If for some unavoidable reason a tool such as a flat-bladed screwdriver is used, be careful not to damage the mating surfaces.

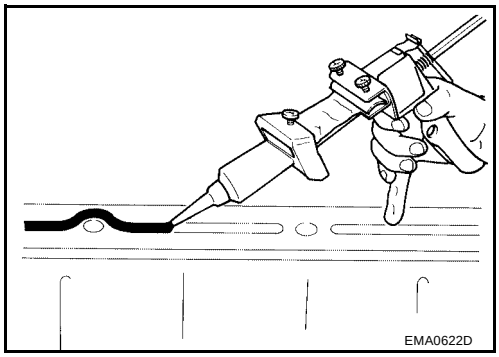


LIQUID GASKET APPLICATION PROCEDURE

1. Using a scraper, remove the old sealant adhering to the gasket application surface and the mating surface.
   - Remove the old sealant completely from the groove of the gasket application surface, mounting bolts, and bolt holes.
2. Clean the mating surface to remove dirt, moisture, grease, and foreign material.
3. Attach the sealant tube to the tube presser.
   Use Genuine RTV Silicone Sealant or equivalent. Refer to **GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"** **.**

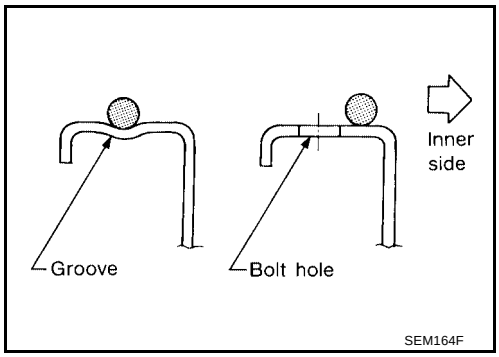


4. Apply the sealant without breaks to the specified location with the specified dimensions.
   - If there is a groove for the sealant application, apply the Sealant to the groove.
   - As for the bolt holes, normally apply the sealant inside the holes. Occasionally, it should be applied outside the holes.



   - Within five minutes of sealant application, install the mating component.
   - If the sealant protrudes, wipe it off immediately.
   - Do not retighten after the installation.
   - After 30 minutes or more have passed after installation, fill the engine with oil and coolant.

CAUTION:
If there are specific instructions in the service manual, observe them.



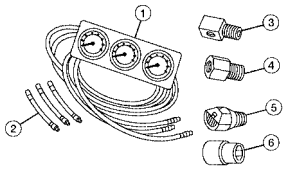
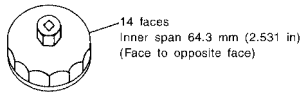
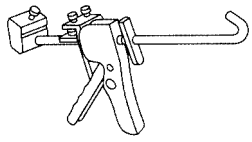
PREPARATION

PFP:00002

Special Service Tools

EBS00CGC

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

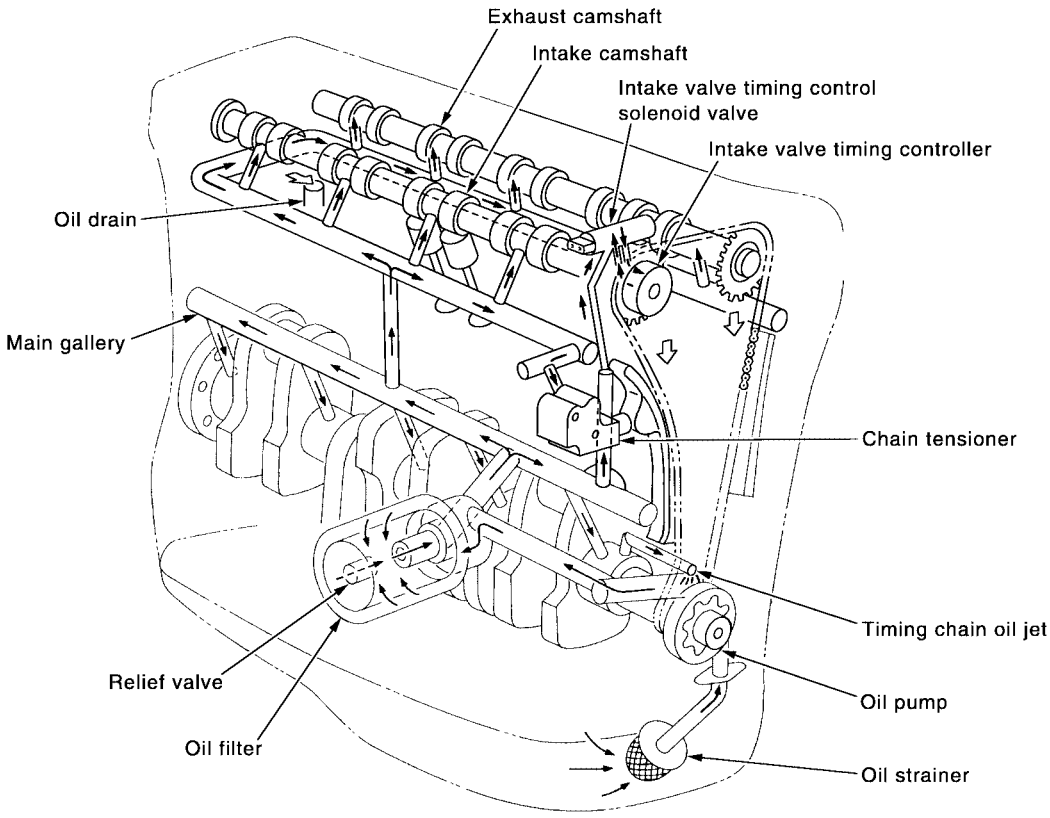
Tool number (Kent-Moore No.) Tool name	Description
(J34301-C) Oil pressure gauge set 1. (J34301-1) Oil pressure gauge 2. (J34301-2) Hoses 3. (J34298) Adapter 4. (J34282-1) Adapter 5. (790-301-1230-A) 60° adapter 6. (J34301-15) Square socket  AAT896	Measuring oil pressure **Maximum measuring range:** **1,373 kPa (14 kg/cm^2 , 199 psi)**
KV10115800 (J-37140-A) Oil filter wrench  S-NT772	Removing and installing oil filter
WS39930000 (—) Tube presser  S-NT052	Pressing the tube of liquid gasket

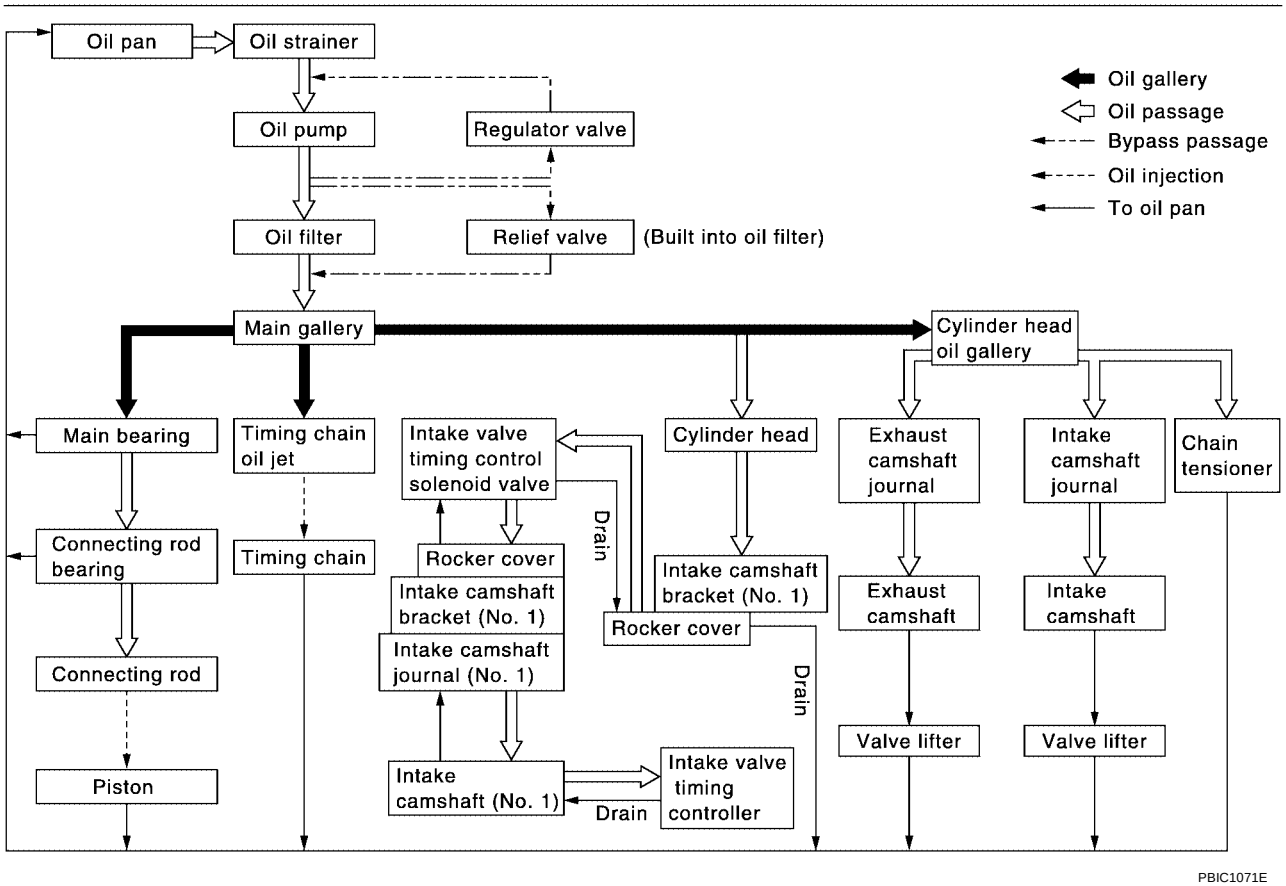
LUBRICATION SYSTEM

PFP:15010

Lubrication Circuit

EBS00CGD





PBIC1071E

ENGINE OIL

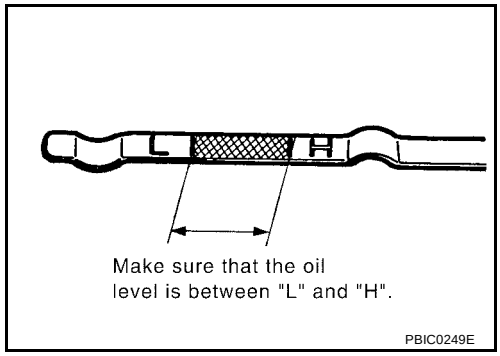
PFP:KLA92

Inspection

EBS00CGE

OIL LEVEL AND MUDDINESS

- Ensure the vehicle is on a level surface with engine off, then check the oil level. If the engine is already started, stop it and allow 10 minutes before checking.
- Check that the oil level is within the range shown in the figure.
- If it is out of range, add oil as necessary. Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .
- Check the oil for white turbidity or remarkable contamination.
- If the oil becomes turbid and white, it is highly probable that it is contaminated with coolant. Diagnose the problem and correct as necessary.



OIL LEAKAGE

Check for oil leakage around the following areas.

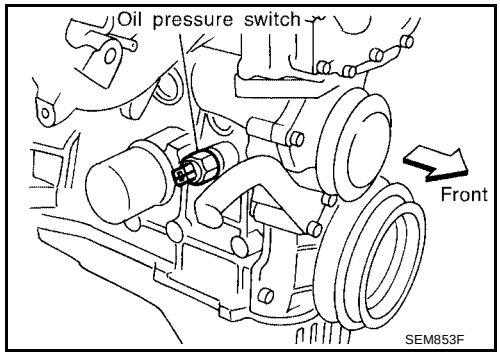
- Oil pan
- Oil pan drain plug
- Oil pressure switch
- Oil filter
- Front cover
- Mating surface between cylinder block and cylinder head
- Mating surface between cylinder head and rocker cover
- Crankshaft oil seal.

OIL PRESSURE CHECK

WARNING:

- **Be careful not to burn yourself, as the engine oil may be hot.**
- **For M/T models, put gearshift lever in Neutral. For A/T models, put the selector lever in Park "P" position.**

1. Check the oil level.
2. Remove the oil pressure switch.
3. Connect the oil pressure gauge using the Tool.
4. After warming up the engine to the normal operating temperature, check that oil pressure corresponding to the engine speed is produced.



Engine oil pressure [Oil temperature is 80°C (176°F)]

Engine speed (rpm)	Idle speed	2,000	6,000
Engine pressure kPa (kg/cm^2 , psi)	Approx. 98 (1.0, 14) or more	Approx. 294 (3.0, 43) or more	Approx. 392 (4.0, 57) or more

5. After checking, install the oil pressure switch as follows.

a. Remove old sealant adhering to the switch and engine.

b. Apply thread sealant. Tighten switch to specification.
Use Genuine High Performance Thread Sealant or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .

Oil pressure switch : 12 - 17 N·m (1.22 - 1.73 kg-m, 8.8 - 12.5 ft-lb)

Changing Engine Oil

EBS00CGF

WARNING:

- **Be careful not to burn yourself, as the engine oil may be hot.**
- **Prolonged and repeated contact with used engine oil may cause skin cancer: try to avoid direct skin contact with used oil. If skin contact is made, wash thoroughly with soap or hand cleaner as soon as possible.**

1. Warm up engine, and check for oil leakage from engine components.
2. Stop engine and wait for 10 minutes.
3. Remove drain plug and oil filler cap to drain the oil.
4. Remove the oil filter and install a new filter.
5. Install the oil pan drain plug with a new washer.

CAUTION:

- **Be sure to clean the drain plug and install with new washer.**

Oil pan drain plug : 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)

- **The refill capacity depends on the oil temperature and drain time. Use these specifications for reference only.**
  Always use the dipstick to determine that the proper amount of oil is in the engine.

6. Fill the engine with oil.

Oil specification and viscosity

- Refer to MA-13, "Fluids and Lubricants" .

Oil capacity (Approximate):

Drain and refill	With oil filter change	2.7 ℓ (2-7/8 US qt, 2-3/8 Imp qt)
	Without oil filter change	2.5 ℓ (2-5/8 US qt, 2-1/4 Imp qt)
Dry engine (engine overhaul)		3.1 ℓ (3-1/4 US qt, 2-3/4 Imp qt)

7. Warm up the engine and check the area around the drain plug and oil filter for oil leakage.
8. Stop the engine and wait for 10 minutes.
9. Check the oil level. Refer to LU-5, "ENGINE OIL" .

OIL FILTER

PFP:15208

Removal and Installation

EBS00CGG

REMOVAL

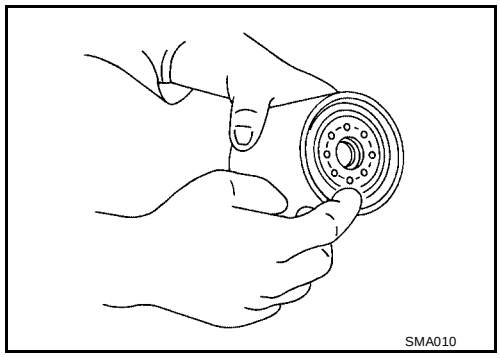
1. Remove the RH engine under cover.
2. Using an oil filter wrench, remove the oil filter.

CAUTION:

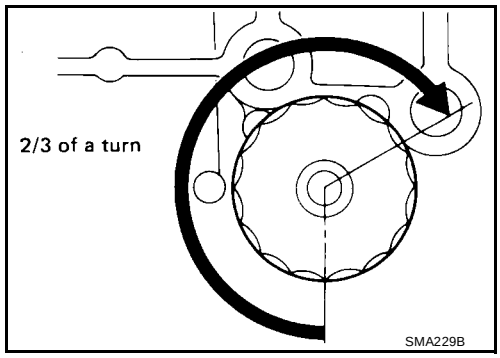
- **Be careful not to get burned when the engine and engine oil are hot.**
- **When removing, prepare a shop cloth to absorb any oil leakage or spillage.**
- **Do not allow engine oil to adhere to the drive belts.**
- **Completely wipe off any oil that adheres to the engine and the vehicle.**

INSTALLATION

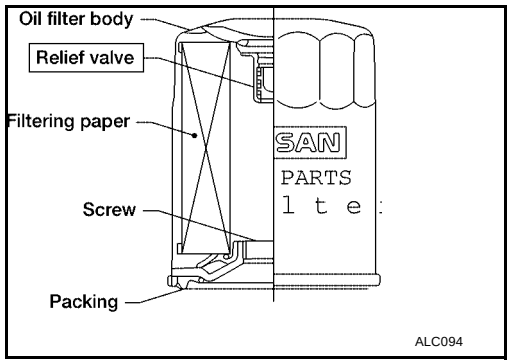
1. Remove foreign materials adhering to the oil filter installation surface.
2. Apply engine oil to the oil seal circumference of the new oil filter.



3. Screw the oil filter manually until it touches the installation surface, then tighten it by 2/3 turn.



4. After warming up the engine, check for engine oil leakage.
5. Check oil level with the dipstick and add engine oil as necessary. Refer to LU-5, "ENGINE OIL" .
6. Install the RH engine under cover.



OIL PUMP

PFP:15010

Removal and Installation

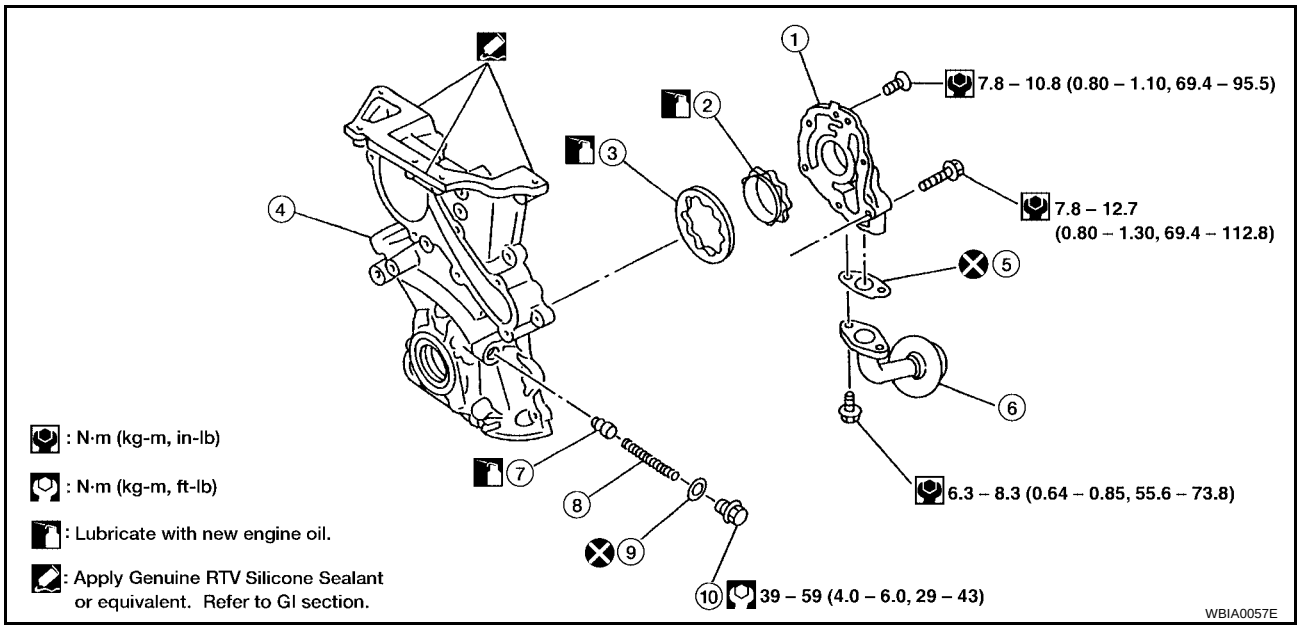
EBS00CGH

- **When installing the oil pump, apply clean engine oil to the rotor.**
- **Make sure that O-ring seal is fitted properly.**
- **Use a scraper to remove the old sealant from the mating surface of the front cover.**
- **Also remove all traces of the old sealant from the mating surface of the engine block.**

1. Remove the drive belts.
2. Remove the oil pan. Refer to EM-18, "Removal" .
3. Remove the oil strainer.
4. Remove the front cover. Refer to EM-43, "Removal" .
5. Install the front cover, applying a continuous bead of Genuine RTV Silicone Sealant or equivalent to mating surface of front cover assembly. Refer to LU-2, "LIQUID GASKET APPLICATION PROCEDURE" .
6. Installation is in the reverse order of removal.

Disassembly and Assembly

EBS00CGI

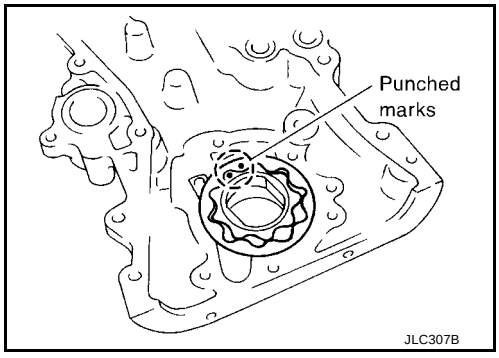


1. Oil pump cover
2. Inner rotor
3. Outer rotor
4. Front cover
5. Gasket
6. Oil strainer
7. Regulator valve
8. Spring
9. Washer
10. Plug

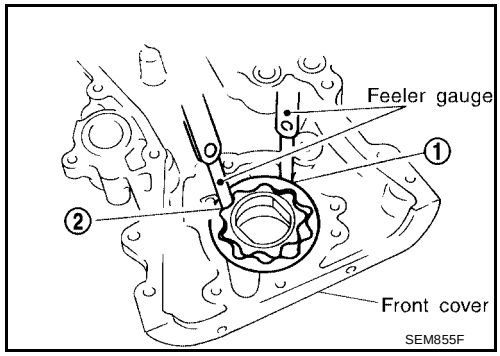
Inspection

EBS00CGJ

- Install the oil pump rotors with the punch marks on the oil pump cover side, as shown.



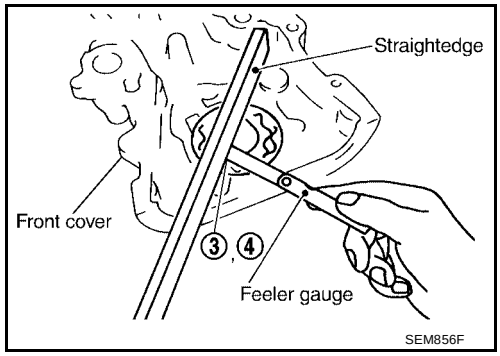
- Using a feeler gauge, check the following clearances.



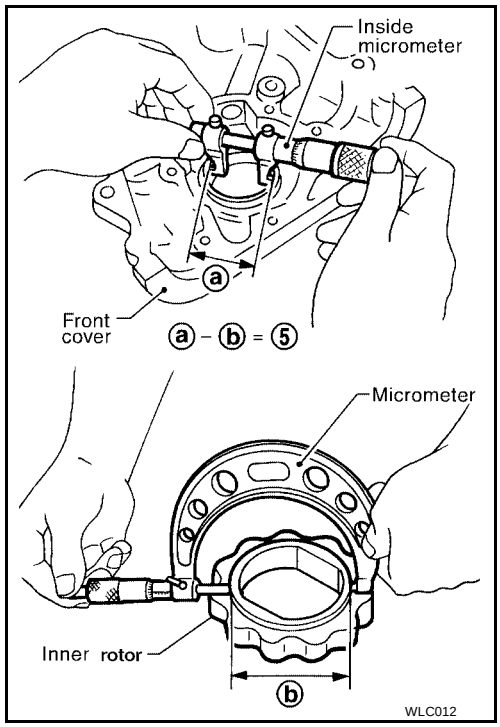
Standard clearance:

Unit: mm (in)

Body to outer rotor radial clearance **1**	0.114 - 0.200 (0.0045 - 0.0079)
Inner rotor to outer rotor tip clearance **2**	Below 0.18 (0.0071)
Body to inner rotor clearance **3**	0.030 - 0.070 (0.0012 - 0.0028)
Body to outer rotor axial clearance **4**	0.030 - 0.090 (0.0012 - 0.0035)
Inner rotor to brazed portion of housing clearance **5**	0.045 - 0.091 (0.0018 - 0.0036)



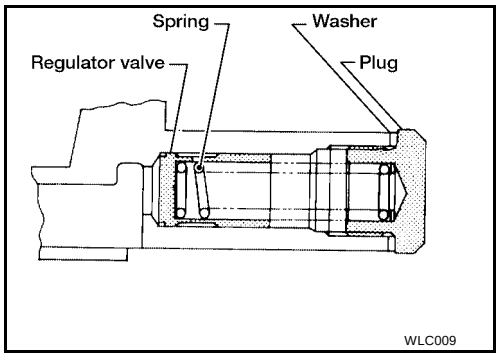
- If the tip clearance (2) exceeds the limit, replace the rotor set.
- If the body to rotor clearances (1, 3, 4, 5) exceed the limit, replace the front cover assembly.



Regulator Valve Inspection

EBS00CGK

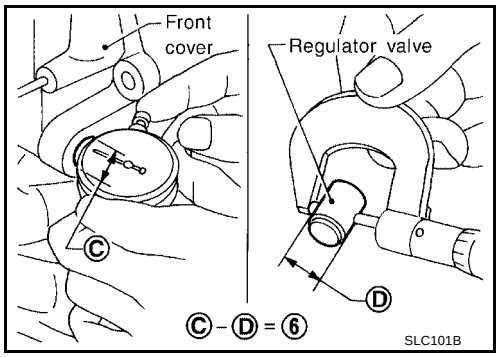
1. Visually inspect components for wear and damage.
2. Check oil pressure regulator valve sliding surface and valve spring.
3. Coat regulator valve with engine oil.
   - Check that the regulator valve falls smoothly into the valve hole by its own weight and gravity.
   - If damaged, replace the regulator valve set or front cover assembly.



4. Check regulator valve to front cover clearance.

   Clearance : 0.040 - 0.097 mm (0.0016 - 0.0038 in)

   - If the valve exceeds the specification, replace the front cover assembly.



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Oil Pressure

EBS00CGL

Engine speed (rpm)	Approximate discharge pressure kPa (kg/cm^2 , psi)
Idle speed	Approx. 98 (1.0, 14) or more
2,000	Approx. 294 (3.0, 43) or more
6,000	Approx. 392 (4.0, 57) or more

Oil Pump

EBS00CGM

Unit: mm (in)

Body to outer rotor radial clearance	0.114 - 0.200 (0.0045 - 0.0079)
Inner rotor to outer rotor tip clearance	Below 0.18 (0.0071)
Body to inner rotor clearance	0.030 - 0.070 (0.0012 - 0.0028)
Body to outer rotor axial clearance	0.030 - 0.090 (0.0012 - 0.0035)
Inner rotor to brazed portion of housing clearance	0.045 - 0.091 (0.0018 - 0.0036)

Regulator Valve

EBS00CGN

Unit: mm (in)

Regulator valve to oil pump cover clearance	0.040 - 0.097 (0.0016 - 0.0038)

Oil Capacity

EBS00EYQ

Unit: ℓ (US qt., Imp qt.)

With oil filter change	2.7 (2-7/8, 2-3/8)
Without oil filter change	2.5 (2-5/8, 2-1/4)
Dry engine (engine overhaul)	3.1 (3-1/4, 2-3/4)

PRECAUTIONS

PFP:00001

Precautions for Liquid Gasket

EBS00CGO

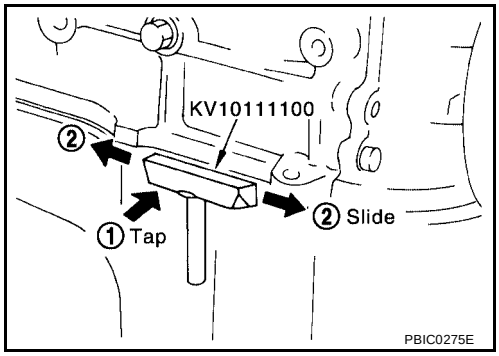
REMOVAL OF LIQUID GASKET SEALING

- After removing the mounting bolts and nuts, disconnect and remove the sealant using a seal cutter.

CAUTION:
Be careful not to damage the mating surfaces.

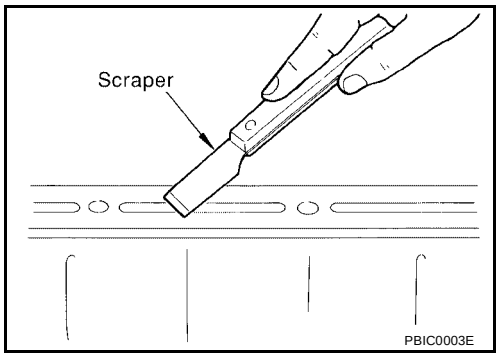
- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap the areas where the sealant is applied.

CAUTION:
If for some unavoidable reason a tool such as a flat-bladed screwdriver is used, be careful not to damage the mating surfaces.

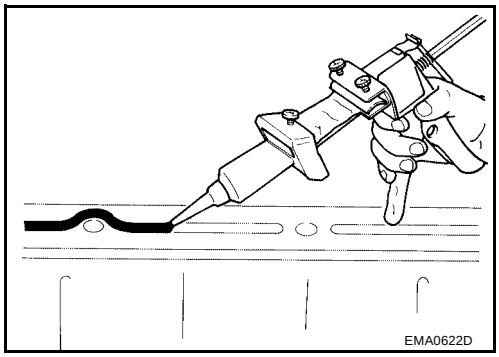


LIQUID GASKET APPLICATION PROCEDURE

1. Using a scraper, remove the old sealant adhering to the gasket application surface and the mating surface.
   - Remove the old sealant completely from the groove of the gasket application surface, mounting bolts, and bolt holes.
2. Clean the mating surface to remove dirt, moisture, grease, and foreign material.
3. Attach the sealant tube to the tube presser.
   Use Genuine RTV Silicone Sealant or equivalent. Refer to **GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"** **.**

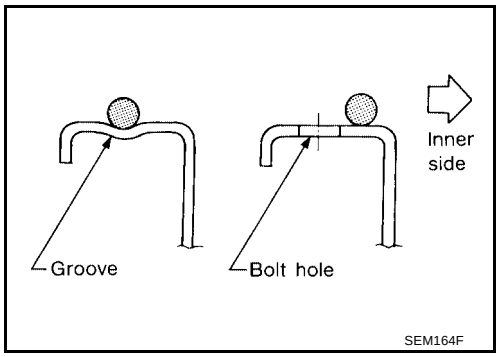


4. Apply the sealant without breaks to the specified location with the specified dimensions.
   - If there is a groove for the sealant application, apply the Sealant to the groove.
   - As for the bolt holes, normally apply the sealant inside the holes. Occasionally, it should be applied outside the holes.



   - Within five minutes of sealant application, install the mating component.
   - If the sealant protrudes, wipe it off immediately.
   - Do not retighten after the installation.
   - After 30 minutes or more have passed after installation, fill the engine with oil and coolant.

CAUTION:
If there are specific instructions in the service manual, observe them.



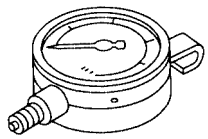
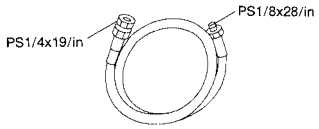
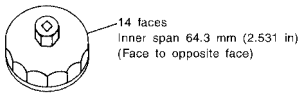
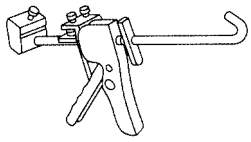
PREPARATION

PFP:00002

Special Service Tools

EBS00CGP

The actual shape of Kent-Moore tools may differ from those of special service tools illustrated here.

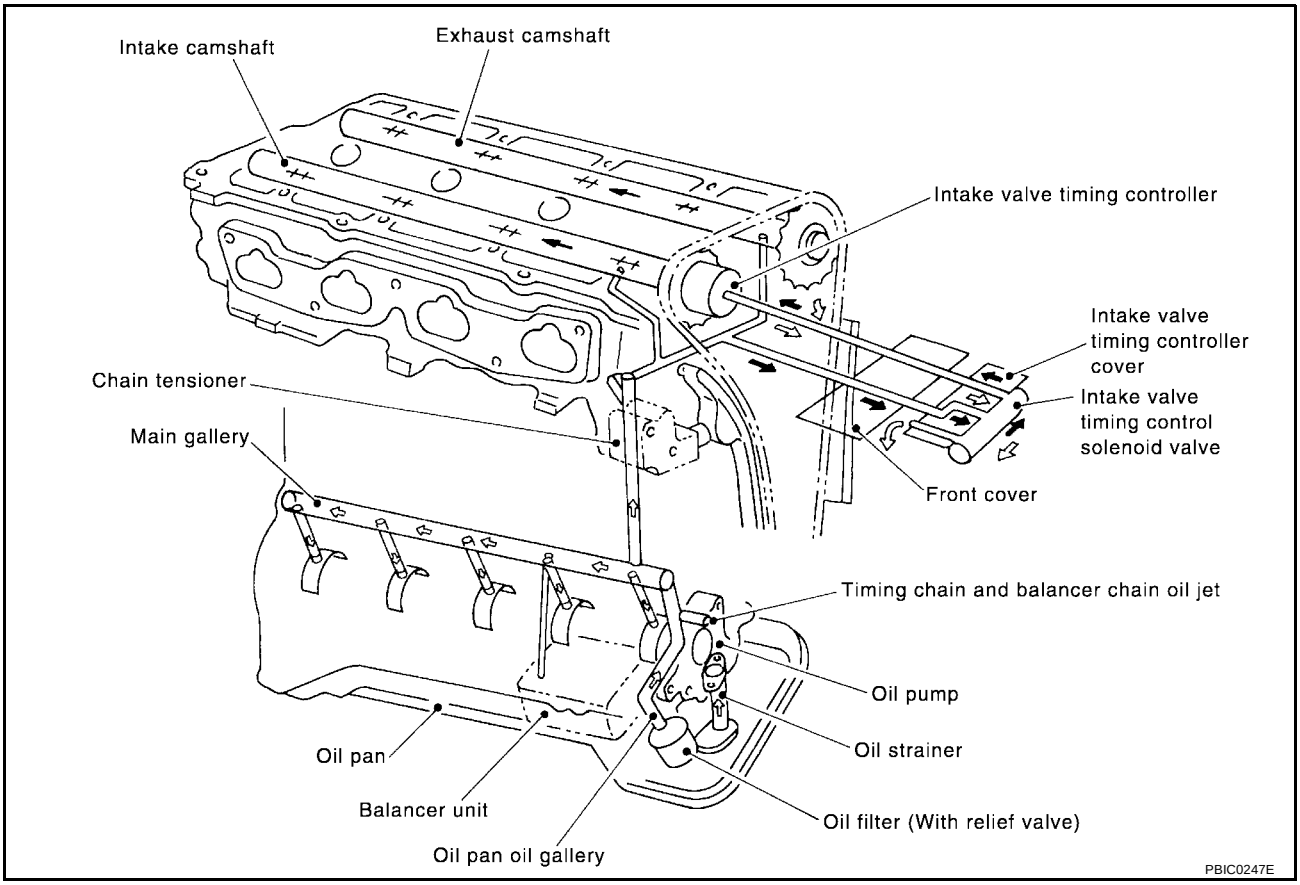
Tool number Tool name	Description
ST25051001 (J34301-1) Oil pressure gauge  S-NT050	Measuring oil pressure **Maximum measuring range:** **2,452 kPa (25 kg/cm2, 356 psi)**
ST25052000 (J34301-2) Hose  S-NT559	Adapting oil pressure gauge to cylinder block
KV10115801 (J37140-A) Oil filter wrench  S-NT772	Removing and installing oil filter
WS39930000 (-) Tube presser  S-NT052	Pressing the tube of RTV Silicone Sealant

LUBRICATION SYSTEM

PFP:15010

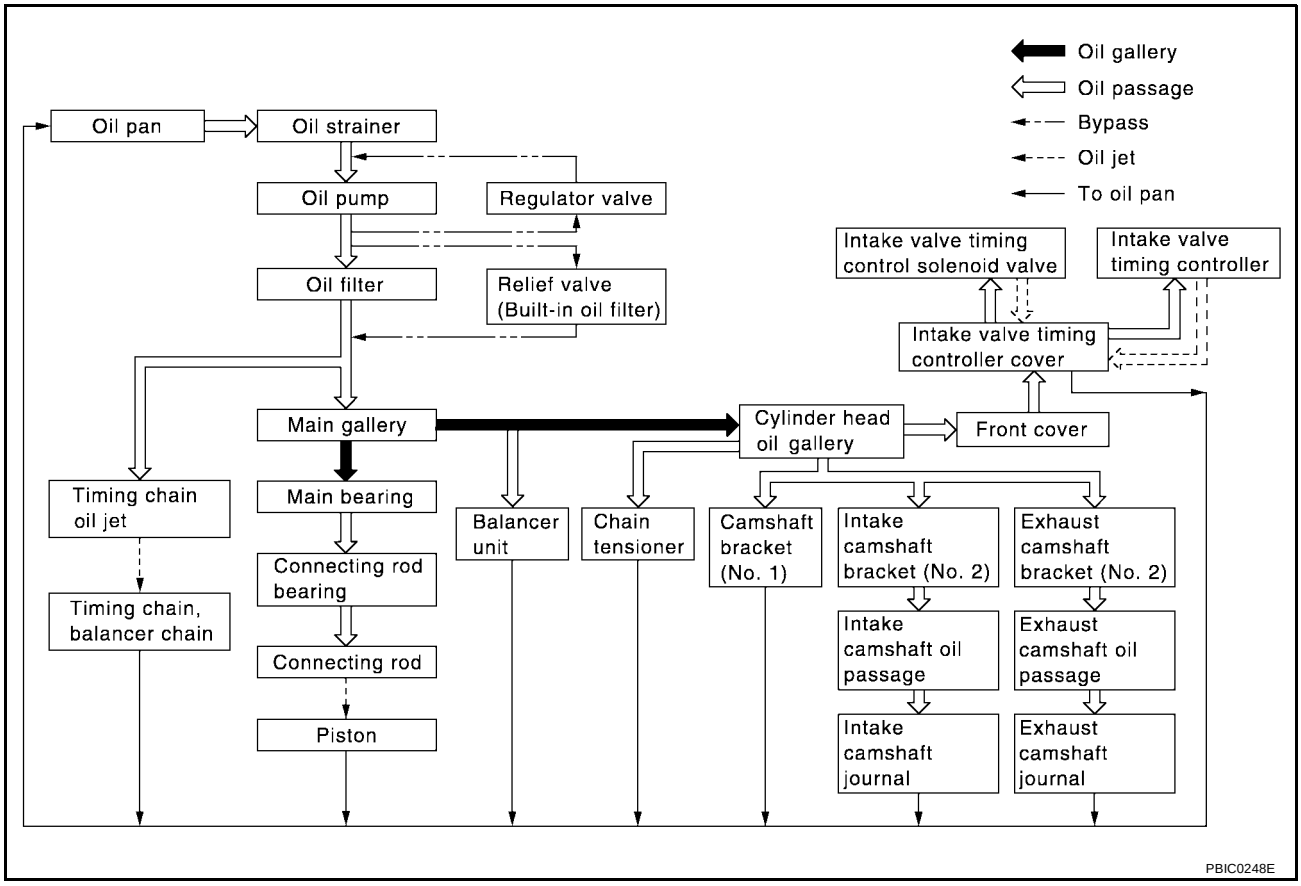
Lubrication Circuit

EBS00CGQ



System Drawing

EBS00CGR



ENGINE OIL

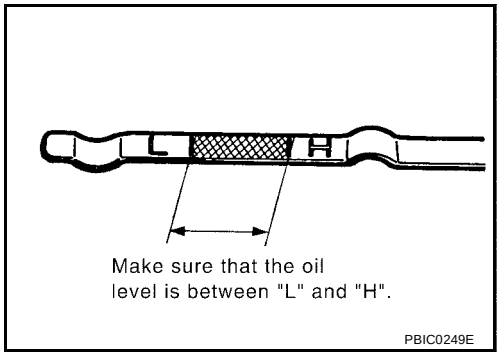
PFP:KLA92

Inspection

EBS00CGS

OIL LEVEL AND MUDINESS

- Ensure the vehicle is on a level surface with engine off, then check the oil level. If the engine is already started, stop it and allow 10 minutes before checking.
- Check that the oil level is within the range shown in the figure and adjust if necessary.
- If it is out of range, add oil as necessary. Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .
- Check the oil for white turbidity or remarkable contamination.
- If the oil becomes turbid and white, it is highly probable that it is contaminated with coolant. Diagnose the problem and correct as necessary.



OIL LEAKAGE

Check for oil leakage around the following areas.

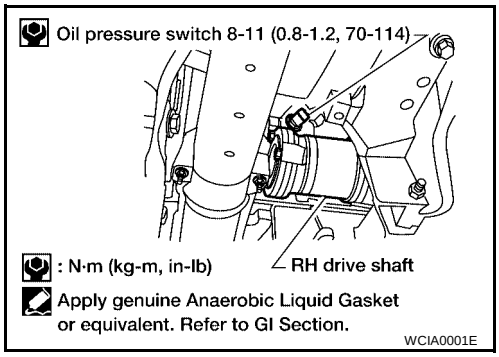
- Oil pan
- Oil pan drain plug
- Oil pressure switch
- Oil filter
- IVTC (intake valve timing control) cover
- Front cover
- Mating surface between cylinder block and cylinder head
- Mating surface between cylinder head and rocker cover
- Crankshaft oil seal

OIL PRESSURE CHECK

WARNING:

- **Be careful not to burn yourself, as the engine oil may be hot.**
- **For M/T models, put gearshift lever in Neutral position. For A/T models, put selector lever in Park "P" position.**

1. Check the oil level.
2. Remove the under cover.
3. Remove the oil pressure switch to connect the oil pressure gauge.
4. After warming up the engine to the normal operating temperature, check that oil pressure corresponding to the engine speed is produced.



Engine oil pressure [Oil temperature is 80 °C (176 °F)]

Engine speed (rpm)	Idle speed	2,000	6,000
Engine pressure kPa (kg/cm^2 , psi)	Approx. 98 (1.0, 14) or more	Approx. 294 (3.0, 43) or more	Approx. 392 (4.0, 57) or more

5. After checking, install the oil pressure switch as follows:

a. Remove the old thread sealant adhering to the switch and engine.

b. Apply thread sealant. Tighten the switch to specification.
Use Genuine High Performance Thread Sealant or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .

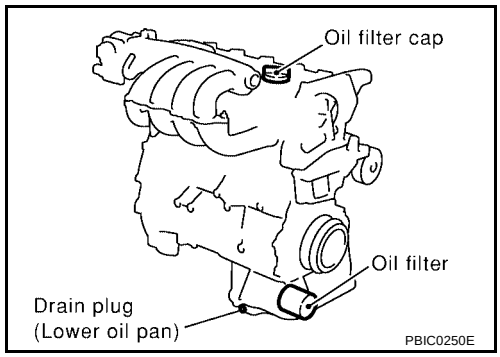
Oil pressure switch : 12.3 - 17.2 N·m (1.25 - 1.75 kg-m, 10 - 12 ft-lb)

Changing Engine Oil

EBS00CGT

WARNING:

- **Be careful not to burn yourself, as the engine oil is hot.**
- **Prolonged and repeated contact with used engine oil may cause skin cancer: try to avoid direct skin contact with used oil. If skin contact is made, wash thoroughly with soap or hand cleaner as soon as possible.**



1. Warm up engine, and check for oil leakage from engine components.
2. Stop the engine and wait for 10 minutes.
3. Remove the oil drain plug and oil filler cap to drain the oil.
4. Remove the oil filter and replace it with a new oil filter.
5. Install the oil drain plug using a new washer.

   Oil pan drain plug : 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)

   CAUTION:
   - **Clean the oil drain plug and install with a new washer.**
6. Fill the engine with the specified oil.
   - Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .

   Oil capacity (Approximate):

Drain and refill	With oil filter change	4.0 ℓ (4-1/4 US qt, 3-1/2 Imp qt)
	Without oil filter change	3.8 ℓ (4 US qt, 3-3/8 Imp qt)
Dry engine (engine overhaul)		4.5 ℓ (4-3/4 US qt, 4 Imp qt)

   - The refill capacity depends on the oil temperature and drain time. Use these specifications for reference only.
   - Always use the dipstick to the determine when the proper amount of oil is in the engine.
7. Warm up the engine and check the area around the oil drain plug and oil filter for oil leakage.
8. Stop the engine and wait for 10 minutes.
9. Check the oil level using the dipstick. Refer to LU-16, "ENGINE OIL" .

OIL FILTER

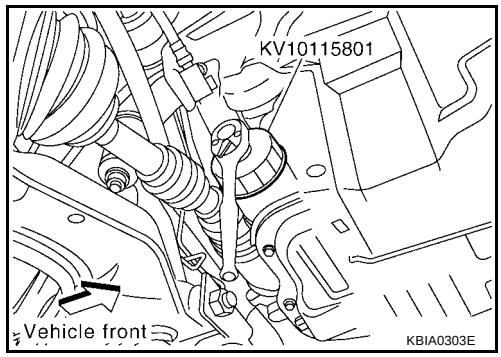
PFP:15208

Removal and Installation

EBS00CGU

REMOVAL

1. Open the oil filter installation/removal access cover on the RH engine under cover.
2. Using an oil filter wrench, remove the oil filter.

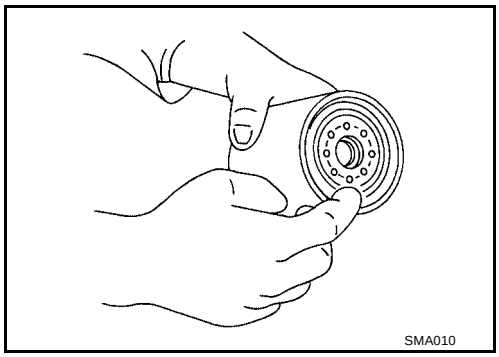


CAUTION:

- **Be careful not to get burned when the engine and engine oil are hot.**
- **When removing, prepare a shop cloth to absorb any oil leakage or spillage.**
- **Do not allow engine oil to adhere to the drive belts.**
- **Completely wipe off any oil that adheres to the engine and the vehicle.**

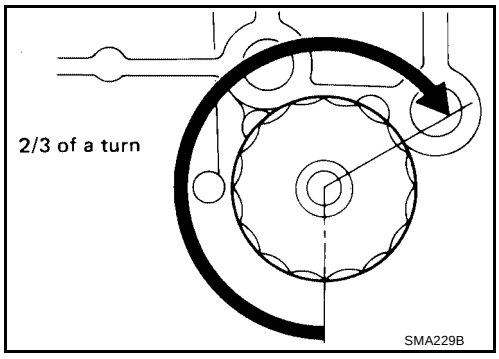
INSTALLATION

1. Remove foreign material adhering to the oil filter installation surface.
2. Apply a thin coating of engine oil to the oil seal surface of the new oil filter.

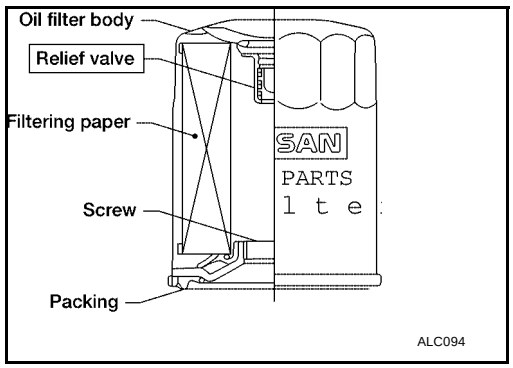


3. Screw the oil filter manually until it touches the installation surface and then tighten it by 2/3 turn. Or tighten the oil filter to the correct specification.

Oil filter : 14.7 - 20.5 N·m (1.5 - 2.1 kg-m, 11 - 15 ft-lb)



4. After warming up the engine, check for engine oil leakage.
5. Check the oil level and adjust the engine oil level as necessary. Refer to LU-16, "ENGINE OIL" .



OIL PUMP

PFP:15010

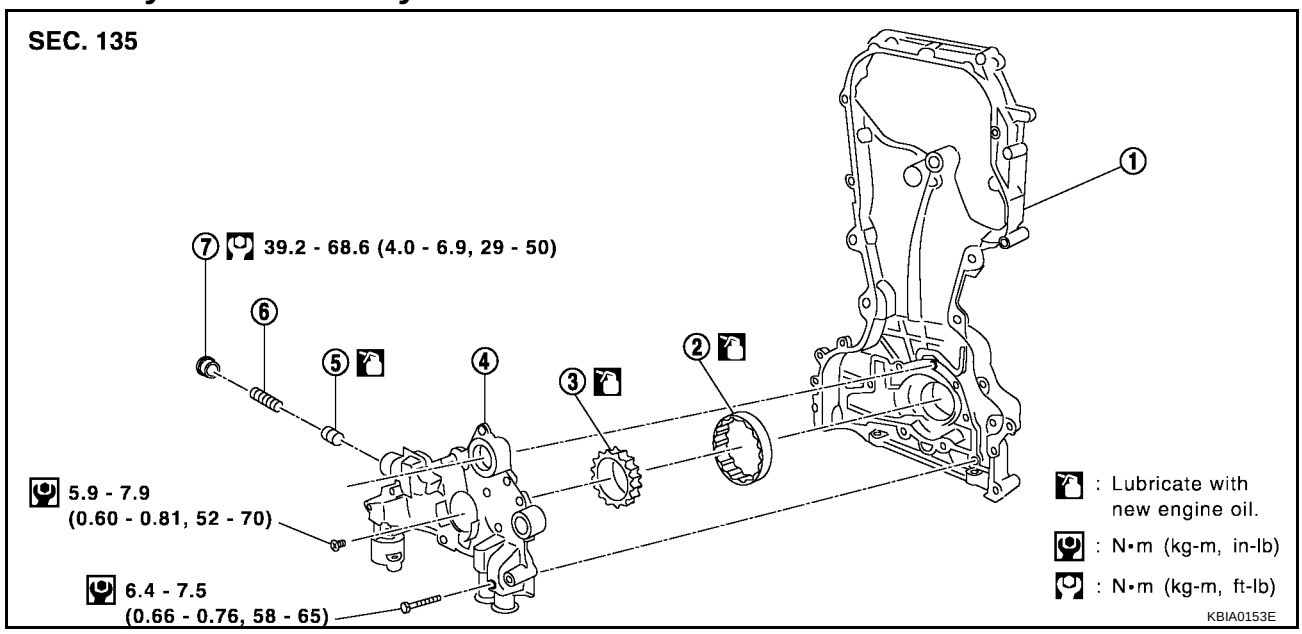
Removal and Installation

EBS00CGV

1. To remove the oil pump, remove the front cover. Refer to EM-136, "TIMING CHAIN" .
   - Only perform the steps necessary to remove the front cover.
2. Installation is in the reverse order of removal.

Disassembly and Assembly

EBS00CGW



1. Front cover
2. Outer rotor
3. Inner rotor
4. Oil pump cover
5. Regulator valve
6. Regulator valve spring
7. Regulator plug

CAUTION:

Before installation, apply new engine oil to the parts as instructed in the figure.

DISASSEMBLY

1. Remove the oil pump cover.
2. Remove the inner rotor and the outer rotor from the front cover.
3. After removing the regulator plug, remove the regulator valve spring and the regulator valve.

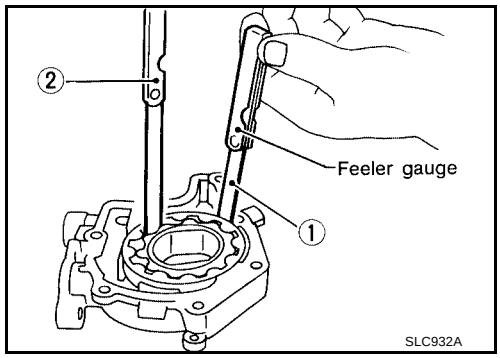
INSPECTION AFTER DISASSEMBLY

1. Measuring the internal clearance of the oil pump components.
   - Measure the clearance with a feeler gauge.
     Clearance between outer rotor and oil pump body (position 1):

     Standard clearance : 0.114 - 0.179 mm (0.0045 - 0.0070 in)

     Tip clearance between inner rotor and outer rotor (position 2):

     Standard clearance : Less than 0.220 mm (0.0087 in)



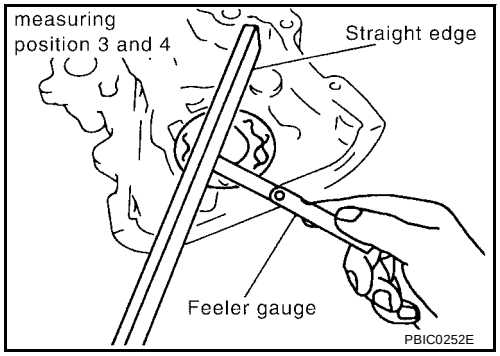
- Measure clearance with feeler gauge and straightedge.
  Side clearance between inner rotor and oil pump body (position 3):

  Standard clearance : 0.030 - 0.070 mm (0.0012 - 0.0028 in)

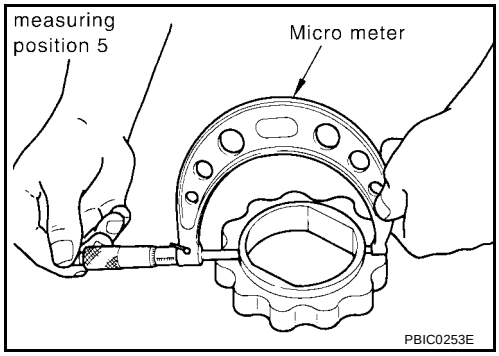
- Side clearance between outer rotor and oil pump body (position 4):

  Standard clearance : 0.060 - 0.110 mm (0.0024 - 0.0043 in)

- Calculate the clearance between inner rotor and oil pump body as follows.

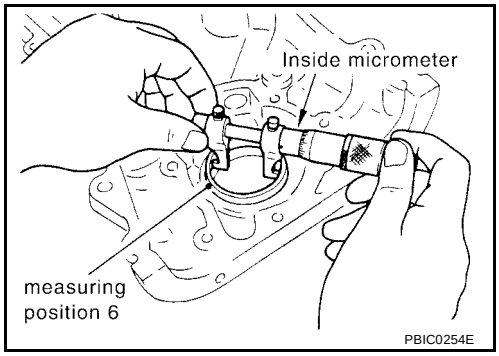


2. Measure the outer diameter of protruded portion of inner rotor (Position 5).



3. Measure the inner diameter of oil pump body with an inside micrometer (Position 6).
   (Clearance) = (Inner diameter of oil pump body) – (Outer diameter of inner rotor):

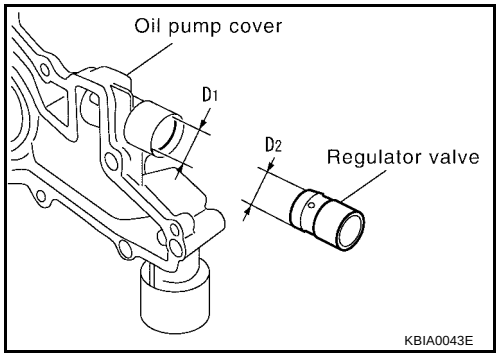
   Standard clearance : 0.035 - 0.070 mm (0.0014 - 0.0028 in)



4. Measure the regulator valve clearance.
   - (Clearance) = D1(Valve hole diameter) – D2 (Outer diameter of valve):

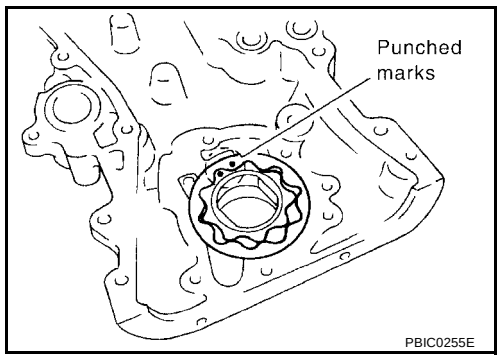
     Standard clearance : 0.040 - 0.097 mm (0.0016 - 0.0038 in)

     CAUTION:
     Coat the regulator valve with engine oil.
     Check that it falls smoothly into the valve hole by its own weight.



ASSEMBLY

- Assembly is in the reverse order of disassembly.
- Install the inner rotor and outer rotor with the punched marks on the oil pump cover side.



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Oil Pressure

EBS00CGX

Engine speed (rpm)	Approximate discharge pressure kPa (kg/cm^2 , psi)
Idle speed	Approx. 98 (1.0, 14) or more
2,000	Approx. 294 (3.0, 43) or more
6,000	Approx. 392 (4.0, 57) or more

Oil Pump

EBS00CGY

Unit: mm (in)

Body to outer rotor radial clearance	0.114 - 0.179 (0.0045-0.0070)
Inner rotor to outer rotor tip clearance	Less than 0.220 (0.0087)
Body to inner rotor axial clearance	0.030 - 0.070 (0.0012 - 0.0028)
Body to outer rotor axial clearance	0.060 - 0.110 (0.0024 - 0.0043)
Inner rotor to brazed portion of housing clearance	0.035 - 0.070 (0.0014 - 0.0028)

Regulator Valve

EBS00CGZ

Unit: mm (in)

Regulator valve to oil pump cover clearance	0.040 - 0.097 (0.0016 - 0.0038)

Oil Capacity

EBS00CH0

Unit: ℓ (US qt., Imp qt.)

With oil filter change	Approximately 4.0 (4-1/4, 3-1/2)
Without oil filter change	Approximately 3.8 (4, 3-3/8)
Dry engine (engine overhaul)	Approximately 4.5 (4-3/4, 4)

SECTION GI
GENERAL INFORMATION

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EAS000X3

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**

Description

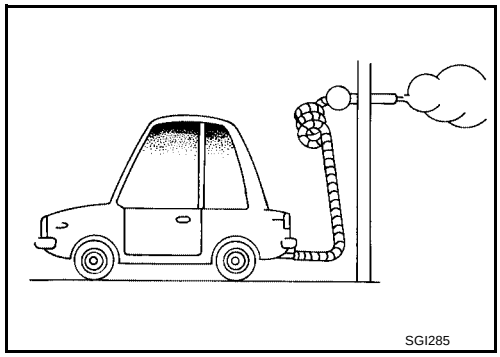
EAS000V5

Observe the following precautions to ensure safe and proper servicing. These precautions are not described in each individual section.

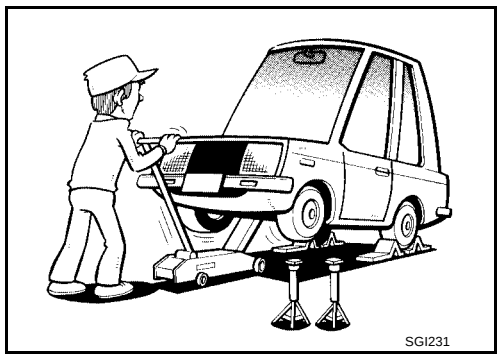
General Precautions

EAS000V6

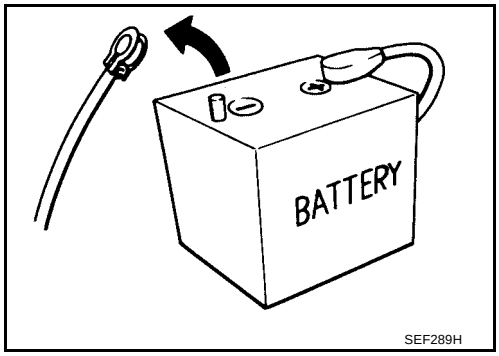
- Do not operate the engine for an extended period of time without proper exhaust ventilation.
  Keep the work area well ventilated and free of any inflammable materials. Special care should be taken when handling any inflammable or poisonous materials, such as gasoline, refrigerant gas, etc. When working in a pit or other enclosed area, be sure to properly ventilate the area before working with hazardous materials.
  Do not smoke while working on the vehicle.


SGI285

- Before jacking up the vehicle, apply wheel chocks or other tire blocks to the wheels to prevent the vehicle from moving. After jacking up the vehicle, support the vehicle weight with safety stands at the points designated for proper lifting before working on the vehicle.
  These operations should be done on a level surface.
- When removing a heavy component such as the engine or transaxle/transmission, be careful not to lose your balance and drop them. Also, do not allow them to strike adjacent parts, especially the brake tubes and master cylinder.

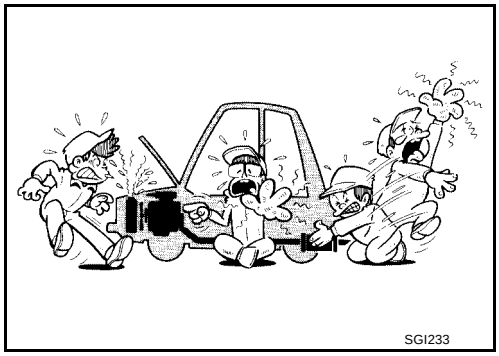

SGI231

- Before starting repairs which do not require battery power:
  Turn off ignition switch.
  Disconnect the negative battery terminal.
- If the battery terminals are disconnected, recorded memory of radio and each control unit is erased.

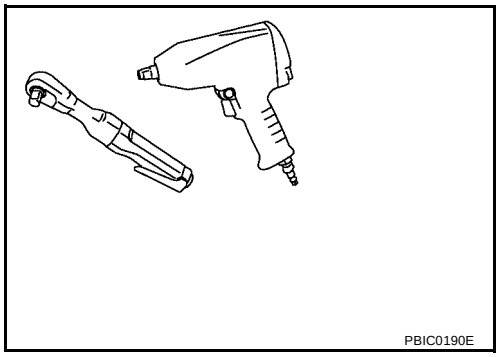


SEF289H

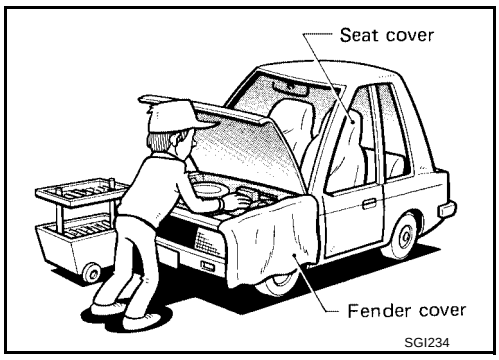
- To prevent serious burns:
  Avoid contact with hot metal parts.
  Do not remove the radiator cap when the engine is hot.
- Dispose of drained oil or the solvent used for cleaning parts in an appropriate manner.
- Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically.
  Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.
- Clean all disassembled parts in the designated liquid or solvent prior to inspection or assembly.


SGI233

- Replace oil seals, gaskets, packings, O-rings, locking washers, cotter pins, self-locking nuts, etc. with new ones.
- Replace inner and outer races of tapered roller bearings and needle bearings as a set.
- Arrange the disassembled parts in accordance with their assembled locations and sequence.
- Do not touch the terminals of electrical components which use microcomputers (such as ECM).
  Static electricity may damage internal electronic components.
- After disconnecting vacuum or air hoses, attach a tag to indicate the proper connection.
- Use only the fluids and lubricants specified in this manual.
- Use approved bonding agent, sealants or their equivalents when required.
- Use hand tools, power tools (disassembly only) and recommended special tools where specified for safe and efficient service repairs.
- When repairing the fuel, oil, water, vacuum or exhaust systems, check all affected lines for leaks.


PBIC0190E

- Before servicing the vehicle:
  Protect fenders, upholstery and carpeting with appropriate covers.
  Take caution that keys, buckles or buttons do not scratch paint.



SGI234

WARNING:
To prevent ECM from storing the diagnostic trouble codes, do not carelessly disconnect the harness connectors which are related to the engine control system and TCM (transmission control module) system. The connectors should be disconnected only when working according to the WORK FLOW of TROUBLE DIAGNOSES in EC and AT sections.

Precautions for NVIS/IVIS (NISSAN/INFINITI VEHICLE IMMOBILIZER SYSTEM - NATS) (If Equipped)

EAS000V7

NVIS/IVIS (NATS) will immobilize the engine if someone tries to start it without the registered key of NVIS/IVIS (NATS).
Both of the originally supplied ignition key IDs have been NVIS/IVIS (NATS) registered.
The security indicator is located on the instrument panel. The indicator blinks when the immobilizer system is functioning.
Therefore, NVIS/IVIS (NATS) warns outsiders that the vehicle is equipped with the anti-theft system.

- When NVIS/IVIS (NATS) detects trouble, the security indicator lamp lights up while ignition switch is in "ON" position.
  This lighting up indicates that the anti-theft is not functioning, so prompt service is required.
- When servicing NVIS/IVIS (NATS) (trouble diagnoses, system initialization and additional registration of other NVIS/IVIS (NATS) ignition key IDs), CONSULT-II hardware and CONSULT-II NVIS/IVIS (NATS) software is necessary.
  Regarding the procedures of NVIS/IVIS (NATS) initialization and NVIS/IVIS (NATS) ignition key ID registration, refer to CONSULT-II operation manual, NVIS/IVIS (NATS).

Therefore, CONSULT-II NVIS/IVIS (NATS) software (program card and operation manual) must be kept strictly confidential to maintain the integrity of the anti-theft function.

- When servicing NVIS/IVIS (NATS) (trouble diagnoses, system initialization and additional registration of other NVIS/IVIS (NATS) ignition key IDs), it may be necessary to re-register original key identification. Therefore, be sure to receive all keys from vehicle owner. A maximum of four or five key IDs can be registered into NVIS/IVIS (NATS).
- When failing to start the engine first time using the key of NVIS/IVIS (NATS), start as follows.

1. Leave the ignition key in "ON" position for approximately 5 seconds.
2. Turn ignition key to "OFF" or "LOCK" position and wait approximately 5 seconds.
3. Repeat step 1 and 2 again.
4. Restart the engine while keeping the key separate from any others on key-chain.

Precautions for Three Way Catalyst

EAS000V8

If a large amount of unburned fuel flows into the catalyst, the catalyst temperature will be excessively high. To prevent this, follow the instructions.

- Use unleaded gasoline only. Leaded gasoline will seriously damage the three way catalyst.
- When checking for ignition spark or measuring engine compression, make tests quickly and only when necessary.
- Do not run engine when the fuel tank level is low, otherwise the engine may misfire, causing damage to the catalyst.

Do not place the vehicle on flammable material. Keep flammable material off the exhaust pipe and the three way catalyst.

Precautions for Fuel (Unleaded Regular Gasoline Recommended)

EAS000X4

Use unleaded regular gasoline with an octane rating of at least 87 AKI (Anti-Knock Index) number (Research octane number 91).

CAUTION:
Do not use leaded gasoline. Using leaded gasoline will damage the three way catalyst. Using a fuel other than that specified could adversely affect the emission control devices and systems, and could also affect the warranty coverage validity.

Precautions for Fuel (Unleaded Premium Gasoline Recommended)

EAS000X5

Use unleaded regular gasoline with an octane rating of at least 87 AKI (Anti-Knock Index) number (Research octane number 91).

For improved vehicle performance, NISSAN/INFINITI recommend the use of unleaded premium gasoline with an octane rating of at least 91 AKI number (Research octane number 96).

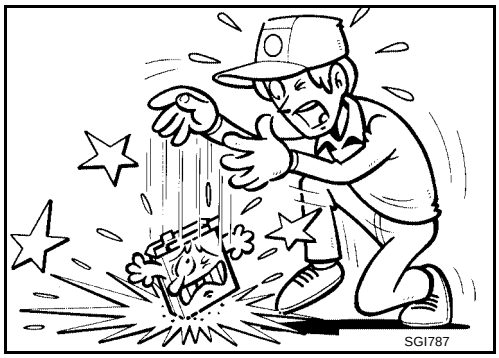
CAUTION:

Do not use leaded gasoline. Using leaded gasoline will damage the three way catalyst. Using a fuel other than that specified could adversely affect the emission control devices and systems, and could also affect the warranty coverage validity.

Precautions for Multiport Fuel Injection System or Engine Control System

EAS000VA

- Before connecting or disconnecting any harness connector for the multiport fuel injection system or ECM:
  Turn ignition switch to “OFF” position.
  Disconnect negative battery terminal.
  Otherwise, there may be damage to ECM.
- Before disconnecting pressurized fuel line from fuel pump to injectors, be sure to release fuel pressure.
- Be careful not to jar components such as ECM and mass air flow sensor.

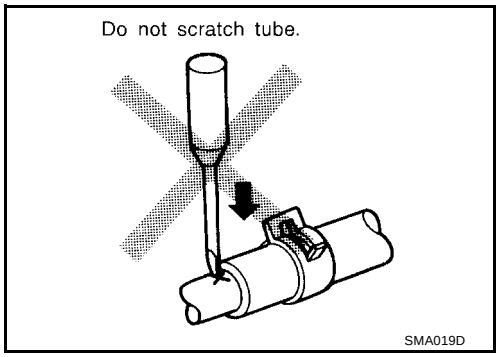


Precautions for Hoses

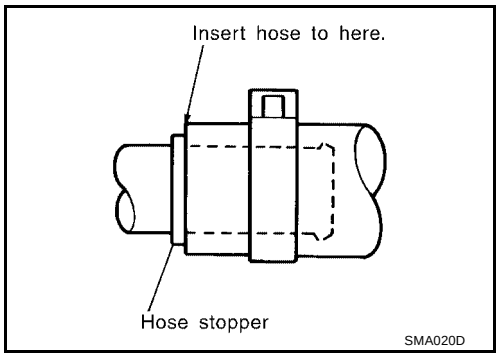
EAS000VB

HOSE REMOVAL AND INSTALLATION

- To prevent damage to rubber hose, do not pry off rubber hose with tapered tool or screwdriver.

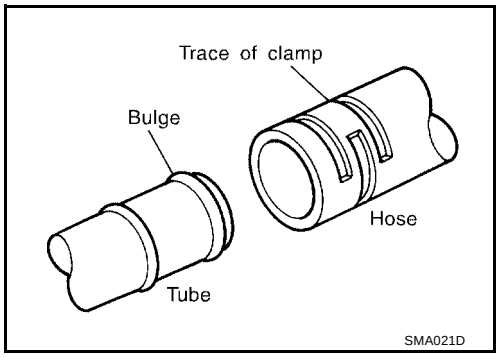


- To reinstall the rubber hose securely, make sure that hose insertion length and orientation is correct. (If tube is equipped with hose stopper, insert rubber hose into tube until it butts up against hose stopper.)

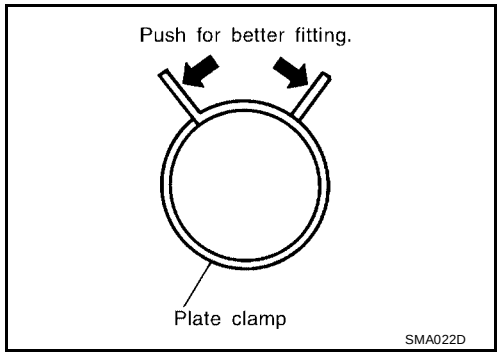


HOSE CLAMPING

- If old rubber hose is re-used, install hose clamp in its original position (at the indentation where the old clamp was). If there is a trace of tube bulging left on the old rubber hose, align rubber hose at that position.
- Discard old clamps; replace with new ones.



- After installing plate clamps, apply force to them in the direction of the arrow, tightening rubber hose equally all around.



Precautions for Engine Oils

EAS000VC

Prolonged and repeated contact with used engine oil may cause skin cancer. Try to avoid direct skin contact with used oil.
If skin contact is made, wash thoroughly with soap or hand cleaner as soon as possible.

HEALTH PROTECTION PRECAUTIONS

- Avoid prolonged and repeated contact with oils, particularly used engine oils.
- Wear protective clothing, including impervious gloves where practicable.
- Do not put oily rags in pockets.
- Avoid contaminating clothes, particularly underpants, with oil.
- Heavily soiled clothing and oil-impregnated footwear should not be worn. Overalls must be cleaned regularly.
- First aid treatment should be obtained immediately for open cuts and wounds.
- Use barrier creams, applying them before each work period, to help the removal of oil from the skin.
- Wash with soap and water to ensure all oil is removed (skin cleansers and nail brushes will help). Preparations containing lanolin replace the natural skin oils which have been removed.
- Do not use gasoline, kerosene, diesel fuel, gas oil, thinners or solvents for cleaning skin.
- If skin disorders develop, obtain medical advice without delay.
- Where practical, degrease components prior to handling.
- Where there is a risk of eye contact, eye protection should be worn, for example, chemical goggles or face shields; in addition an eye wash facility should be provided.

ENVIRONMENTAL PROTECTION PRECAUTIONS

Dispose of used oil and used oil filters through authorized waste disposal contractors to licensed waste disposal sites, or to the waste oil reclamation trade. If in doubt, contact the local authority for advice on disposal facilities.
It is illegal to pour used oil on to the ground, down sewers or drains, or into water sources.
The regulations concerning pollution vary between regions.

Precautions for Air Conditioning

EAS000VD

Use an approved refrigerant recovery unit any time the air conditioning system must be discharged. Refer to ATC/MTC section “HFC-134a (R-134a) Service Procedure”, “REFRIGERANT LINES” for specific instructions.

HOW TO USE THIS MANUAL

PFP:00008

Description

EAS000VE

This volume explains “Removal, Disassembly, Installation, Inspection and Adjustment” and “Trouble Diagnoses”.

Terms

EAS000VF

- The captions **WARNING** and **CAUTION** warn you of steps that must be followed to prevent personal injury and/or damage to some part of the vehicle.
  WARNING indicates the possibility of personal injury if instructions are not followed.
  CAUTION indicates the possibility of component damage if instructions are not followed.
  BOLD TYPED STATEMENTS except **WARNING** and **CAUTION** give you helpful information.
  Standard value:Tolerance at inspection and adjustment.
  Limit value:The maximum or minimum limit value that should not be exceeded at inspection and adjustment.

Units

EAS000VG

- The **UNITS** given in this manual are primarily expressed as the SI UNIT (International System of Unit), and alternatively expressed in the metric system and in the yard/pound system.
  “Example”

  Outer Socket Lock Nut : 59 - 78 N-m (6.0 - 8.0 kg-m, 43 - 58 ft-lb)

Contents

EAS000VH

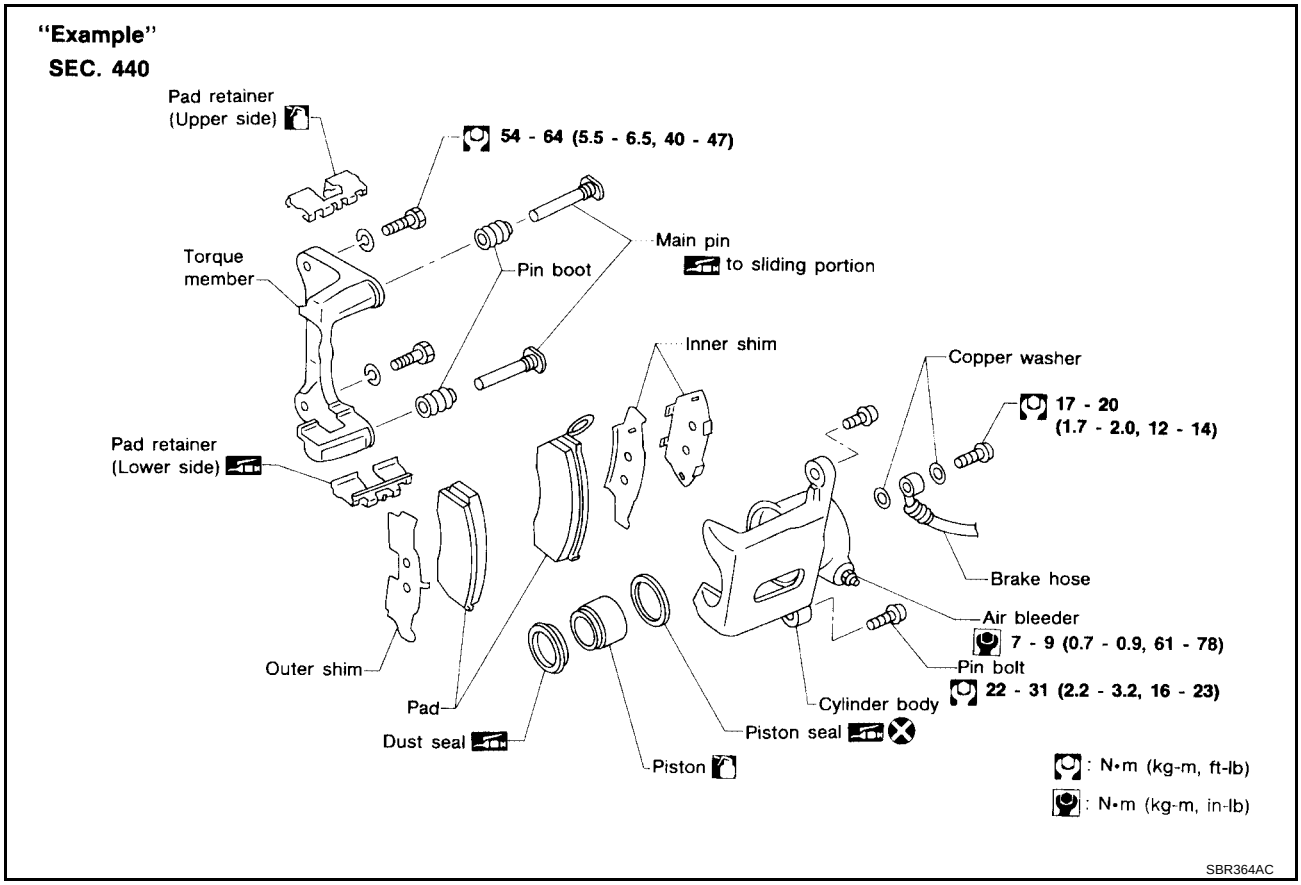
- **ALPHABETICAL INDEX** is provided at the end of this manual so that you can rapidly find the item and page you are searching for.
- **A QUICK REFERENCE INDEX**, a black tab (e.g. BR) is provided on the first page. You can quickly find the first page of each section by matching it to the section's black tab.
- **THE CONTENTS** are listed on the first page of each section.
- **THE TITLE** is indicated on the upper portion of each page and shows the part or system.
- **THE PAGE NUMBER** of each section consists of two or three letters which designate the particular section and a number (e.g. “BR-5”).
- **THE SMALL ILLUSTRATIONS** show the important steps such as inspection, use of special tools, knacks of work and hidden or tricky steps which are not shown in the previous large illustrations.
  Assembly, inspection and adjustment procedures for the complicated units such as the automatic transaxle or transmission, etc. are presented in a step-by-step format where necessary.

Components

EAS000VI

- **THE LARGE ILLUSTRATIONS** are exploded views (See the following) and contain tightening torques, lubrication points, section number of the **PARTS CATALOG** (e.g. SEC. 440) and other information necessary to perform repairs.

The illustrations should be used in reference to service matters only. When ordering parts, refer to the appropriate **PARTS CATALOG** .



SYMBOLS

SYMBOL	DESCRIPTION
	Tightening torque
	Should be lubricated with grease. Unless otherwise indicated, use recommended multi-purpose grease.
	Should be lubricated with oil.
	Sealing point
	Checking point
	Always replace after every disassembly.
P	Apply petroleum jelly.
ATF	Apply ATF.
★	Select with proper thickness.
☆	Adjustment is required.

How to Follow Trouble Diagnoses

EAS000VJ

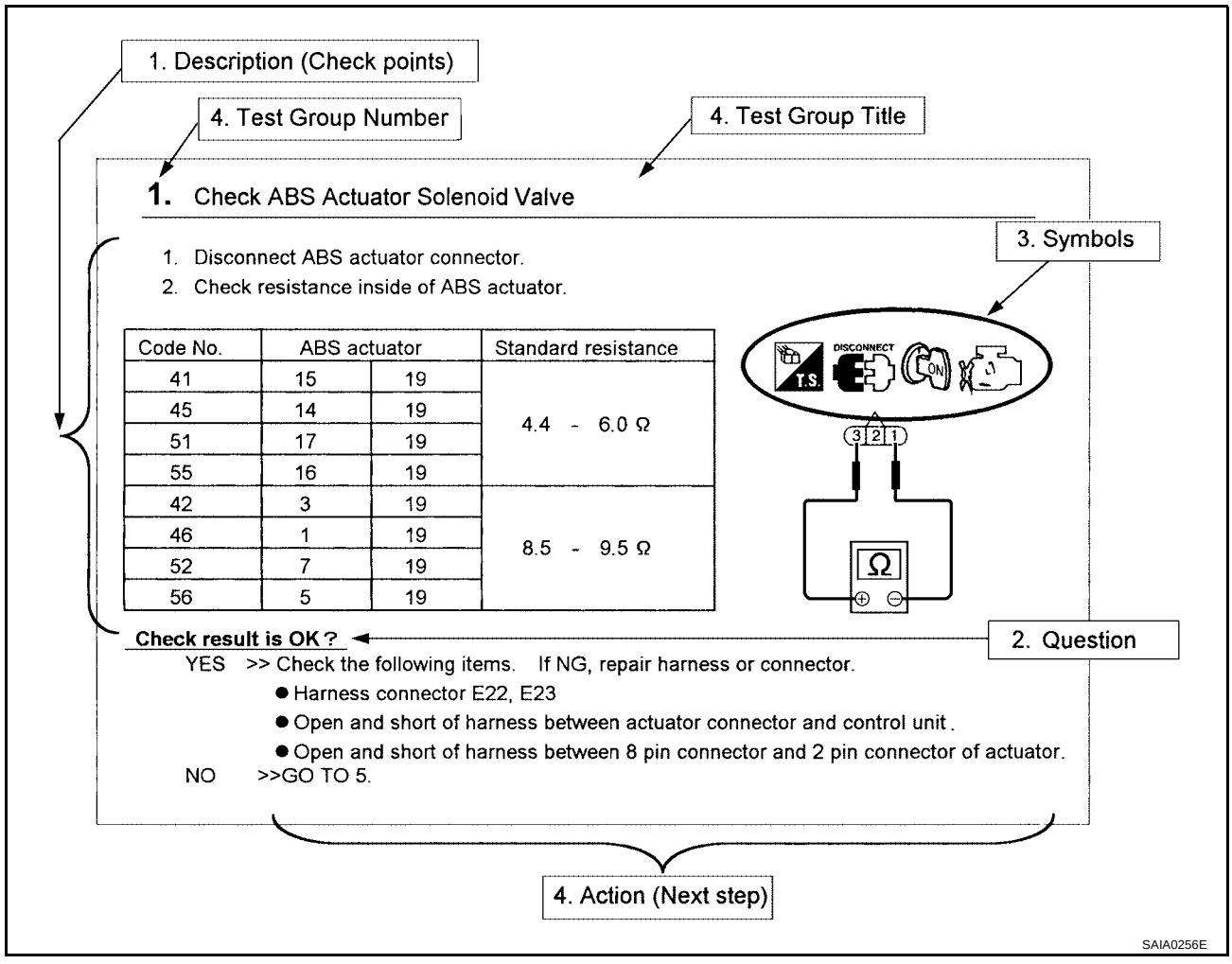
DESCRIPTION

NOTICE:

Trouble diagnoses indicate work procedures required to diagnose problems effectively. Observe the following instructions before diagnosing.

1. **Before performing trouble diagnoses, read the "Preliminary Check", the "Symptom Chart" or the "Work Flow".**
2. **After repairs, re-check that the problem has been completely eliminated.**
3. **Refer to Component Parts and Harness Connector Location for the Systems described in each section for identification/location of components and harness connectors.**
4. **Refer to the Circuit Diagram for quick pinpoint check.**
   If you need to check circuit continuity between harness connectors in more detail, such as when a sub-harness is used, refer to Wiring Diagram in each individual section and Harness Layout in PG section for identification of harness connectors.
5. **When checking circuit continuity, ignition switch should be OFF.**
6. **Before checking voltage at connectors, check battery voltage.**
7. **After accomplishing the Diagnostic Procedures and Electrical Components Inspection, make sure that all harness connectors are reconnected as they were.**

HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES



1. **Work and diagnostic procedure**
   Start to diagnose a problem using procedures indicated in enclosed test groups.
2. **Questions and required results**
   Questions and required results are indicated in bold type in test group.
   The meaning of are as follows:

   a. Battery voltage → 11 - 14V or approximately 12V
   b. Voltage : Approximately 0V → Less than 1V

3. **Symbol used in illustration**

Symbols included in illustrations refer to measurements or procedures. Before diagnosing a problem, familiarize yourself with each symbol. Refer to "Connector Symbols" in GI Section and "KEY TO SYMBOLS SIGNIFYING MEASUREMENTS OR PROCEDURES" below.

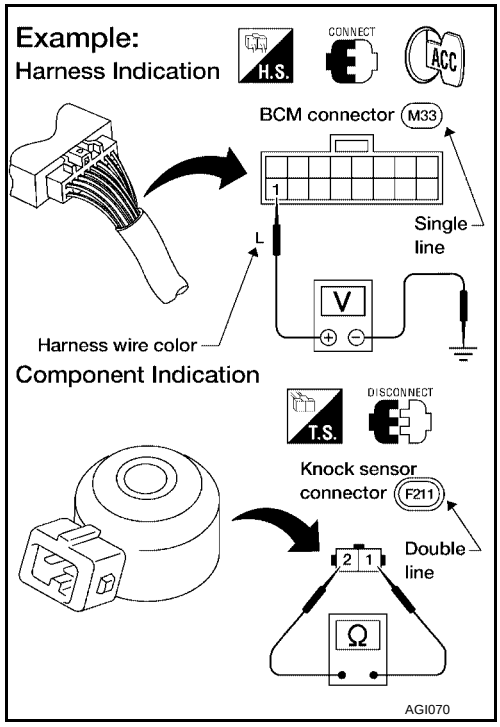
4. **Action items**
   Next action for each test group is indicated based on result of each question. Test group number is shown in the left upper portion of each test group.

HARNESS WIRE COLOR AND CONNECTOR NUMBER INDICATION

There are two types of harness wire color and connector number indication.

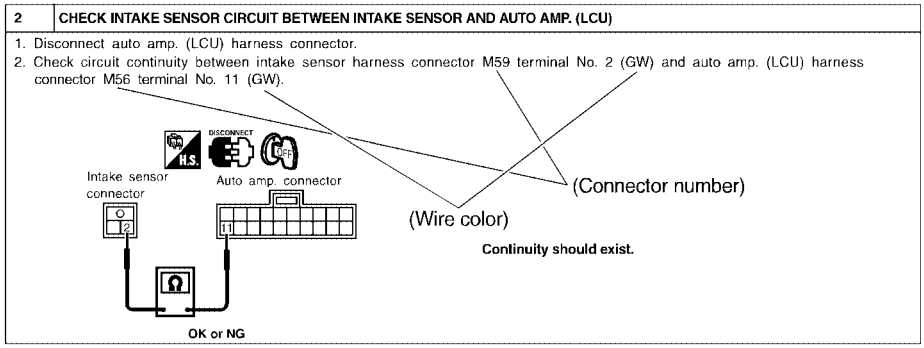
TYPE 1: Harness Wire Color and Connector Number are Shown in Illustration

- Letter designations next to test meter probe indicate harness wire color.
- Connector numbers in a single circle (e.g. M33) indicate harness connectors.
- Connector numbers in a double circle (e.g. F211) indicate component connectors.

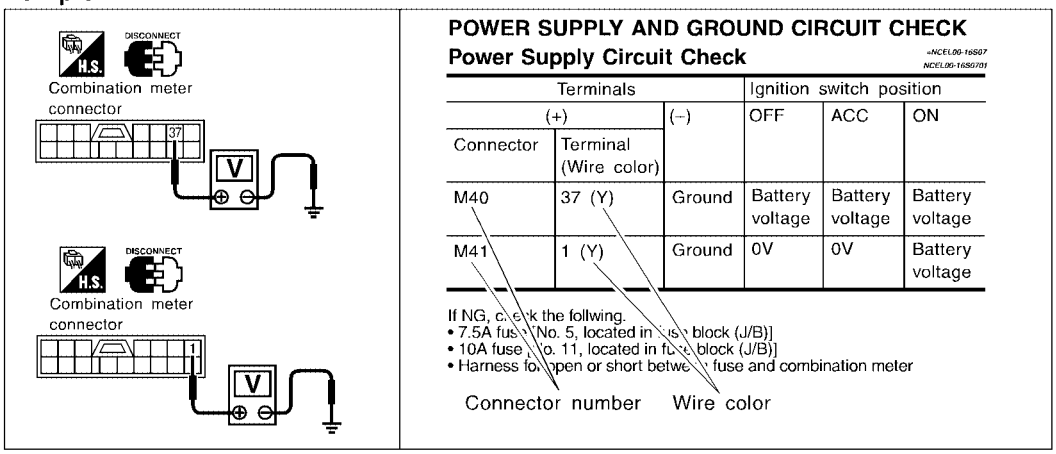


TYPE 2: Harness Wire Color and Connector Number are Shown in Text

Example 1:



Example 2:



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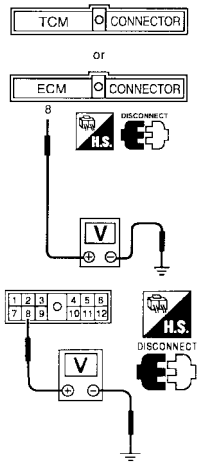
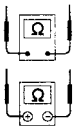
KEY TO SYMBOLS SIGNIFYING MEASUREMENTS OR PROCEDURES

Symbol	Symbol explanation	Symbol	Symbol explanation
DISCONNECT	Check after disconnecting the connector to be measured.	GST	Procedure with Generic Scan Tool (GST, OBD-II scan tool)
CONNECT	Check after connecting the connector to be measured.	NO TOOLS	Procedure without CONSULT, CONSULT-II or GST
	Insert key into ignition switch.	A/C	A/C switch is “OFF”.
	Remove key from ignition switch.	A/C	A/C switch is “ON”.
OFF	Turn ignition switch to “OFF” position.		REC switch is “ON”.
ON	Turn ignition switch to “ON” position.		REC switch is “OFF”.
ST	Turn ignition switch to “START” position.		Fan switch is “ON”. (At any position except for “OFF” position)
OFF→ACC	Turn ignition switch from “OFF” to “ACC” position.		Fan switch is “OFF”.
ACC→OFF	Turn ignition switch from “ACC” to “OFF” position.	FUSE BAT	Apply positive voltage from battery with fuse directly to components.

Symbol	Symbol explanation	Symbol	Symbol explanation
	Turn ignition switch from “OFF” to “ON” position.		Drive vehicle.
	Turn ignition switch from “ON” to “OFF” position.		Disconnect battery negative cable.
	Do not start engine, or check with engine stopped.		Depress brake pedal.
	Start engine, or check with engine running.		Release brake pedal.
	Apply parking brake.		Depress accelerator pedal.
	Release parking brake.		Release accelerator pedal.
	Check after engine is warmed up sufficiently.		Pin terminal check for SMJ type ECM and TCM connectors. **For details regarding the terminal arrangement, refer to the “ELECTRICAL UNITS” electrical reference page at the end of the manual.**
	Voltage should be measured with a voltmeter.		
	Circuit resistance should be measured with an ohmmeter.		
	Current should be measured with an ammeter.		
	Procedure with CONSULT-II		
	Procedure without CONSULT-II		

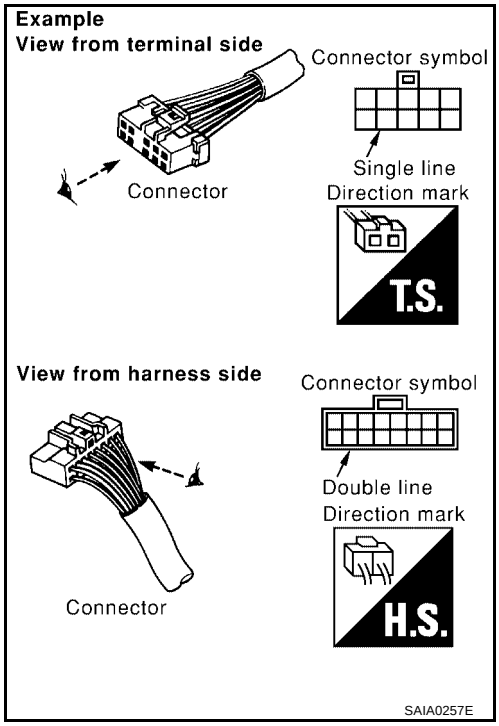
How to Read Wiring Diagrams

EAS000VK

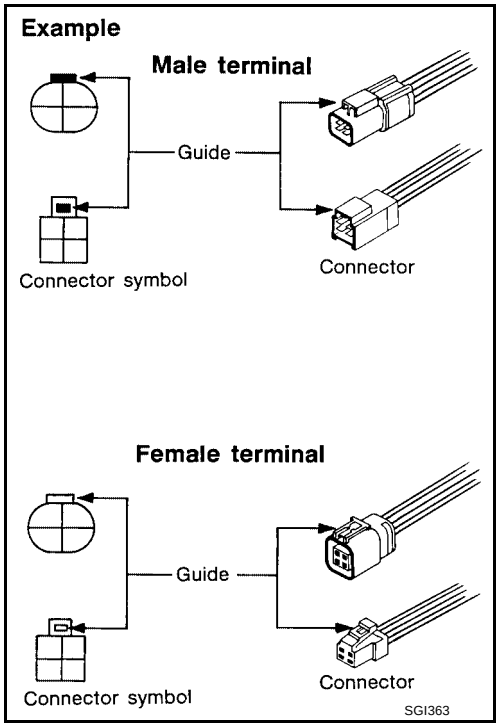
CONNECTOR SYMBOLS

Most of connector symbols in wiring diagrams are shown from the terminal side.

- Connector symbols shown from the terminal side are enclosed by a single line and followed by the direction mark.
- Connector symbols shown from the harness side are enclosed by a double line and followed by the direction mark.
- Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG section, “Description”, “HARNESS CONNECTOR”.

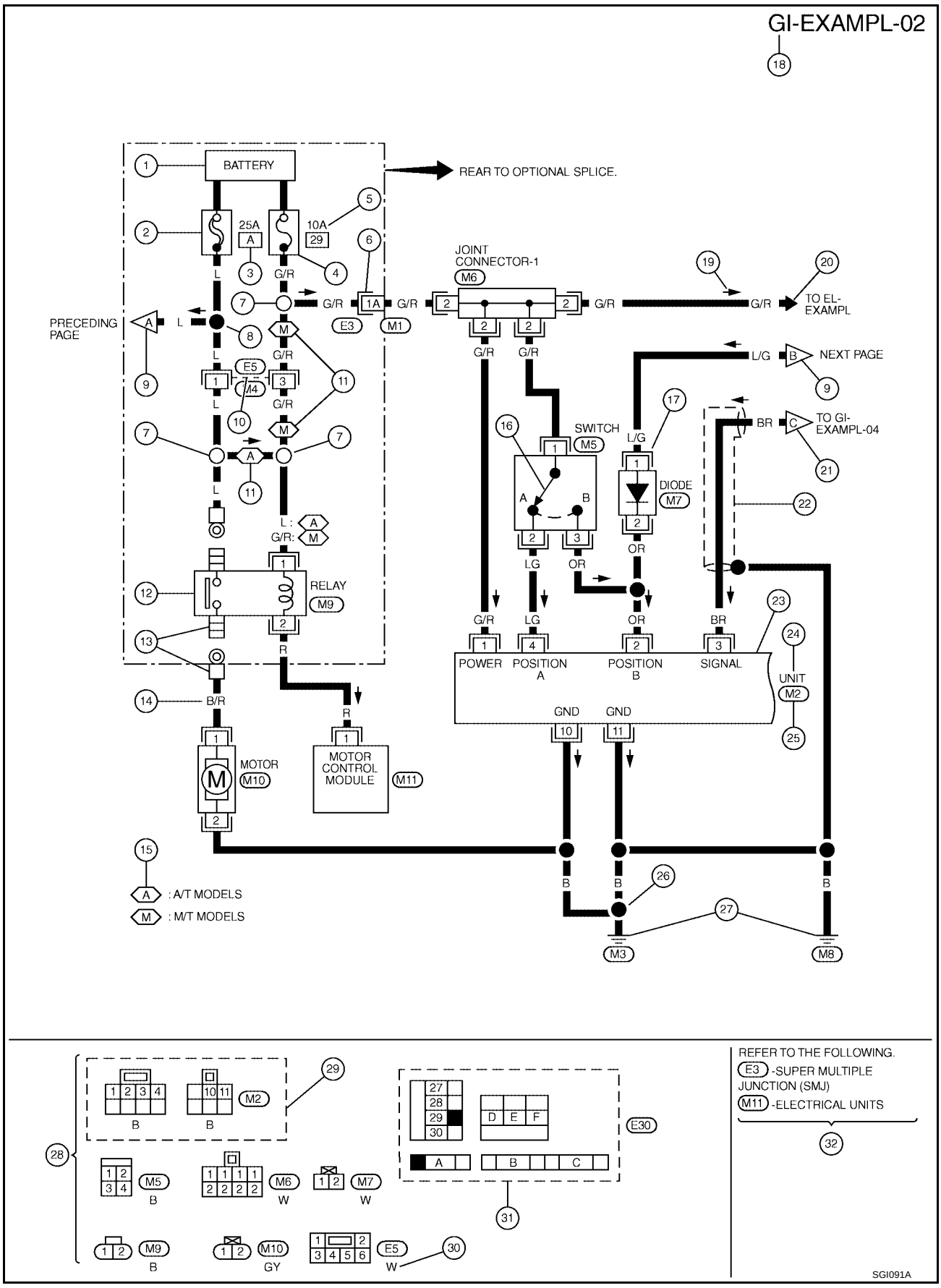


- Male and female terminals
  Connector guides for male terminals are shown in black and female terminals in white in wiring diagrams.

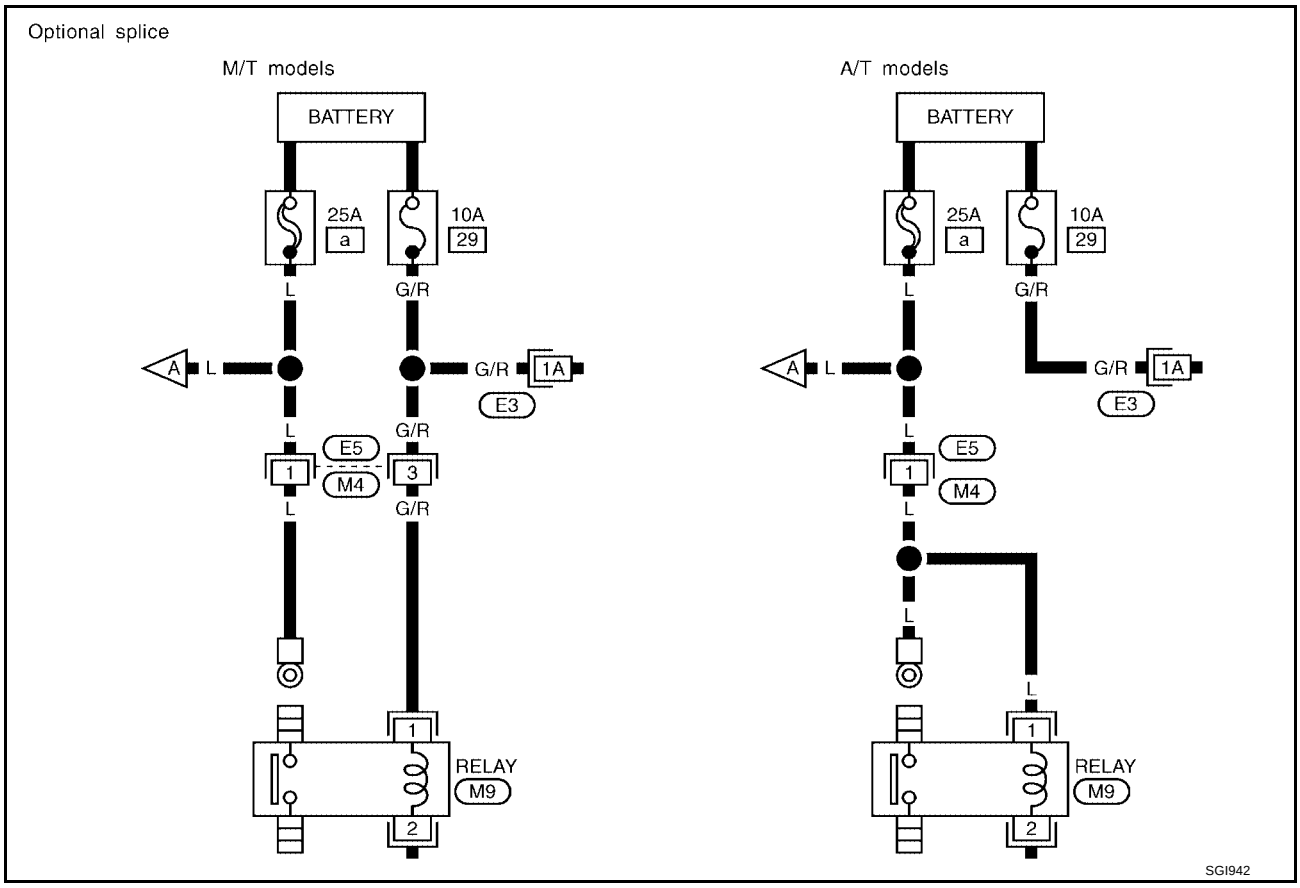


SAMPLE/WIRING DIAGRAM - EXAMPL -

- For detail, refer to following "DESCRIPTION".



Optional Splice



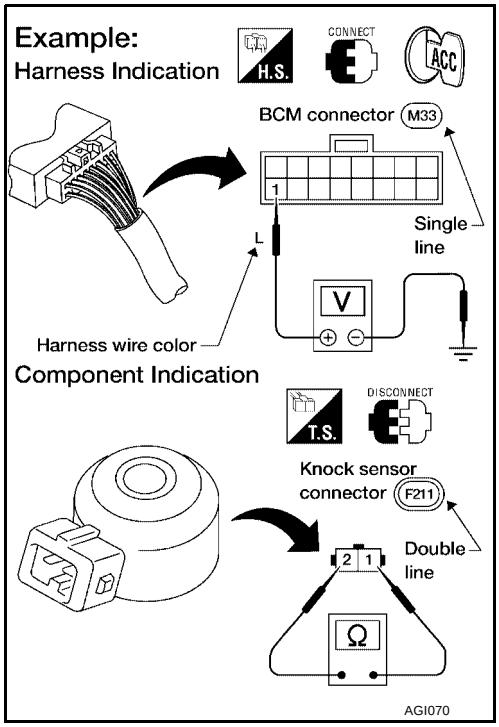
DESCRIPTION

Number	Item	Description
1	Power condition	● This shows the condition when the system receives battery positive voltage (can be operated).
2	Fusible link	● The double line shows that this is a fusible link. ● The open circle shows current flow in, and the shaded circle shows current flow out.
3	Fusible link/fuse location	● This shows the location of the fusible link or fuse in the fusible link or fuse box. For arrangement, refer to PG section, POWER SUPPLY ROUTING.
4	Fuse	● The single line shows that this is a fuse. ● The open circle shows current flow in, and the shaded circle shows current flow out.
5	Current rating	● This shows the current rating of the fusible link or fuse.
6	Connectors	● This shows that connector E3 is female and connector M1 is male. ● The G/R wire is located in the 1A terminal of both connectors. ● Terminal number with an alphabet (1A, 5B, etc.) indicates that the connector is SMJ connector. Refer to PG section, SMJ (SUPER MULTIPLE JUNCTION).
7	Optional splice	● The open circle shows that the splice is optional depending on vehicle application.
8	Splice	● The shaded circle shows that the splice is always on the vehicle.
9	Page crossing	● This arrow shows that the circuit continues to an adjacent page. ● The A will match with the A on the preceding or next page.
10	Common connector	● The dotted lines between terminals show that these terminals are part of the same connector.
11	Option abbreviation	● This shows that the circuit is optional depending on vehicle application.
12	Relay	● This shows an internal representation of the relay. For details, refer to PG section, STANDARDIZED RELAY.
13	Connectors	● This shows that the connector is connected to the body or a terminal with bolt or nut.

Number	Item	Description
14	Wire color	● This shows a code for the color of the wire.
		B = Black W = White R = Red G = Green L = Blue Y = Yellow LG = Light Green BR = Brown OR = Orange P = Pink PU = Purple GY = Gray SB = Sky Blue CH = Dark Brown DG = Dark Green
		When the wire color is striped, the base color is given first, followed by the stripe color as shown below: Example: L/W = Blue with White Stripe
15	Option description	● This shows a description of the option abbreviation used on the page.
16	Switch	● This shows that continuity exists between terminals 1 and 2 when the switch is in the A position. Continuity exists between terminals 1 and 3 when the switch is in the B position.
17	Assembly parts	● Connector terminal in component shows that it is a harness incorporated assembly.
18	Cell code	● This identifies each page of the wiring diagram by section, system and wiring diagram page number.
19	Current flow arrow	● Arrow indicates electric current flow, especially where the direction of standard flow (vertically downward or horizontally from left to right) is difficult to follow. ● A double arrow “ ↔ ” shows that current can flow in either direction depending on circuit operation.
20	System branch	● This shows that the system branches to another system identified by cell code (section and system).
21	Page crossing	● This arrow shows that the circuit continues to another page identified by cell code. ● The C will match with the C on another page within the system other than the next or preceding pages.
22	Shielded line	● The line enclosed by broken line circle shows shield wire.
23	Component box in wave line	● This shows that another part of the component is also shown on another page (indicated by wave line) within the system.
24	Component name	● This shows the name of a component.
25	Connector number	● This shows the connector number. ● The letter shows which harness the connector is located in. ● Example: **M** : main harness. For detail and to locate the connector, refer to PG section "Main Harness", “Harness Layout”. A coordinate grid is included for complex harnesses to aid in locating connectors.
26	Ground (GND)	● The line spliced and grounded under wire color shows that ground line is spliced at the grounded connector.
27	Ground (GND)	● This shows the ground connection. For detailed ground distribution information, refer to "Ground Distribution" in PG section.
28	Connector views	● This area shows the connector faces of the components in the wiring diagram on the page.
29	Common component	● Connectors enclosed in broken line show that these connectors belong to the same component.
30	Connector color	● This shows a code for the color of the connector. For code meaning, refer to wire color codes, Number 14 of this chart.
31	Fusible link and fuse box	● This shows the arrangement of fusible link(s) and fuse(s), used for connector views of "POWER SUPPLY ROUTING" in PG section. The open square shows current flow in, and the shaded square shows current flow out.
32	Reference area	● This shows that more information on the Super Multiple Junction (SMJ) and Joint Connectors (J/C) exists on the PG section. Refer to "Reference Area" for details.

Harness Indication

- Letter designations next to test meter probe indicate harness (connector) wire color.
- Connector numbers in a single circle M33 indicate harness connectors.



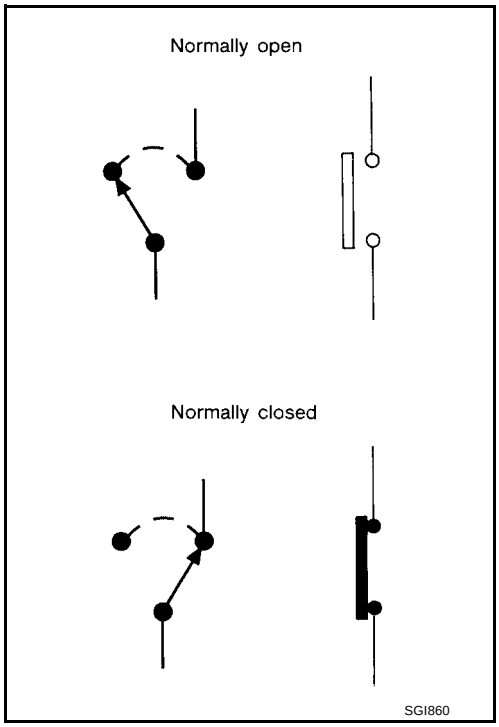
Component Indication

Connector numbers in a double circle F211 indicate component connectors.

Switch Positions

Switches are shown in wiring diagrams as if the vehicle is in the “normal” condition.
A vehicle is in the “normal” condition when:

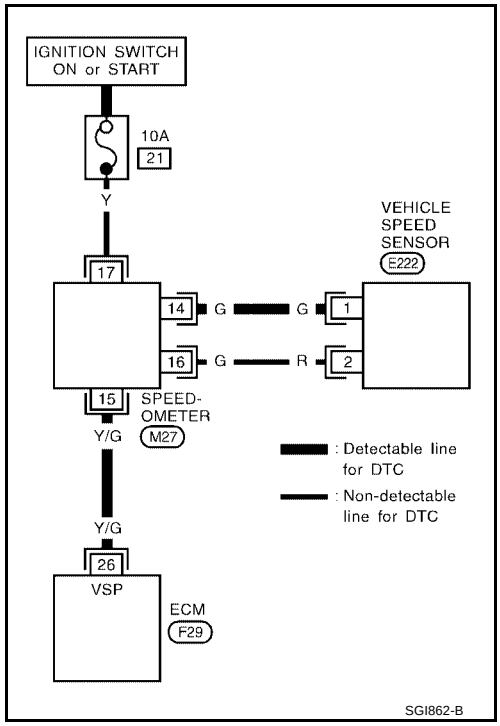
- ignition switch is “OFF”,
- doors, hood and trunk lid/back door are closed,
- pedals are not depressed, and
- parking brake is released.



Detectable Lines and Non-Detectable Lines

In some wiring diagrams, two kinds of lines, representing wires, with different weight are used.

- A line with regular weight (wider line) represents a “detectable line for DTC (Diagnostic Trouble Code)”. A “detectable line for DTC” is a circuit in which ECM can detect its malfunctions with the on board diagnostic system.
- A line with less weight (thinner line) represents a “non-detectable line for DTC”. A “non-detectable line for DTC” is a circuit in which ECM cannot detect its malfunctions with the on board diagnostic system.



Multiple Switch

The continuity of multiple switch is described in two ways as shown below.

- The switch chart is used in schematic diagrams.

- The switch diagram is used in wiring diagrams.

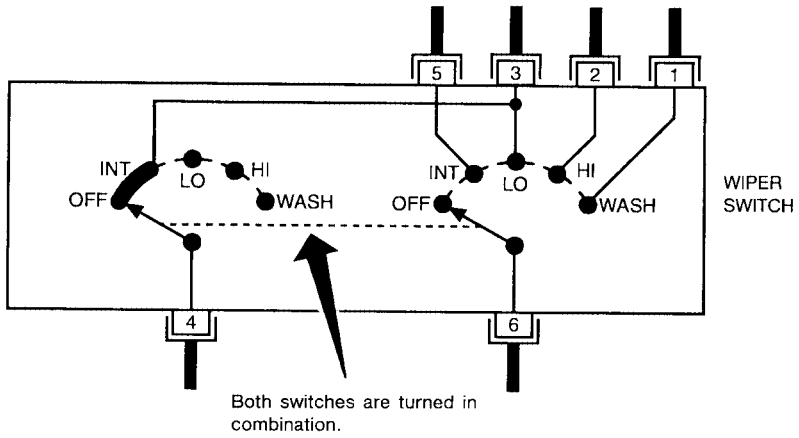
Example

(SWITCH CHART)

WIPER SWITCH

	OFF	INT	LO	HI	WASH
1					○
2				○	
3	○	○	○		
4	○	○			
5		○			
6		○	○	○	○

(SWITCH DIAGRAM)



Continuity circuit of wiper switch

SWITCH POSITION	CONTINUITY CIRCUIT
OFF	3-4
INT	3-4, 5-6
LO	3-6
HI	2-6
WASH	1-6

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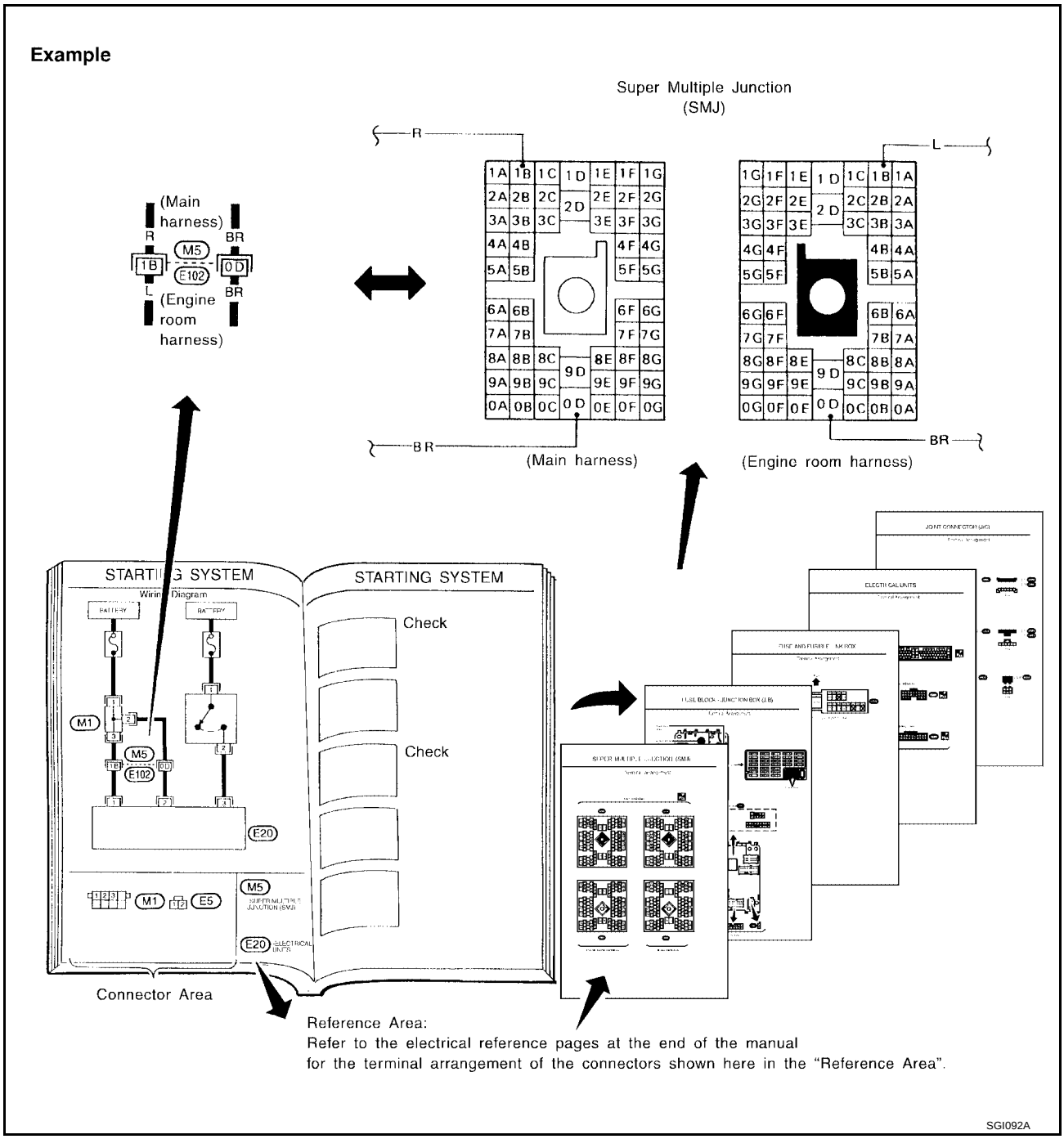
Reference Area

The Reference Area of the wiring diagram contains references to additional electrical reference pages at the end of the manual. If connector numbers and titles are shown in the Reference Area of the wiring diagram, these connector symbols are not shown in the Connector Area.

Example



Abbreviations

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The following **ABBREVIATIONS** are used:

ABBREVIATION	DESCRIPTION
A/C	Air Conditioner
A/T	Automatic Transaxle/Transmission
ATF	Automatic Transmission Fluid
D_1	Drive range 1st gear
D_2	Drive range 2nd gear

ABBREVIATION	DESCRIPTION
D_3	Drive range 3rd gear
D_4	Drive range 4th gear
FR, RR	Front, Rear
LH, RH	Left-Hand, Right-Hand
M/T	Manual Transaxle/Transmission
OD	Overdrive
P/S	Power Steering
SAE	Society of Automotive Engineers, Inc.
SDS	Service Data and Specifications
SST	Special Service Tools
2WD	2-Wheel Drive
2_2	2nd range 2nd gear
2_1	2nd range 1st gear
1_2	1st range 2nd gear
1_1	1st range 1st gear

SERVICE INFORMATION FOR ELECTRICAL INCIDENT

PFP:00000

GI

How to Check Terminal

EAS000VM

CONNECTOR AND TERMINAL PIN KIT

Use the connector and terminal pin kits listed below when replacing connectors or terminals.
The connector and terminal pin kits contain some of the most commonly used NISSAN/INFINITI connectors and terminals. For detailed connector and terminal pin replacement procedures, refer to the latest NISSAN/INFINITI CONNECTOR AND TERMINAL PIN SERVICE MANUAL.

Tool number (Kent-Moore No.) Tool name	Description
- (J38751-95NI) Connector and terminal pin kit (NISSAN) - (J38751-95INF) Connector and terminal pin kit (INFINITI) - (J42992-98KIT) OBD and terminal repair kit - (J42992-2000UPD) OBD-II Connector Kit Update	J38751-95NI, J38751-95INF, J42992-98KIT, J42992-2000UPD WAIA0004E WAIA0005E

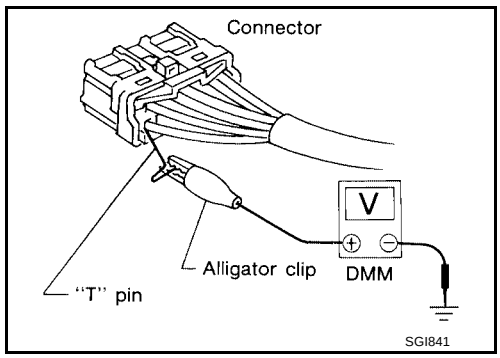
HOW TO PROBE CONNECTORS

Connector damage and an intermittent connection can result from improperly probing of the connector during circuit checks.
The probe of a digital multimeter (DMM) may not correctly fit the connector cavity. To correctly probe the connector, follow the procedures below using a “T” pin. For the best contact grasp the “T” pin using an alligator clip.

Probing from Harness Side

Standard type (not waterproof type) connector should be probed from harness side with “T” pin.

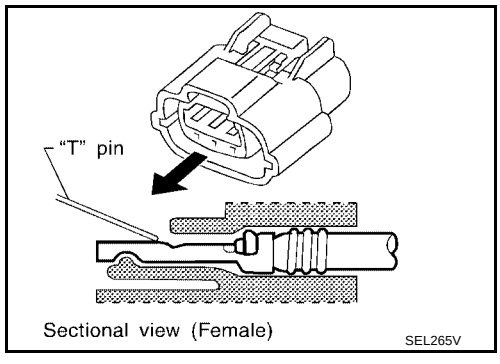
- If the connector has a rear cover such as a ECM connector, remove the rear cover before probing the terminal.
- Do not probe waterproof connector from harness side. Damage to the seal between wire and connector may result.



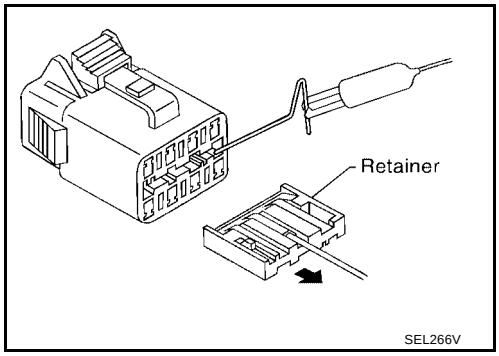
Probing from Terminal Side

FEMALE TERMINAL

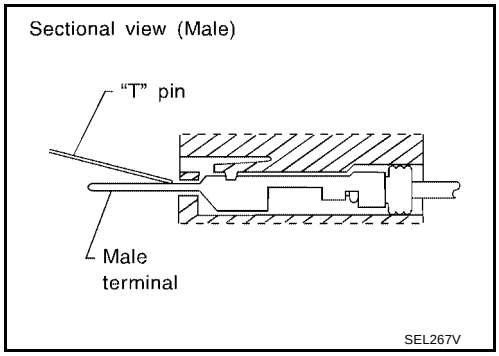
- There is a small notch above each female terminal. Probe each terminal with the “T” pin through the notch.
  Do not insert any object other than the same type male terminal into female terminal.



- Some connectors do not have a notch above each terminal. To probe each terminal, remove the connector retainer to make contact space for probing.



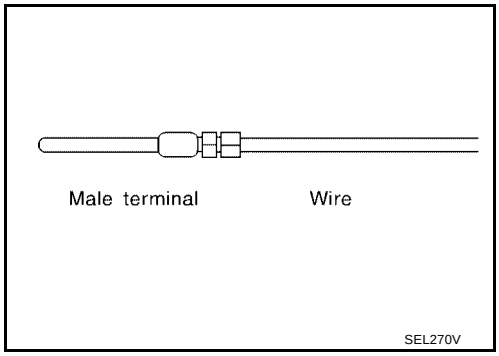
MALE TERMINAL
Carefully probe the contact surface of each terminal using a “T” pin.
Do not bend terminal.



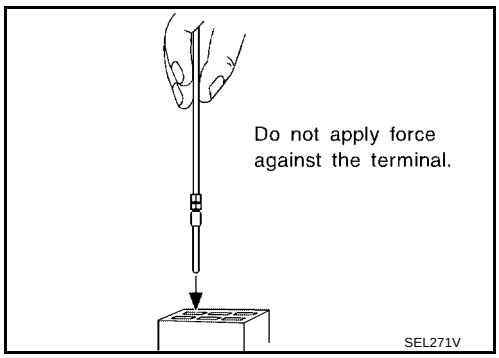
How to Check Enlarged Contact Spring of Terminal

An enlarged contact spring of a terminal may create intermittent signals in the circuit.
If the intermittent open circuit occurs, follow the procedure below to inspect for open wires and enlarged contact spring of female terminal.

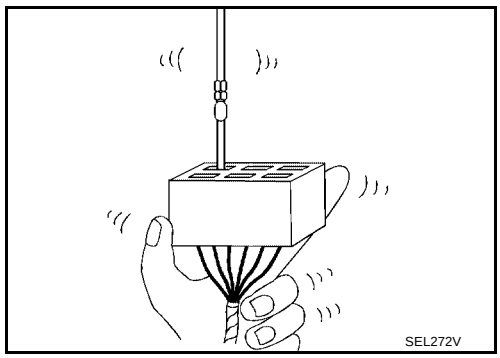
1. Assemble a male terminal and approx. 10 cm (3.9 in) of wire.
   Use a male terminal which matches the female terminal.
2. Disconnect the suspected faulty connector and hold it terminal side up.



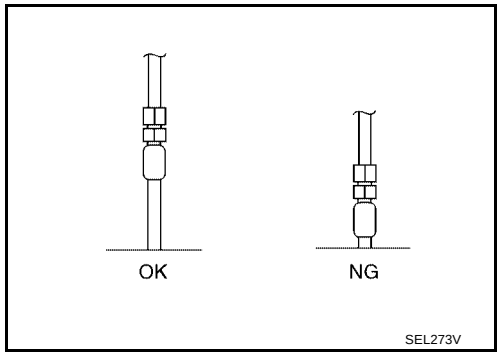
3. While holding the wire of the male terminal, try to insert the male terminal into the female terminal.
   Do not force the male terminal into the female terminal with your hands.



4. While moving the connector, check whether the male terminal can be easily inserted or not.



- If the male terminal can be easily inserted into the female terminal, replace the female terminal.

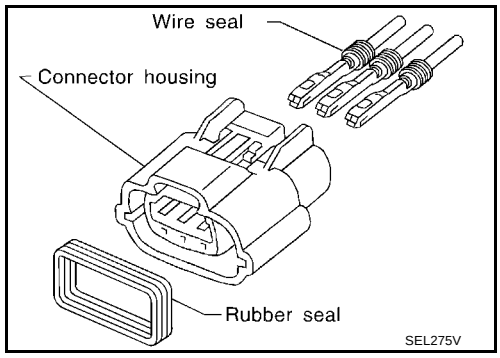


Waterproof Connector Inspection

If water enters the connector, it can short interior circuits. This may lead to intermittent problems. Check the following items to maintain the original waterproof characteristics.

RUBBER SEAL INSPECTION

- Most waterproof connectors are provided with a rubber seal between the male and female connectors. If the seal is missing, the waterproof performance may not meet specifications.
- The rubber seal may come off when connectors are disconnected. Whenever connectors are reconnected, make sure the rubber seal is properly installed on either side of male or female connector.

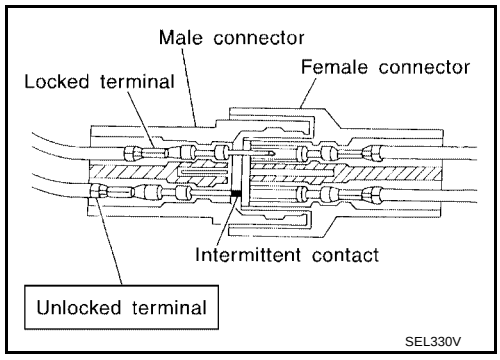


WIRE SEAL INSPECTION

The wire seal must be installed on the wire insertion area of a waterproof connector. Be sure that the seal is installed properly.

Terminal Lock Inspection

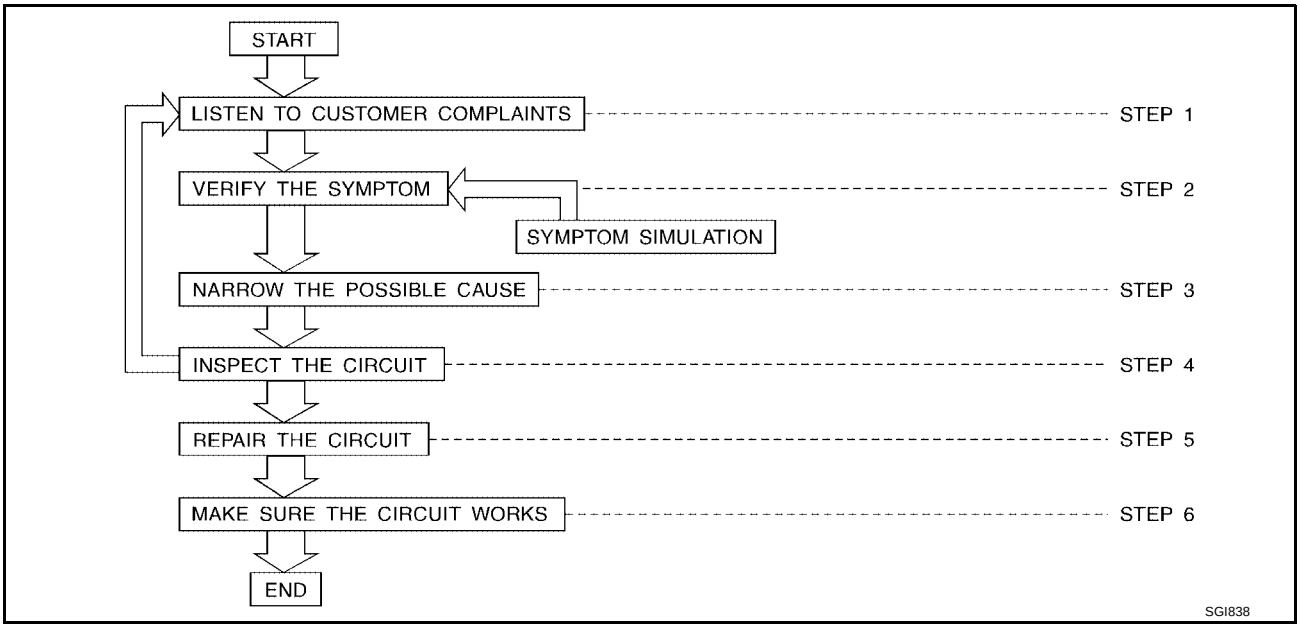
Check for unlocked terminals by pulling wire at the end of connector. An unlocked terminal may create intermittent signals in the circuit.



How to Perform Efficient Diagnosis for an Electrical Incident

EAS000VN

WORK FLOW



STEP	DESCRIPTION	
STEP 1	Get detailed information about the conditions and the environment when the incident occurred. The following are key pieces of information required to make a good analysis:	
	WHAT	Vehicle Model, Engine, Transmission/Transaxle and the System (i.e. Radio).
	WHEN	Date, Time of Day, Weather Conditions, Frequency.
	WHERE	Road Conditions, Altitude and Traffic Situation.
	HOW	System Symptoms, Operating Conditions (Other Components Interaction). Service History and if any After Market Accessories have been installed.
STEP 2	Operate the system, road test if necessary. Verify the parameter of the incident. If the problem cannot be duplicated, refer to “Incident Simulation Tests”.	
STEP 3	Get the proper diagnosis materials together including: ● Power Supply Routing ● System Operation Descriptions ● Applicable Service Manual Sections ● Check for any Service Bulletins Identify where to begin diagnosis based upon your knowledge of the system operation and the customer comments.	
STEP 4	Inspect the system for mechanical binding, loose connectors or wiring damage. Determine which circuits and components are involved and diagnose using the Power Supply Routing and Harness Layouts.	
STEP 5	Repair or replace the incident circuit or component.	
STEP 6	Operate the system in all modes. Verify the system works properly under all conditions. Make sure you have not inadvertently created a new incident during your diagnosis or repair steps.	

INCIDENT SIMULATION TESTS

Introduction

Sometimes the symptom is not present when the vehicle is brought in for service. If possible, re-create the conditions present at the time of the incident. Doing so may help avoid a No Trouble Found Diagnosis. The following section illustrates ways to simulate the conditions/environment under which the owner experiences an electrical incident.

The section is broken into the six following topics:

- Vehicle vibration
- Heat sensitive

- Freezing
- Water intrusion
- Electrical load
- Cold or hot start up

Get a thorough description of the incident from the customer. It is important for simulating the conditions of the problem.

Vehicle Vibration

The problem may occur or become worse while driving on a rough road or when engine is vibrating (idle with A/C on). In such a case, you will want to check for a vibration related condition. Refer to the following illustration.

CONNECTORS & HARNESS

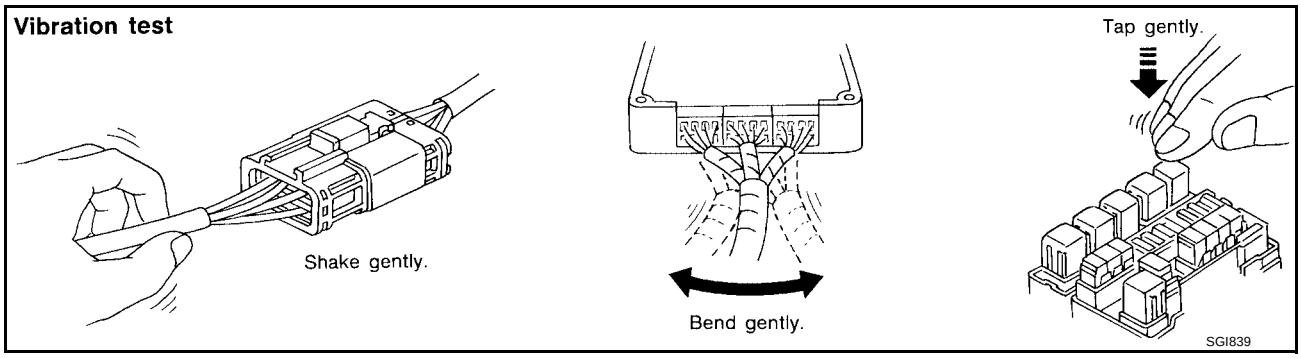
Determine which connectors and wiring harness would affect the electrical system you are inspecting. Gently shake each connector and harness while monitoring the system for the incident you are trying to duplicate. This test may indicate a loose or poor electrical connection.

HINT

Connectors can be exposed to moisture. It is possible to get a thin film of corrosion on the connector terminals. A visual inspection may not reveal this without disconnecting the connector. If the problem occurs intermittently, perhaps the problem is caused by corrosion. It is a good idea to disconnect, inspect and clean the terminals on related connectors in the system.

SENSORS & RELAYS

Gently apply a slight vibration to sensors and relays in the system you are inspecting.
This test may indicate a loose or poorly mounted sensor or relay.



ENGINE COMPARTMENT

There are several reasons a vehicle or engine vibration could cause an electrical complaint. Some of the things to check for are:

- Connectors not fully seated.
- Wiring harness not long enough and is being stressed due to engine vibrations or rocking.
- Wires laying across brackets or moving components.
- Loose, dirty or corroded ground wires.
- Wires routed too close to hot components.

To inspect components under the hood, start by verifying the integrity of ground connections. (Refer to Ground Inspection described later.) First check that the system is properly grounded. Then check for loose connection by gently shaking the wiring or components as previously explained. Using the wiring diagrams inspect the wiring for continuity.

BEHIND THE INSTRUMENT PANEL

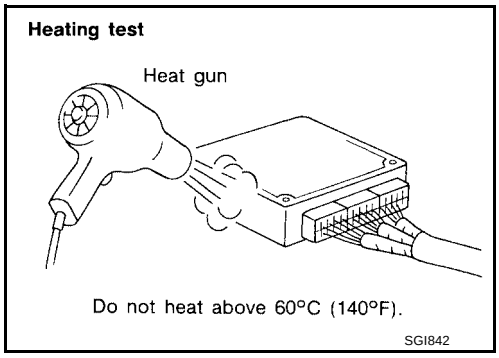
An improperly routed or improperly clamped harness can become pinched during accessory installation. Vehicle vibration can aggravate a harness which is routed along a bracket or near a screw.

UNDER SEATING AREAS

An unclamped or loose harness can cause wiring to be pinched by seat components (such as slide guides) during vehicle vibration. If the wiring runs under seating areas, inspect wire routing for possible damage or pinching.

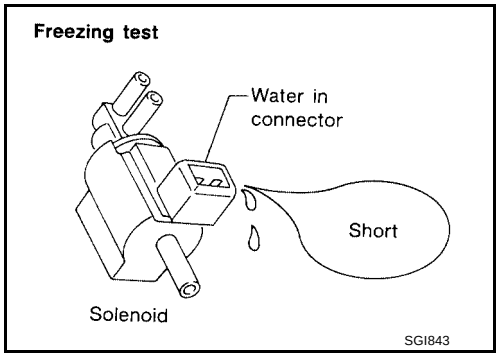
Heat Sensitive

The customer's concern may occur during hot weather or after car has sat for a short time. In such cases you will want to check for a heat sensitive condition.
To determine if an electrical component is heat sensitive, heat the component with a heat gun or equivalent.
Do not heat components above 60°C (140°F). If incident occurs while heating the unit, either replace or properly insulate the component.



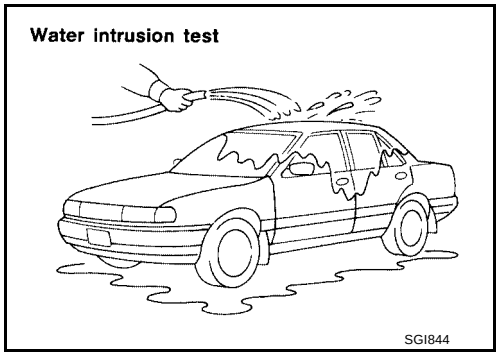
Freezing

The customer may indicate the incident goes away after the car warms up (winter time). The cause could be related to water freezing somewhere in the wiring/electrical system.
There are two methods to check for this. The first is to arrange for the owner to leave his car overnight. Make sure it will get cold enough to demonstrate his complaint. Leave the car parked outside overnight. In the morning, do a quick and thorough diagnosis of those electrical components which could be affected.
The second method is to put the suspect component into a freezer long enough for any water to freeze. Reinstall the part into the car and check for the reoccurrence of the incident. If it occurs, repair or replace the component.



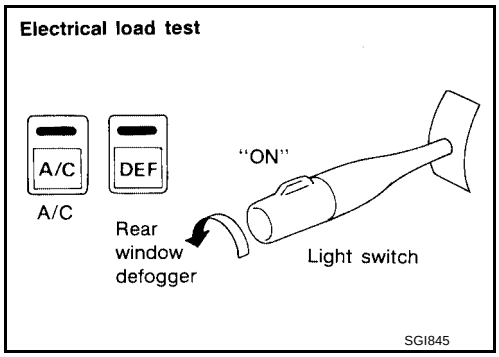
Water Intrusion

The incident may occur only during high humidity or in rainy/snowy weather. In such cases the incident could be caused by water intrusion on an electrical part. This can be simulated by soaking the car or running it through a car wash.
Do not spray water directly on any electrical components.



Electrical Load

The incident may be electrical load sensitive. Perform diagnosis with all accessories (including A/C, rear window defogger, radio, fog lamps) turned on.



Cold or Hot Start Up

On some occasions an electrical incident may occur only when the car is started cold, or it may occur when the car is restarted hot shortly after being turned off. In these cases you may have to keep the car overnight to make a proper diagnosis.

CIRCUIT INSPECTION

Introduction

In general, testing electrical circuits is an easy task if it is approached in a logical and organized method. Before beginning it is important to have all available information on the system to be tested. Also, get a thorough understanding of system operation. Then you will be able to use the appropriate equipment and follow the correct test procedure.
You may have to simulate vehicle vibrations while testing electrical components. Gently shake the wiring harness or electrical component to do this.

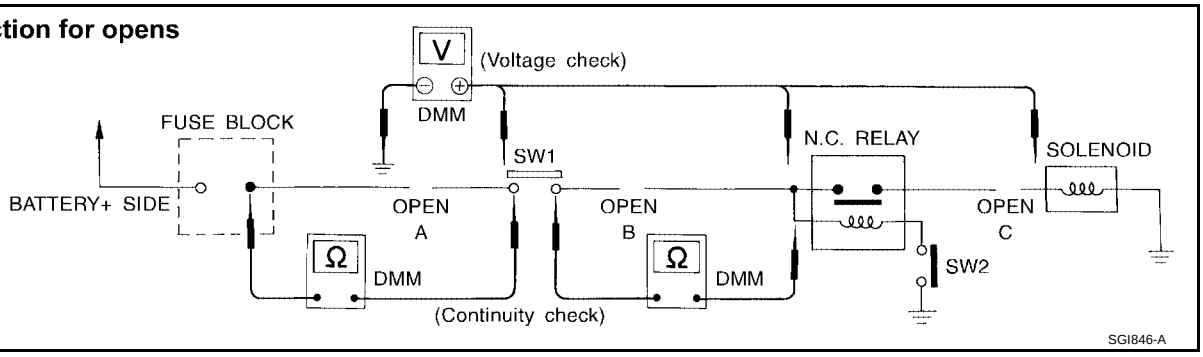
OPEN	A circuit is open when there is no continuity through a section of the circuit.	
SHORT	There are two types of shorts.	
	● SHORT CIRCUIT	When a circuit contacts another circuit and causes the normal resistance to change.
	● SHORT TO GROUND	When a circuit contacts a ground source and grounds the circuit.

NOTE:
Refer to “How to Check Terminal” to probe or check terminal.

Testing for “Opens” in the Circuit

Before you begin to diagnose and test the system, you should rough sketch a schematic of the system. This will help you to logically walk through the diagnosis process. Drawing the sketch will also reinforce your working knowledge of the system.

Inspection for opens



CONTINUITY CHECK METHOD
The continuity check is used to find an open in the circuit. The digital multimeter (DMM) set on the resistance function will indicate an open circuit as over limit (no beep tone or no ohms symbol). Make sure to always start with the DMM at the highest resistance level.
To help in understanding the diagnosis of open circuits, please refer to the previous schematic.

- Disconnect the battery negative cable.
- Start at one end of the circuit and work your way to the other end. (At the fuse block in this example)
- Connect one probe of the DMM to the fuse block terminal on the load side.
- Connect the other probe to the fuse block (power) side of SW1. Little or no resistance will indicate that portion of the circuit has good continuity. If there were an open in the circuit, the DMM would indicate an over limit or infinite resistance condition. (point A)
- Connect the probes between SW1 and the relay. Little or no resistance will indicate that portion of the circuit has good continuity. If there were an open in the circuit, the DMM would indicate an over limit or infinite resistance condition. (point B)
- Connect the probes between the relay and the solenoid. Little or no resistance will indicate that portion of the circuit has good continuity. If there were an open in the circuit, the DMM would indicate an over limit or infinite resistance condition. (point C)

Any circuit can be diagnosed using the approach in the previous example.

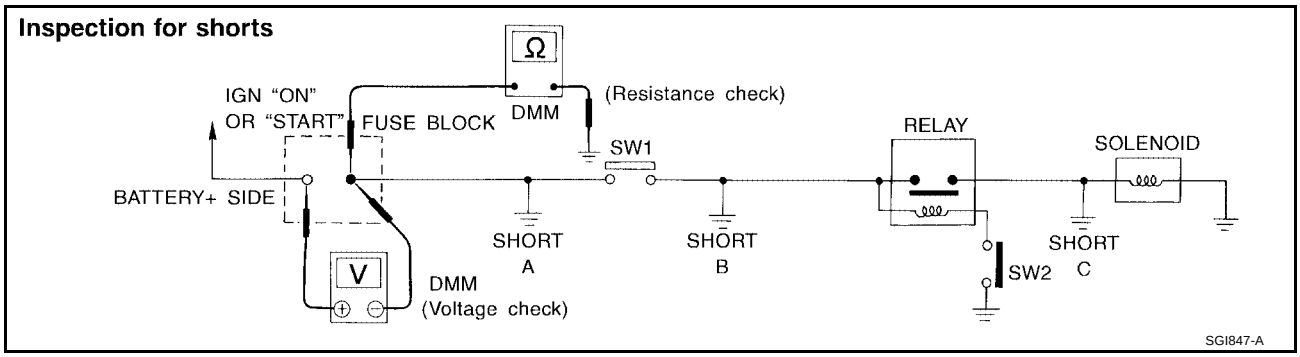
VOLTAGE CHECK METHOD
To help in understanding the diagnosis of open circuits please refer to the previous schematic.
In any powered circuit, an open can be found by methodically checking the system for the presence of voltage. This is done by switching the DMM to the voltage function.

- Connect one probe of the DMM to a known good ground.
- Begin probing at one end of the circuit and work your way to the other end.
- With SW1 open, probe at SW1 to check for voltage.
  voltage; open is further down the circuit than SW1.
  no voltage; open is between fuse block and SW1 (point A).
- Close SW1 and probe at relay.
  voltage; open is further down the circuit than the relay.
  no voltage; open is between SW1 and relay (point B).
- Close the relay and probe at the solenoid.
  voltage; open is further down the circuit than the solenoid.
  no voltage; open is between relay and solenoid (point C).

Any powered circuit can be diagnosed using the approach in the previous example.

Testing for "Shorts" in the Circuit

To simplify the discussion of shorts in the system, please refer to the following schematic.



RESISTANCE CHECK METHOD

- Disconnect the battery negative cable and remove the blown fuse.
- Disconnect all loads (SW1 open, relay disconnected and solenoid disconnected) powered through the fuse.
- Connect one probe of the DMM to the load side of the fuse terminal. Connect the other probe to a known good ground.
- With SW1 open, check for continuity.
  continuity; short is between fuse terminal and SW1 (point A).
  no continuity; short is further down the circuit than SW1.
- Close SW1 and disconnect the relay. Put probes at the load side of fuse terminal and a known good ground. Then, check for continuity.
  continuity; short is between SW1 and the relay (point B).
  no continuity; short is further down the circuit than the relay.
- Close SW1 and jump the relay contacts with jumper wire. Put probes at the load side of fuse terminal and a known good ground. Then, check for continuity.
  continuity; short is between relay and solenoid (point C).
  no continuity; check solenoid, retrace steps.

VOLTAGE CHECK METHOD

- Remove the blown fuse and disconnect all loads (i.e. SW1 open, relay disconnected and solenoid disconnected) powered through the fuse.
- Turn the ignition key to the ON or START position. Verify battery voltage at the battery + side of the fuse terminal (one lead on the battery + terminal side of the fuse block and one lead on a known good ground).
- With SW1 open and the DMM leads across both fuse terminals, check for voltage.
  voltage; short is between fuse block and SW1 (point A).
  no voltage; short is further down the circuit than SW1.
- With SW1 closed, relay and solenoid disconnected and the DMM leads across both fuse terminals, check for voltage.
  voltage; short is between SW1 and the relay (point B).

no voltage; short is further down the circuit than the relay.

- With SW1 closed, relay contacts jumped with fused jumper wire check for voltage.
  voltage; short is down the circuit of the relay or between the relay and the disconnected solenoid (point C).
  no voltage; retrace steps and check power to fuse block.

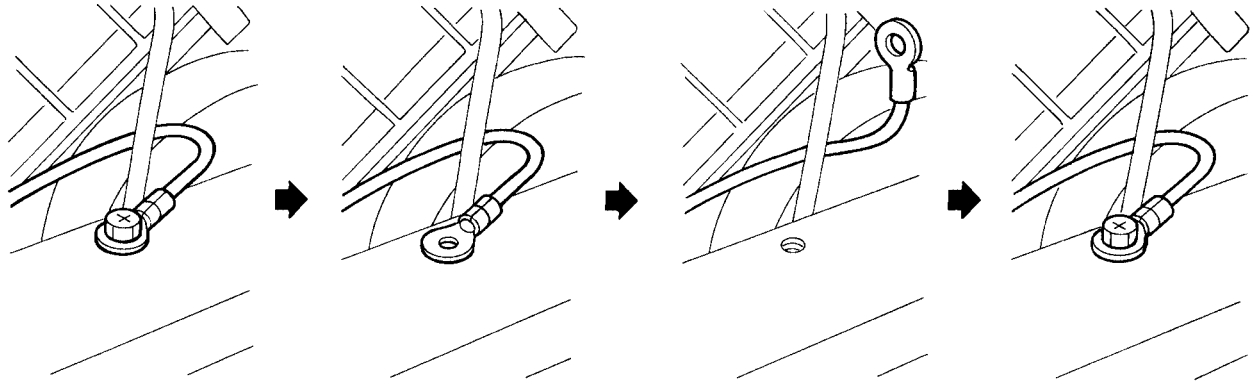
Ground Inspection

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to “Ground Distribution” in PG section.

Ground Inspection



Voltage Drop Tests

Voltage drop tests are often used to find components or circuits which have excessive resistance. A voltage drop in a circuit is caused by a resistance when the circuit is in operation.
Check the wire in the illustration. When measuring resistance with DMM, contact by a single strand of wire will give reading of 0 ohms. This would indicate a good circuit. When the circuit operates, this single strand of wire is not able to carry the current. The single strand will have a high resistance to the current. This will be picked up as a slight voltage drop.
Unwanted resistance can be caused by many situations as follows:

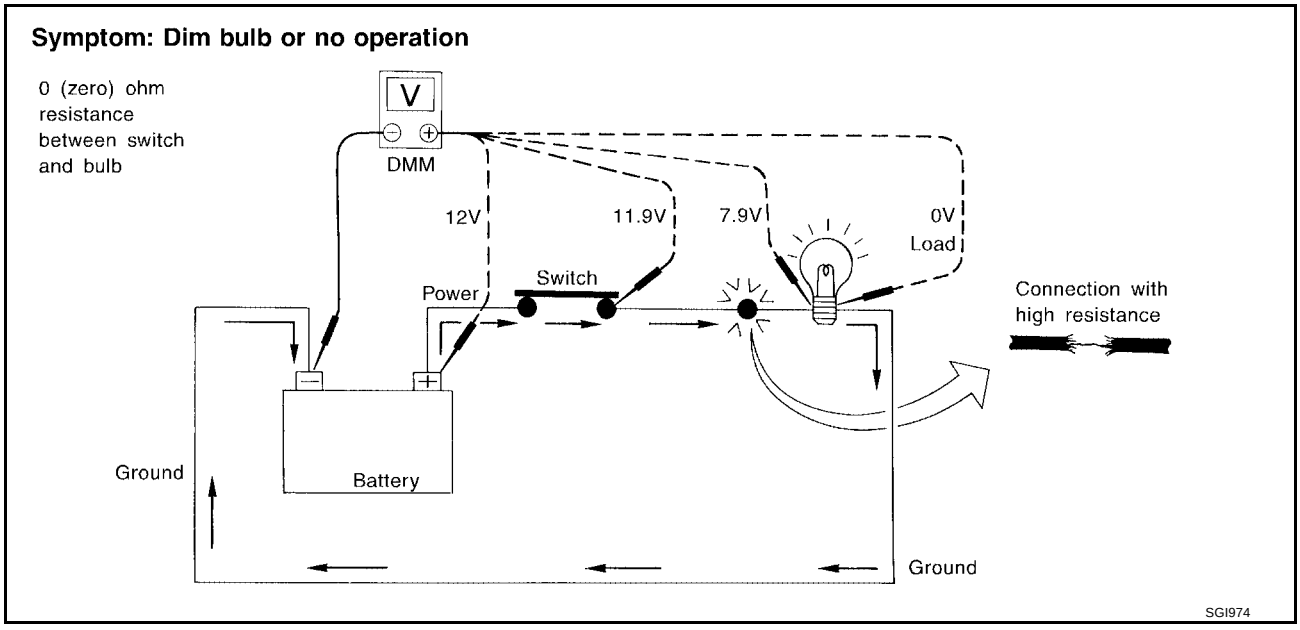
- Undersized wiring (single strand example)
- Corrosion on switch contacts
- Loose wire connections or splices.

If repairs are needed always use wire that is of the same or larger gauge.

MEASURING VOLTAGE DROP — ACCUMULATED METHOD

- Connect the DMM across the connector or part of the circuit you want to check. The positive lead of the DMM should be closer to power and the negative lead closer to ground.
- Operate the circuit.
- The DMM will indicate how many volts are being used to “push” current through that part of the circuit.

Note in the illustration that there is an excessive 4.1 volt drop between the battery and the bulb.



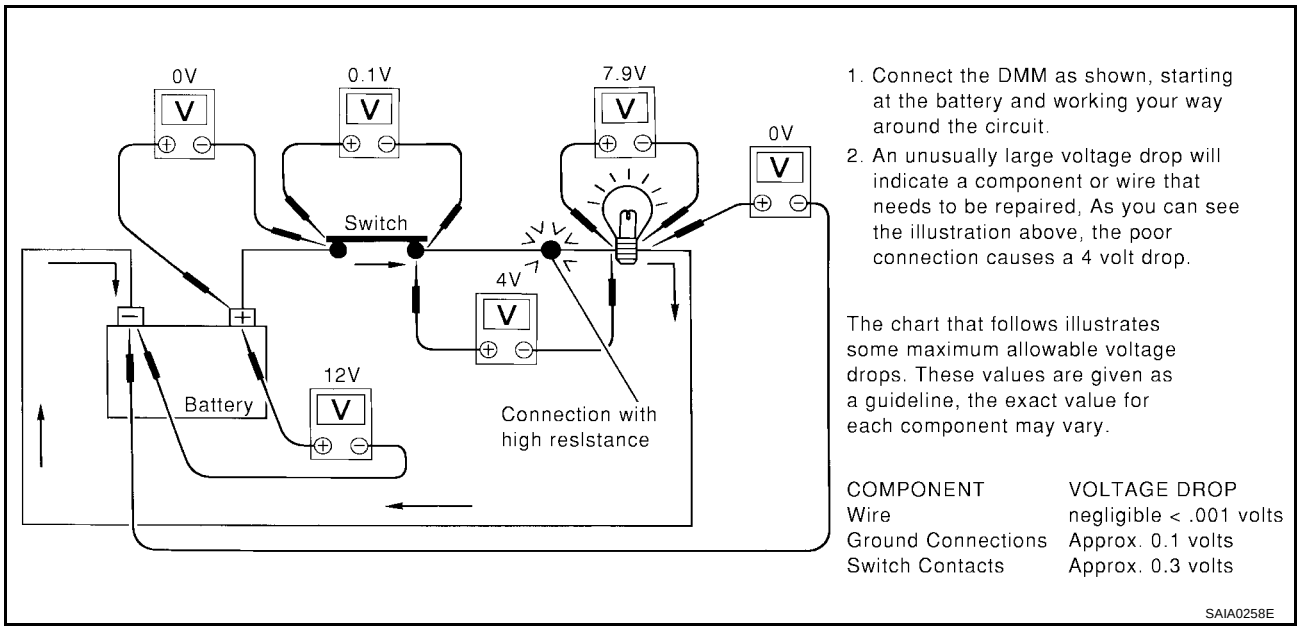
MEASURING VOLTAGE DROP — STEP-BY-STEP

The step-by-step method is most useful for isolating excessive drops in low voltage systems (such as those in “Computer Controlled Systems”).

Circuits in the “Computer Controlled System” operate on very low amperage.

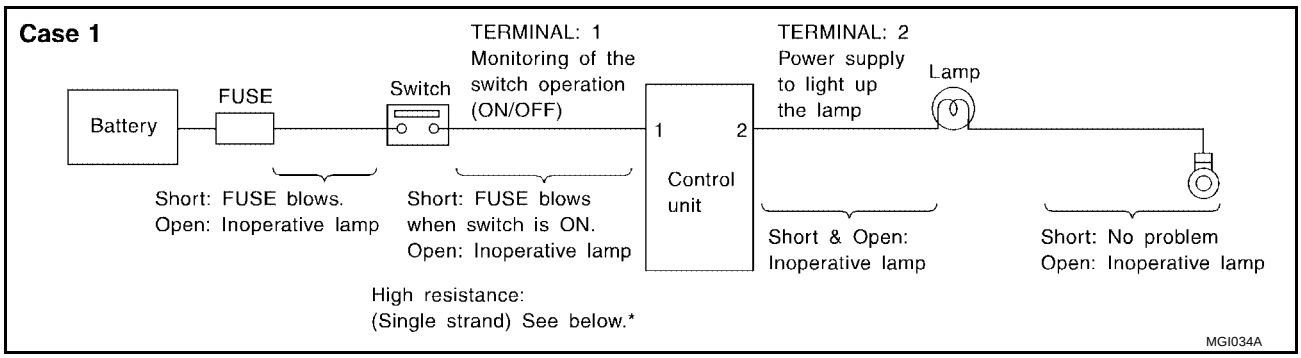
The (Computer Controlled) system operations can be adversely affected by any variation in resistance in the system. Such resistance variation may be caused by poor connection, improper installation, improper wire gauge or corrosion.

The step by step voltage drop test can identify a component or wire with too much resistance.



Control Unit Circuit Test

System Description:When the switch is ON, the control unit lights up the lamp.

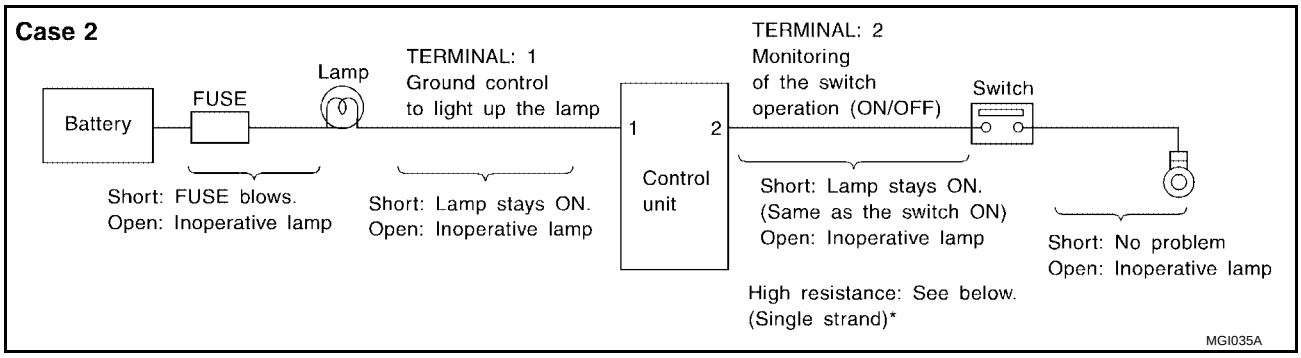


INPUT-OUTPUT VOLTAGE CHART

Pin No.	Item	Condition	Voltage value [V]	In case of high resistance such as single strand [V] *
1	Switch	Switch ON	Battery voltage	Lower than battery voltage Approx. 8 (Example)
		Switch OFF	Approx. 0	Approx. 0
2	Lamp	Switch ON	Battery voltage	Approx. 0 (Inoperative lamp)
		Switch OFF	Approx. 0	Approx. 0

The voltage value is based on the body ground.

*:If high resistance exists in the switch side circuit (caused by a single strand), terminal 1 does not detect battery voltage. Control unit does not detect the switch is ON even if the switch does not turn ON. Therefore, the control unit does not supply power to light up the lamp.



INPUT-OUTPUT VOLTAGE CHART

Pin No.	Item	Condition	Voltage value [V]	In case of high resistance such as single strand [V] *
1	Lamp	Switch ON	Approx. 0	Battery voltage (Inoperative lamp)
		Switch OFF	Battery voltage	Battery voltage
2	Switch	Switch ON	Approx. 0	Higher than 0 Approx. 4 (Example)
		Switch OFF	Approx. 5	Approx. 5

The voltage value is based on the body ground.

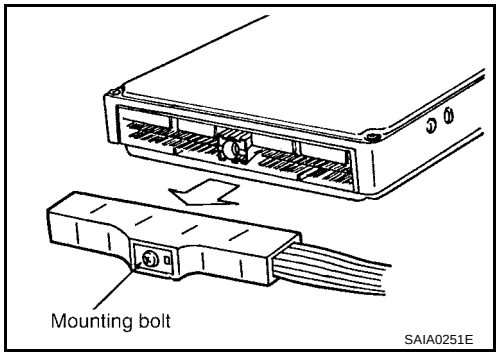
*:If high resistance exists in the switch side circuit (caused by a single strand), terminal 2 does not detect approx. 0V. Control unit does not detect the switch is ON even if the switch does not turn ON. Therefore, the control unit does not control ground to light up the lamp.

Control Units and Electrical Parts

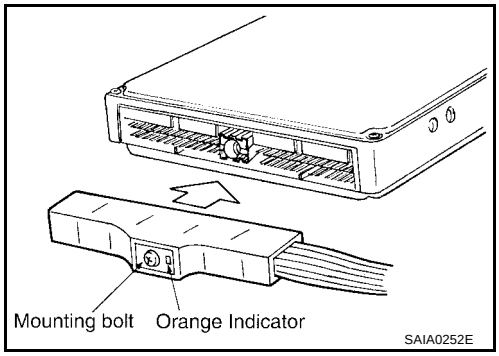
EAS000VO

PRECAUTIONS

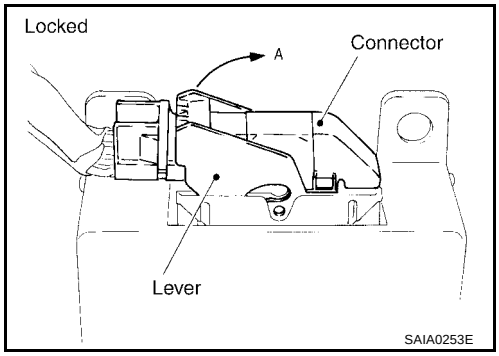
- Never reverse polarity of battery terminals.
- Install only parts specified for a vehicle.
- Before replacing the control unit, check the input and output and functions of the component parts.
- Do not apply excessive force when disconnecting a connector.
- If a connector is installed by tightening bolts, loosen bolt mounting it, then take it out by hand.



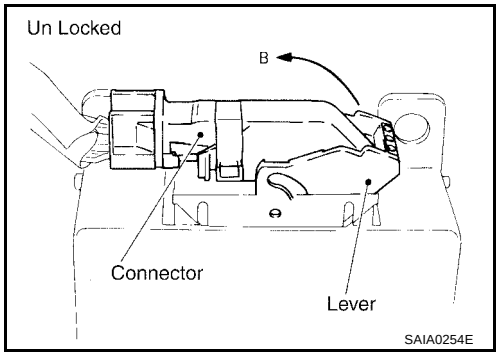
- Before installing a connector, make sure the terminal is not bent or damaged, and then correctly connect it.
  When installing a connector by tightening bolts, fix it by tightening the mounting bolt until the painted projection of the connector becomes even with the surface.



- For removal of the lever type connector, pull the lever up to the direction pointed to by the arrow A in the figure, and then remove the connector.

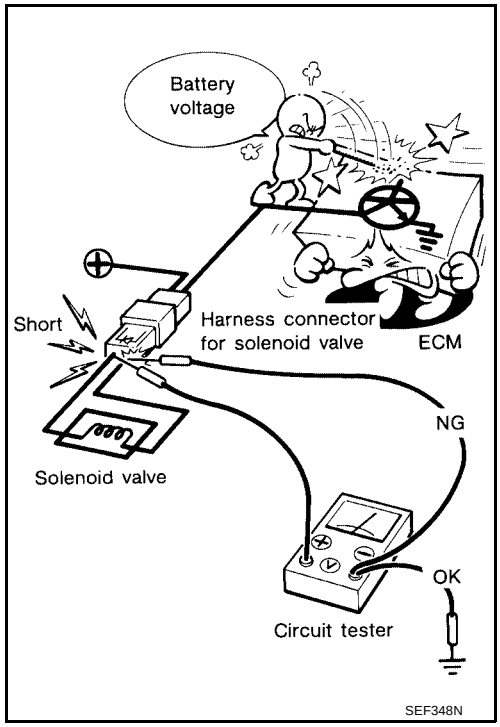


- For installation of the lever type connector, pull down the lever to the direction pointed by the arrow B in the figure, and then push the connector until a clicking noise is heard.



- Do not apply excessive shock to the control unit by dropping or hitting it.
- Be careful to prevent condensation in the control unit due to rapid temperature changes and do not let water or rain get on it. If water is found in the control unit, dry it fully and then install it in the vehicle.
- Be careful not to let oil to get on the control unit connector.
- Avoid cleaning the control unit with volatile oil.
- Do not disassemble the control unit, and do not remove the upper and lower covers.

- When using a DMM, be careful not to let test probes get close to each other to prevent the power transistor in the control unit from damaging battery voltage because of short circuiting.
- When checking input and output signals of the control unit, use the specified check adapter.



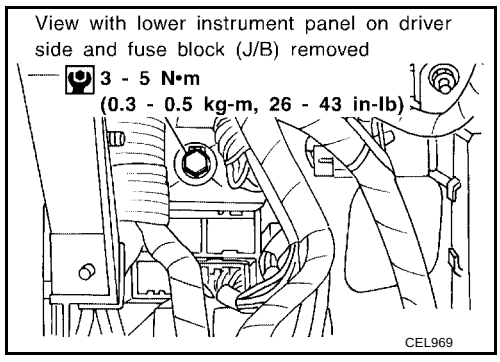
SMJ INSTALLATION

To install SMJ, tighten bolts until orange “fulltight” mark appears and then retighten to specified torque as required.

SMJ :3 - 5 N-m (0.3 - 0.5 kg-m, 26 - 43 in-lb)

CAUTION:

Do not overtighten bolts, otherwise, they may be damaged.



CONSULT CHECKING SYSTEM

PFP:00000

Description

EAS000VP

- CONSULT-II is a hand-held type tester. When it is connected with a diagnostic connector equipped on the vehicle side, it will communicate with the control unit equipped in the vehicle and then enable various kinds of diagnostic tests.
- Refer to “CONSULT Operator's Manual” for more information.

Function and System Application

EAS000VQ

Diagnostic test mode	Function	ENGINE	A/T	ABS	AIR BAG	SMART ENTRANCE	NVIS (NATS)*
Work support	This mode enables a technician to adjust some devices faster and more accurate by following the indications on CONSULT-II.	x	x	—	—	—	—
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.	x	x	x	x	—	x
Trouble diagnostic record	Current self-diagnostic results and all trouble diagnostic records previously stored can be read.	—	—	—	x	—	—
ECU discriminated No.	Classification number of a replacement ECU can be read to prevent an incorrect ECU from being installed.	—	—	—	x	—	—
Data monitor	Input/Output data in the ECU (ECM) can be read.	x	x	x	—	—	—
DTC work support	This mode enables a technician to set operating conditions to confirm self-diagnosis status/ results.	—	x	—	—	—	—
Data monitor (Spec.)	The specified values will be displayed when an OK/NG judgement is difficult for the DATA MONITOR items by Bar Chart and Line Graph.	x	—	—	—	—	—
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECU (ECM) and also shifts some parameters in a specified range.	x	—	x	—	—	—
ECU (ECM) part number	ECU (ECM) part number can be read.	x	x	x	—	—	—
Control unit initialization	All registered ignition key IDs in NATS components can be initialized and new IDs can be registered.	—	—	—	—	—	x
Function test	Conducted by CONSULT-II instead of a technician to determine whether each system is "OK" or "NG".	x	—	—	x	—	—
SRT & DTC confirmation	The results of SRT (System Readiness Test) and the self-diagnosis status/results can be confirmed.	x	—	—	—	—	—
REMO CONT ID SET UP	A maximum of four IDs (identifications) can be registered in the memory using the remote controller. These IDs can also be confirmed and erased.	—	—	—	—	x	—

x: Applicable
*: NVIS (NATS) [Nissan Vehicle Immobilizer System (Nissan Anti-Theft System)]

Nickel Metal Hydride Battery Replacement

EAS000VR

CONSULT-II contains a nickel metal hydride battery. When replacing the battery obey the following:

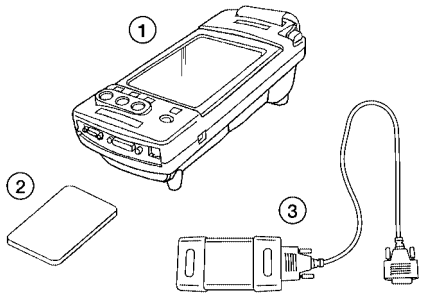
WARNING:

Replace the nickel metal hydride battery with Genuine CONSULT-II battery only. Use of another battery may present a risk of fire or explosion. The battery may present a fire or chemical burn hazard if mistreated. Do not recharge, disassemble or dispose of in fire.
Keep the battery out of reach of children and discard used battery conforming to the local regulations.

Checking Equipment

EAS000VT

When ordering the below equipment, contact your NISSAN distributor.

Tool name	Description
NISSAN CONSULT-II (J-44200) 1. CONSULT-II unit (Tester internal soft: Resident version 3.3.0) and accessories 2. Program card AED04A and AEN02C-1 (For NATS) To confirm the best combination of these softwares, refer to CONSULT-II Operation Manual. 3. CONSULT-II coverter	 LAIA0038E

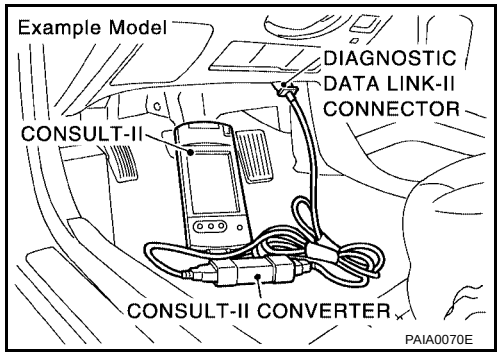
NOTE:

- The CONSULT-II must be used in conjunction with a program card. CONSULT-II does not require loading (Initialization) procedure.
- Be sure the CONSULT-II is turned off before installing or removing a program card.

CONSULT-II Start Procedure

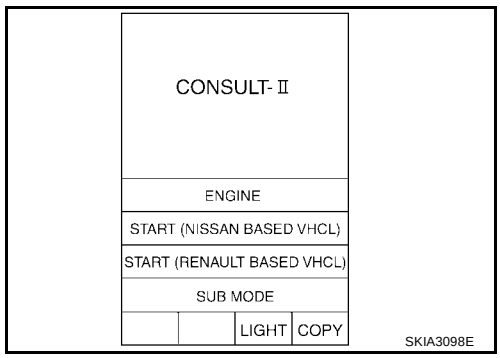
EAS000ZM

1. Turn off the ignition switch.
2. Connect CONSULT-II and CONSULT-II CONVERTER to the data link connector.



PAIA0070E

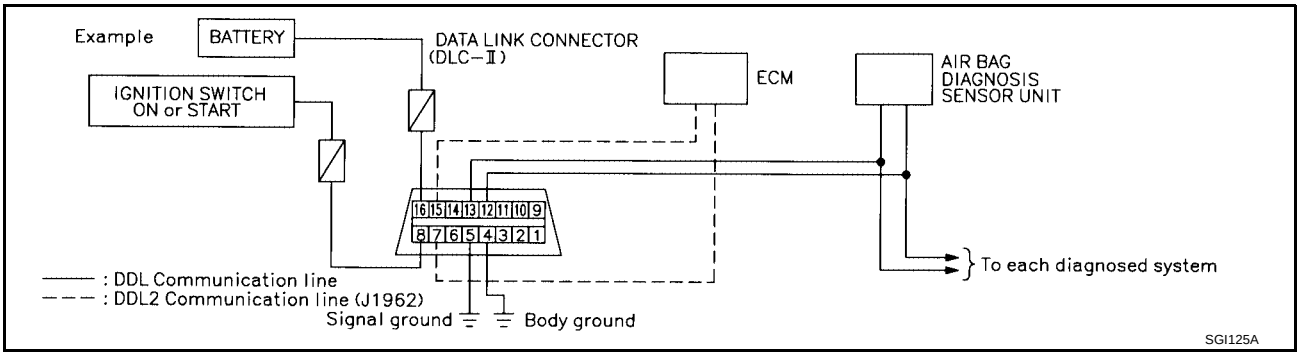
3. Turn on the ignition switch.
4. Touch “START (NISSAN BASED VECL)” or “System Shortcut” (eg: Engine) on the screen.



SKIA3098E

CONSULT-II Data Link Connector (DLC) Circuit

EAS000VU



INSPECTION PROCEDURE

If the CONSULT-II cannot diagnose the system properly, check the following items.

Symptom	Check item
CONSULT-II cannot access any system.	● CONSULT-II DLC power supply circuit (Terminal 8) and ground circuit (Terminal 4) (For detailed circuit, refer to “MIL & Data Link Connectors Wiring Diagram” in EC section.) ● CONSULT-II DLC cable
CONSULT-II cannot access individual system. (Other systems can be accessed.)	● CONSULT-II program card (Check the appropriate CONSULT-II program card for the system. Refer to "Checking Equipment".) ● Power supply and ground circuit for the control unit of the system (For detailed circuit, refer to wiring diagram for each system.) ● Open or short circuit between the system and CONSULT-II DLC (For detailed circuit, refer to wiring diagram for each system.)

NOTE:

The DDL1 and DDL2 circuits from DLC pins 12, 13, 14 and 15 may be connected to more than one system. A short in a DDL circuit connected to a control unit in one system may affect CONSULT-II access to other systems.

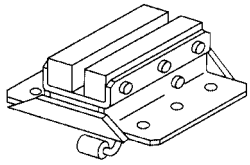
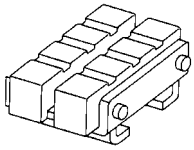
LIFTING POINT

PFP:00000

Special Service Tools

EAS000ZN

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore number) Tool name	Description
LM4086-0200 (—) Board-on attachment	 NT001
LM4519-0000 (—) Safety stand attachment	 NT002

CAUTION:

- **Every time the vehicle is lifted up, maintain the complete vehicle curb condition.**
- **Since the vehicle's center of gravity changes when removing main parts on the front side (engine, transmission, suspension, etc.), support the rear of the vehicle with a suitable jack.**
- **Since the vehicle's center of gravity changes when removing main parts on the rear side (rear axle, suspension, etc.), support the front of the vehicle with a suitable jack.**
- **Make sure not to damage piping parts when lifting vehicle.**

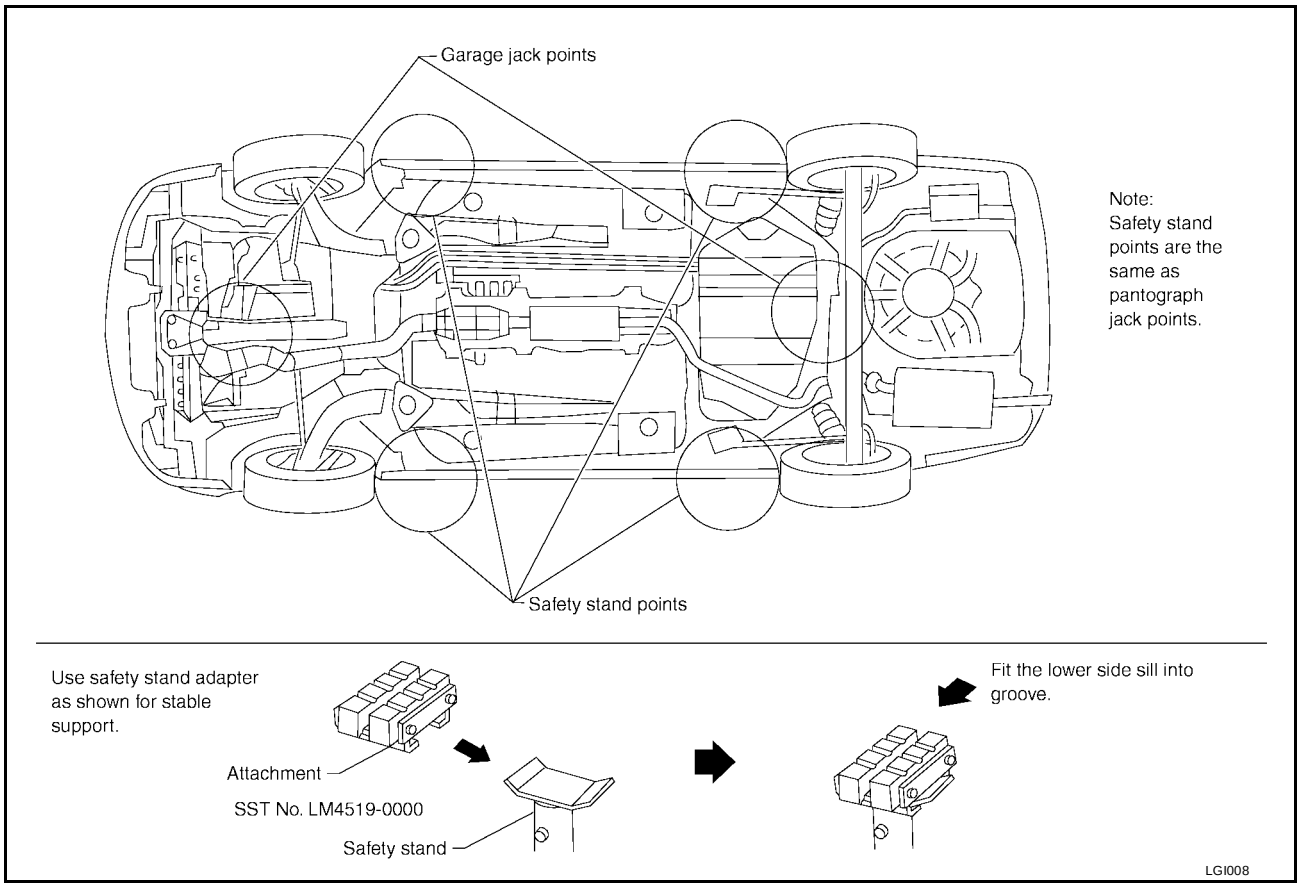
Garage Jack and Safety Stand

EAS000ZO

WARNING:

- **Never get under the vehicle while it is supported only by the jack. Always use safety stands when you have to get under the vehicle.**

- **Place wheel chocks at both front and back of the wheels on the ground.**



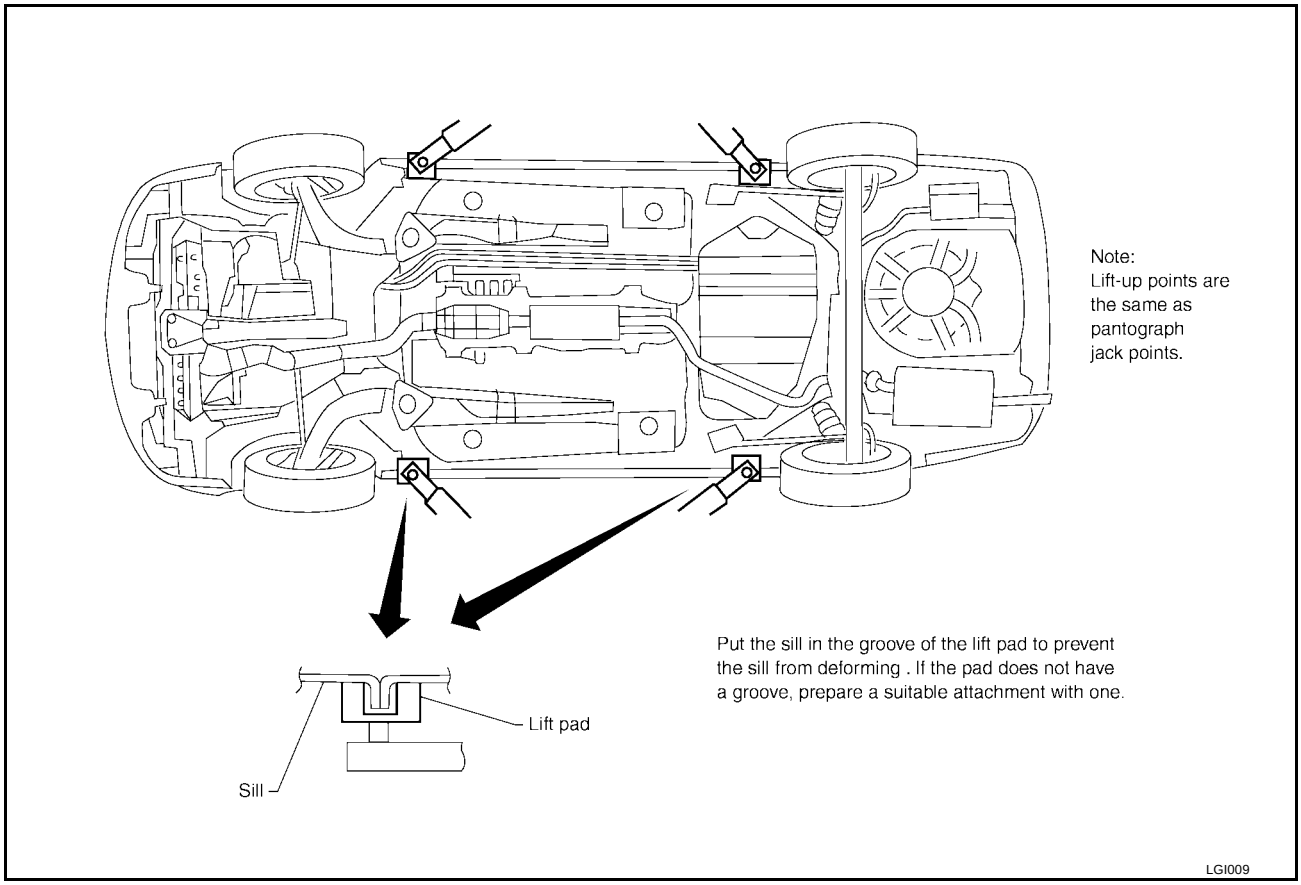
2-Pole Lift

EAS000ZP

WARNING:

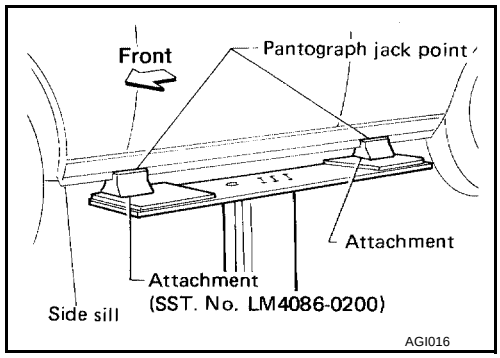
When lifting the vehicle, open the lift arms as wide as possible and ensure that the front and rear of the vehicle are well balanced.

When setting the lift arm, do not allow the arm to contact the brake tubes, brake cable, fuel lines and sill spoiler.



Board-On Lift

EAS000ZQ



CAUTION:

Make sure vehicle is empty when lifting.

- **The board-on lift attachment (LM4086-0200) set at front end of vehicle should be set on the front of the sill under the front door opening.**
- **Position attachments at front and rear ends of board-on lift.**

TOW TRUCK TOWING

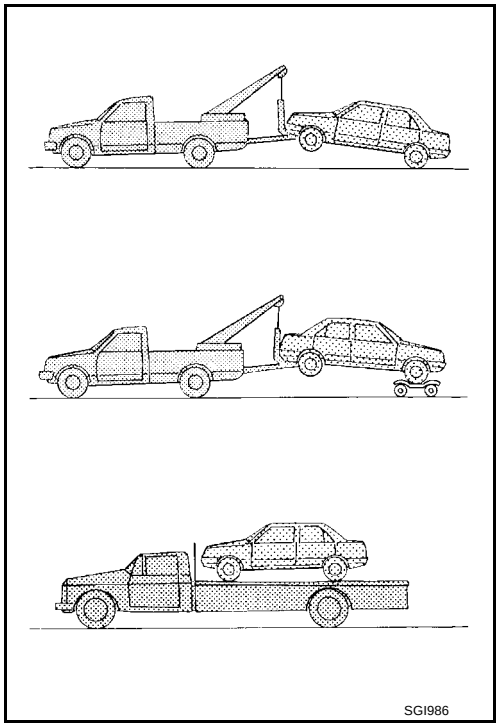
PFP:00000

Tow Truck Towing

EAS000VW

CAUTION:

- **All applicable state or Provincial (in Canada) laws and local laws regarding the towing operation must be obeyed.**
- **It is necessary to use proper towing equipment to avoid possible damage to the vehicle during towing operation. Towing is in accordance with Towing Procedure Manual at dealer.**
- **Always attach safety chains before towing.**
- **When towing, make sure that the transmission, steering system and power train are in good order. If any unit is damaged, dollies must be used.**



NISSAN recommends that the vehicle be towed with the driving (front) wheels off the ground as illustrated.

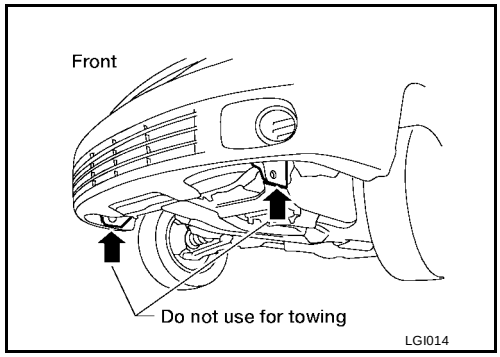
CAUTION:

- **Always release the parking brake when towing the vehicle with the front wheels raised with the rear wheels on the ground.**
- **When towing manual transaxle models with the front wheels on the ground (if a towing dolly is not used), turn the ignition key to the OFF position, and secure the steering wheel in the straight-ahead position with a rope or similar device. Never place the ignition key in the LOCK position. This will result in damage to the steering lock mechanism.**
  Move the shift lever to the N (Neutral) position.
- **Never tow an automatic transaxle model with the rear wheels raised and the front wheels on the ground. This may cause serious and expensive damage to the transaxle. If it is necessary to tow the vehicle with the rear wheels raised, always use towing dollies under the front wheels.**
- **Never tow an automatic transaxle model from the rear (that is backward) with four wheels on the ground. This may cause serious and expensive damage to the transaxle.**

Vehicle Recovery (Freeing a stuck vehicle)

EAS000VX

- **Tow chains or cables must be attached only to the main structural members of the vehicle.**
- **Pulling devices should be routed so they do not touch any part of the suspension, steering, brake or cooling systems.**
- **Always pull the cable straight out from the front of the vehicle. Never pull on the vehicle at an angle.**
- **Pulling devices such as ropes or canvas straps are not recommended for use in vehicle towing or recovery.**



TIGHTENING TORQUE OF STANDARD BOLTS

PFP:00000

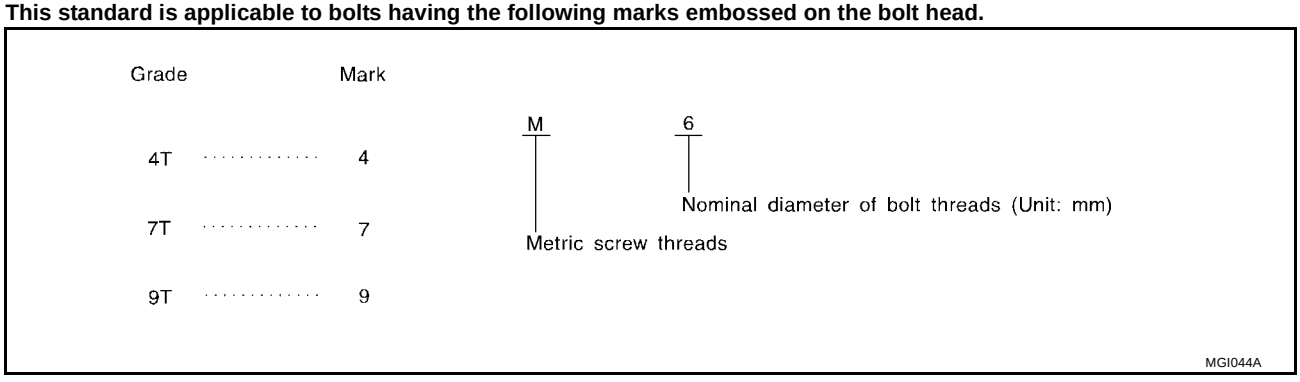
Tightening Torque Table

EAS000VY

Grade	Bolt size	Bolt diameter * mm	Pitch mm	Tightening torque (Without lubricant)							
				Hexagon head bolt				Hexagon flange bolt			
				N-m	kg-m	ft-lb	in-lb	N-m	kg-m	ft-lb	in-lb
4T	M6	6.0	1.0	5.1	0.52	3.8	45.1	6.1	0.62	4.5	53.8
	M8	8.0	1.25	13	1.3	9	—	15	1.5	11	—
			1.0	13	1.3	9	—	16	1.6	12	—
	M10	10.0	1.5	25	2.5	18	—	29	3.0	22	—
			1.25	25	2.6	19	—	30	3.1	22	—
	M12	12.0	1.75	42	4.3	31	—	51	5.2	38	—
			1.25	46	4.7	34	—	56	5.7	41	—
	M14	14.0	1.5	74	7.5	54	—	88	9.0	65	—
7T	M6	6.0	1.0	8.4	0.86	6.2	74.6	10	1.0	7	87
	M8	8.0	1.25	21	2.1	15	—	25	2.5	18	—
			1.0	22	2.2	16	—	26	2.7	20	—
	M10	10.0	1.5	41	4.2	30	—	48	4.9	35	—
			1.25	43	4.4	32	—	51	5.2	38	—
	M12	12.0	1.75	71	7.2	52	—	84	8.6	62	—
			1.25	77	7.9	57	—	92	9.4	68	—
	M14	14.0	1.5	127	13.0	94	—	147	15.0	108	—
9T	M6	6.0	1.0	12	1.2	9	—	15	1.5	11	—
	M8	8.0	1.25	29	3.0	22	—	35	3.6	26	—
			1.0	31	3.2	23	—	37	3.8	27	—
	M10	10.0	1.5	59	6.0	43	—	70	7.1	51	—
			1.25	62	6.3	46	—	74	7.5	54	—
	M12	12.0	1.75	98	10.0	72	—	118	12.0	87	—
			1.25	108	11.0	80	—	137	14.0	101	—
	M14	14.0	1.5	177	18.0	130	—	206	21.0	152	—

*: Nominal diameter

1. **Special parts are excluded.**
2. **This standard is applicable to bolts having the following marks embossed on the bolt head.**



RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS

PFP:00000

Recommended Chemical Products and Sealants

EAS000VZ

Refer to the following chart for help in selecting the appropriate chemical product or sealant.

	Product Description	Purpose	Nissan North America Part No. (USA)	Nissan Canada Part No. (Canada)	Aftermarket Cross Reference Part Nos.
1	Rear View Mirror Adhesive	Used to permanently remount rear view mirrors to windows.	999MP-AM000P	99998-50505	Permatex 81844
2	Anaerobic Liquid Gasket	For metal-to-metal flange sealing. Can fill a 0.38 mm (0.015 inch) gap and provide instant sealing for most powertrain applications.	999MP-AM001P	99998-50503	Three Bond 1215; Permatex 51813 and 51817
3	High Performance Thread Sealant	Provides instant sealing on any threaded straight or parallel threaded fitting. (Thread sealant only, no locking ability.) ● Do not use on plastic.	999MP-AM002P	999MP-AM002P	Permatex 56521
4	Silicone RTV	Gasket Maker	999MP-AM003P (Ultra Grey)	99998-50506 (Ultra Grey)	Permatex Ultra Grey 82194; Three Bond 1207 and 1216; Nissan RTV Part No. 999MP-A7007
5	High Temperature, High Strength Thread Locking Sealant (Red)	Threadlocker	999MP-AM004P	999MP-AM004P	Permatex 27200; Three Bond 1360, 1360N, 1305 N&P, 1307N, 1335, 1335B, 1363B, 1377C, 1386B, D&E and 1388
6	Medium Strength Thread Locking Sealant (Blue)	Threadlocker (service tool removable)	999MP-AM005P	999MP-AM005P	Permatex 24200, 24206, 24240, 24283 and 09178; Three Bond 1322, 1322N, 1324 D&N, 1333D, 1361C, 1364D, 1370C and 1374

IDENTIFICATION INFORMATION

PFP:00010

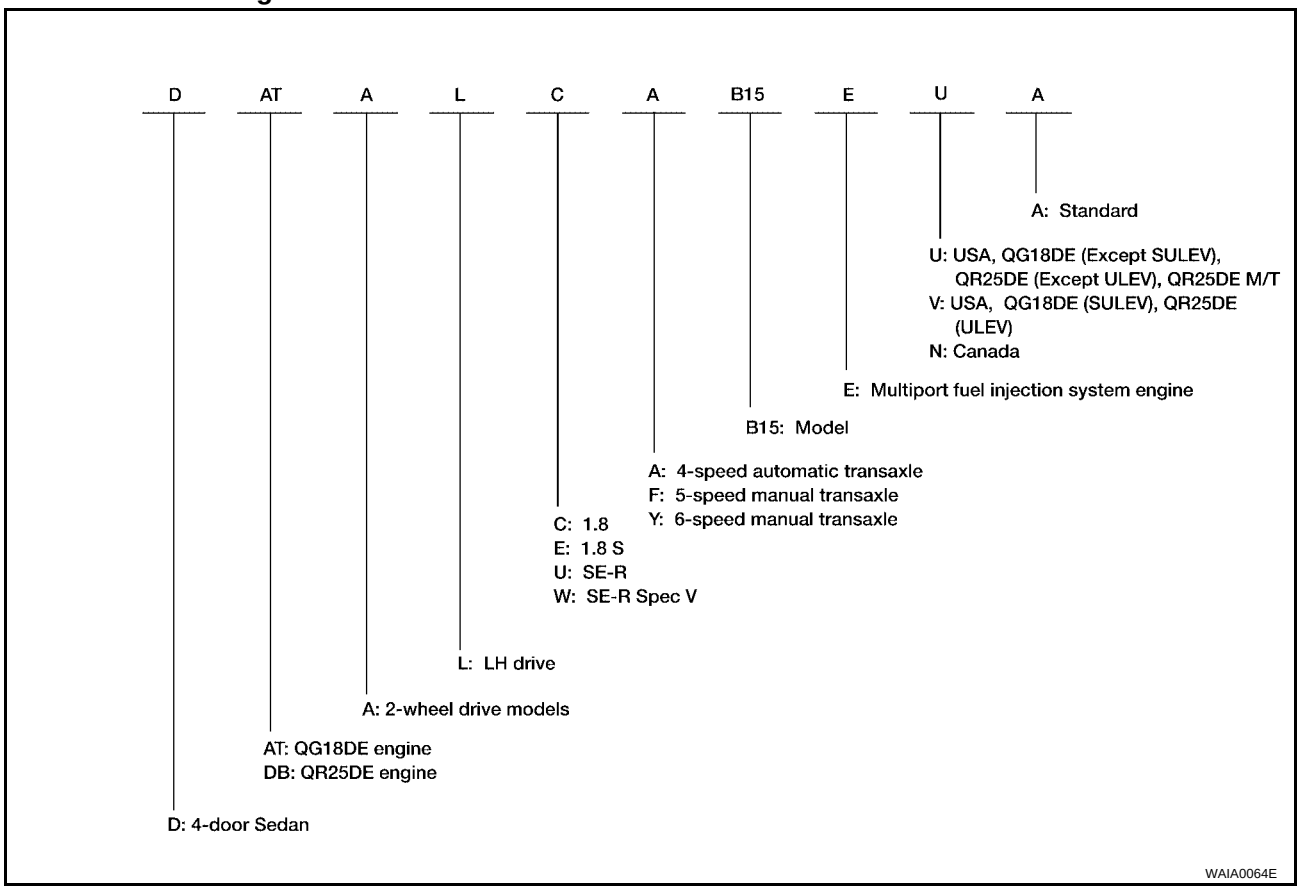
Identification Information

EAS000W0

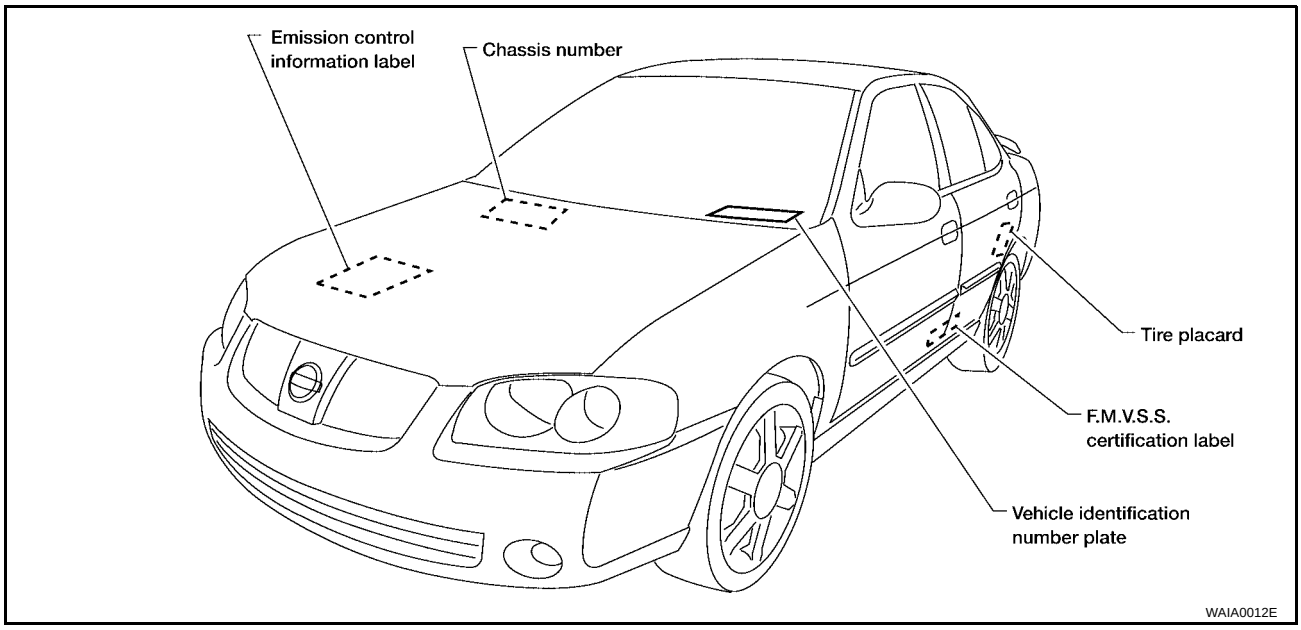
MODEL VARIATION

Body	Grade	Transaxle	Destination/Engine						
			USA					Canada	
			QG18DE (Except SULEV)	QG18DE (SULEV)	QR25DE (Except ULEV)	QR25DE (ULEV)	QR25DE	QG18DE	QR25DE
Sedan	1.8	RE4F03B (A/T)	DATALCA-EUA	DATALCA-EVA	—	—	—	DATALCA-ENA	—
		RS5F70A (M/T)	DATALCF-EUA	DATALCF-EVA	—	—	—	DATALCF-ENA	—
	1.8 S	RE4F03B (A/T)	DATALEA-EUA	DATALEA-EVA	—	—	—	DATALEA-ENA	—
		RS5F70A (M/T)	DATALEF-EUA	DATALEF-EVA	—	—	—	DATALEF-ENA	—
	SE-R	RE4F04B (A/T)	—	—	DDBALUA-EUA	DDBALUA-EVA	—	—	DDBALUA-ENA
	SE-R SPEC V	RS6F51A (6M/T)	—	—	—	—	DDBALWY-EUA	—	DDBALWY-ENA

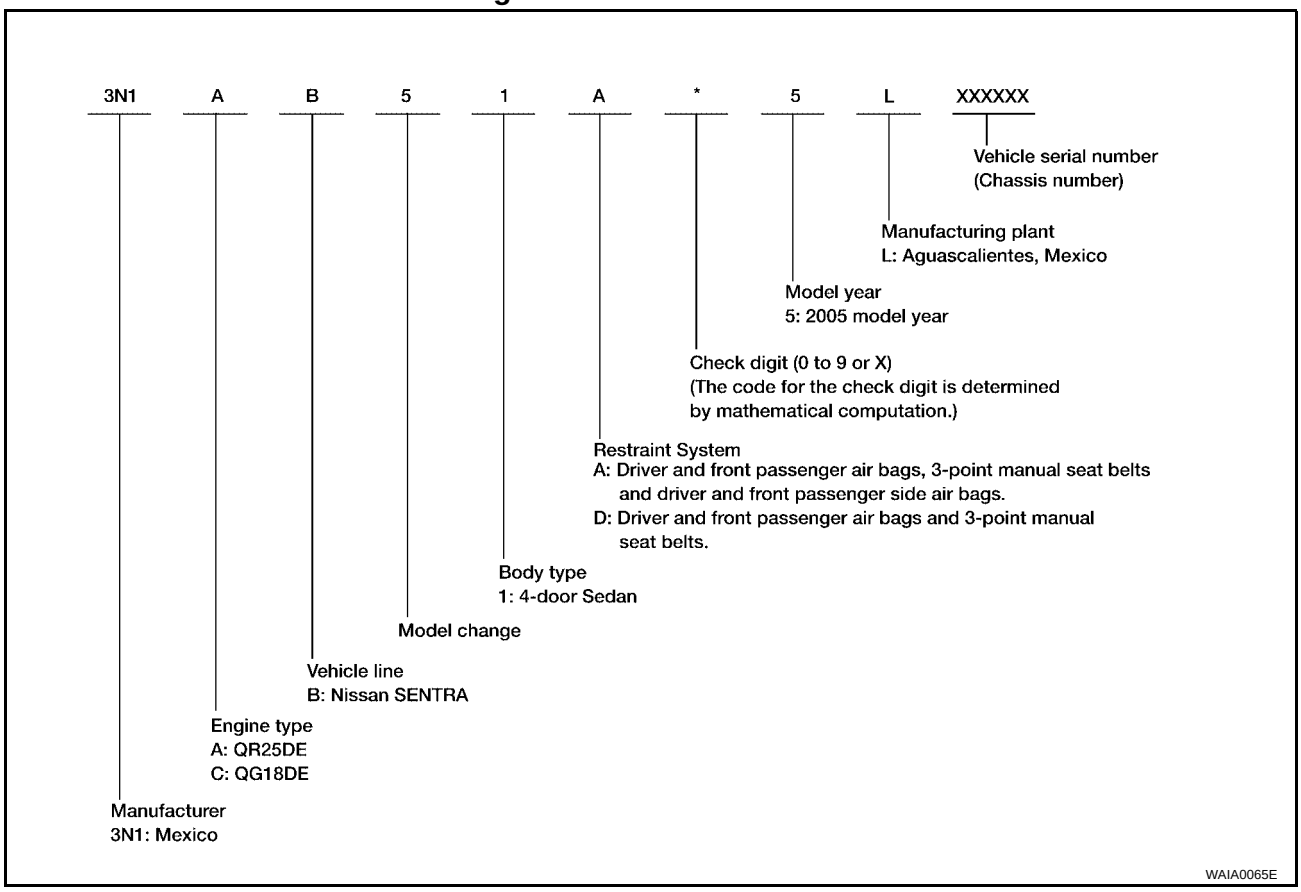
Prefix and suffix designations:



IDENTIFICATION NUMBER

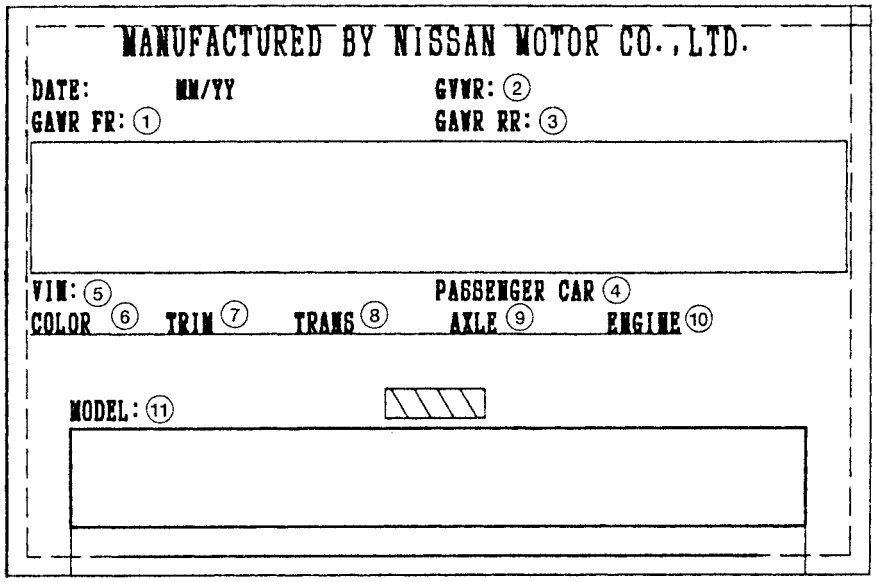


Vehicle Identification Number Arrangement



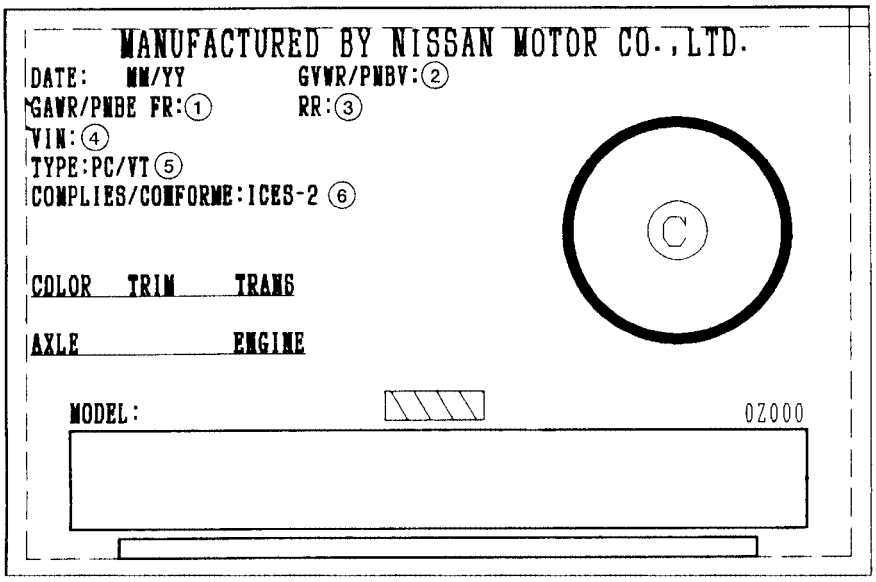
F.M.V.S.S. Certification Label

For US Vehicles



1. Gross front axle weight (in pounds)
2. Gross vehicle weight (in pounds)
3. Gross rear axle weight (in pounds)
4. Type
5. Vehicle identification number (chassis number)
6. Body color code
7. Trim color code
8. Transaxle
9. Axle model
10. Engine model
11. Model

For Canadian Vehicles

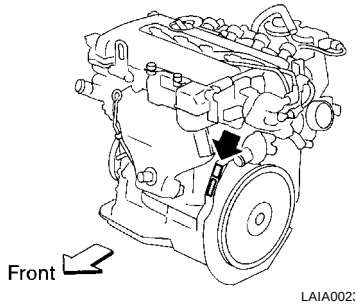


1. Gross axle weight rating front in English and French (in kilograms)
2. Gross vehicle weight rating in English and French (in kilograms)
3. Gross axle weight rating rear in English and French (in kilograms)
4. Vehicle identification number (chassis number)
5. Type of vehicle in English and French.
6. Radio frequency interference statement in English and French.

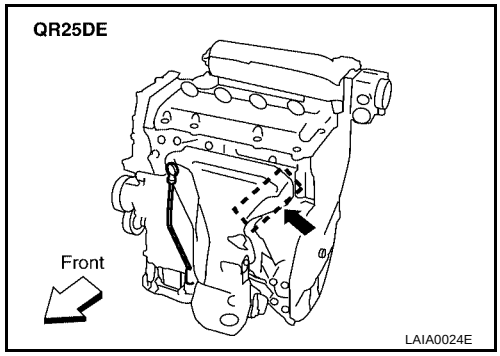
LGI013

Engine Serial Number

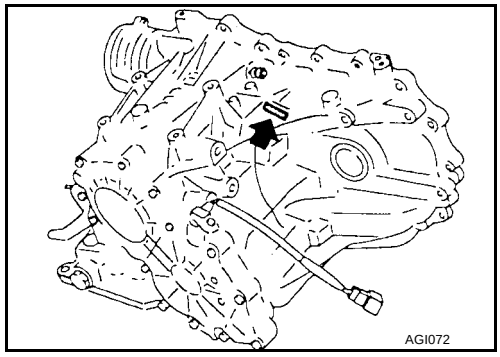
QG18DE



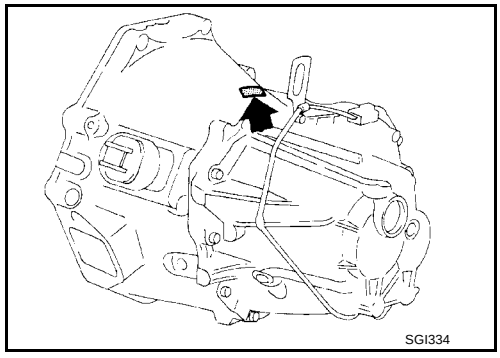
LAIA0023E



Automatic Transaxle Number



Manual Transaxle Number



DIMENSIONS

Unit: mm (in)

Overall length		4,508 (177.5)
Overall width		1,710 (67.3)
Overall height		1,410 (55.5)
Front tread 15/16 inch 17 inch		 1,476 (58.1) 1466 (57.7)
Rear tread 15/16 inch 17 inch		 1,455 (57.3) 1446 (56.9)
Wheelbase		2,535 (99.8)
Gross vehicle weight rating kg (lb)		See the “F.M.V.S.S. certification label” on the driver's side lock pillar.
Gross axle weight rating	Front kg (lb)	
	Rear kg (lb)	

WHEELS & TIRES

Road wheel Offset mm (in)	15 × 6JJ (steel) 45 (1.77)	15 × 6JJ (aluminum) 45 (1.77)	16 × 6JJ (aluminum) 45 (1.77)	17 x 7JJ (aluminum) 47 (1.85)
Conventional tire	P195/60HR15	P195/60HR15	P195/55HR16	P215/45ZR17
Spare tire	T125/70*14 or T125/70*15	T125/70*15	T125/70*15	T135/80D15T2 or T135/80*17

*: D or R, depending on manufacturer.

TERMINOLOGY

PFP:00011

SAE J1930 Terminology List

EAS000W1

All emission related terms used in this publication in accordance with SAE J1930 are listed. Accordingly, new terms, new acronyms/abbreviations and old terms are listed in the following chart.

NEW TERM	NEW ACRONYM / ABBREVIATION	OLD TERM
Air cleaner	ACL	Air cleaner
Barometric pressure	BARO	***
Barometric pressure sensor-BCDD	BAROS-BCDD	BCDD
Camshaft position	CMP	***
Camshaft position sensor	CMPS	Crank angle sensor
Canister	***	Canister
Carburetor	CARB	Carburetor
Charge air cooler	CAC	Intercooler
Closed loop	CL	Closed loop
Closed throttle position switch	CTP switch	Idle switch
Clutch pedal position switch	CPP switch	Clutch switch
Continuous fuel injection system	CFI system	***
Continuous trap oxidizer system	CTOX system	***
Crankshaft position	CKP	***
Crankshaft position sensor	CKPS	***
Data link connector	DLC	***
Data link connector for CONSULT-II	DLC for CONSULT-II	Diagnostic connector for CONSULT-II
Diagnostic test mode	DTM	Diagnostic mode
Diagnostic test mode selector	DTM selector	Diagnostic mode selector
Diagnostic test mode I	DTM I	Mode I
Diagnostic test mode II	DTM II	Mode II
Diagnostic trouble code	DTC	Malfunction code
Direct fuel injection system	DFI system	***
Distributor ignition system	DI system	Ignition timing control
Early fuel evaporation-mixture heater	EFE-mixture heater	Mixture heater
Early fuel evaporation system	EFE system	Mixture heater control
Electrically erasable programmable read only memory	EEPROM	***
Electronic ignition system	EI system	Ignition timing control
Engine control	EC	***
Engine control module	ECM	ECCS control unit
Engine coolant temperature	ECT	Engine temperature
Engine coolant temperature sensor	ECTS	Engine temperature sensor
Engine modification	EM	***
Engine speed	RPM	Engine speed
Erasable programmable read only memory	EPROM	***
Evaporative emission canister	EVAP canister	Canister
Evaporative emission system	EVAP system	Canister control solenoid valve
Exhaust gas recirculation valve	EGR valve	EGR valve

NEW TERM	NEW ACRONYM / ABBREVIATION	OLD TERM
Exhaust gas recirculation control-BPT valve	EGRC-BPT valve	BPT valve
Exhaust gas recirculation control-solenoid valve	EGRC-solenoid valve	EGR control solenoid valve
Exhaust gas recirculation temperature sensor	EGRT sensor	Exhaust gas temperature sensor
EGR temperature sensor		
Flash electrically erasable programmable read only memory	FEEPROM	***
Flash erasable programmable read only memory	FEPROM	***
Flexible fuel sensor	FFS	***
Flexible fuel system	FF system	***
Fuel pressure regulator	***	Pressure regulator
Fuel pressure regulator control solenoid valve	***	PRVR control solenoid valve
Fuel trim	FT	***
Heated Oxygen sensor	HO2S	Exhaust gas sensor
Idle air control system	IAC system	Idle speed control
Idle air control valve-air regulator	IACV-air regulator	Air regulator
Idle air control valve-auxiliary air control valve	IACV-AAC valve	Auxiliary air control (AAC) valve
Idle air control valve-FICD solenoid valve	IACV-FICD solenoid valve	FICD solenoid valve
Idle air control valve-idle up control solenoid valve	IACV-idle up control solenoid valve	Idle up control solenoid valve
Idle speed control-FI pot	ISC-FI pot	FI pot
Idle speed control system	ISC system	***
Ignition control	IC	***
Ignition control module	ICM	***
Indirect fuel injection system	IFI system	***
Intake air	IA	Air
Intake air temperature sensor	IAT sensor	Air temperature sensor
Knock	***	Detonation
Knock sensor	KS	Detonation sensor
Malfunction indicator lamp	MIL	Check engine light
Manifold absolute pressure	MAP	***
Manifold absolute pressure sensor	MAPS	***
Manifold differential pressure	MDP	***
Manifold differential pressure sensor	MDPS	***
Manifold surface temperature	MST	***
Manifold surface temperature sensor	MSTS	***
Manifold vacuum zone	MVZ	***
Manifold vacuum zone sensor	MVZS	***
Mass air flow sensor	MAFS	Air flow meter
Mixture control solenoid valve	MC solenoid valve	Air-fuel ratio control solenoid valve
Multiport fuel injection System	MFI system	Fuel injection control

NEW TERM	NEW ACRONYM / ABBREVIATION	OLD TERM
Nonvolatile random access memory	NVRAM	***
On board diagnostic system	OBD system	Self-diagnosis
Open loop	OL	Open loop
Oxidation catalyst	OC	Catalyst
Oxidation catalytic converter system	OC system	***
Oxygen sensor	O2S	Exhaust gas sensor
Park position switch	***	Park switch
Park/neutral position switch	PNP switch	Park/neutral switch Inhibitor switch Neutral position switch
Periodic trap oxidizer system	PTOX system	***
Positive crankcase ventilation	PCV	Positive crankcase ventilation
Positive crankcase ventilation valve	PCV valve	PCV valve
Powertrain control module	PCM	***
Programmable read only memory	PROM	***
Pulsed secondary air injection control solenoid valve	PAIRC solenoid valve	AIV control solenoid valve
Pulsed secondary air injection system	PAIR system	Air induction valve (AIV) control
Pulsed secondary air injection valve	PAIR valve	Air induction valve
Random access memory	RAM	***
Read only memory	ROM	***
Scan tool	ST	***
Secondary air injection pump	AIR pump	***
Secondary air injection system	AIR system	***
Sequential multiport fuel injection system	SFI system	Sequential fuel injection
Service reminder indicator	SRI	***
Simultaneous multiport fuel injection system	***	Simultaneous fuel injection
Smoke puff limiter system	SPL system	***
Supercharger	SC	***
Supercharger bypass	SCB	***
System readiness test	SRT	***
Thermal vacuum valve	TVV	Thermal vacuum valve
Three way catalyst	TWC	Catalyst
Three way catalytic converter system	TWC system	***
Three way + oxidation catalyst	TWC + OC	Catalyst
Three way + oxidation catalytic converter system	TWC + OC system	***
Throttle body	TB	Throttle chamber SPI body
Throttle body fuel injection system	TBI system	Fuel injection control
Throttle position	TP	Throttle position
Throttle position sensor	TPS	Throttle sensor
Throttle position switch	TP switch	Throttle switch
Torque converter clutch solenoid valve	TCC solenoid valve	Lock-up cancel solenoid Lock-up solenoid

NEW TERM	NEW ACRONYM / ABBREVIATION	OLD TERM
Transmission control module	TCM	A/T control unit
Turbocharger	TC	Turbocharger
Vehicle speed sensor	VSS	Vehicle speed sensor
Volume air flow sensor	VAFS	Air flow meter
Warm up oxidation catalyst	WU-OC	Catalyst
Warm up oxidation catalytic converter system	WU-OC system	***
Warm up three way catalyst	WU-TWC	Catalyst
Warm up three way catalytic converter system	WU-TWC system	***
Wide open throttle position switch	WOTP switch	Full switch

***: Not applicable

SECTION CO

ENGINE COOLING SYSTEM

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QG18DE

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PRECAUTIONS

PFP:00001

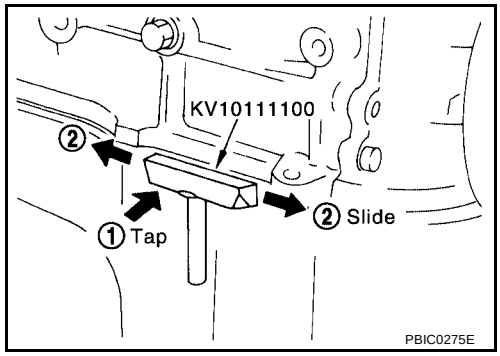
Precautions For Liquid Gasket

EBS00EYR

REMOVAL OF LIQUID GASKET

- After removing the bolts and nuts, disconnect and remove the sealant using Tool.

Tool number : KV10111100 (J-37228)



CAUTION:

Be careful not to damage the mating surfaces.

- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap the liquid gasket applied area.

CAUTION:

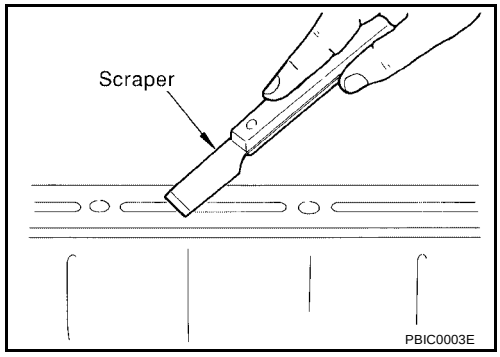
If for some unavoidable reason a tool such as a flat-blade screwdriver is used, be careful not to damage the mating surfaces.

LIQUID GASKET APPLICATION PROCEDURE

1. Using a scraper, remove the old sealant adhering to the application surface and the mating surface.

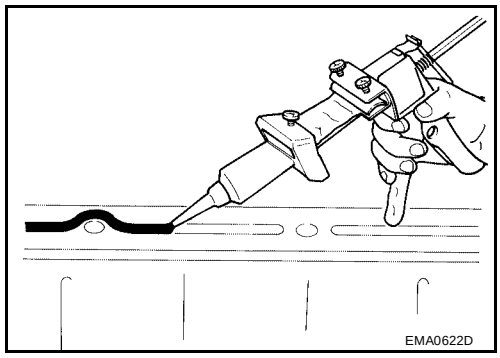
- Remove the old sealant completely from the groove of the application surface, mounting bolts, and bolt holes.

2. Thoroughly clean the application surface and the mating surface to remove adhering moisture, grease and foreign material.
3. Attach the sealant tube to the tube presser.
   Use Genuine RTV Silicone Sealant or equivalent. Refer to **GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"** .

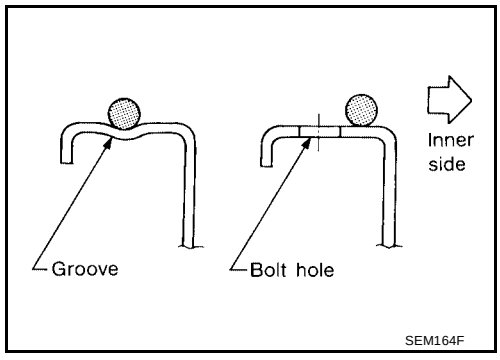


4. Apply the sealant without breaks to the specified location with the specified dimensions.

- If there is a groove for the sealant application, apply the sealant to the groove.



- As for the bolt holes, normally apply the sealant inside the holes. Occasionally, it should be applied outside the holes.
- Within five minutes of sealant application, install the mating component.
- If the sealant protrudes, wipe it off immediately.
- Do not retighten after the installation.
- After 30 minutes or more have passed from the installation, fill the engine with the specified oil and coolant. Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .



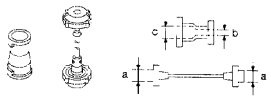
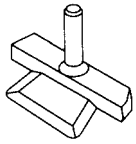
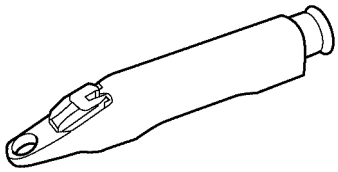
PREPARATION

PFP:00002

Special Service Tools

EBS00CH2

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
EG17650301 (J33984-A) Radiator cap tester adapter	 NT564	Adapting radiator cap tester to radiator filler neck **a: 28 (1.10) via.** **b: 31.4 (1.236) via.** **c: 41.3 (1.626) via.** Unit: mm (in)
KV99103510 (—) Radiator plate pliers A	S-NT224	Installing radiator upper and lower tanks
KV99103520 (—) Radiator plate pliers B	S-NT225	Removing radiator upper and lower tanks
KV10111100 (J-37228) Seal cutter	 NT046	Removing sealant
— (J-23688) Engine coolant refractometer	 WBIA0539E	Checking concentration of ethylene glycol in engine coolant

OVERHEATING CAUSE ANALYSIS

PFP:00012

Overheating Cause Analysis

EBS00CH3

	Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—
		Thermostat stuck closed	Coolant circulation	
		Damaged fins	Dust contamination or paper clogging	
			Mechanical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Cooling fan does not operate	Engine cooling fans	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper coolant mixture ratio	—	—	—
	Poor coolant quality	—	—	—
	Insufficient coolant	Coolant leaks	Cooling hose	Loose clamp
				Cracked hose
			Water pump	Poor sealing
			Radiator cap	Loose
				Poor sealing
			Radiator	O-ring for damage, deterioration or improper fitting
				Cracked radiator tank
				Cracked radiator core
			Reservoir tank	Cracked reservoir tank
		Overflowing reservoir tank	Exhaust gas leaks into cooling system	Cylinder head deterioration
				Cylinder head gasket deterioration

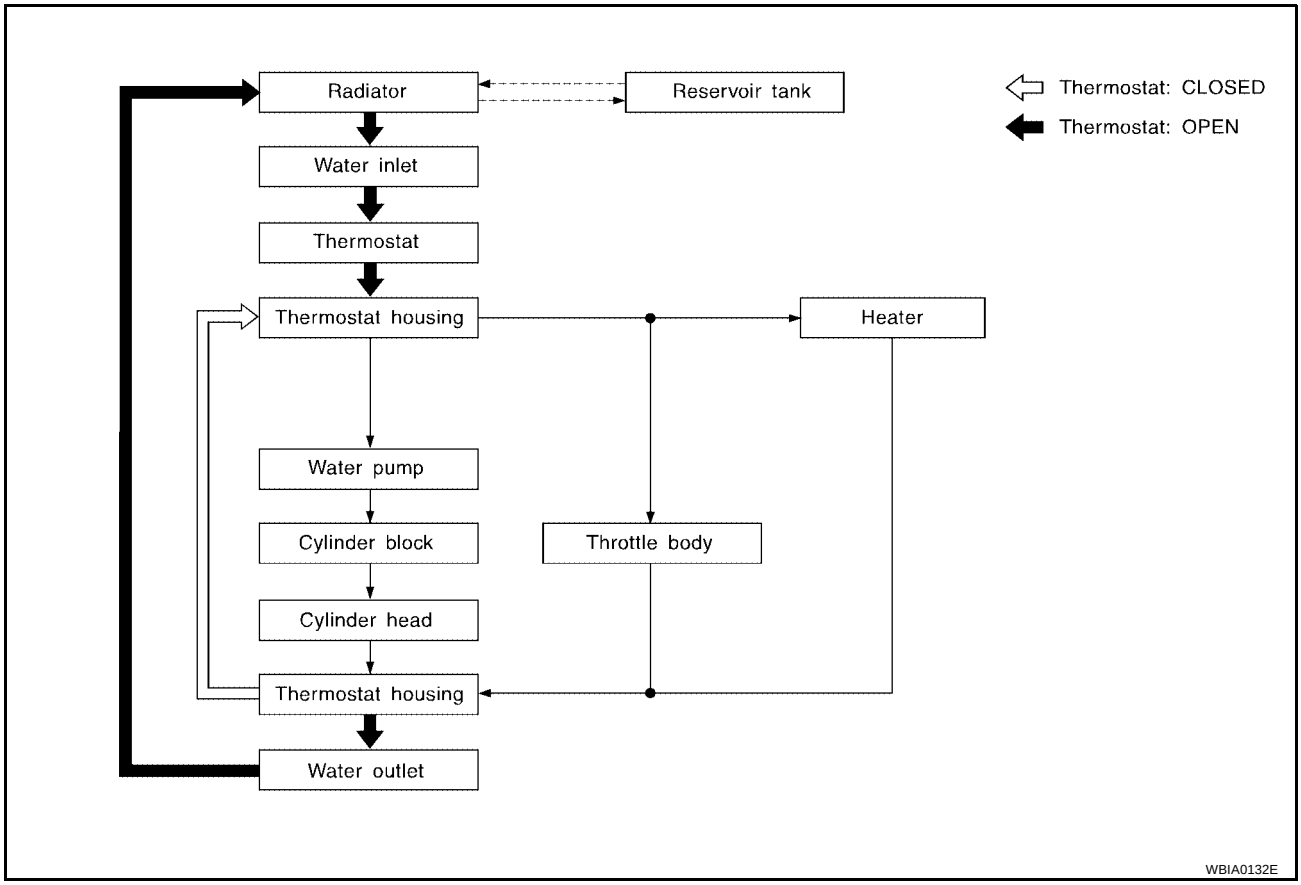
	Symptom		Check items	
Except cooling system parts malfunction	Over heating engine	Overload on engine	Abusive driving	High engine RPM under no load
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes	
			Improper ignition timing	
	Blocked or restricted air flow	Blocked bumper	—	Mud, debris, or paper clogging
		Blocked radiator grille	Installed car brassiere	
			—	
		Blocked radiator	—	
		Blocked condenser	—	
		Installed large fog lamp		

COOLING SYSTEM

PFP:21020

Cooling Circuit

EBS00CH4



ENGINE COOLANT

PFP:KQ100

System Check

EBS00CH5

WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure fluid escaping from the radiator.
Wrap a thick cloth around the cap. Slowly push down and turn it a quarter turn to allow built-up pressure to escape. Carefully remove the cap by pushing down and turning it all the way.

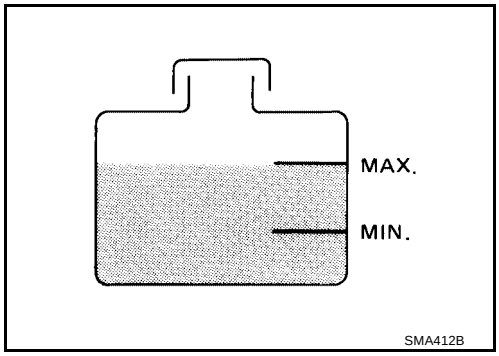
CHECKING COOLING SYSTEM HOSES

Check hoses for the following:

- Improper attachment
- Leaks
- Cracks
- Damage
- Loose connections
- Chafing
- Deterioration

CHECKING RESERVOIR LEVEL

- Check if the reservoir tank coolant level is within MIN to MAX when the engine is cool.
- Adjust coolant level if it is too much or too little.



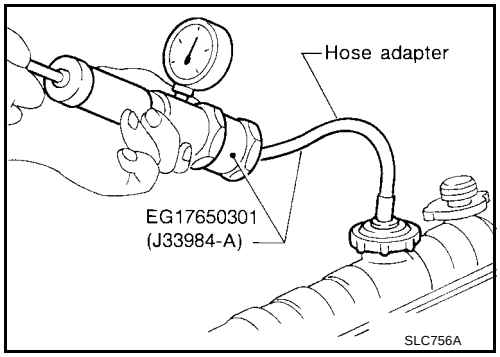
CHECKING COOLING SYSTEM FOR LEAKS

To check for leakage, apply pressure to the cooling system using Tool.

Testing pressure : 157 kPa (1.6 kg/cm^2 , 23 psi)

WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator.

CAUTION:
Higher pressure than specified may cause radiator damage.



CHECKING RADIATOR

Check radiator for mud or clogging. If necessary, clean radiator as follows:

- Be careful not to bend or damage the radiator fins.
- When radiator is cleaned without removal, remove all surrounding parts such as cooling fan, radiator shroud and horns. Then tape the harness and connectors to prevent water from entering.

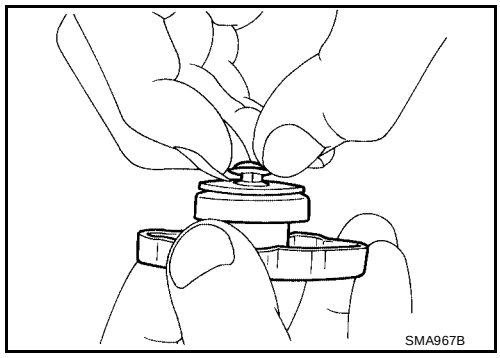
1. Apply water by hose to the back side of the radiator core vertically downward.
2. Apply water again to all radiator core surfaces once per minute.
3. Stop washing when clear water flows off the radiator.
4. Blow air into the back side of radiator core vertically downward.
   - Use compressed air lower than 490 kPa (5 kg/cm^2 , 71 psi) and keep distance more than 300 mm (11.8 in).

5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.
6. Check for leakage.

CHECKING RADIATOR CAP

1. Inspect the radiator cap.
   - Replace the cap if the metal plunger cannot be seen around the edge of the black rubber gasket.
   - Replace the cap if deposits of waxy residue or other foreign material are on the black rubber gasket or the metal retainer.

   NOTE:
   Thoroughly wipe out the radiator filler neck to remove any waxy residue or foreign material.
2. Pull the negative-pressure valve to open it and check that it closes completely when released.
   - Check that there is no dirt or damage on the valve seat of the radiator cap negative-pressure valve.
   - Check that there are no abnormalities in the opening and closing conditions of the negative-pressure valve.

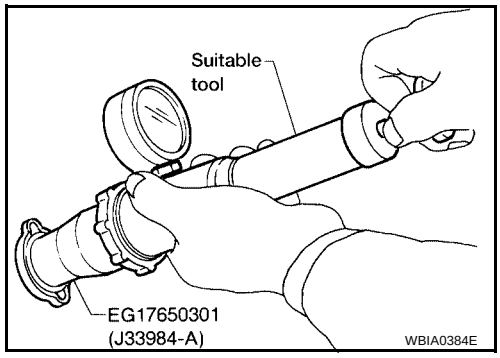


3. Check radiator cap relief pressure using Tool.

   Tool number : EG17650301 (J-33984-A)

   Standard: 78 – 98 kPa (0.8 – 1.0 kg/cm^2 , 11 – 14 psi)

   Limit: 59 kPa (0.6 kg/cm^2 , 9 psi)
   - When connecting the radiator cap to the tester, apply water or coolant to the cap seal surface.
   - Replace the radiator cap if there is an abnormality in the negative-pressure valve, or if the open-valve pressure is outside of the standard values.



Refilling Engine Coolant

EBS00CH6

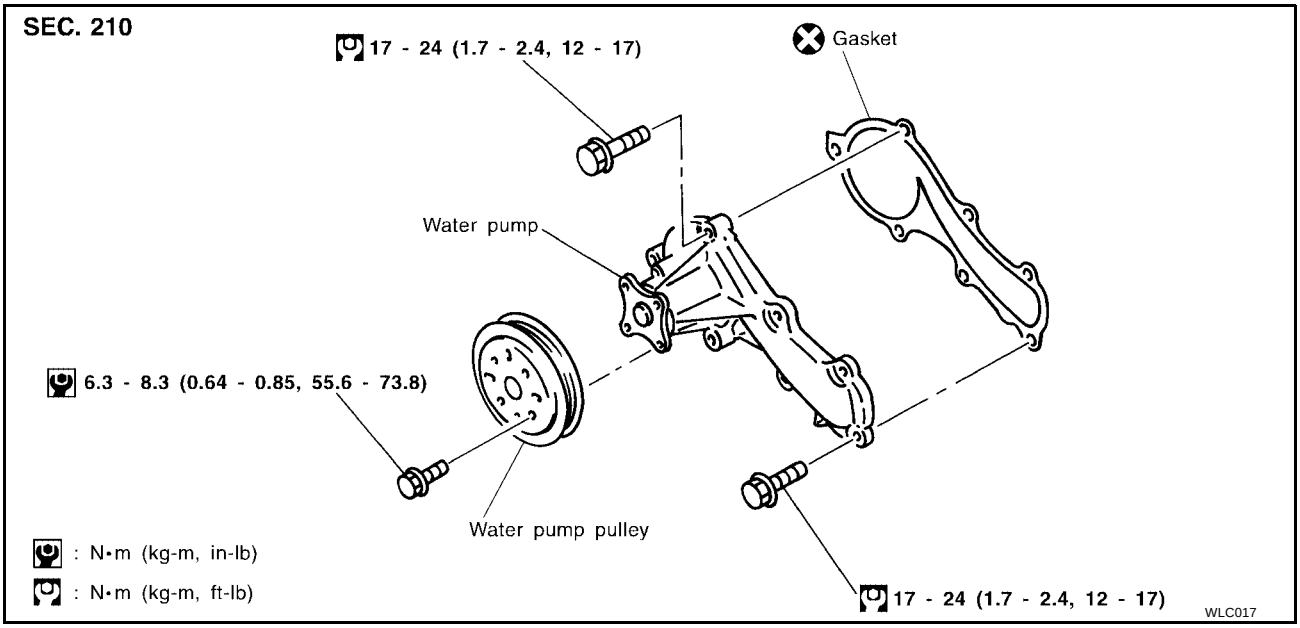
Changing the engine coolant is part of the required maintenance of the engine. Refer to MA-16, "Changing Engine Coolant" .

WATER PUMP

PFP:21020

Removal and Installation

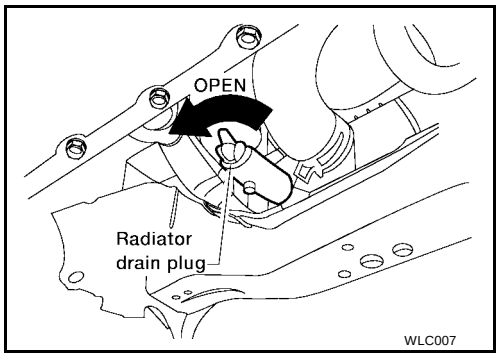
EBS00CH7

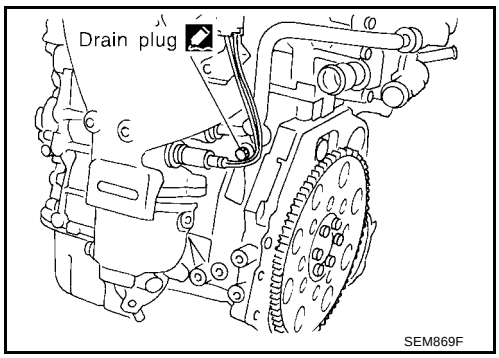


CAUTION:

- **When removing water pump assembly, be careful not to get coolant on drive belt.**
- **Water pump cannot be disassembled and should be replaced as a unit.**
- **After installing water pump, check for leaks using radiator cap tester. Refer to CO-8, "CHECKING COOLING SYSTEM FOR LEAKS" .**

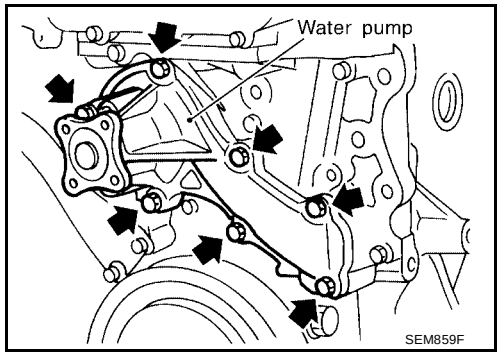
1. Drain engine coolant.
   Refer to MA-16, "DRAINING ENGINE COOLANT" .





2. Remove front RH wheel.
3. Remove engine side cover.
4. Remove drive belts and idler pulley.
5. Loosen water pump pulley bolts.
6. Remove water pump pulley.

7. Remove the water pump bolts.
8. Remove the water pump.
   - Remove liquid gasket from water pump and mating surface of cylinder block using a scraper.
9. Installation is in the reverse order of removal.
   - When applying liquid gasket to mating surface of water pump, use Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .
   - When filling radiator with coolant, refer to MA-17, "REFILLING ENGINE COOLANT" .
   - When installing drive belts, refer to MA-16, "Checking Drive Belts" .

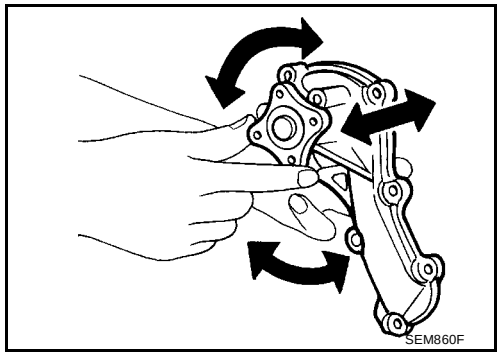


Inspection

EBS00CH8

1. Rotate water pump shaft, replace the water pump as necessary.

- **Check body assembly and vane for rust or corrosion.**
- **Check for rough operation due to excessive end play.**

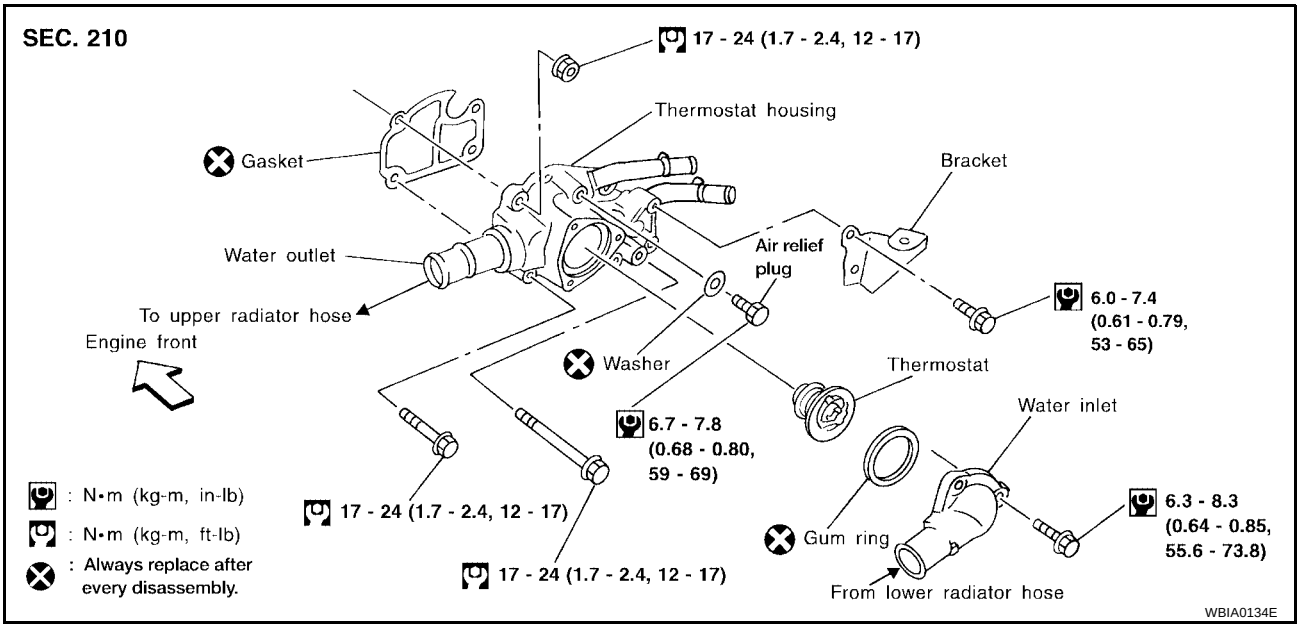


THERMOSTAT AND THERMOSTAT HOUSING

PFP:21200

Removal and Installation

EBS00CH9



WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator.

CAUTION:

Perform when the engine is cold.

CAUTION:

Be careful not to spill coolant over the engine compartment. Use a rag to absorb any spilled coolant.

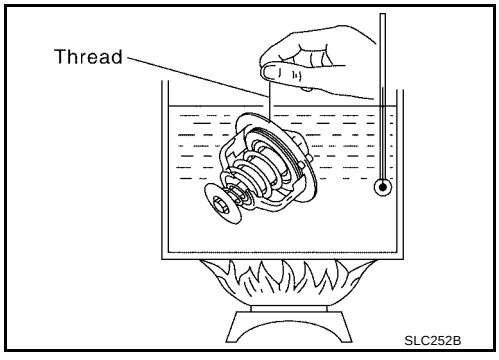
REMOVAL

1. Drain engine coolant. Refer to MA-16, "DRAINING ENGINE COOLANT" .
2. Disconnect the lower radiator hose.
3. Remove water inlet thermostat housing, then remove the thermostat.

INSPECTION AFTER REMOVAL

- Place a string so that it is caught in the valve of the thermostat (or water control valve) and suspend it in boiling water. It must be fully immersed in the water.
- The valve opening temperature is the temperature at which the valve plate begins to rise from the top plate causing the thermostat to fall off of the string.
- Continue heating the water and thermostat to check the valve lift (the full-open valve lift distance).

  NOTE:
  The valve lift standard temperature for the thermostat (or water control valve) is the reference value.



- After checking the valve lift, lower the water temperature and check the valve closing temperature.

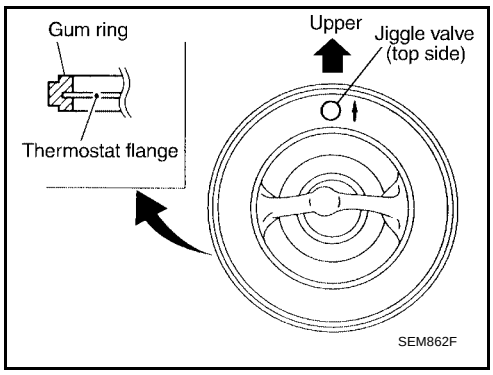
Standard Values

Valve opening temperature	76.5°C (170°F)
Valve lift	More than 9 mm/90°C (0.35 in/194°F)
Valve closing temperature	71.5°C (161°F)

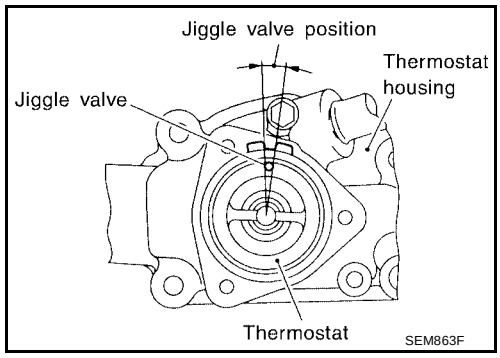
INSTALLATION

1. Installation is in the reverse order of removal, paying attention to the following:

- Before installing the thermostat, make sure the gum ring is properly seated around the thermostat.



- Install thermostat with jiggle valve or air bleeder at upper side.



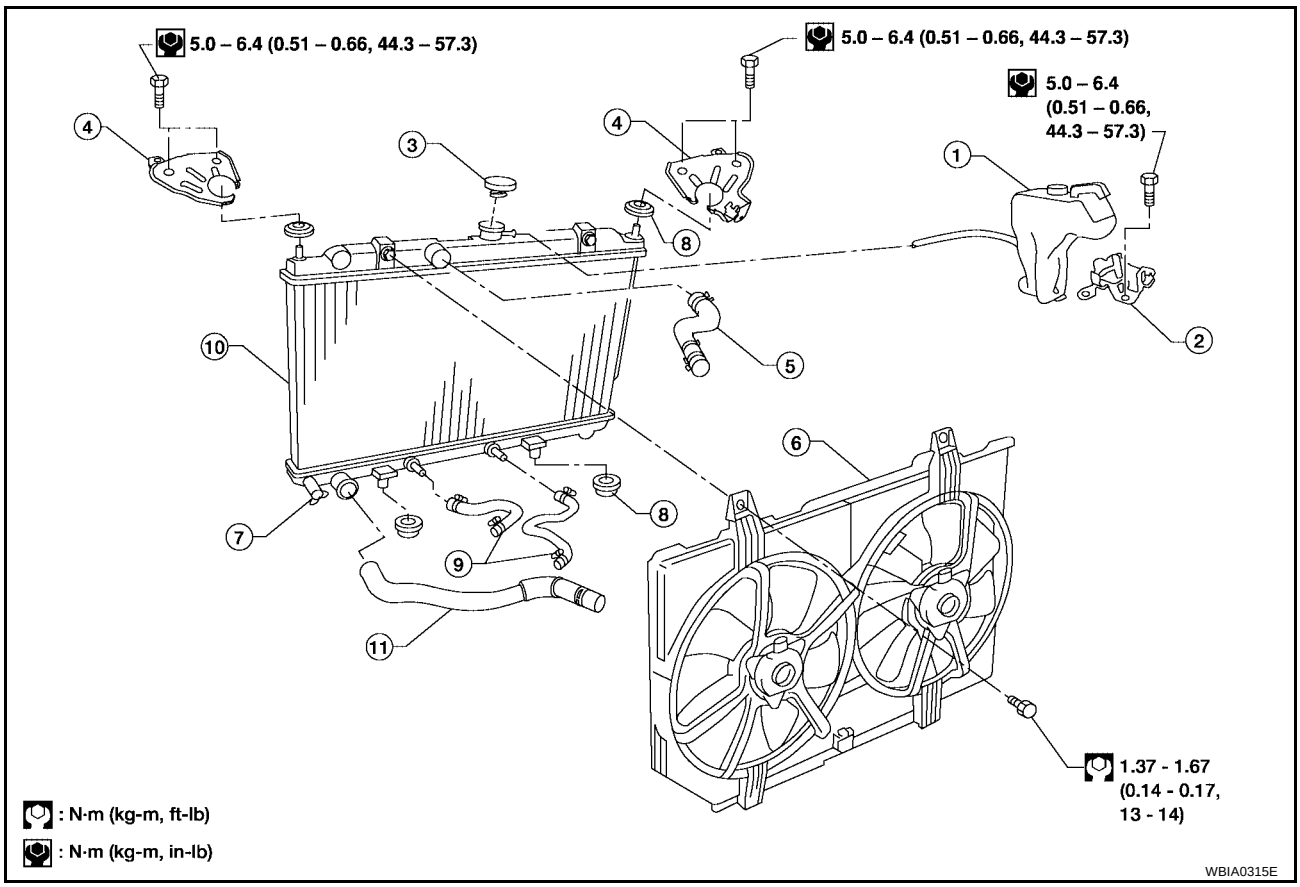
- Refill engine coolant after installation. Run engine for a few minutes, and check for any coolant leaks. Refer to MA-17, "REFILLING ENGINE COOLANT"

RADIATOR

PFP:21400

Removal and Installation

EBS00CHB



1. Reservoir tank
2. Reservoir tank bracket
3. Radiator cap
4. Mounting bracket
5. Upper radiator hose
6. Cooling fans
7. Radiator drain plug
8. Mounting rubber
9. Oil cooler hose (A/T models)
10. Radiator
11. Lower radiator hose

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns can occur from high pressure coolant escaping from the radiator. Wrap a thick cloth around the cap. Slowly push down and turn it a quarter of a turn to allow the built-up pressure to escape. Carefully remove the cap by pushing down and turning it the rest of the way.

REMOVAL

1. Drain engine coolant. Refer to MA-16, "DRAINING ENGINE COOLANT" .
2. Remove the air duct and air cleaner assembly.
3. Disconnect the A/T oil cooler hoses (if equipped) and install a blind plug in the hoses to prevent A/T oil loss.
4. Disconnect the upper and lower radiator hoses and mounting bracket.
5. Remove the radiator and radiator fan assembly as one unit.

   CAUTION:

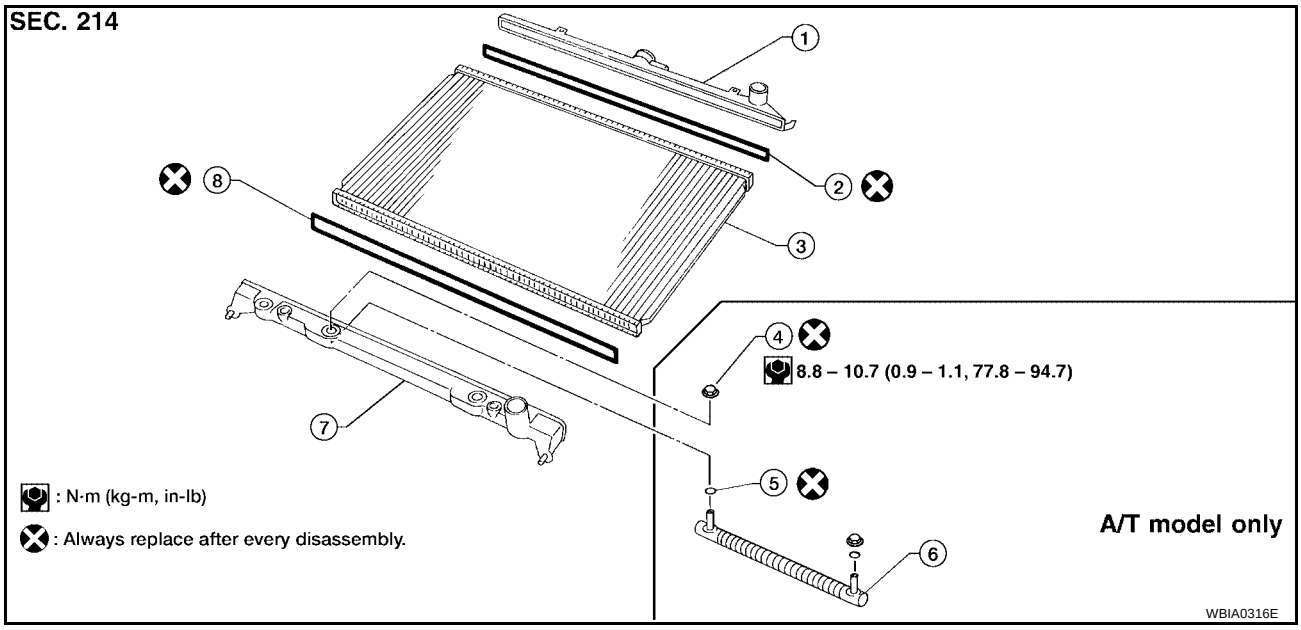
   Do not damage or scratch the radiator core when removing.

INSTALLATION

- Installation is in the reverse order of removal.

Disassembly and Assembly

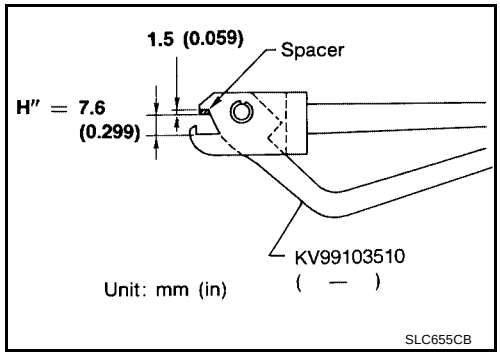
EBS00CHC



1. Upper tank
2. Sealing rubber
3. Core
4. Oil cooler securing nut
5. O-ring
6. Oil cooler
7. Lower tank
8. Sealing rubber

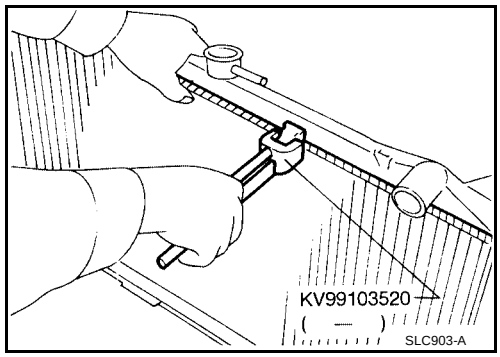
PREPARATION

1. Attach the spacer to the tip of the radiator plate pliers A. Spacer specification: 1.5 mm (0.059 in) thick x 18 mm (0.71 in) wide x 8.5 mm (0.335 in) long.
2. Make sure that when radiator plate pliers A are closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with the spacer, if necessary.



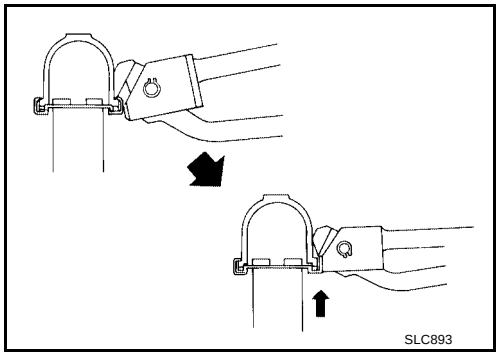
DISASSEMBLY

1. Remove tank using Tool.



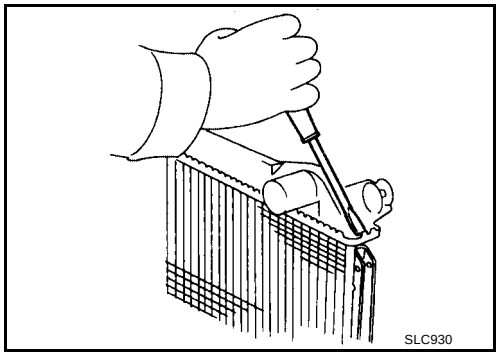
- Grip the crimped edge and bend it upwards so that Tool slips off.

CAUTION:
Do not bend excessively.

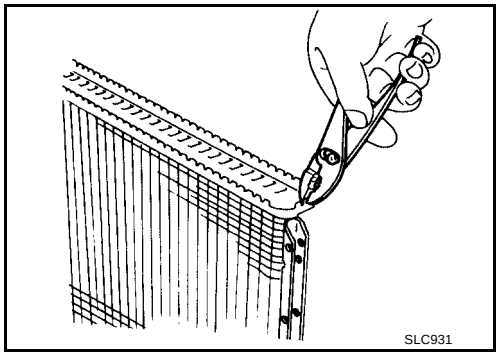


- In areas where Tool cannot be used, use a screwdriver to bend the edge up.

CAUTION:
Be careful not to damage tank.

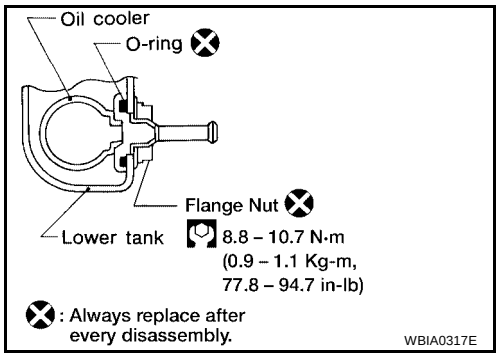


2. Make sure the edge stands straight up.
3. Remove oil cooler from tank (A/T model only).

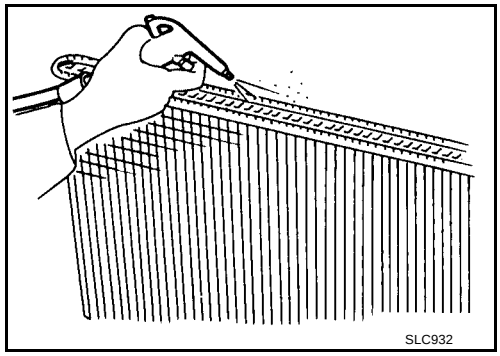


ASSEMBLY

1. Install oil cooler (A/T model only).



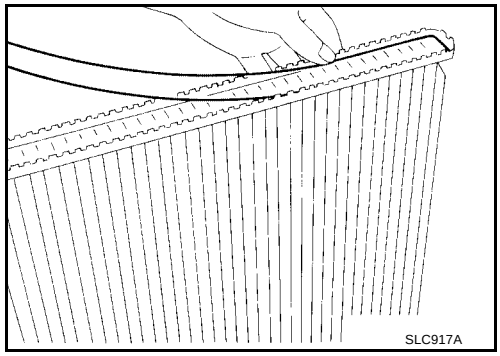
2. Clean contact portion of tank.



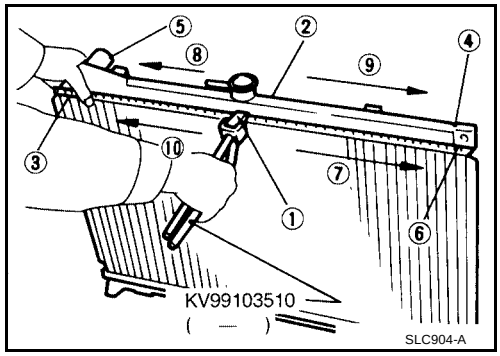
3. Install sealing rubber.

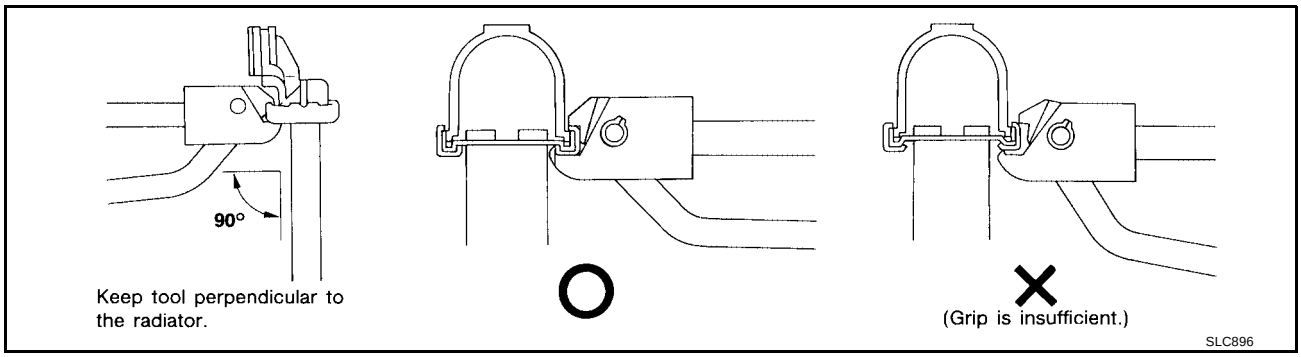
NOTE:
Push it in with fingers.

CAUTION:
Be careful not to twist sealing rubber.

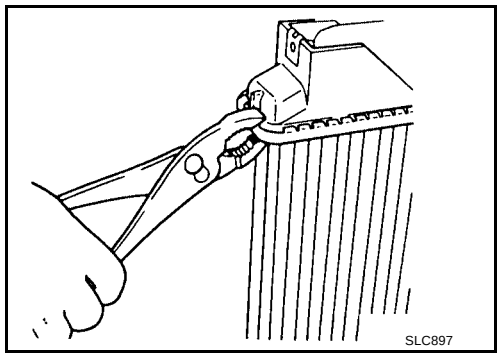


4. Crimp the tank rim in a specified sequence using Tool.



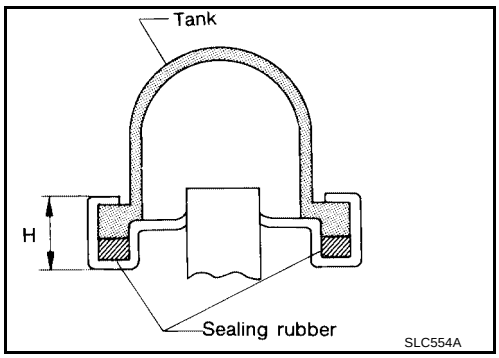


- Use pliers in the locations where the Tool cannot be used.



5. Make sure that the tank rim is completely crimped down.

Standard height “H” : 8.0 - 8.4 mm (0.315 - 0.331 in)



6. Check for any coolant leakage. Refer to CO-8, "CHECKING COOLING SYSTEM FOR LEAKS" .

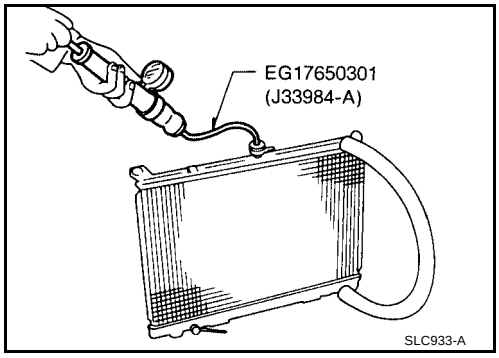
Inspection

EBS00CHD

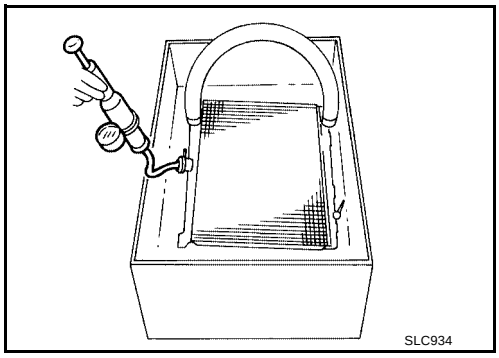
1. Apply pressure using Tool.

Specified pressure value : 157 kPa (1.6 kg/cm^2 , 23 psi)

WARNING:
To prevent the risk of the hose coming undone while under pressure, securely fasten it down with a hose clamp.
Attach a hose to the oil cooler as well (A/T model only).



2. Check for leaks in dip tank.

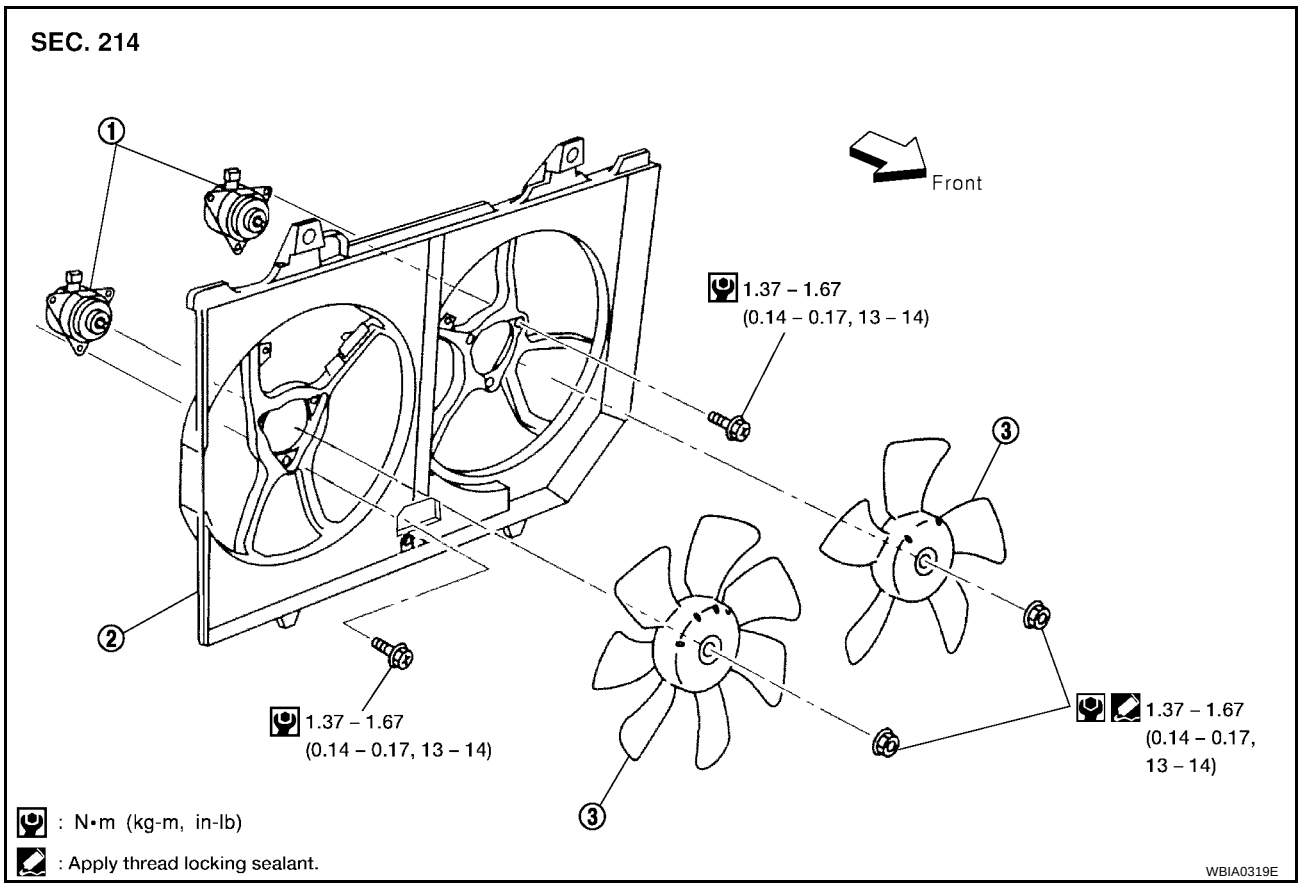


COOLING FAN

PFP:21486

Disassembly and Assembly Radiator Cooling Fan

EBS00CHE



1. Cooling fan motors
2. Cooling fan shroud
3. Cooling fan blades

DISASSEMBLY

1. Remove the radiator and cooling fan assembly. Refer to CO-14, "Removal" .
2. Remove the cooling fan shroud assembly from the radiator.
3. Remove the cooling fan blades from the shroud.
4. Remove cooling fan motors from the shroud.

ASSEMBLY

- Assembly is in the reverse order of disassembly.

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Capacity

EBS00GJS

Unit: ℓ (US gal, Imp gal)

Coolant capacity with reservoir tank (MAX level)	A/T	6.6 (1 3/4, 1 1/2)
	M/T	6.7 (1 3/4, 1 1/2)

Thermostat

EBS00CHF

Valve opening temperature	76.5°C (170°F)
Valve lift	More than 9 mm/90°C (0.35 in/194°F)
Valve closing temperature	71.5°C (161°F)

Radiator

EBS00CHG

Unit: kPa (kg/cm^2 , psi)

Cap relief pressure	Standard	78 - 98 (0.8 - 1.0, 11 - 14)
	Limit	59 (0.6, 9)
Leakage test pressure		157 (1.6, 23)

PRECAUTIONS

PFP:00001

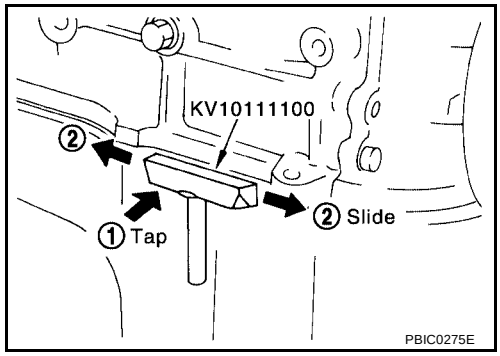
Precautions For Liquid Gasket

EBS00CHH

REMOVAL OF LIQUID GASKET

- After removing the bolts and nuts, disconnect and remove the sealant using Tool.

Tool number : KV10111100 (J-37228)



CAUTION:

Be careful not to damage the mating surfaces.

- In areas where the cutter is difficult to use, use a plastic hammer to lightly tap the sealant applied area.

CAUTION:

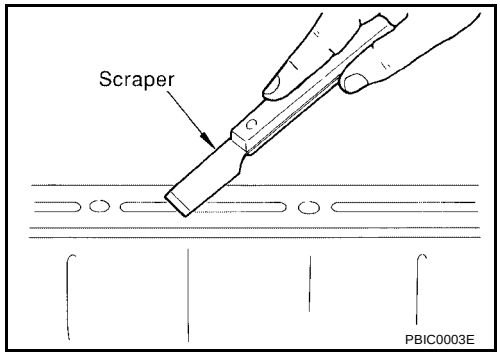
If for some unavoidable reason a tool such as a flat-blade screwdriver is used, be careful not to damage the mating surfaces.

LIQUID GASKET APPLICATION PROCEDURE

1. Using a scraper, remove the old sealant adhering to the application surface and the mating surface.

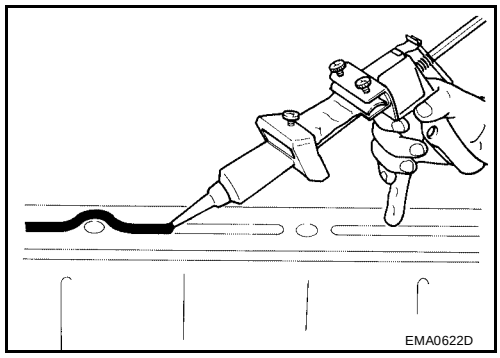
- Remove the old sealant completely from the groove of the application surface, mounting bolts, and bolt holes.

2. Thoroughly clean the application surface and the mating surface to remove adhering moisture, grease and foreign material.
3. Attach the sealant tube to the tube presser.
   Use Genuine RTV Silicone Sealant or equivalent. Refer to **GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS"** .

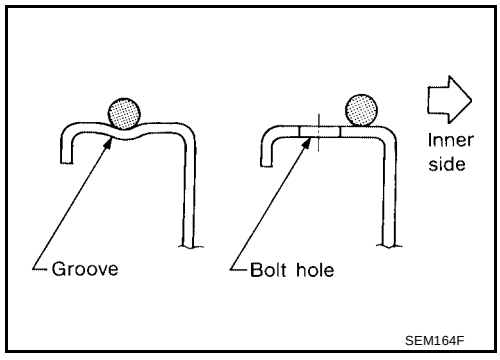


4. Apply the sealant without breaks to the specified location with the specified dimensions.

- If there is a groove for the sealant application, apply the sealant to the groove.



- As for the bolt holes, normally apply the sealant inside the holes. Occasionally, it should be applied outside the holes.
- Within five minutes of sealant application, install the mating component.
- If the sealant protrudes, wipe it off immediately.
- Do not retighten after the installation.
- After 30 minutes or more have passed from the installation, fill the engine with the specified oil and coolant. Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .



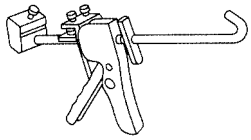
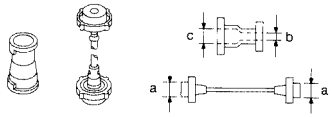
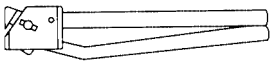
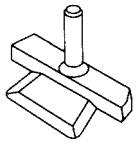
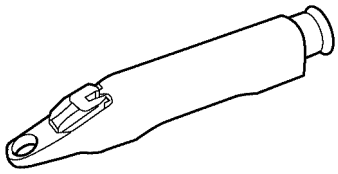
PREPARATION

PFP:00002

Special Service Tools

EBS00CHI

The actual shapes of Kent-Moore tools may differ from those of special tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
WS39930000 (—) Tube presser  S-NT052	Pressing the tube of liquid gasket
EG17650301 (J33984-A) Radiator cap tester adapter  S-NT564	Adapting radiator cap tester to radiator filler neck **a: 28 (1.10) diameter** **b: 31.4 (1.236) diameter** **c: 41.3 (1.626) diameter** Unit: mm (in)
KV99103510 (—) Radiator plate pliers A S-NT224	Installing radiator upper and lower tanks
KV99103520 (—) Radiator plate pliers B  S-NT225	Removing radiator upper and lower tanks
KV10111100 (J-37228) Seal cutter  NT046	Removing sealant
— (J-23688) Engine coolant refractometer  WBIA0539E	Checking concentration of ethylene glycol in engine coolant

OVERHEATING CAUSE ANALYSIS

PFP:00012

Troubleshooting Chart

EBS00CHJ

	Symptom		Check items	
Cooling system parts malfunction	Poor heat transfer	Water pump malfunction	Worn or loose drive belt	—
		Thermostat stuck closed	—	
		Damaged fins	Dust contamination or paper clogging	
			Mechanical damage	
		Clogged radiator cooling tube	Excess foreign material (rust, dirt, sand, etc.)	
	Reduced air flow	Cooling fan does not operate	Fan blades	—
		High resistance to fan rotation		
		Damaged fan blades		
	Damaged radiator shroud	—	—	—
	Improper coolant mixture ratio	—	—	—
	Poor coolant quality	—	—	—
	Insufficient coolant	Coolant leaks	Cooling hose	Loose clamp
				Cracked hose
			Water pump	Poor sealing
			Radiator cap	Loose
				Poor sealing
			Radiator	O-ring for damage, deterioration or improper fitting
				Cracked radiator tank
				Cracked radiator core
			Reservoir tank	Cracked reservoir tank
		Overflowing reservoir tank	Exhaust gas leaks into cooling system	Cylinder head deterioration
				Cylinder head gasket deterioration

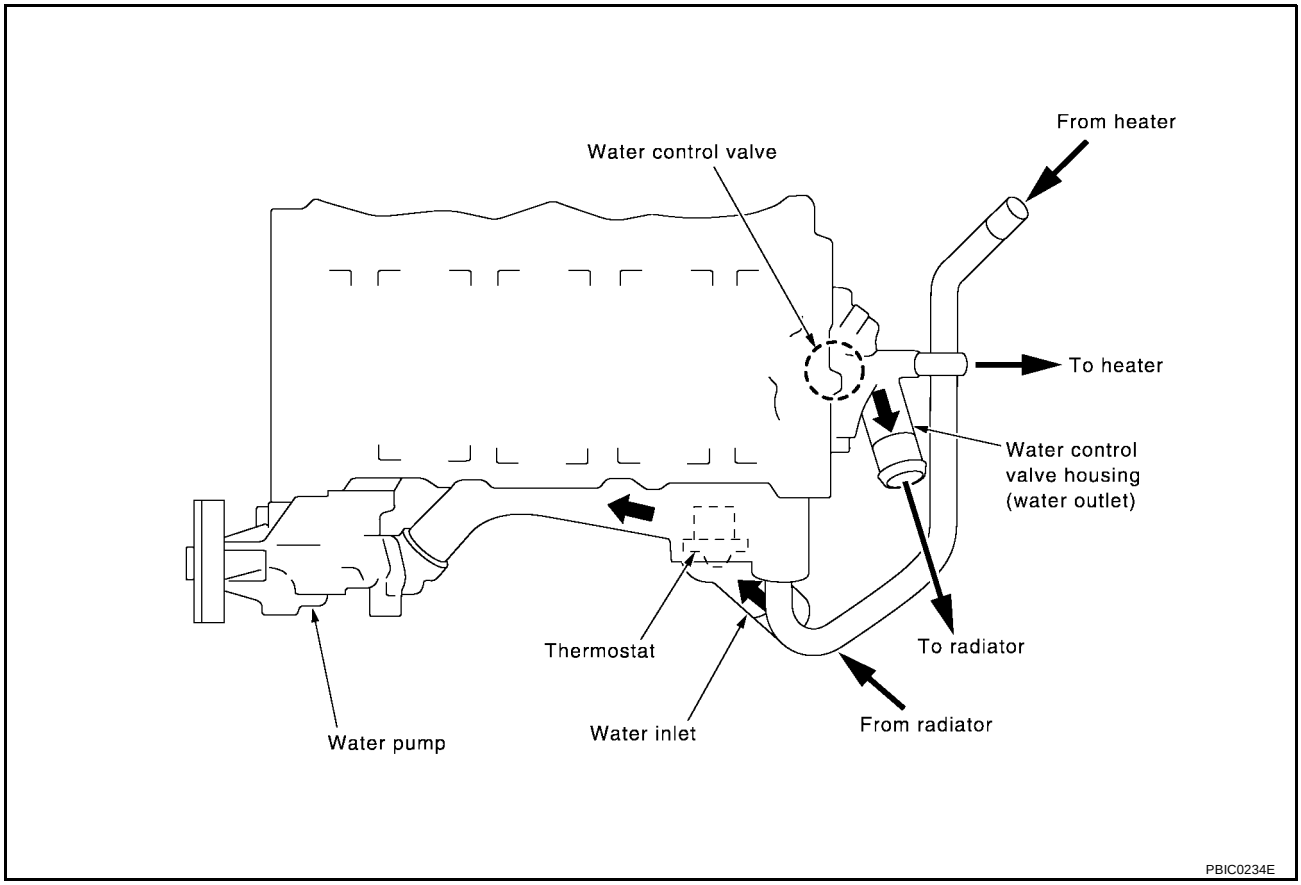
	Symptom		Check items	
Except cooling system parts malfunction	—	Overload on engine	Abusive driving	High engine rpm under no load
				Driving in low gear for extended time
				Driving at extremely high speed
			Powertrain system malfunction	—
			Installed improper size wheels and tires	
			Dragging brakes	
			Improper ignition timing	
	Blocked or restricted air flow	Blocked bumper	—	Mud, debris, or paper clogging
		Blocked radiator grille	Installed car brassiere	
			—	
		Blocked radiator	—	
		Blocked condenser	—	
		Installed large fog lamp		

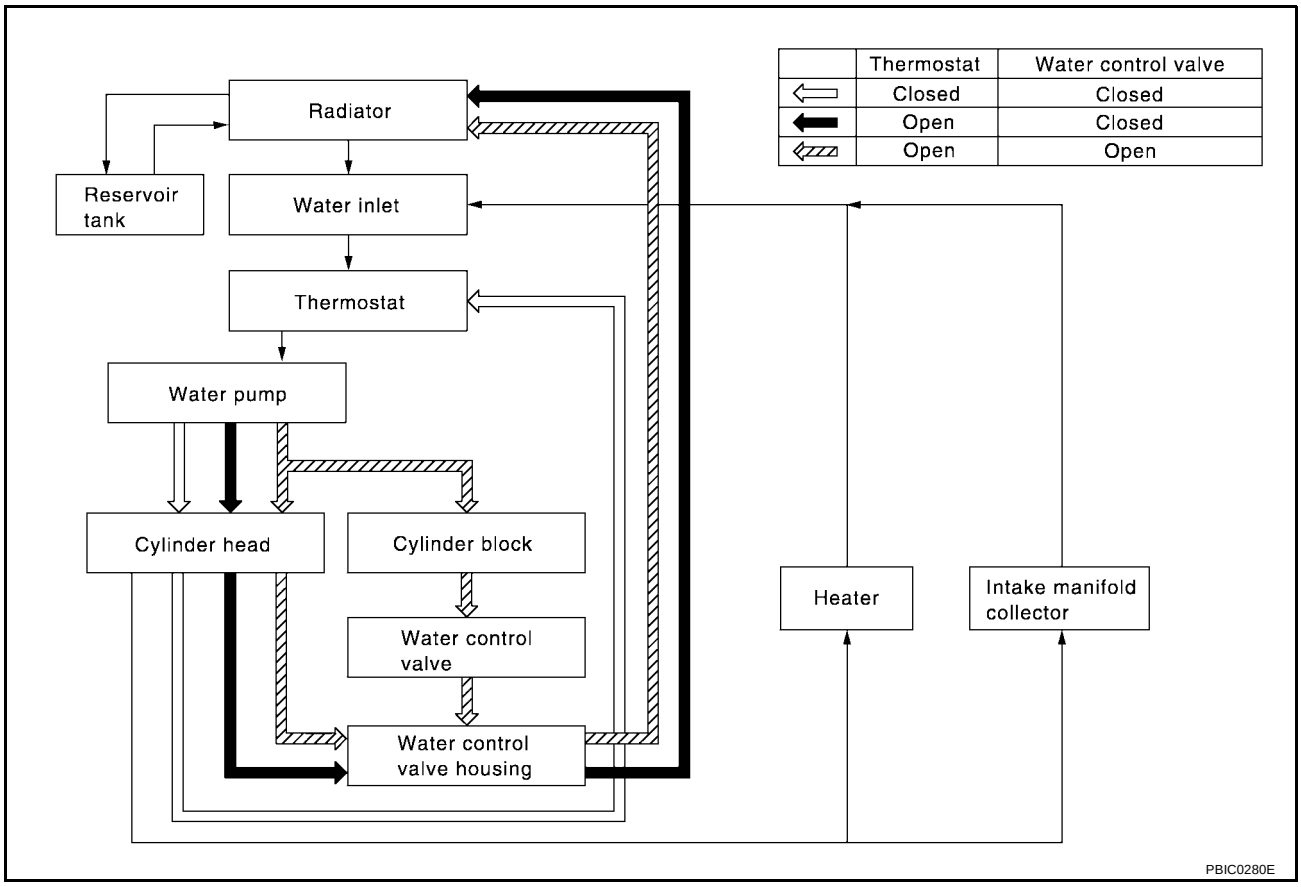
COOLING SYSTEM

PFP:21020

Cooling Circuit

EBS00CHK





ENGINE COOLANT

PFP:KQ100

System Check

EBS00EYS

WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure fluid escaping from the radiator.
Wrap a thick cloth around the cap. Slowly push down and turn it a quarter turn to allow built-up pressure to escape. Carefully remove the cap by pushing down and turning it all the way.

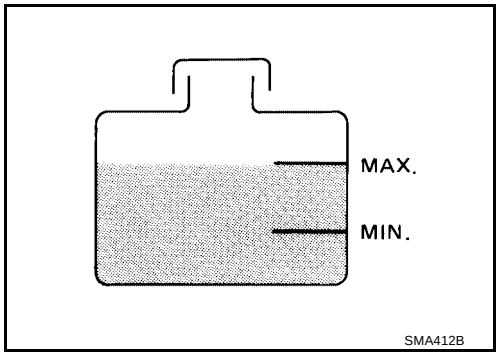
CHECKING COOLING SYSTEM HOSES

Check hoses for the following:

- Improper attachment
- Leaks
- Cracks
- Damage
- Loose connections
- Chafing
- Deterioration

CHECKING RESERVOIR LEVEL

- Check if the reservoir tank coolant level is within MIN to MAX when the engine is cool.
- Adjust coolant level if it is too much or too little.



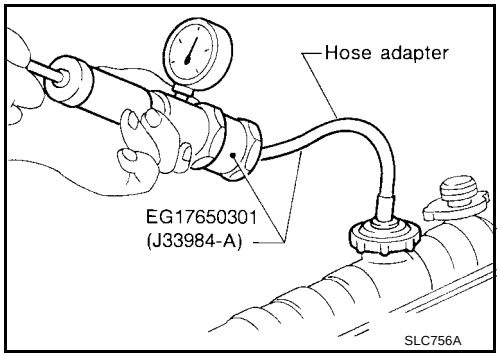
CHECKING COOLING SYSTEM FOR LEAKS

To check for leakage, apply pressure to the cooling system using Tool.

Testing pressure : 157 kPa (1.6 kg/cm^2 , 23 psi)

WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator.

CAUTION:
Higher pressure than specified may cause radiator damage.



CHECKING RADIATOR

Check radiator for mud or clogging. If necessary, clean radiator as follows:

- Be careful not to bend or damage the radiator fins.
- When radiator is cleaned without removal, remove all surrounding parts such as cooling fan, radiator shroud and horns. Then tape the harness and connectors to prevent water from entering.

1. Apply water by hose to the back side of the radiator core vertically downward.
2. Apply water again to all radiator core surfaces once per minute.
3. Stop washing when clear water is flowing off the radiator.
4. Blow air into the back side of radiator core vertically downward.

- Use compressed air lower than 490 kPa (5 kg/cm^2 , 71psi) and keep distance more than 30 cm (11.8 in).

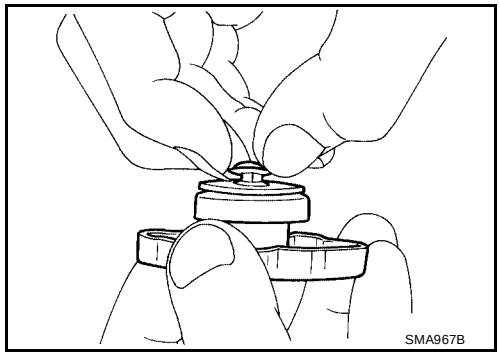
5. Blow air again into all the radiator core surfaces once per minute until no water sprays out.

6. Check for leaks.

CHECKING RADIATOR CAP

1. Inspect the radiator cap.
   - Replace the cap if the metal plunger cannot be seen around the edge of the black rubber gasket.
   - Replace the cap if deposits of waxy residue or other foreign material are on the black rubber gasket or the metal retainer.

   NOTE:
   Thoroughly wipe out the radiator filler neck to remove any waxy residue or foreign material.
2. Pull the negative-pressure valve to open it and check that it closes completely when released.
   - Check that there is no dirt or damage on the valve seat of the radiator cap negative-pressure valve.
   - Check that there are no abnormalities in the opening and closing conditions of the negative-pressure valve.

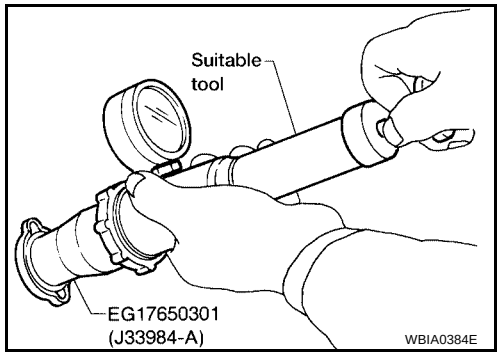


3. Check radiator cap relief pressure using Tool.

   Tool number : EG17650301 (J-33984-A)

   Standard: 78 – 98 kPa (0.8 – 1.0 kg/cm^2 , 11 – 14 psi)

   Limit: 59 kPa (0.6 kg/cm^2 , 9 psi)
   - When connecting the radiator cap to the tester, apply water or coolant to the cap seal surface.
   - Replace the radiator cap if there is an abnormality in the negative-pressure valve, or if the open-valve pressure is outside of the standard values.



Refilling Engine Coolant

EBS00EYT

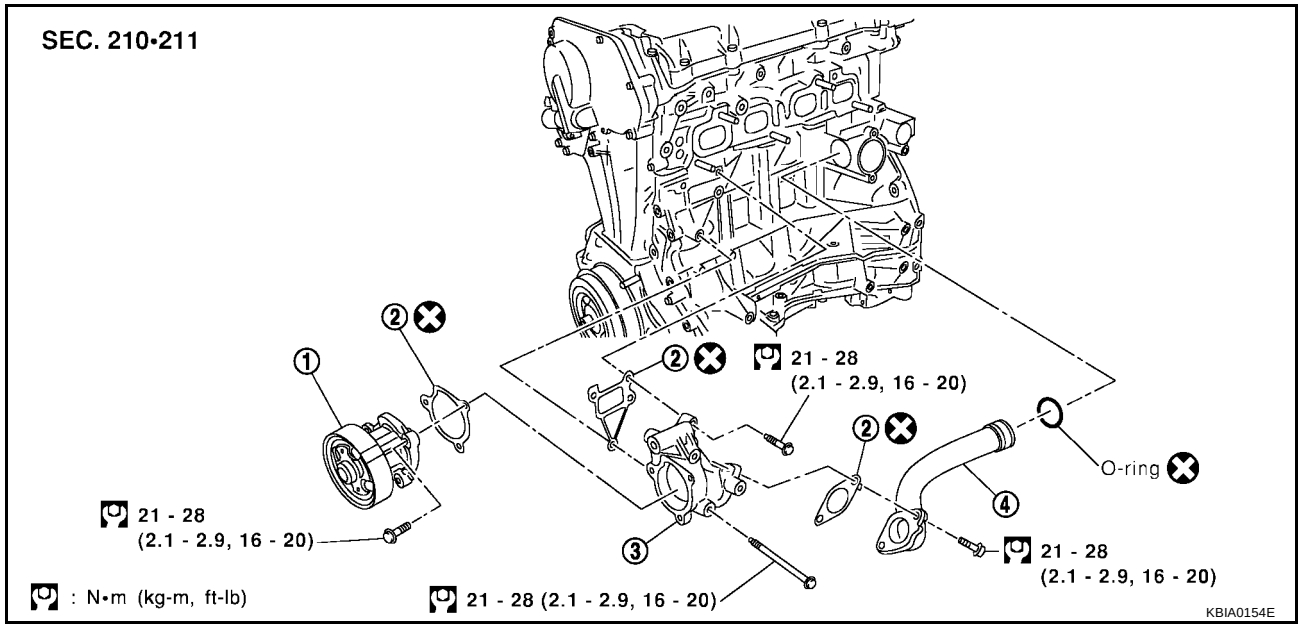
Changing the engine coolant is part of the required maintenance of the engine. Refer to MA-23, "Changing Engine Coolant" .

WATER PUMP

PFP:21020

Removal and Installation

EBS00CHN



1. Water pump
2. Gasket
3. Water pump housing
4. Water pipe

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator.

REMOVAL

Water Pump

1. Drain the engine coolant. Refer to MA-23, "DRAINING ENGINE COOLANT" .

   CAUTION:

   Perform when the engine is cold.
2. Remove the generator. Refer to SC-32, "Removal" .
3. Remove the water pump.
   - Coolant will leak from the cylinder block, have a drain pan in position.

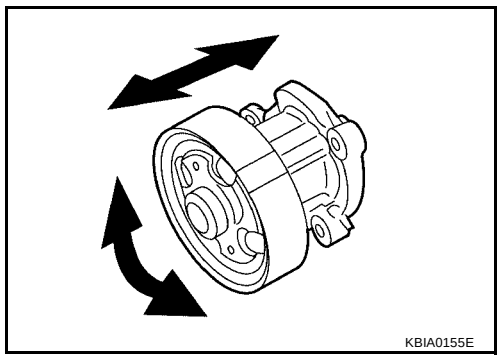
   CAUTION:
   - **Handle the water pump vane so that it does not contact any other parts.**
   - **The water pump cannot be disassembled and should be replaced as a unit.**
4. Remove the water pipe mounting bolts.
5. Remove the water pump housing from the engine block. Use a new gasket for installation.

Water Pipe

1. Remove the water pump.
2. Remove the exhaust manifold. Refer to EX-3, "Removal and Installation" .
3. Remove the water pipe from the thermostat housing.

INSPECTION AFTER REMOVAL

- Visually check that there is no significant dirt or rust on the water pump body and vane.
- Check that there is no play when rotating the vane shaft, and that it turns smoothly when rotated by hand.
- If necessary, replace the water pump as an assembly.


KBIA0155E

INSTALLATION

Installation is in the reverse order of removal.

NOTE:
When inserting the water pipe end into the thermostat housing, apply coolant to the O-ring seal and install immediately.

INSPECTION AFTER INSTALLATION

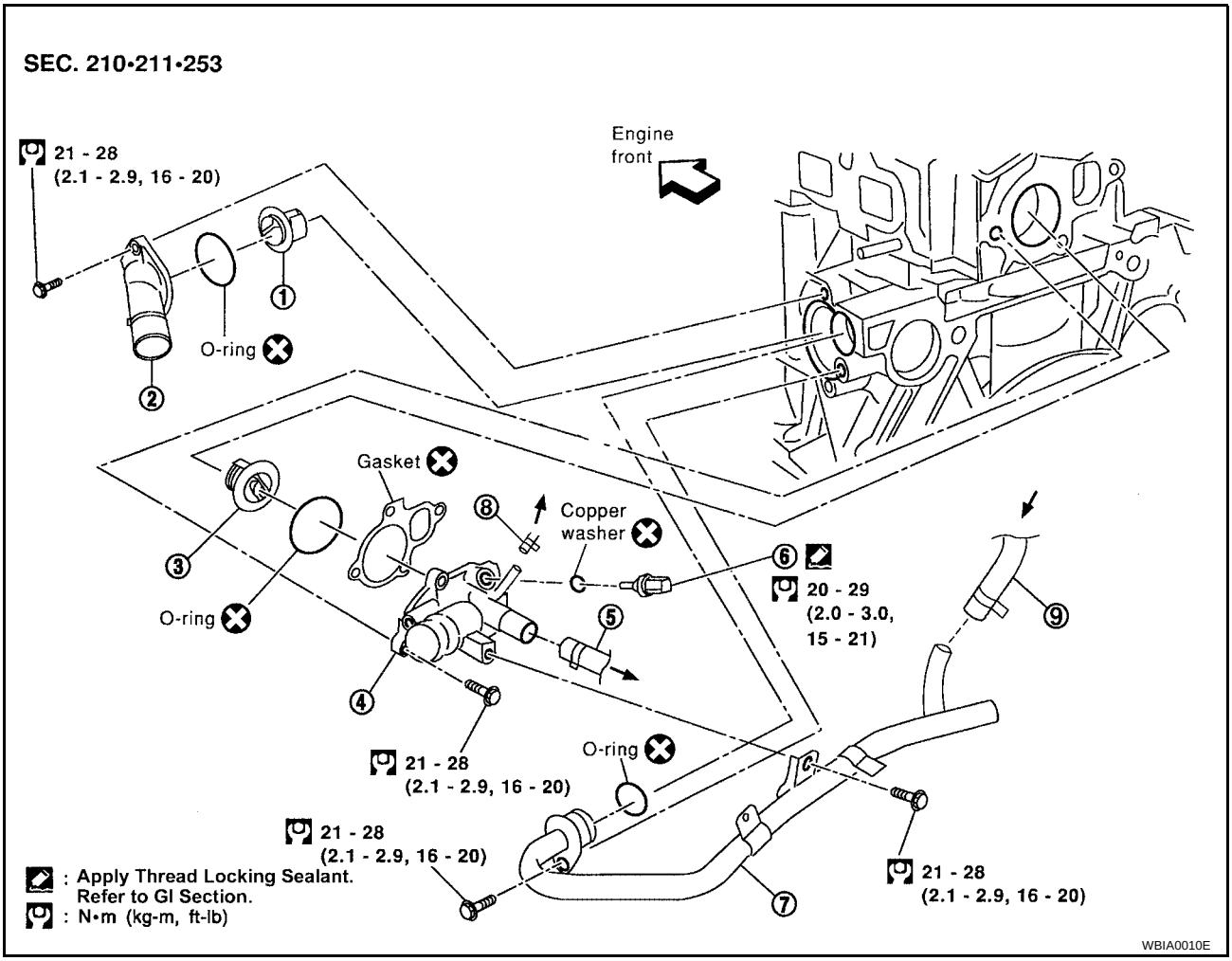
After installing the water pump and pipe, check for leaks using the radiator cap tester. Refer to CO-26, "CHECKING RADIATOR" .

THERMOSTAT AND THERMOSTAT HOUSING

PFP:21200

Removal and Installation

EBS00CHO



1. Thermostat
2. Water inlet housing
3. Water control valve
4. Water outlet housing
5. Heater hose
6. Water temperature sensor
7. Heater pipe
8. Throttle body coolant inlet
9. Throttle body coolant outlet

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator.

CAUTION:

Perform when the engine is cold.

CAUTION:

Be careful not to spill coolant over the engine compartment. Use a rag to absorb any spilled coolant.

REMOVAL

Thermostat

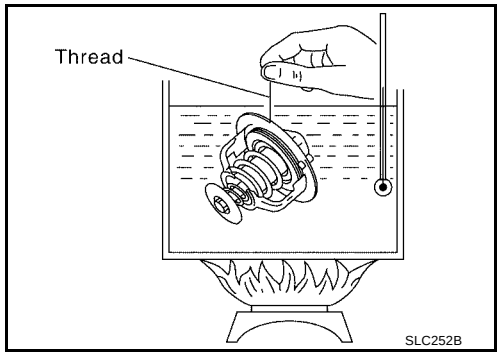
1. Drain engine coolant. Refer to MA-23, "DRAINING ENGINE COOLANT" .
2. Remove the lower radiator hose from the water inlet housing.
3. Remove the water inlet housing.
4. Remove the thermostat.

Water Control Valve

1. Drain engine coolant. Refer to MA-23, "DRAINING ENGINE COOLANT" .
2. Remove the upper radiator hose, heater pipe, and heater hose.
3. Remove the water outlet housing.

4. Remove the water control valve.

INSPECTION AFTER REMOVAL



- Place a string so that it is caught in the valve of the thermostat (or water control valve) and suspend it in boiling water. It must be fully immersed in the water.
- The valve opening temperature is the temperature at which the valve plate begins to rise from the top plate causing the thermostat to fall off of the string.
- Continue heating the water and thermostat to check valve lift (the full-open valve lift distance).

  NOTE:
  The valve lift standard temperature for the thermostat (or water control valve) is the reference value.
- After checking the valve lift, lower the water temperature and check the valve closing temperature.

Standard Values

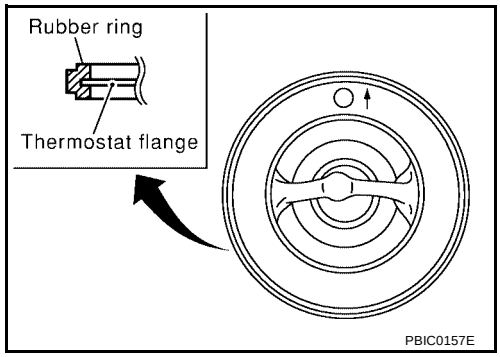
Component	Thermostat	Water control valve
Valve opening temperature	80.5 - 83.5°C (177 - 182°F)	93.5 - 96.5°C (200 - 206°F)
Valve lift	More than 8 mm/95°C (0.315 in/203°F)	More than 8 mm/108°C (0.315 in/226° F)
Valve closing temperature	77°C (171°F)	90°C (194° F)

INSTALLATION

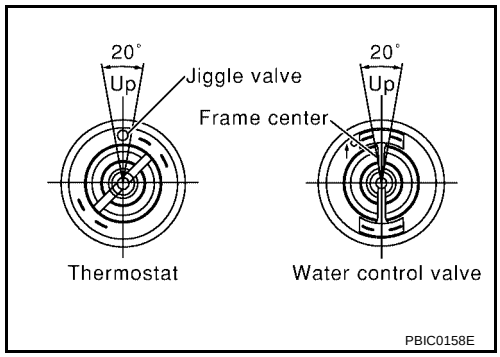
- Installation is in the reverse order of removal.

Thermostat and Water Control Valve

- Install the thermostat and water control valve with the whole circumference of each flange fitting securely inside the rubber ring. (The example in the figure shown is the thermostat.)



- Install the thermostat with the jiggle valve facing upwards. (The position deviation may be within the range of ±10°.)
- Install the water control valve with the up-mark facing up and the frame center part facing upwards. The position deviation may be within the range of ±10° of vertical.



Heater Pipe

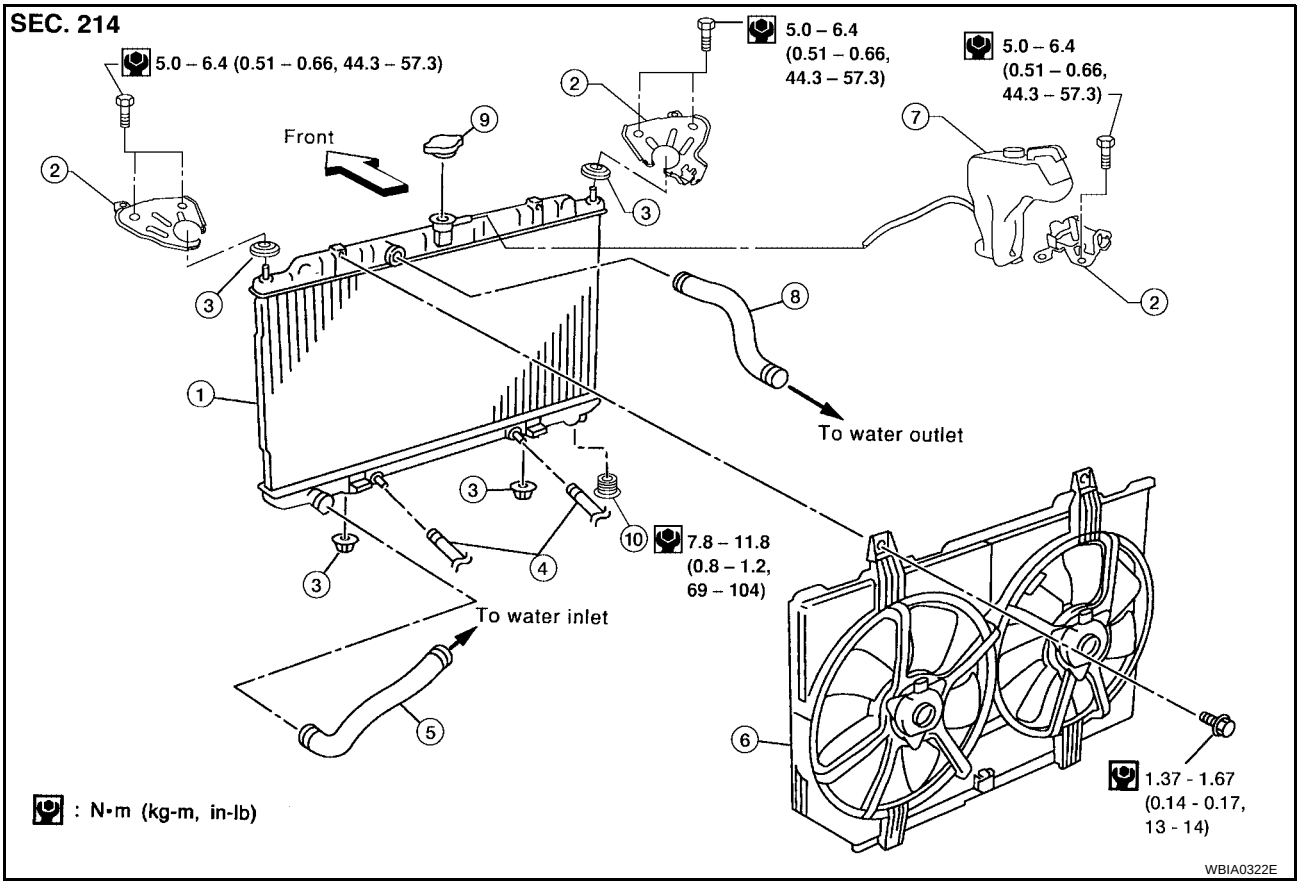
- Apply clean coolant to the heater pipe O-ring, and immediately install the heater pipe into the installation holes.

RADIATOR

PFP:21400

Removal and Installation

EBS00CHP



1. Radiator
2. Bracket
3. Mounting rubber
4. A/T oil cooler hose (if equipped)
5. Radiator hose (lower)
6. Cooling fan assembly
7. Reservoir tank
8. Radiator hose (upper)
9. Radiator cap
10. Drain plug

WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could occur from high pressure coolant escaping from the radiator. Wrap a thick cloth around the cap. Slowly push down and turn it a quarter turn to allow built-up pressure to escape. Carefully remove the cap by pushing down and turning it three-quarters around.

REMOVAL

1. Drain the engine coolant. Refer to MA-23, "DRAINING ENGINE COOLANT" .
2. Remove the air duct with air cleaner assembly. Refer to EM-106, "Removal and Installation" .
3. Disconnect A/T oil cooler hoses (if equipped).
   - Install a blind plug to avoid leakage of A/T oil.
4. Disconnect the radiator upper hose, lower hose, and mounting bracket.
5. Remove the radiator and cooling fan assembly

CAUTION:

- **Do not damage or scratch radiator core when removing.**

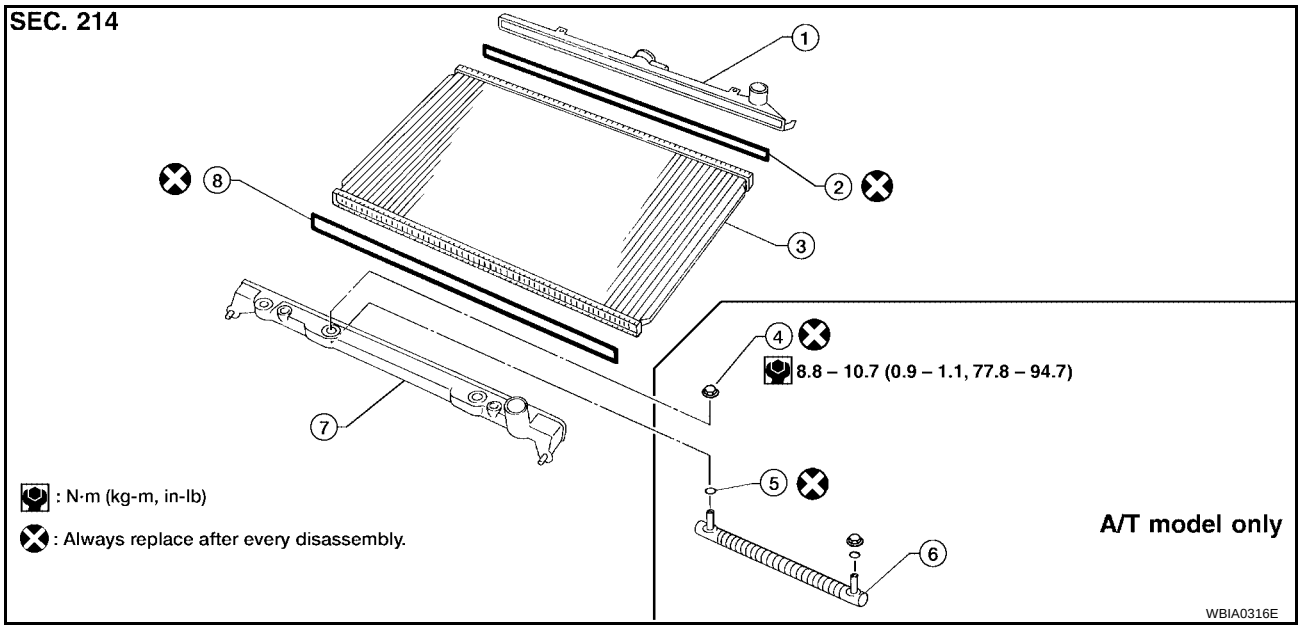
INSTALLATION

Installation is in the reverse order of removal.

- After installation, run the engine until it reaches full operating temperature and check for any cooling system leaks. Repair any leaks as necessary.

Disassembly and Assembly

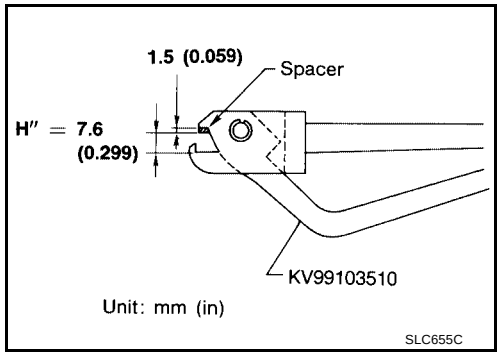
EBS00CHQ



1. Upper tank
2. Sealing rubber
3. Core
4. Oil cooler securing nut
5. O-ring
6. Oil cooler
7. Lower tank
8. Sealing rubber

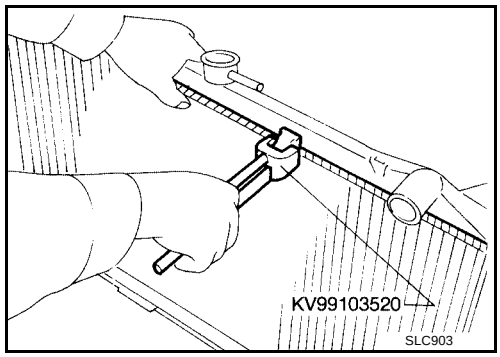
PREPARATION

1. Attach the spacer to the tip of the radiator plate pliers A. Spacer specification: 1.5 mm (0.059 in) thick x 18 mm (0.71 in) wide x 8.5 mm (0.335 in) long.
2. Make sure that when radiator plate pliers A are closed dimension H″ is approx. 7.6 mm (0.299 in).
3. Adjust dimension H″ with the spacer, if necessary.



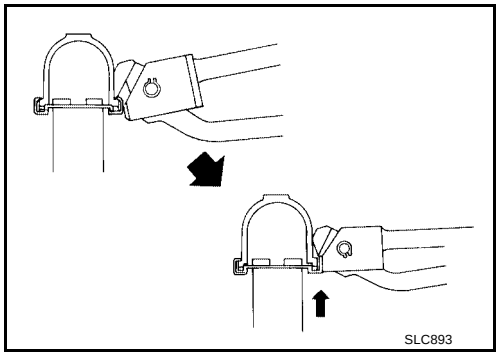
DISASSEMBLY

1. Remove tank using Tool.



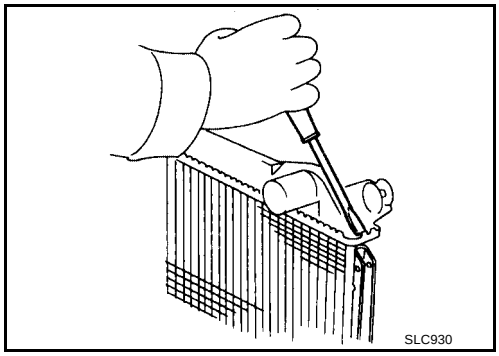
- Grip the crimped edge and bend it upwards so that the Tool slips off.

  CAUTION:
  Do not bend excessively.

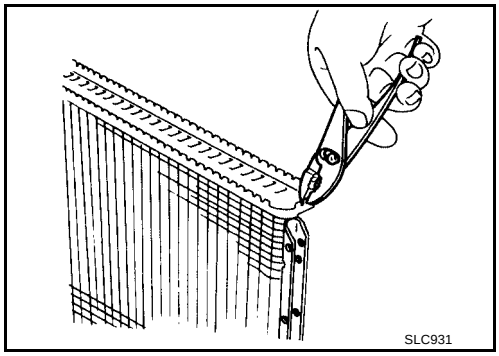


- In areas where Tool cannot be used, use a screwdriver to bend the edge up.

  CAUTION:
  Be careful not to damage tank.

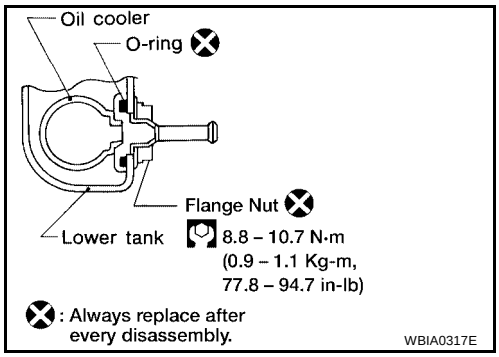


2. Make sure the edge stands straight up.
3. Remove oil cooler from tank (A/T model only).

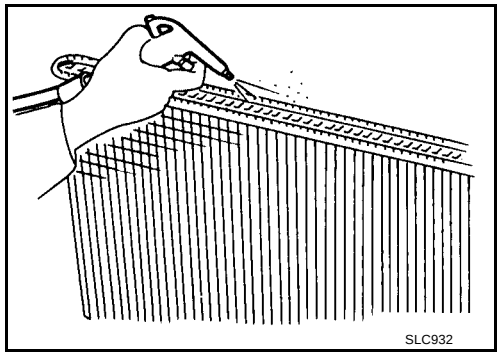


ASSEMBLY

1. Install oil cooler (A/T model only).



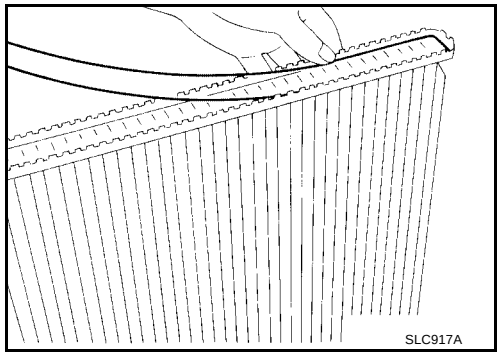
2. Clean contact portion of tank.



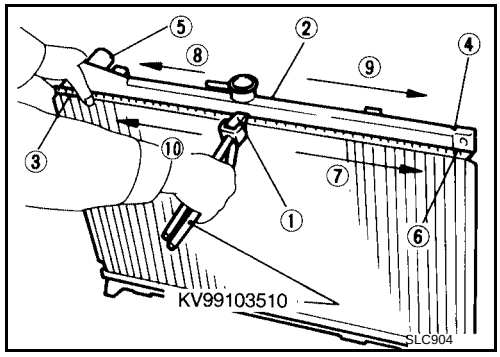
3. Install sealing rubber.

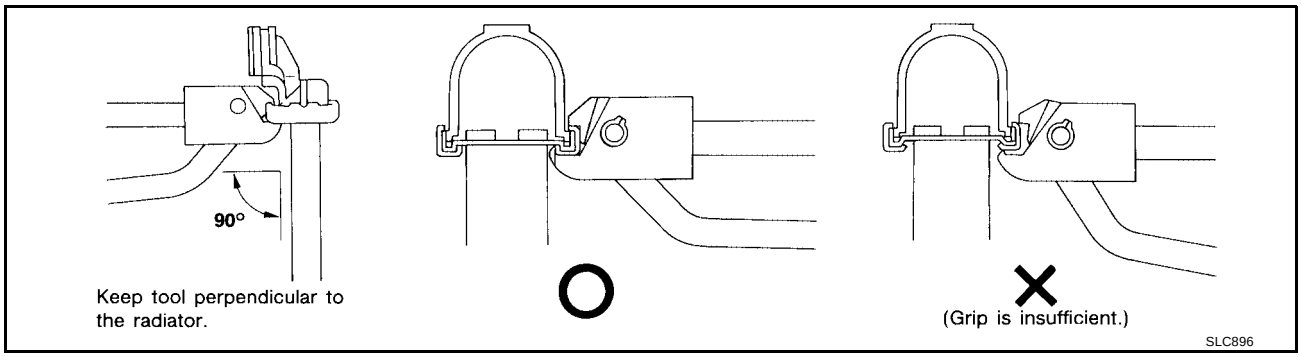
NOTE:
Push it in with fingers.

CAUTION:
Be careful not to twist sealing rubber.

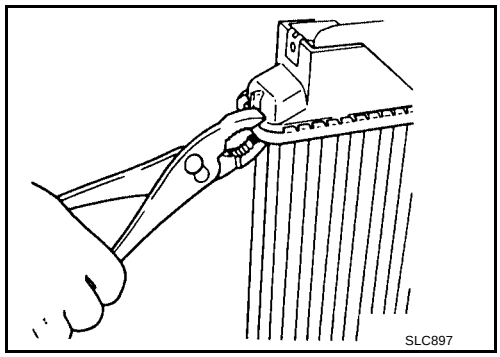


4. Crimp tank in specified sequence using Tool.



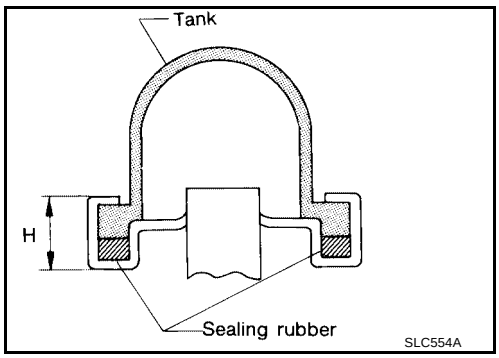


- Use pliers in the locations where Tool cannot be used.



5. Make sure that the rim is completely crimped down.

Standard height “H” : 8.0 - 8.4 mm (0.315 - 0.331 in)



6. Confirm that there is no leakage.
   - Refer to CO-26, "CHECKING COOLING SYSTEM FOR LEAKS" .

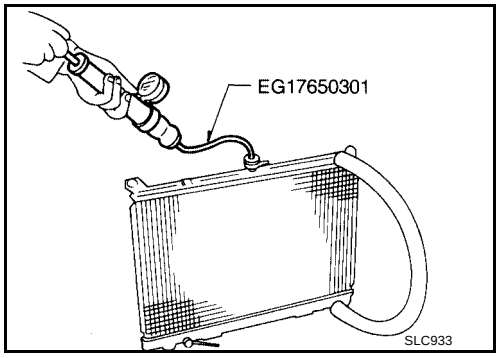
Inspection

EBS00CHR

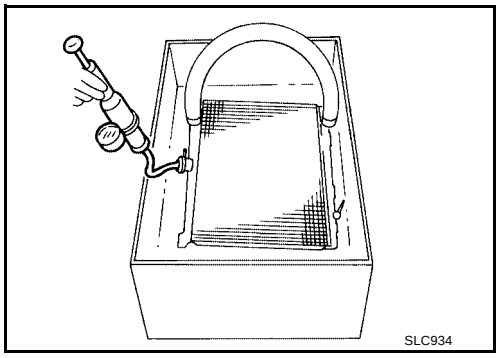
1. Apply pressure using Tool.

Specified pressure value : 157 kPa (1.6 kg/cm^2 , 23 psi)

WARNING:
To prevent the risk of the hose coming undone while under pressure, securely fasten it down with a hose clamp.
Attach a hose to the oil cooler as well (A/T model only).



2. Check for leaks in dip tank.

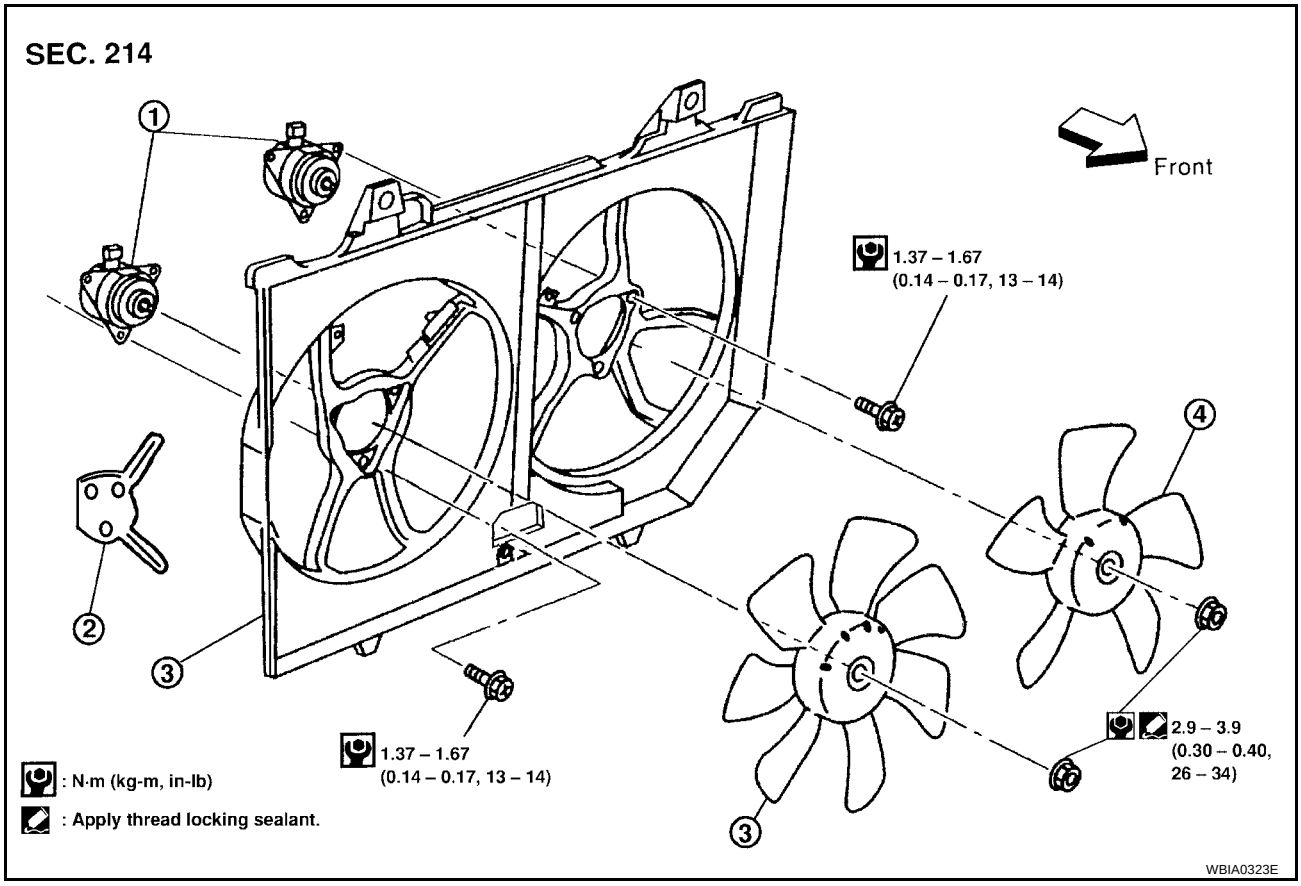


COOLING FAN

PFP:21060

Disassembly and Assembly

EBS00CHS



1. Cooling fan motor
2. Insulator
3. Cooling fan shroud
4. Cooling fan blade

DISASSEMBLY

1. Remove the radiator and cooling fan assembly. Refer to CO-32, "REMOVAL" .
2. Remove the cooling fan shroud from the radiator.
3. Remove the cooling fan blades from the cooling fan motors.
4. Remove the insulator.
5. Remove the cooling fan motors from the fan shroud.

ASSEMBLY

- Assembly is in the reverse order of disassembly.

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Capacity

EBS00CHT

Unit: ℓ (US gal, Imp gal)

Coolant capacity with reservoir tank (MAX level)	A/T	6.7 (1 3/4, 1 1/2)
	M/T	6.8 (1 3/4, 1 1/2)

Thermostat

EBS00CHU

Valve opening temperature	80.5 - 83.5°C (177 - 182°F)
Valve lift	More than 8 mm/95°C (0.315 in/203°F)
Valve closing temperature	77°C (171°F)

Water Control Valve

EBS00CHV

Valve opening temperature	93.5 - 96.5°C (200 - 206°F)
Valve lift	More than 8 mm/108°C (0.315 in/226°F)
Valve closing temperature	90°C (194°F)

Radiator

EBS00CHW

Unit: kPa (kg/cm^2 , psi)

Cap relief pressure	Standard	78- 98 (0.8 -1.0, 11-14)
	Limit	59 (0.6, 9)
Leakage test pressure		157 (1.6, 23)

SECTION EC

ENGINE CONTROL SYSTEM

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QG18DE

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UBS00JRB

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-172, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

×: Applicable —: Not applicable

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
U1000	1000*4	CAN COMM CIRCUIT	EC-172
U1001	1001*4	CAN COMM CIRCUIT	EC-172
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—
P0011	0011	INT/V TIM CONT-B1	EC-175
P0037	0037	HO2S2 HTR (B1)	EC-179
P0038	0038	HO2S2 HTR (B1)	EC-179
P0101	0101	MAF SEN/CIRCUIT	EC-185
P0102	0102	MAF SEN/CIRCUIT	EC-195
P0103	0103	MAF SEN/CIRCUIT	EC-195
P0112	0112	IAT SEN/CIRCUIT	EC-203
P0113	0113	IAT SEN/CIRCUIT	EC-203
P0117	0117	ECT SEN/CIRCUIT	EC-207
P0118	0118	ECT SEN/CIRCUIT	EC-207
P0122	0122	TP SEN 2/CIRC	EC-212
P0123	0123	TP SEN 2/CIRC	EC-212
P0125	0125	ECT SENSOR	EC-219
P0127	0127	IAT SENSOR	EC-222
P0128	0128	THERMSTAT FNCTN	EC-225
P0138	0138	HO2S2 (B1)	EC-227
P0139	0139	HO2S2 (B1)	EC-233
P0171	0171	FUEL SYS-LEAN-B1	EC-241
P0172	0172	FUEL SYS-RICH-B1	EC-248
P0181	0181	FTT SENSOR	EC-255
P0182	0182	FTT SEN/CIRCUIT	EC-260
P0183	0183	FTT SEN/CIRCUIT	EC-260
P0222	0222	TP SEN 1/CIRC	EC-264
P0223	0223	TP SEN 1/CIRC	EC-264
P0300	0300	MULTI CYL MISFIRE	EC-271
P0301	0301	CYL 1 MISFIRE	EC-271
P0302	0302	CYL 2 MISFIRE	EC-271
P0303	0303	CYL 3 MISFIRE	EC-271
P0304	0304	CYL 4 MISFIRE	EC-271
P0327	0327	KNOCK SEN/CIRC-B1	EC-278
P0328	0328	KNOCK SEN/CIRC-B1	EC-278
P0335	0335	CKP SEN/CIRCUIT	EC-283

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
P0340	0340	CMP SEN/CIRC-B1	EC-290
P0420	0420	TW CATALYST SYS-B1	EC-297
P0441	0441	EVAP PURG FLOW/MON	EC-302
P0442	0442	EVAP SMALL LEAK	EC-308
P0444	0444	PURG VOLUME CONT/V	EC-317
P0445	0445	PURG VOLUME CONT/V	EC-317
P0447	0447	VENT CONTROL VALVE	EC-324
P0451	0451	EVAP SYS PRES SEN	EC-331
P0452	0452	EVAP SYS PRES SEN	EC-334
P0453	0453	EVAP SYS PRES SEN	EC-340
P0455	0455	EVAP GROSS LEAK	EC-347
P0456	0456	EVAP VERY SML LEAK	EC-355
P0460	0460	FUEL LEV SEN SLOSH	EC-364
P0461	0461	FUEL LEVEL SENSOR	EC-366
P0462	0462	FUEL LEVL SEN/CIRC	EC-368
P0463	0463	FUEL LEVL SEN/CIRC	EC-368
P0500	0500	VEH SPEED SEN/CIRC*5	EC-370
P0506	0506	ISC SYSTEM	EC-372
P0507	0507	ISC SYSTEM	EC-374
P0550	0550	PW ST P SEN/CIRC	EC-376
P0605	0605	ECM	EC-381
P0705	0705	PNP SW/CIRC	AT-115
P0710	0710	ATF TEMP SEN/CIRC	AT-120
P0720	0720	VEH SPD SEN/CIR AT*5	AT-126
P0725	0725	ENGINE SPEED SIG	AT-131
P0731	0731	A/T 1ST GR FNCTN	AT-135
P0732	0732	A/T 2ND GR FNCTN	AT-140
P0733	0733	A/T 3RD GR FNCTN	AT-145
P0734	0734	A/T 4TH GR FNCTN	AT-150
P0740	0740	TCC SOLENOID/CIRC	AT-159
P0744	0744	A/T TCC S/V FNCTN	AT-163
P0745	0745	L/PRESS SOL/CIRC	AT-173
P0750	0750	SFT SOL A/CIRC	AT-179
P0755	0755	SFT SOL B/CIRC	AT-183
P1031	1031	A/F SEN1 HTR (B1)	EC-384
P1032	1032	A/F SEN1 HTR (B1)	EC-384
P1065	1065	ECM BACK UP/CIRC	EC-389
P1111	1111	INT/V TIM V/CIR-B1	EC-393
P1121	1121	ETC ACTR	EC-397
P1122	1122	ETC FUNCTION/CIRC	EC-399
P1124	1124	ETC MOT PWR	EC-406
P1126	1126	ETC MOT PWR	EC-406

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3		
P1128	1128	ETC MOT	EC-411
P1132	1132	VARI SWL CON/SV-B1*6	EC-416
P1137	1137	SWL CON/V POSI SEN*6	EC-421
P1138	1138	SWIRL CONT VALVE*6	EC-429
P1146	1146	HO2S2 (B1)	EC-437
P1147	1147	HO2S2 (B1)	EC-445
P1148	1148	CLOSED LOOP-B1	EC-453
P1217	1217	ENG OVER TEMP	EC-454
P1225	1225	CTP LEARNING	EC-469
P1226	1226	CTP LEARNING	EC-471
P1229	1229	SENSOR POWER/CIRC	EC-473
P1271	1271	A/F SENSOR1 (B1)	EC-478
P1272	1272	A/F SENSOR1 (B1)	EC-484
P1273	1273	A/F SENSOR1 (B1)	EC-490
P1274	1274	A/F SENSOR1 (B1)	EC-497
P1276	1276	A/F SENSOR1 (B1)	EC-504
P1278	1278	A/F SENSOR1 (B1)	EC-510
P1279	1279	A/F SENSOR1 (B1)	EC-518
P1444	1444	PURG VOLUME CONT/V	EC-526
P1446	1446	VENT CONTROL VALVE	EC-534
P1564	1564	ASCD SW	EC-541
P1572	1572	ASCD BRAKE SW	EC-548
P1574	1574	ASCD VHL SPD SEN	EC-560
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	BL-97
P1705	1705	TP SEN/CIRC A/T	AT-187
P1706	1706	P-N POS SW/CIRCUIT	EC-562
P1760	1760	O/R CLTCH SOL/CIRC	AT-193
P1805	1805	BRAKE SW/CIRCUIT	EC-566
P2122	2122	APP SEN 1/CIRC	EC-572
P2123	2123	APP SEN 1/CIRC	EC-572
P2127	2127	APP SEN 2/CIRC	EC-579
P2128	2128	APP SEN 2/CIRC	EC-579
P2135	2135	TP SENSOR	EC-586
P2138	2138	APP SENSOR	EC-593

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: The troubleshooting for this DTC needs CONSULT-II.
*5: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.
*6: SULEV models.

Alphabetical Index

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NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-840, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

×: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
A/F SENSOR1 (B1)	P1271	1271	EC-478
A/F SENSOR1 (B1)	P1272	1272	EC-484
A/F SENSOR1 (B1)	P1273	1273	EC-490
A/F SENSOR1 (B1)	P1274	1274	EC-497
A/F SENSOR1 (B1)	P1276	1276	EC-504
A/F SENSOR1 (B1)	P1278	1278	EC-510
A/F SENSOR1 (B1)	P1279	1279	EC-518
A/F SEN1 HTR (B1)	P1031	1031	EC-384
A/F SEN1 HTR (B1)	P1032	1032	EC-384
A/T 1ST GR FNCTN	P0731	0731	AT-135
A/T 2ND GR FNCTN	P0732	0732	AT-140
A/T 3RD GR FNCTN	P0733	0733	AT-145
A/T 4TH GR FNCTN	P0734	0734	AT-150
A/T TCC S/V FNCTN	P0744	0744	AT-163
APP SEN 1/CIRC	P2122	2122	EC-572
APP SEN 1/CIRC	P2123	2123	EC-572
APP SEN 2/CIRC	P2127	2127	EC-579
APP SEN 2/CIRC	P2128	2128	EC-579
APP SENSOR	P2138	2138	EC-593
ASCD BRAKE SW	P1572	1572	EC-548
ASCD SW	P1564	1564	EC-541
ASCD VHL SPD SEN	P1574	1574	EC-560
ATF TEMP SEN/CIRC	P0710	0710	AT-120
BRAKE SW/CIRCUIT	P1805	1805	EC-566
CAN COMM CIRCUIT	U1000	1000*4	EC-172
CAN COMM CIRCUIT	U1001	1001*4	EC-172
CKP SEN/CIRCUIT	P0335	0335	EC-283
CLOSED LOOP-B1	P1148	1148	EC-453
CMP SEN/CIRC-B1	P0340	0340	EC-290
CTP LEARNING	P1225	1225	EC-469
CTP LEARNING	P1226	1226	EC-471
CYL 1 MISFIRE	P0301	0301	EC-271
CYL 2 MISFIRE	P0302	0302	EC-271
CYL 3 MISFIRE	P0303	0303	EC-271
CYL 4 MISFIRE	P0304	0304	EC-271
ECM	P0605	0605	EC-381
ECM BACK UP/CIRC	P1065	1065	EC-389
ECT SEN/CIRCUIT	P0117	0117	EC-207
ECT SEN/CIRCUIT	P0118	0118	EC-207
ECT SENSOR	P0125	0125	EC-219
ENG OVER TEMP	P1217	1217	EC-454

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
ENGINE SPEED SIG	P0725	0725	AT-131
ETC ACTR	P1121	1121	EC-397
ETC FUNCTION/CIRC	P1122	1122	EC-399
ETC MOT	P1128	1128	EC-411
ETC MOT PWR	P1124	1124	EC-406
ETC MOT PWR	P1126	1126	EC-406
EVAP GROSS LEAK	P0455	0455	EC-347
EVAP PURG FLOW/MON	P0441	0441	EC-302
EVAP SMALL LEAK	P0442	0442	EC-308
EVAP SYS PRES SEN	P0451	0451	EC-331
EVAP SYS PRES SEN	P0452	0452	EC-334
EVAP SYS PRES SEN	P0453	0453	EC-340
EVAP VERY SML LEAK	P0456	0456	EC-355
FTT SEN/CIRCUIT	P0182	0182	EC-260
FTT SEN/CIRCUIT	P0183	0183	EC-260
FTT SENSOR	P0181	0181	EC-255
FUEL LEV SEN SLOSH	P0460	0460	EC-364
FUEL LEVEL SENSOR	P0461	0461	EC-366
FUEL LEVL SEN/CIRC	P0462	0462	EC-368
FUEL LEVL SEN/CIRC	P0463	0463	EC-368
FUEL SYS-LEAN-B1	P0171	0171	EC-241
FUEL SYS-RICH-B1	P0172	0172	EC-248
HO2S2 (B1)	P0138	0138	EC-227
HO2S2 (B1)	P0139	0139	EC-233
HO2S2 (B1)	P1146	1146	EC-437
HO2S2 (B1)	P1147	1147	EC-445
HO2S2 HTR (B1)	P0037	0037	EC-179
HO2S2 HTR (B1)	P0038	0038	EC-179
IAT SEN/CIRCUIT	P0112	0112	EC-203
IAT SEN/CIRCUIT	P0113	0113	EC-203
IAT SENSOR	P0127	0127	EC-222
INT/V TIM CONT-B1	P0011	0011	EC-175
INT/V TIM V/CIR-B1	P1111	1111	EC-393
ISC SYSTEM	P0506	0506	EC-372
ISC SYSTEM	P0507	0507	EC-374
KNOCK SEN/CIRC-B1	P0327	0327	EC-278
KNOCK SEN/CIRC-B1	P0328	0328	EC-278
L/PRESS SOL/CIRC	P0745	0745	AT-173
MAF SEN/CIRCUIT	P0101	0101	EC-185
MAF SEN/CIRCUIT	P0102	0102	EC-195
MAF SEN/CIRCUIT	P0103	0103	EC-195
MULTI CYL MISFIRE	P0300	0300	EC-271

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	BL-97
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	**—**
O/R CLTCH SOL/CIRC	P1760	1760	AT-193
P-N POS SW/CIRCUIT	P1706	1706	EC-562
PNP SW/CIRC	P0705	0705	AT-115
PURG VOLUME CONT/V	P0444	0444	EC-317
PURG VOLUME CONT/V	P0445	0445	EC-317
PURG VOLUME CONT/V	P1444	1444	EC-526
PW ST P SEN/CIRC	P0550	0550	EC-376
SENSOR POWER/CIRC	P1229	1229	EC-473
SFT SOL A/CIRC	P0750	0750	AT-179
SFT SOL B/CIRC	P0755	0755	AT-183
SWIRL CONT VALVE*6	P1138	1138	EC-429
SWL CON/V POSI SEN*6	P1137	1137	EC-421
TCC SOLENOID/CIRC	P0740	0740	AT-159
THERMSTAT FNCTN	P0128	0128	EC-225
TP SEN 1/CIRC	P0222	0222	EC-264
TP SEN 1/CIRC	P0223	0223	EC-264
TP SEN 2/CIRC	P0122	0122	EC-212
TP SEN 2/CIRC	P0123	0123	EC-212
TP SENSOR	P2135	2135	EC-586
TP SEN/CIRC A/T	P1705	1705	AT-187
TW CATALYST SYS-B1	P0420	0420	EC-297
VARI SWL CON/SV-B1*6	P1132	1132	EC-416
VEH SPD SEN/CIR AT*5	P0720	0720	AT-126
VEH SPEED SEN/CIRC*5	P0500	0500	EC-370
VENT CONTROL VALVE	P0447	0447	EC-324
VENT CONTROL VALVE	P1446	1446	EC-534

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: The troubleshooting for this DTC needs CONSULT-II.
*5: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.
*6: SULEV models.

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

UBS00K2R

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

On Board Diagnostic (OBD) System of Engine and A/T

UBS00JRE

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

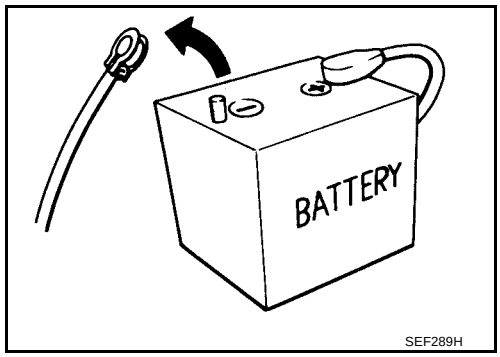
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the battery ground cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-47, "HARNESS CONNECTOR" .**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

Precaution

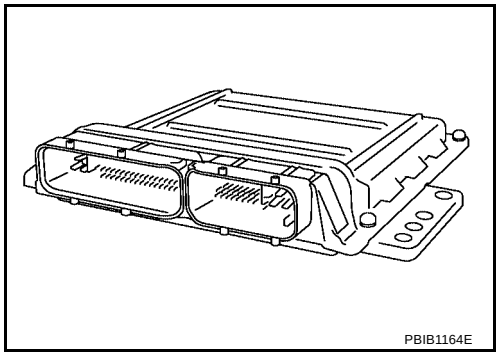
UBS00JRF

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect battery ground cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.**



SEF289H

- **Do not disassemble ECM.**
- **If battery cable is disconnected, the memory will return to the initial ECM values.**
  The ECM will now start to self-control at its initial values. Engine operation can vary slightly when the cable is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**
  - **Diagnostic trouble codes**
  - **1st trip diagnostic trouble codes**
  - **Freeze frame data**
  - **1st trip freeze frame data**
  - **System readiness test (SRT) codes**
  - **Test values**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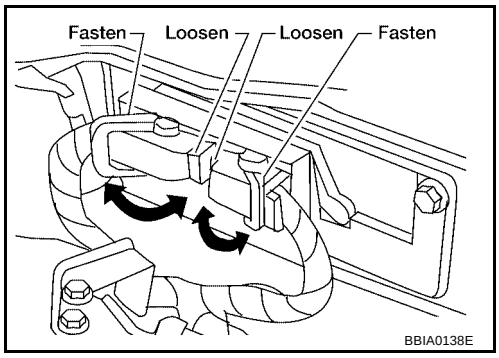
- **When connecting ECM harness connector, fasten it securely with a lever as far as it will go as shown in the figure.**



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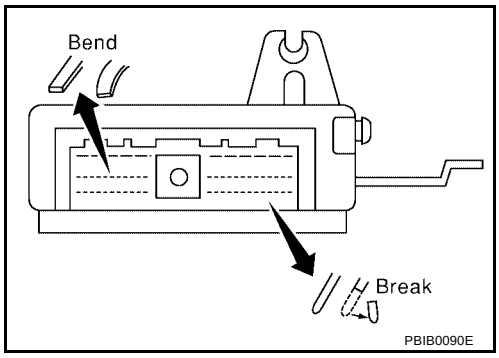
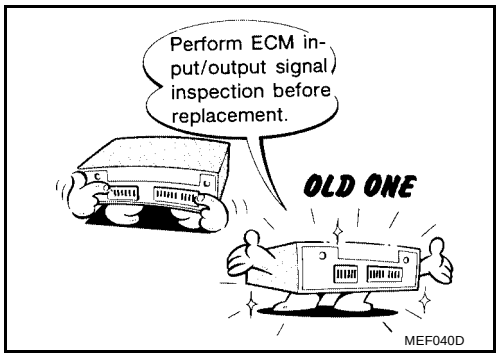
- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**



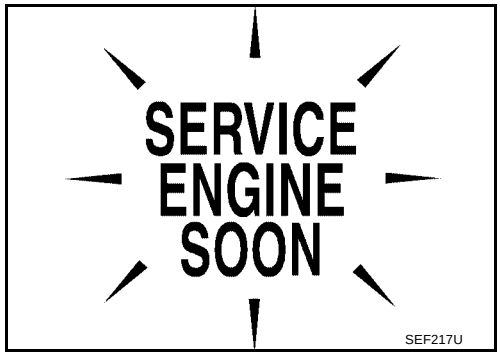
PBIB0090E

- **Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-125 .**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**

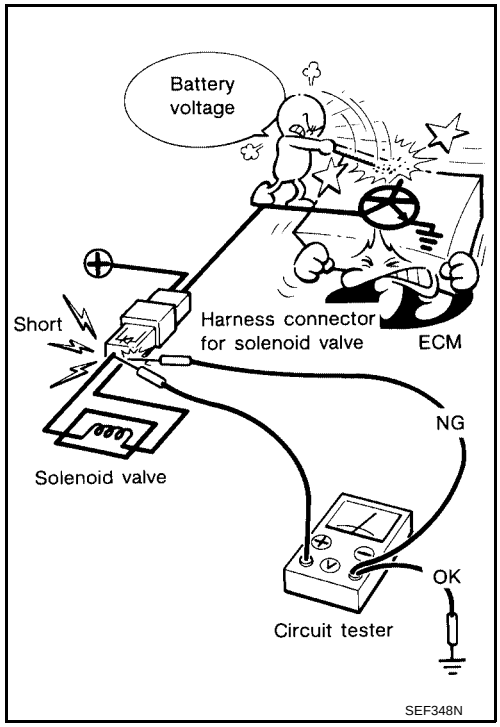


MEF040D

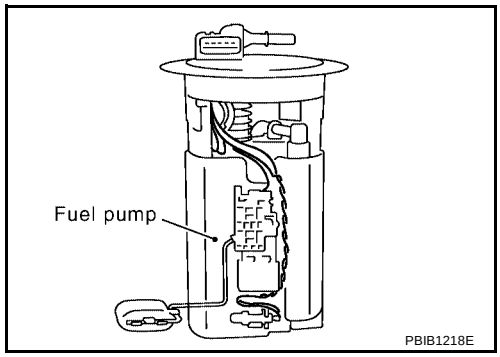
- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check.**
  The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.



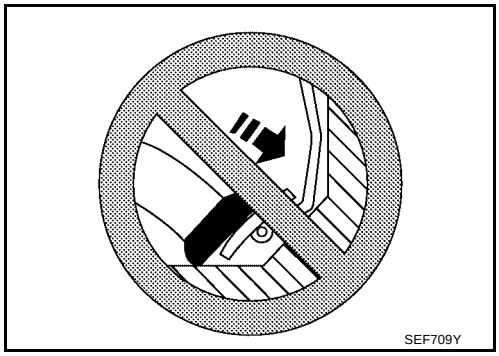
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



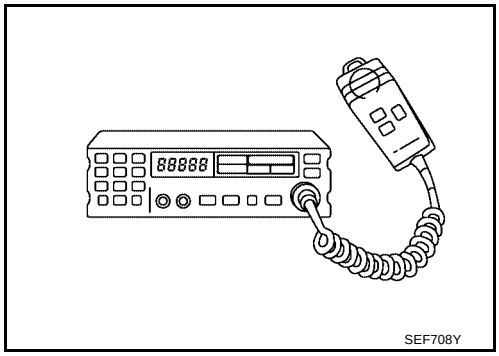
- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**



- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**


SEF709Y

- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
  - **Keep the antenna as far as possible from the electronic control units.**
  - **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
    Do not let them run parallel for a long distance.
  - **Adjust the antenna and feeder line so that the standing-wave radio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**


SEF708Y

Wiring Diagrams and Trouble Diagnosis

UBS00JRG

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams"
- PG-3, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident"

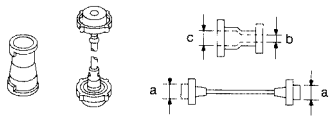
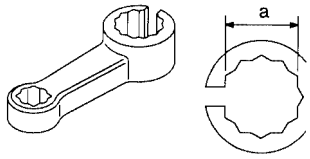
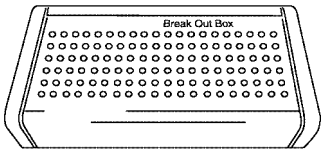
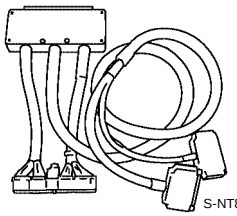
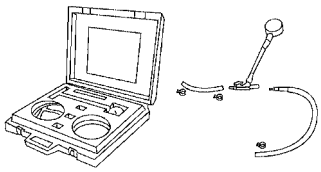
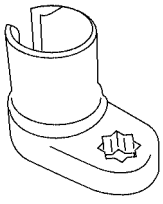
PREPARATION

PFP:00002

Special Service Tools

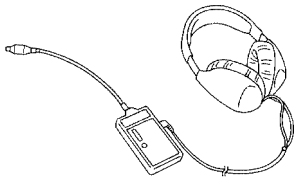
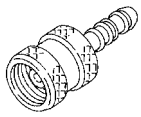
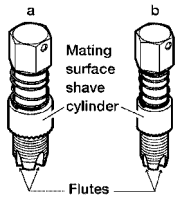
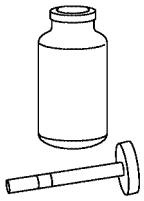
UBS00K2S

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
EG17650301 (J-33984-A) Radiator cap tester adapter	 S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
KV10114400 (J-38365) Heated oxygen sensor wrench	 NT636	Loosening or tightening heated oxygen sensor **a: 22 mm (0.87 in)**
KV109E0010 (J-46209) Break-out box	 S-NT825	Measuring the ECM signals with a circuit tester
KV109E0080 (J-45819) Y-cable adapter	 S-NT826	Measuring the ECM signals with a circuit tester
(J-44321) Fuel pressure gauge kit	 LEC642	Checking fuel pressure
(J-45356) Fuel filler cap adapter	NT815	Checking fuel tank vacuum relief valve opening pressure
(J-44626) Air fuel ratio (A/F) sensor wrench	 LEM054	Loosening or tightening air fuel ratio (A/F) sensor 1

Commercial Service Tools

UBS00K2T

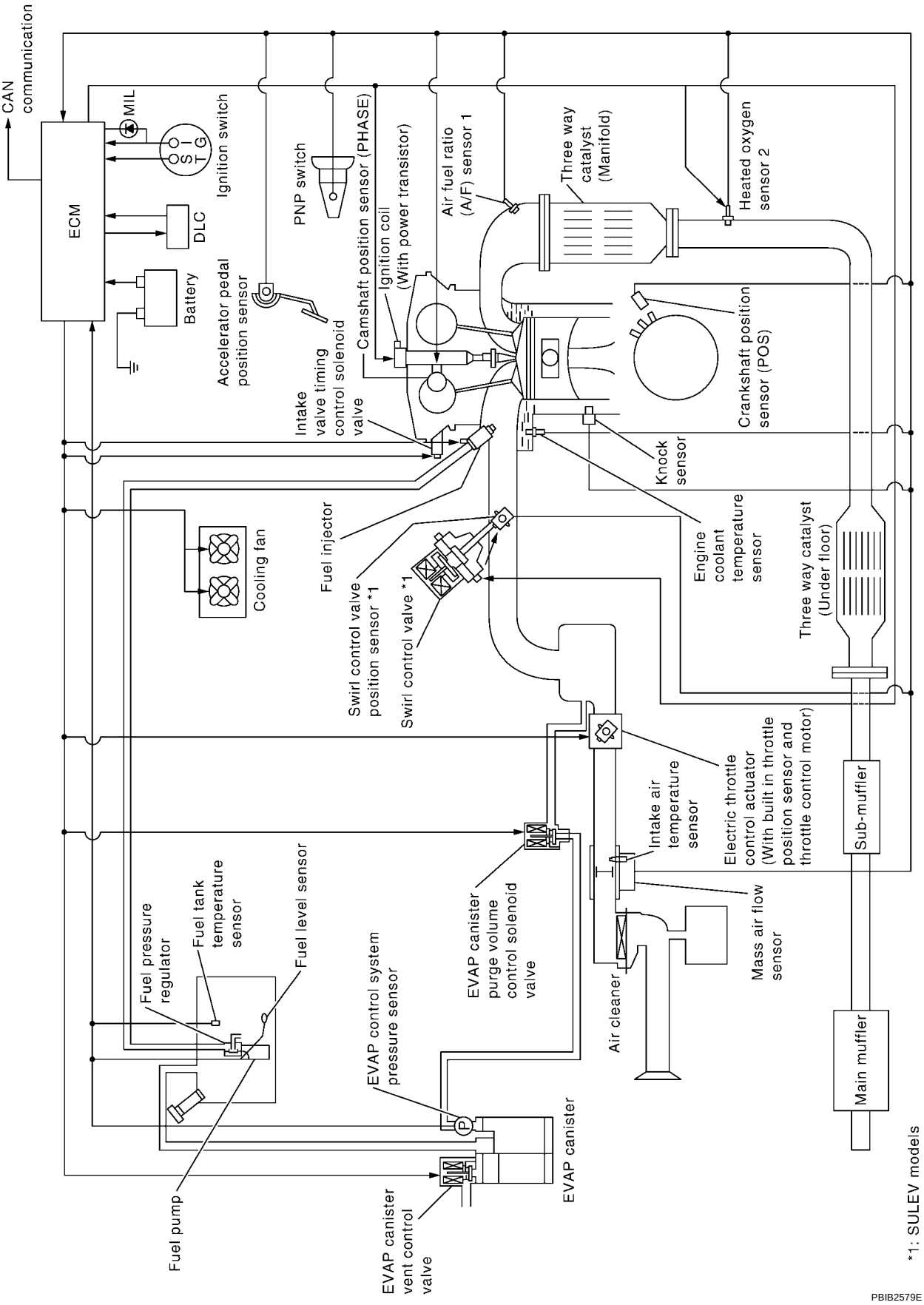
Tool name	Description	
Leak detector i.e.: (J-41416)	 NT703	Locating the EVAP leak
EVAP service port adapter i.e.: (J-41413-OBD)	 NT704	Applying positive pressure through EVAP service port
Oxygen sensor thread cleaner i.e.: (J-43897-18) (J-43897-12)	 AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor or A/F sensor. Use with anti-seize lubricant shown below. **a: J-43897-18 18 mm with 1.5 mm pitch dia., for Zirconia Oxygen Sensor or A/F sensor** **b: J-43897-12 12 mm with 1.25 mm pitch dia., for Titania Oxygen Sensor**
Anti-seize lubricant i.e: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.
Fuel tube removal tool	 LEC643	For disconnecting fuel tube quick connectors **a: 7.9 mm (5/16 in)**

ENGINE CONTROL SYSTEM

PFP:23710

System Diagram

UBS00JRJ



Multiport Fuel Injection (MFI) System

UBS00JRK

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*3	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Knock sensor	Engine knocking condition		
Power steering pressure sensor	Power steering operation		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
Vehicle speed sensor*2	Vehicle speed		
Air conditioner switch	Air conditioner operation		
Electrical load	Electrical load signal		
Battery	Battery voltage*3		

*1: This sensor is not used to control the engine system under normal conditions.
*2: This signal is sent to the ECM through CAN communication line.
*3: ECM determines the start signal status by the signal of engine speed and battery voltage.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from both the crankshaft position sensor and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

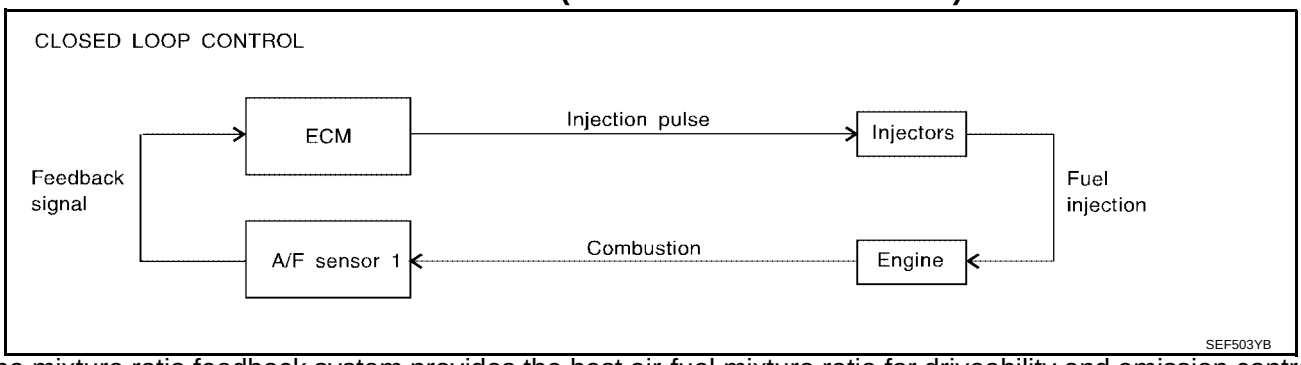
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (A/T models)
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses air fuel ratio (A/F) sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about air fuel ratio (A/F) sensor 1, refer to EC-478, "DTC P1271 A/F SENSOR 1" . This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of air fuel ratio (A/F) sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

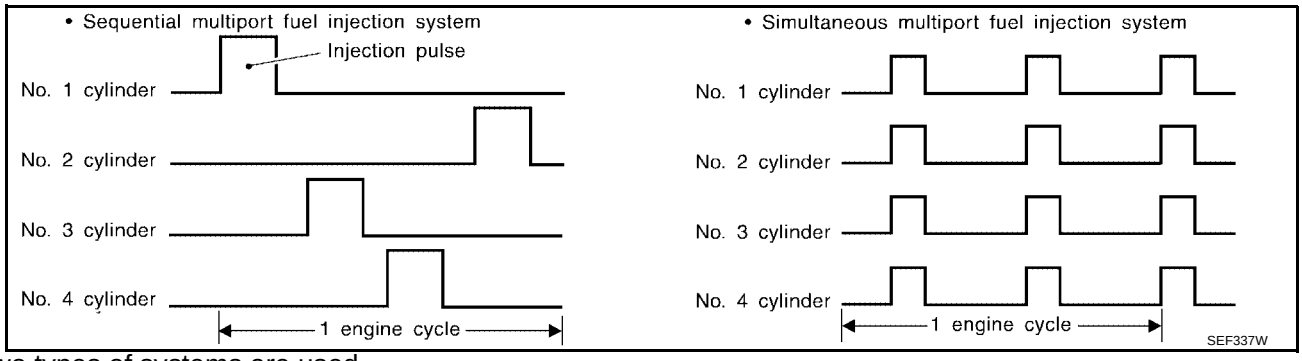
The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of air fuel ratio (A/F) sensor 1 or its circuit
- Insufficient activation of air fuel ratio (A/F) sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from air fuel ratio (A/F) sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.
“Fuel trim” refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
“Short term fuel trim” is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from air fuel ratio (A/F) sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
“Long term fuel trim” is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

Sequential Multiport Fuel Injection System

Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System

Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The four injectors will then receive the signals two times for each engine cycle.
This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

Electronic Ignition (EI) System

UBS00JRL

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2	Ignition timing control	Power transistor
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Vehicle speed sensor*1	Vehicle speed		
Battery	Battery voltage*2		

*1: This signal is sent to the ECM through CAN communication line.
*2: ECM determines the start signal status by the signal of engine speed and battery voltage.

SYSTEM DESCRIPTION

Firing order: 1 - 3 - 4 - 2
The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle

- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Fuel Cut Control (at No Load and High Engine Speed)

UBS00JRM

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Park/neutral position (PNP) switch	Neutral position	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Vehicle speed sensor*	Vehicle speed		

*: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

If the engine speed is above 2,500 rpm under no load (for example, the shift position is neutral and engine speed is over 2,500 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.
Fuel cut will be operated until the engine speed reaches 2,000 rpm, then fuel cut will be cancelled.

NOTE:
This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-28 .

AIR CONDITIONING CUT CONTROL

PFP:23710

Input/output Signal Chart

UBS00JRN

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner ON signal	Air conditioner cut control	Air conditioner relay
Park/neutral position (PNP) switch	Neutral position		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		
Power steering pressure sensor	Power steering operation		
Vehicle speed sensor*1	Vehicle speed		
Battery	Battery voltage*2		

*1: This signal is sent to the ECM through CAN communication line.
*2: ECM determines the start signal status by the signal of engine speed and battery voltage.

System Description

UBS00JRO

This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

PFP:18930

System Description

UBS00JRP

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch	Brake pedal operation		
ASCD clutch switch (M/T models)	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/Neutral position (PNP) switch (A/T models)	Gear position		
Combination meter*	Vehicle speed		
TCM*	Powertrain revolution		

*: This signal is sent to the ECM through CAN communication line.

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

NOTE:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH), press SET/COAST switch. (Then SET indicator in combination meter illuminates.)

ACCEL OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to the neutral position (M/T models)
- Selector lever is changed to N, P, R position (A/T models)
- Vehicle speed decreased to 13km/h(8MPH) lower than the set speed

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released.
- Clutch pedal is released (M/T models)
- A/T selector lever is in other than P and N positions (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

Component Description

UBS00JRQ

ASCD STEERING SWITCH

Refer to EC-541 .

ASCD BRAKE SWITCH

Refer to EC-548 and EC-642 .

ASCD CLUTCH SWITCH

Refer to EC-566 .

STOP LAMP SWITCH

Refer to EC-566 .

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EC-397 and EC-399 .

ASCD INDICATOR

Refer to EC-651 .

CAN COMMUNICATION

PFP:23710

System Description

UBS00JRR

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-4 , about CAN communication for detail.

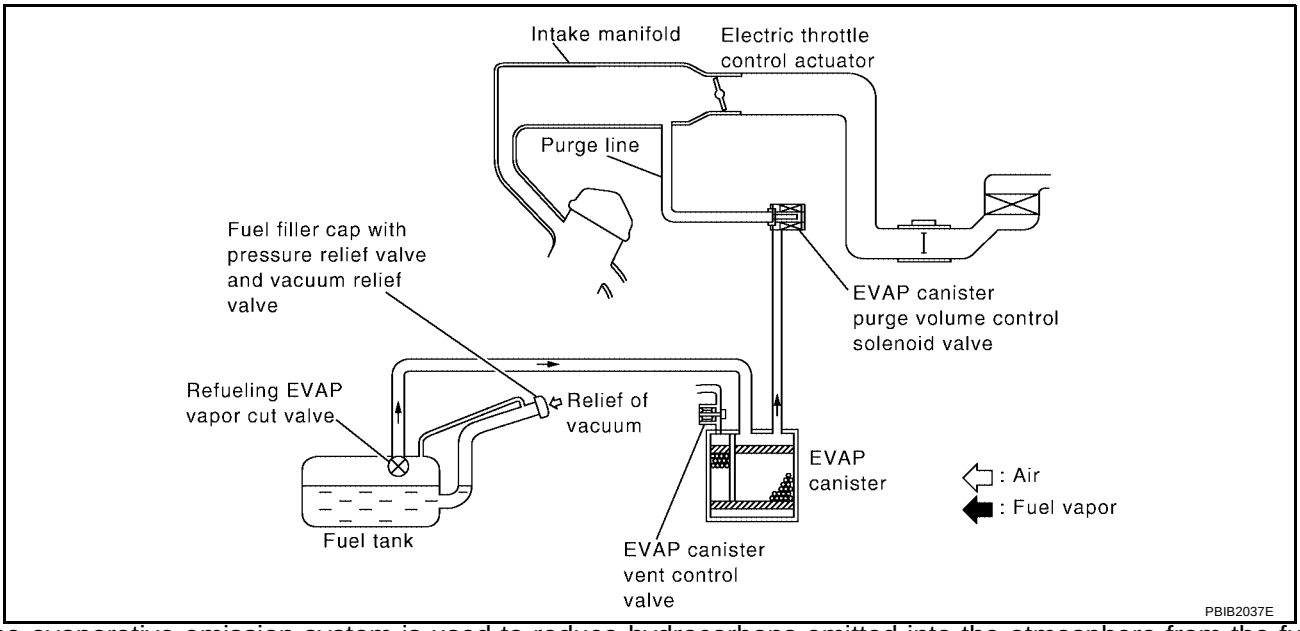
EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description

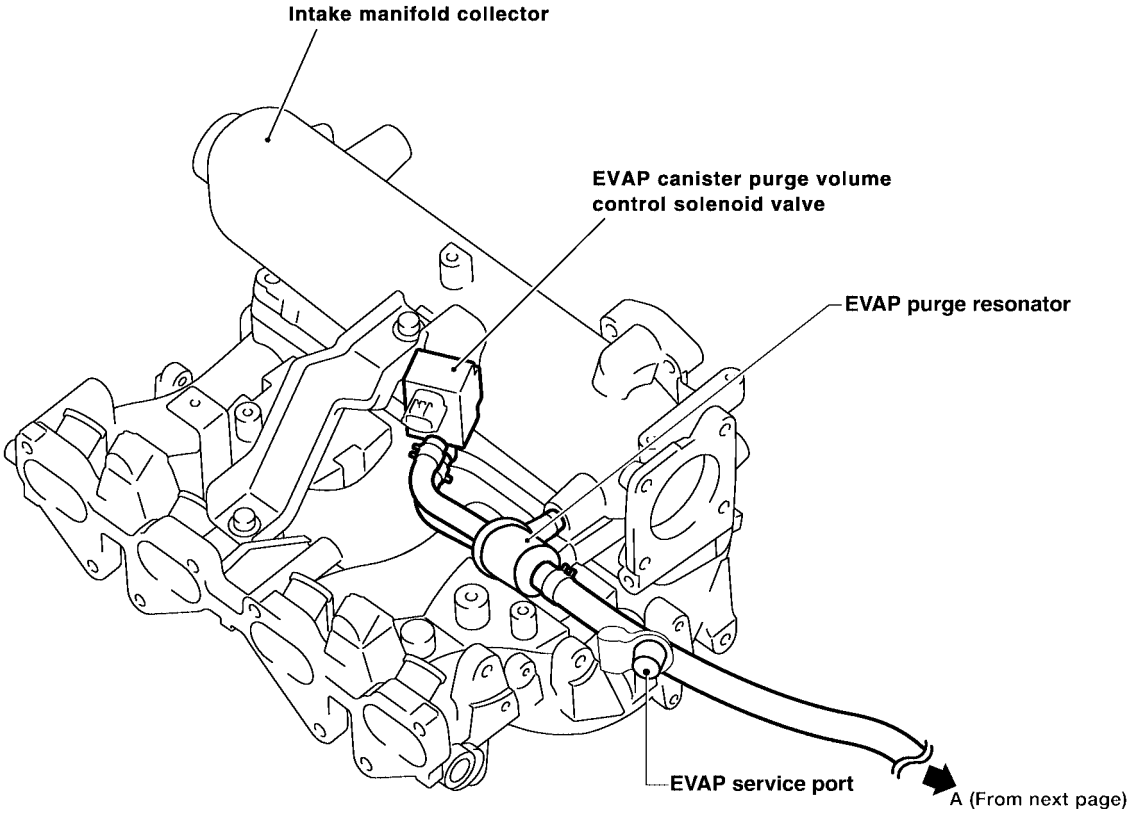
UBS00JRS

SYSTEM DESCRIPTION



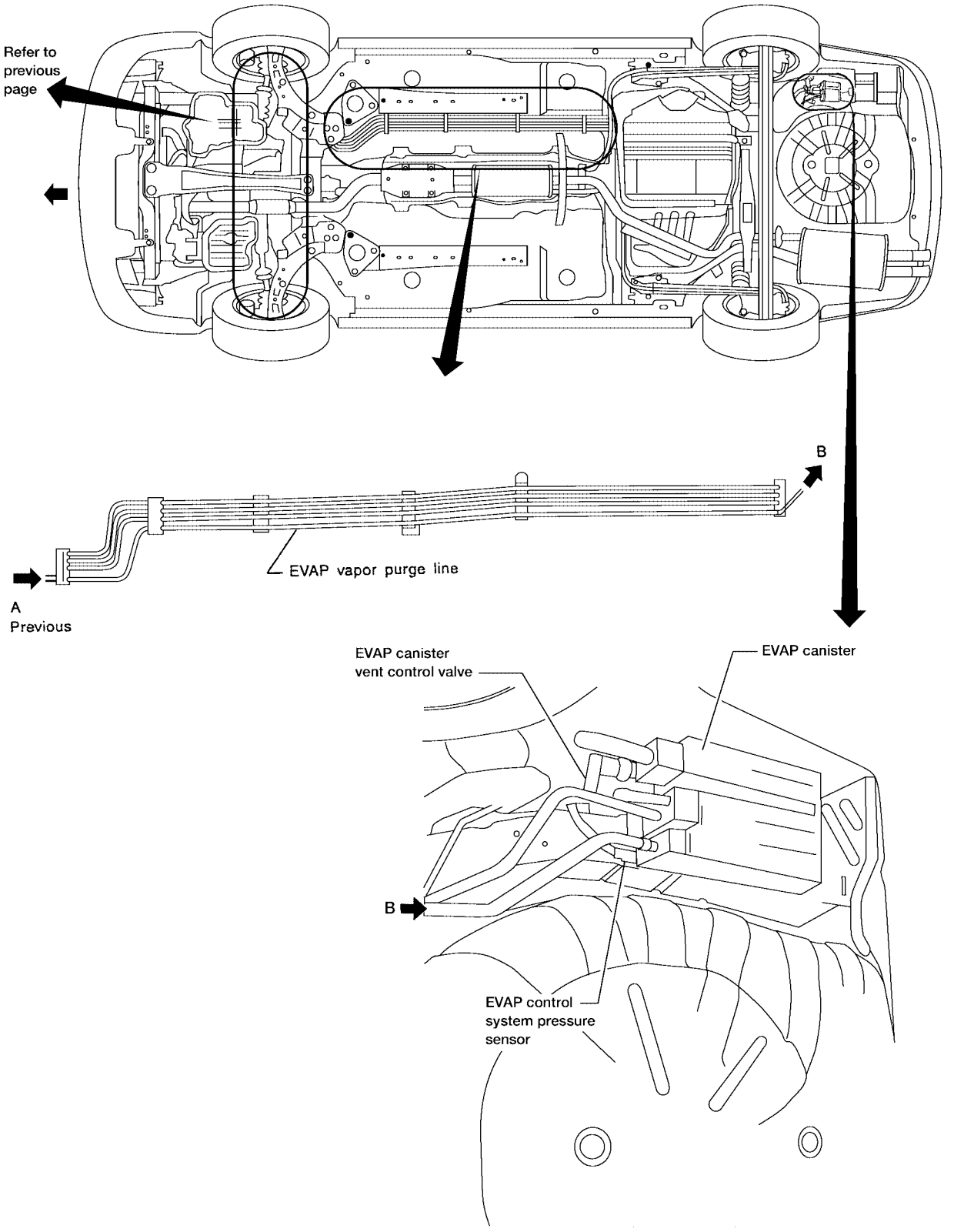
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

EVAPORATIVE EMISSION LINE DRAWING



NOTE : Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

BBIA0524E


Refer to previous page
B
EVAP vapor purge line
A
Previous
EVAP canister vent control valve
EVAP canister
B
EVAP control system pressure sensor

BBIA0294E

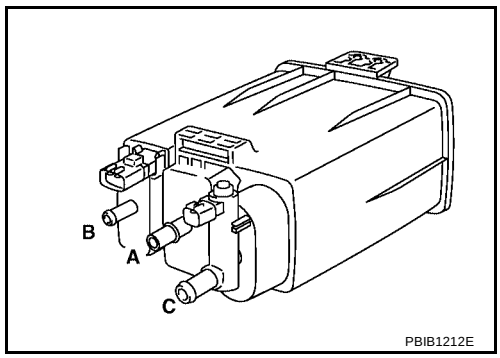
Component Inspection

UBS00JRT

EVAP CANISTER

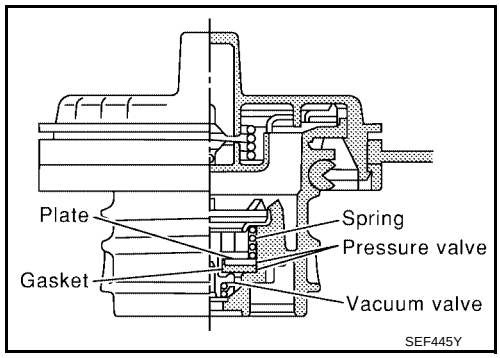
Check EVAP canister as follows:

1. Block port **B** .
2. Blow air into port **A** and check that it flows freely out of port **C** .
3. Release blocked port **B** .
4. Apply vacuum pressure to port **B** and check that vacuum pressure exists at the ports **A** and **C** .
5. Block port **A** and **B** .
6. Apply pressure to port **C** and check that there is no leakage.



FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)

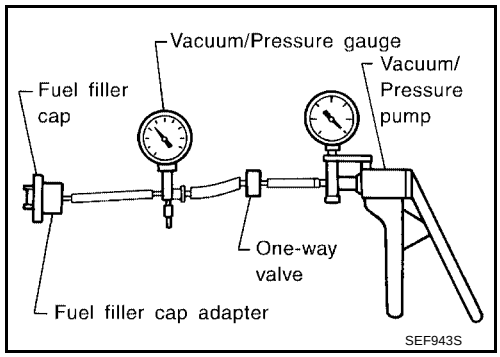
1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa
(0.156 - 0.204 kg/cm^2 , 2.22 - 2.90 psi)
Vacuum: –6.0 to –3.4 kPa
(–0.061 to –0.035 kg/cm^2 , –0.87 to –0.48 psi)

3. If out of specification, replace fuel filler cap as an assembly.



CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer toEC-322

FUEL TANK TEMPERATURE SENSOR

Refer to EC-259 .

EVAP CANISTER VENT CONTROL VALVE

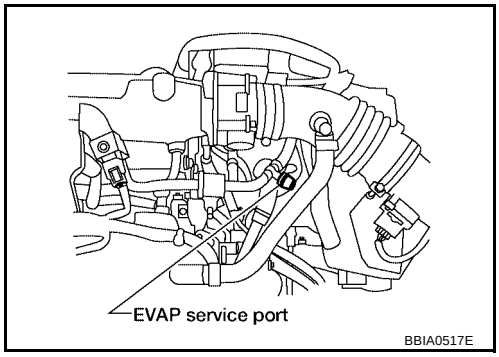
Refer to EC-329 .

EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-333 .

EVAP SERVICE PORT

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.

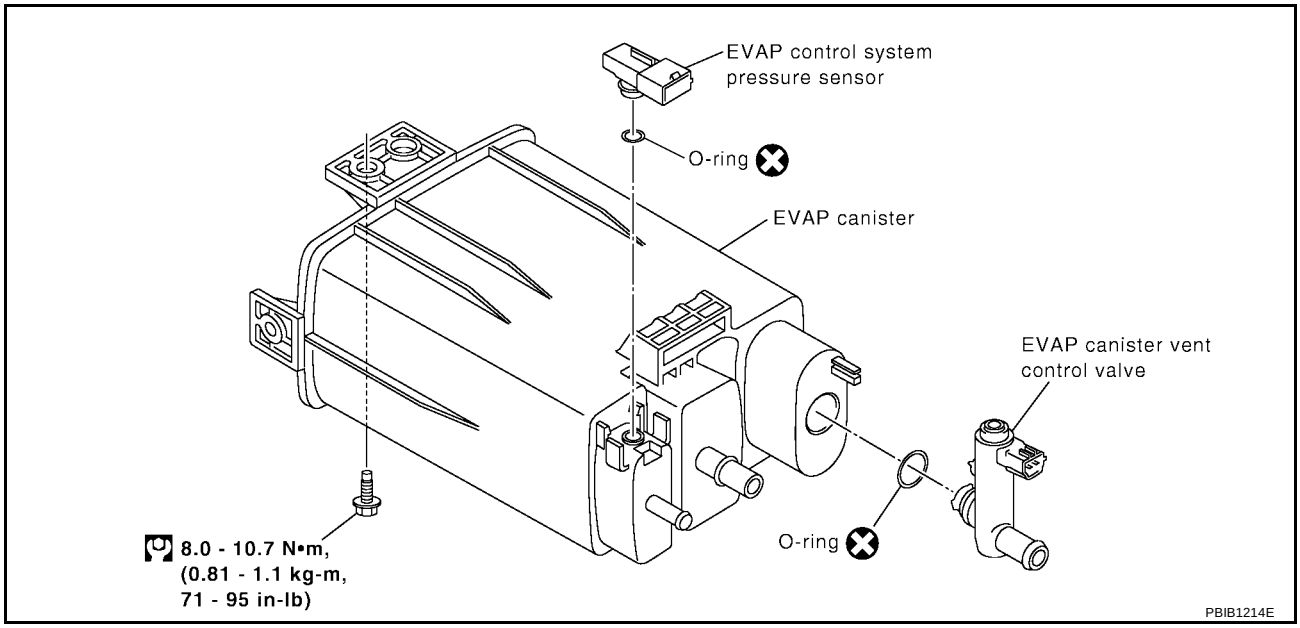


Removal and Installation

UBS00JRU

EVAP CANISTER

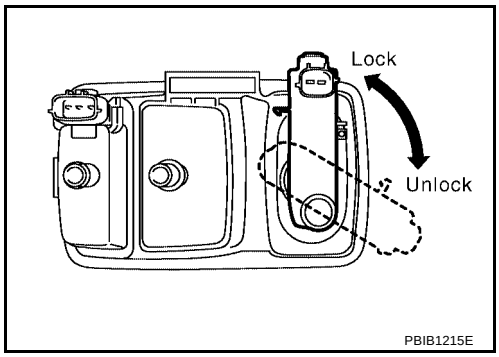
Tighten EVAP canister as shown in the figure.



EVAP CANISTER VENT CONTROL VALVE

1. Turn EVAP canister vent control valve clockwise.
2. Remove the EVAP canister vent control valve.

Do not reuse the O-ring, replace it with a new one.



How to Detect Fuel Vapor Leakage

UBS00JRV

CAUTION:

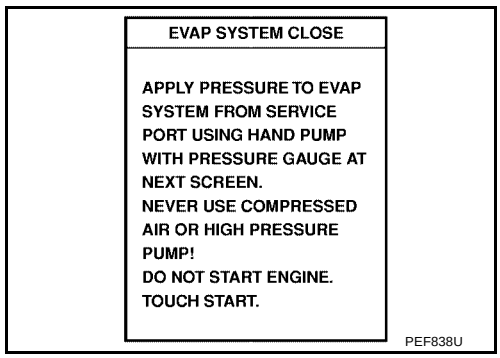
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in EVAP system.**

NOTE:

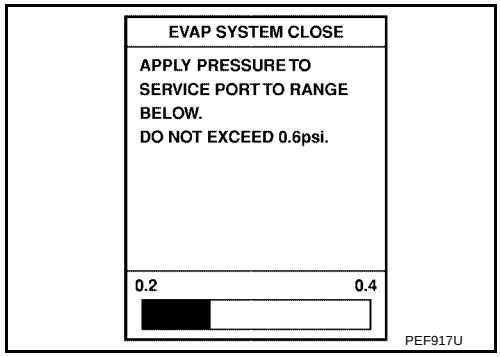
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

WITH CONSULT-II

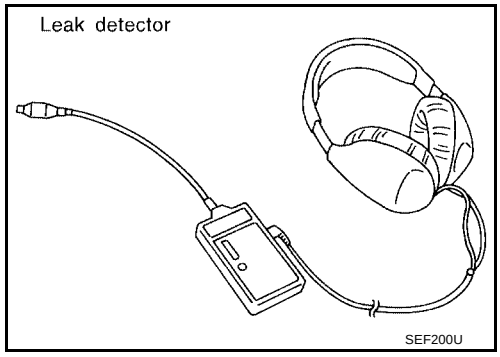
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose to the EVAP service port adapter.
3. Turn ignition switch ON.
4. Select the “EVAP SYSTEM CLOSE” of “WORK SUPPORT MODE” with CONSULT-II.
5. Touch “START”. A bar graph (Pressure indicating display) will appear on the screen.



6. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7. Remove EVAP service port adapter and hose with pressure pump.

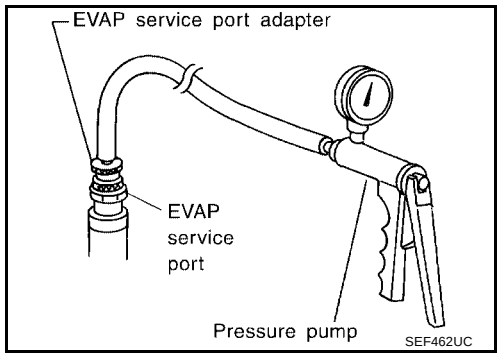


8. Locate the leak using a leak detector. Refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .

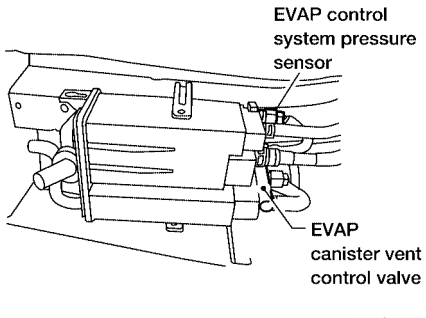


WITHOUT CONSULT-II

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump with pressure gauge to the EVAP service port adapter.



3. Apply battery voltage to between the terminals of both EVAP canister vent control valve to make a closed EVAP system.
4. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2 , 0.2 to 0.4 psi).
5. Remove EVAP service port adapter and hose with pressure pump.
6. Locate the leak using a leak detector. Refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .

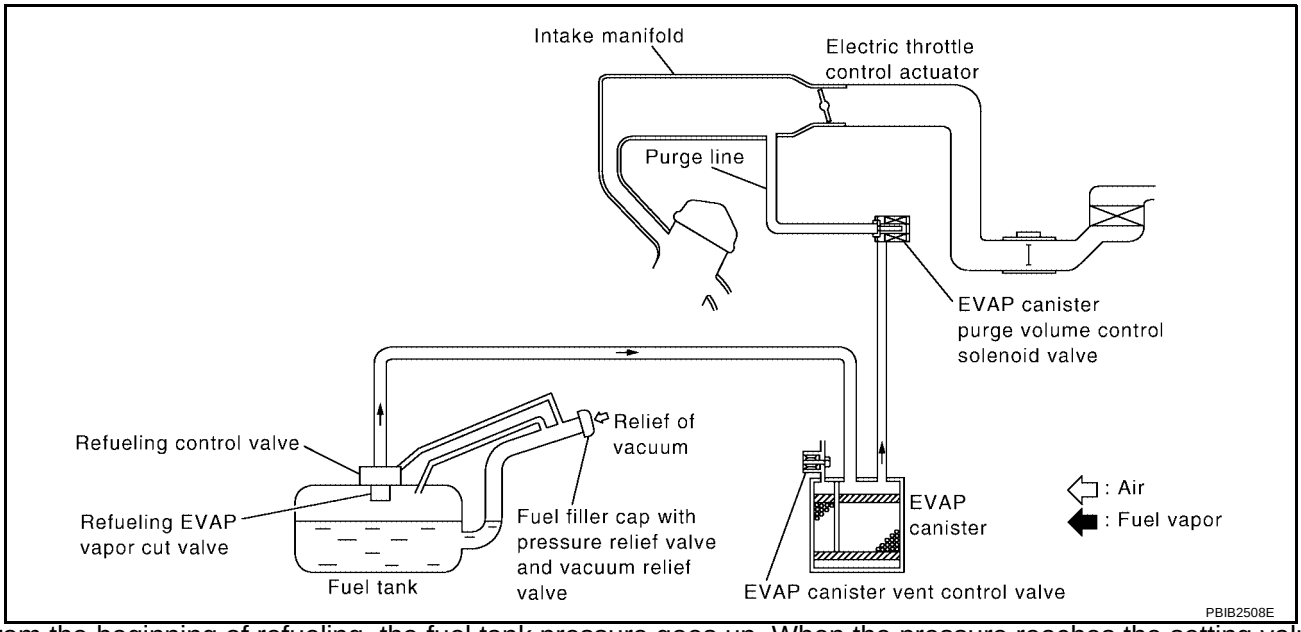


ON BOARD REFUELING VAPOR RECOVERY (ORVR)

PFP:00032

System Description

UBS00JRW



From the beginning of refueling, the fuel tank pressure goes up. When the pressure reaches the setting value of the refueling control valve (RCV) opening pressure, the RCV is opened. After RCV opens, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve, RCV and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

The RCV is always closed during driving and the evaporative emission control system is operated the same as conventional system.

WARNING:

When conducting inspections below, be sure to observe the following:

- **Put a “CAUTION: INFLAMMABLE” sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to furnish the workshop with a CO_2 fire extinguisher.**

CAUTION:

- **Before removing fuel line parts, carry out the following procedures:**
  - **Put drained fuel in an explosion-proof container and put lid on securely.**
  - **Release fuel pressure from fuel line. Refer to EC-94, "FUEL PRESSURE RELEASE" .**
  - **Disconnect battery ground cable.**
- **Always replace O-ring when the fuel gauge retainer is removed.**
- **Do not kink or twist hose and tube when they are installed.**
- **Do not tighten hose and clamps excessively to avoid damaging hoses.**
- **After installation, run engine and check for fuel leaks at connection.**
- **Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.**

Diagnostic Procedure

UBS00JRX

SYMPTOM: FUEL ODOR FROM EVAP CANISTER IS STRONG.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.9 kg (4.2 lb).

OK or NG

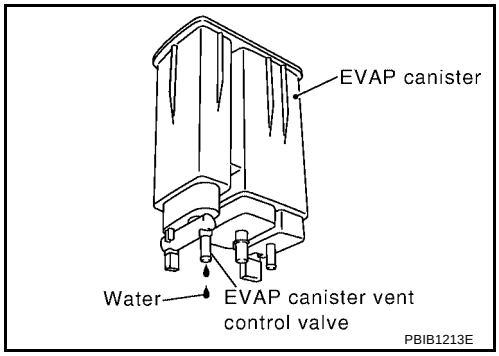
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No >> GO TO 5.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

5. CHECK REFUELING CONTROL VALVE

Refer to EC-48, "REFUELING CONTROL VALVE" .

OK or NG

OK >> GO TO 6.
NG >> Replace refueling control valve.

6. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-47, "REFUELING EVAP VAPOR CUT VALVE" .

OK or NG

OK >> **INSPECTION END**
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

SYMPTOM: CANNOT REFUEL/FUEL ODOR FROM THE FUEL FILLER OPENING IS STRONG WHILE REFUELING.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.9 kg (4.2 lb).

OK or NG

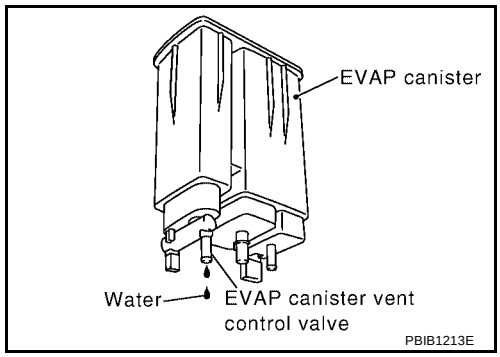
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No >> GO TO 5.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

5. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling EVAP vapor cut valve for clogging, kink, looseness and improper connection.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace hoses and tubes.

6. CHECK FILLER NECK TUBE

Check signal line and recirculation line for clogging, dents and cracks.

OK or NG

OK >> GO TO 7.
NG >> Replace filler neck tube.

7. CHECK REFUELING CONTROL VALVE

Refer to EC-48, "REFUELING CONTROL VALVE" .

OK or NG

OK >> GO TO 8.
NG >> Replace refueling control valve.

8. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-48, "REFUELING CONTROL VALVE" .

OK or NG

OK >> GO TO 9.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

9. CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

OK or NG

OK >> GO TO 10.
NG >> Replace fuel filler tube.

10. CHECK ONE-WAY FUEL VALVE-I

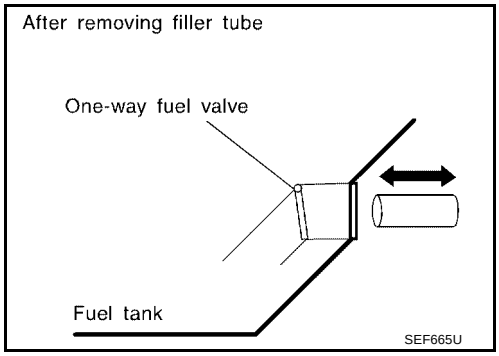
Check one-way valve for clogging.

OK or NG

OK >> GO TO 11.
NG >> Repair or replace one-way fuel valve with fuel tank.

11. CHECK ONE-WAY FUEL VALVE-II

1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.
   When a stick is inserted, the valve should open, when removing stick it should close.
   Do not drop any material into the tank.



OK or NG

OK >> **INSPECTION END**
NG >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.

Component Inspection

UBS00JRY

REFUELING EVAP VAPOR CUT VALVE

With CONSULT-II

1. Remove fuel tank. Refer to FL-7, "FUEL TANK" .
2. Drain fuel from the tank as follows:

a. Remove fuel feed hose located on the fuel level sensor unit retainer.

b. Connect a spare fuel hose, one side to fuel level sensor unit retainer where the hose was removed and the other side to a fuel container.

c. Drain fuel using “FUEL PUMP RELAY” in “ACTIVE TEST” mode with CONSULT-II.

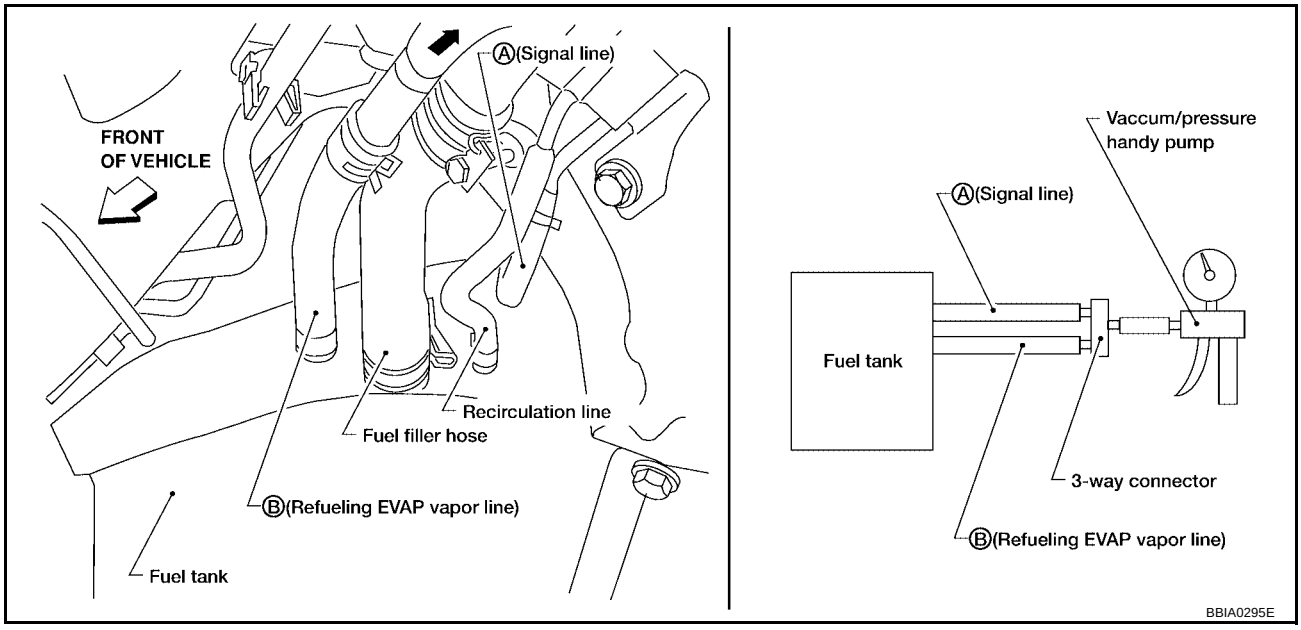
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from the hose end B), and check that the air flows freely into the tank.
4. Check refueling EVAP vapor cut valve for being stuck to open as follows.

a. Connect vacuum pump to hose ends A and B using suitable 3-way connector.

b. Remove fuel level sensor unit retainer with fuel level sensor unit.
Always replace O-ring with new one.

c. Put fuel tank upside down.

d. Apply vacuum pressure to both hose ends A and B [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



Without CONSULT-II

1. Remove fuel tank. Refer to FL-7, "FUEL TANK" .
2. Drain fuel from the tank as follows:

a. Remove fuel level sensor unit retainer.

b. Drain fuel from the tank using a handy pump into a fuel container.

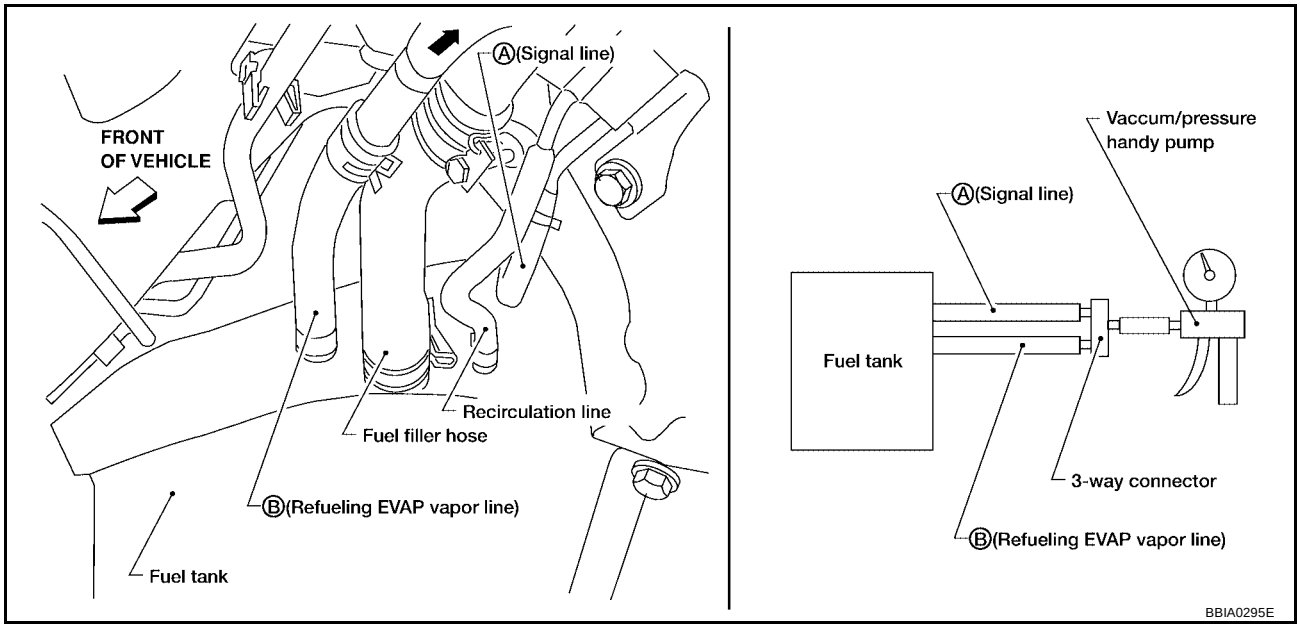
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
Blow air into the refueling EVAP vapor cut valve (from hose end B), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.

a. Connect vacuum pump to hose ends A and B using a suitable 3-way connector.

b. Remove fuel level sensor unit retainer with fuel level sensor unit.
Always replace O-ring with new one.

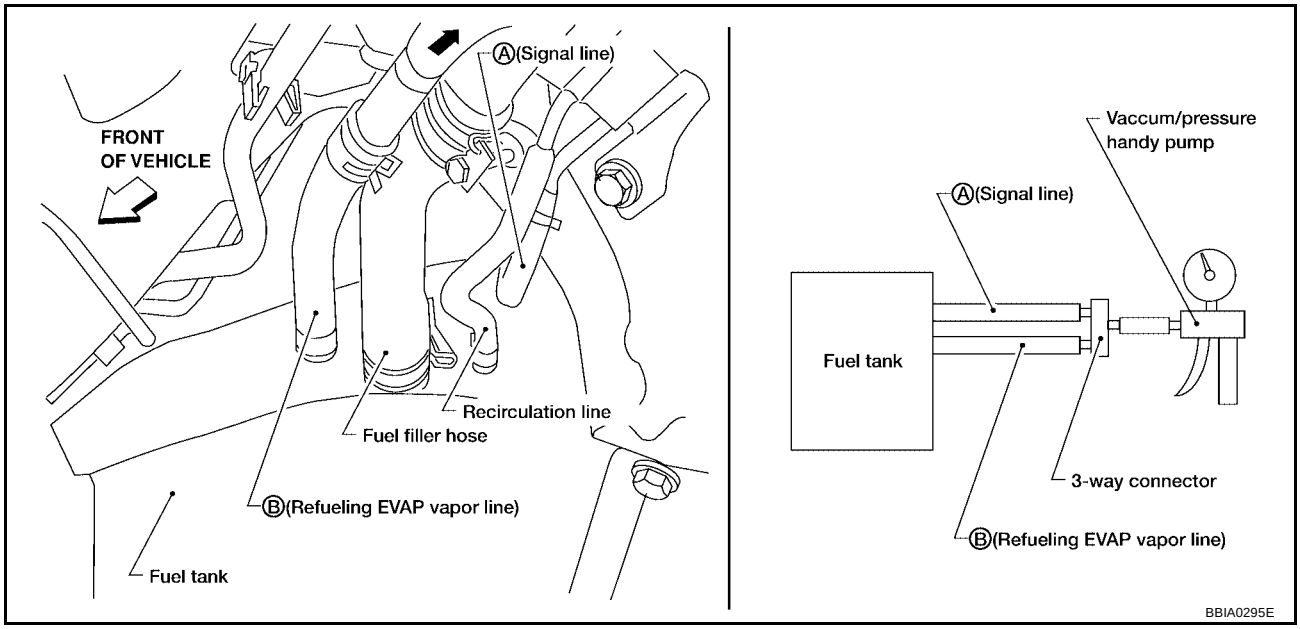
c. Put fuel tank upside down.

d. Apply vacuum pressure to both hose ends A and B [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into the hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check there is no leakage.
4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



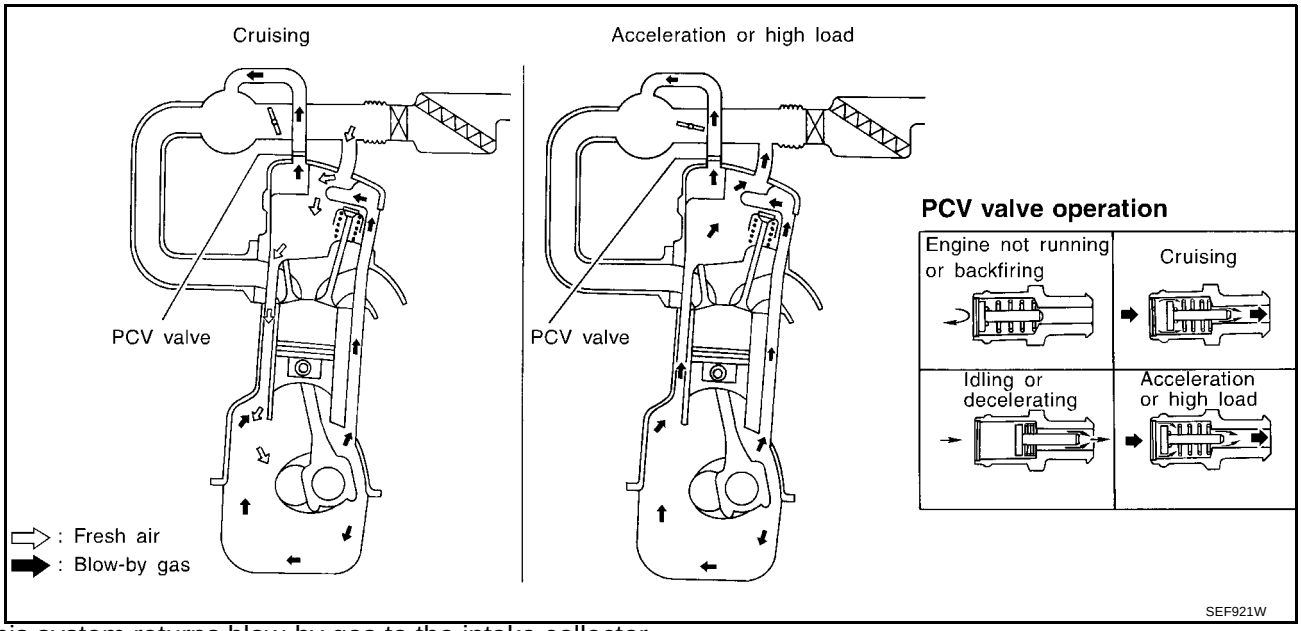
POSITIVE CRANKCASE VENTILATION

PFP:11810

Description

UBS00JRZ

SYSTEM DESCRIPTION



This system returns blow-by gas to the intake collector.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold. During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve. Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover. Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

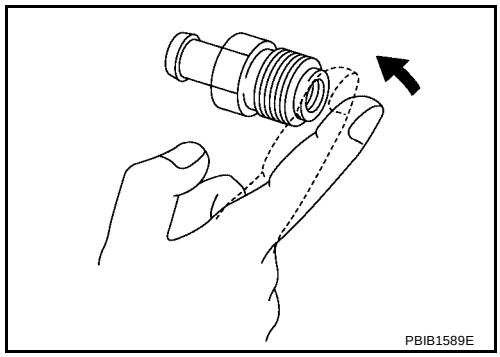
On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.

Component Inspection

UBS00JS0

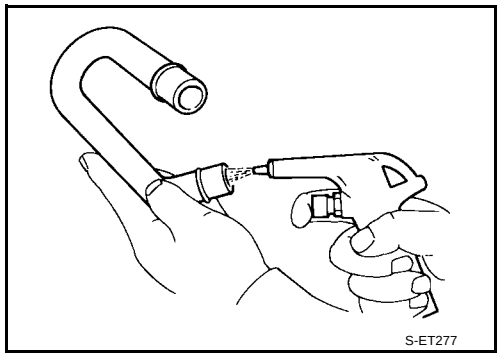
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



PCV VALVE VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM-NATS)

PFP:25386

Description

UBS00JS1

- **If the security indicator lights up with the ignition switch in the ON position or "NATS MALFUNCTION" is displayed on "SELF-DIAG RESULTS" screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .**
- **Confirm no self-diagnostic results of NVIS (NATS) is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.**
- **When replacing ECM, initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs must be carried out with CONSULT-II using NATS program card.**
  Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of NVIS (NATS) initialization and NVIS (NATS) ignition key ID registration, refer to CONSULT-II operation manual, IVIS/NVIS.

SELF DIAG RESULTS	
DTC RESULTS	TIME
NATS MALFUNCTION [P1610]	0

SEF543X

ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

UBS00JS2

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	Diagnostic service
Diagnostic Trouble Code (DTC)	Service $03 of SAE J1979
Freeze Frame data	Service $02 of SAE J1979
System Readiness Test (SRT) code	Service $01 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service $07 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Service $06 of SAE J1979
Calibration ID	Service $09 of SAE J1979

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT status	SRT code	Test value
CONSULT-II	×	×	×	×	×	×	—
GST	×	×	×	—	×	×	×
ECM	×	×*	—	—	×	—	—

*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-104 .)

Two Trip Detection Logic

UBS00JS3

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-52 .)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.
Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.

The fail-safe function also operates when above diagnoses except MIL circuit are detected, and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Emission-related Diagnostic Information

UBS00JS4

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

×: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL lighting up	Reference page
	CONSULT-II GST*2	ECM*3					
CAN COMM CIRCUIT	U1000	1000*6	—	—	1 or 2	× or —	EC-172
CAN COMM CIRCUIT	U1001	1001*6	—	—	2	—	EC-172
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	—	**Flashing***7	EC-66
INT/V TIM CONT-B1	P0011	0011	—	—	2	×	EC-175
HO2S2 HTR (B1)	P0037	0037	×	×	2	×	EC-179
HO2S2 HTR (B1)	P0038	0038	×	×	2	×	EC-179
MAF SEN/CIRCUIT	P0101	0101	—	—	2	×	EC-185
MAF SEN/CIRCUIT	P0102	0102	—	—	1	×	EC-195
MAF SEN/CIRCUIT	P0103	0103	—	—	1	×	EC-195
IAT SEN/CIRCUIT	P0112	0112	—	—	2	×	EC-203
IAT SEN/CIRCUIT	P0113	0113	—	—	2	×	EC-203
ECT SEN/CIRCUIT	P0117	0117	—	—	1	×	EC-207
ECT SEN/CIRCUIT	P0118	0118	—	—	1	×	EC-207
TP SEN 2/CIRC	P0122	0122	—	—	1	×	EC-212
TP SEN 2/CIRC	P0123	0123	—	—	1	×	EC-212
ECT SENSOR	P0125	0125	—	—	1	×	EC-219
IAT SENSOR	P0127	0127	—	—	2	×	EC-222
THERMSTAT FNCTN	P0128	0128	—	—	2	×	EC-225
HO2S2 (B1)	P0138	0138	—	×	2	×	EC-227
HO2S2 (B1)	P0139	0139	×	×	2	×	EC-233
FUEL SYS-LEAN-B1	P0171	0171	—	—	2	×	EC-241
FUEL SYS-RICH-B1	P0172	0172	—	—	2	×	EC-248
FTT SENSOR	P0181	0181	—	—	2	×	EC-255
FTT SEN/CIRCUIT	P0182	0182	—	—	2	×	EC-260
FTT SEN/CIRCUIT	P0183	0183	—	—	2	×	EC-260
TP SEN 1/CIRC	P0222	0222	—	—	1	×	EC-264
TP SEN 1/CIRC	P0223	0223	—	—	1	×	EC-264
MULTI CYL MISFIRE	P0300	0300	—	—	2	×	EC-271
CYL 1 MISFIRE	P0301	0301	—	—	2	×	EC-271
CYL 2 MISFIRE	P0302	0302	—	—	2	×	EC-271
CYL 3 MISFIRE	P0303	0303	—	—	2	×	EC-271
CYL 4 MISFIRE	P0304	0304	—	—	2	×	EC-271
KNOCK SEN/CIRC-B1	P0327	0327	—	—	2	—	EC-278
KNOCK SEN/CIRC-B1	P0328	0328	—	—	2	—	EC-278
CKP SEN/CIRCUIT	P0335	0335	—	—	2	×	EC-283

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL lighting up	Reference page
	CONSULT-II GST*2	ECM*3					
CMP SEN/CIRC-B1	P0340	0340	—	—	2	×	EC-290
TW CATALYST SYS-B1	P0420	0420	×	×	2	×	EC-297
EVAP PURG FLOW/MON	P0441	0441	×	×	2	×	EC-302
EVAP SMALL LEAK	P0442	0442	×	×	2	×	EC-308
PURG VOLUME CONT/V	P0444	0444	—	—	2	×	EC-317
PURG VOLUME CONT/V	P0445	0445	—	—	2	×	EC-317
VENT CONTROL VALVE	P0447	0447	—	—	2	×	EC-324
EVAP SYS PRES SEN	P0451	0451	—	—	2	×	EC-331
EVAP SYS PRES SEN	P0452	0452	—	—	2	×	EC-334
EVAP SYS PRES SEN	P0453	0453	—	—	2	×	EC-340
EVAP GROSS LEAK	P0455	0455	—	—	2	×	EC-347
EVAP VERY SML LEAK	P0456	0456	×*4	×	2	×	EC-355
FUEL LEV SEN SLOSH	P0460	0460	—	—	2	×	EC-364
FUEL LEVEL SENSOR	P0461	0461	—	—	2	×	EC-366
FUEL LEVL SEN/CIRC	P0462	0462	—	—	2	×	EC-368
FUEL LEVL SEN/CIRC	P0463	0463	—	—	2	×	EC-368
VEH SPEED SEN/CIRC*5	P0500	0500	—	—	2	×	EC-370
ISC SYSTEM	P0506	0506	—	—	2	×	EC-372
ISC SYSTEM	P0507	0507	—	—	2	×	EC-374
PW STP SEN/CIRC	P0550	0550	—	—	2	—	EC-376
ECM	P0605	0605	—	—	1 or 2	× or —	EC-381
PNP SW/CIRC	P0705	0705	—	—	2	×	AT-115
ATF TEMP SEN/CIRC	P0710	0710	—	—	2	×	AT-120
VEH SPD SEN/CIR AT*5	P0720	0720	—	—	2	×	AT-126
ENGINE SPEED SIG	P0725	0725	—	—	2	×	AT-131
A/T 1ST GR FNCTN	P0731	0731	—	—	2	×	AT-135
A/T 2ND GR FNCTN	P0732	0732	—	—	2	×	AT-140
A/T 3RD GR FNCTN	P0733	0733	—	—	2	×	AT-145
A/T 4TH GR FNCTN	P0734	0734	—	—	2	×	AT-150
TCC SOLENOID/CIRC	P0740	0740	—	—	2	×	AT-159
A/T TCC S/V FNCTN	P0744	0744	—	—	2	×	AT-163
L/PRESS SOL/CIRC	P0745	0745	—	—	2	×	AT-173
SFT SOL A/CIRC	P0750	0750	—	—	1	×	AT-179
SFT SOL B/CIRC	P0755	0755	—	—	1	×	AT-183
A/F SEN1 HTR (B1)	P1031	1031	×	×	2	×	EC-384
A/F SEN1 HTR (B1)	P1032	1032	×	×	2	×	EC-384
ECM BACK UP/CIRC	P1065	1065	—	—	2	×	EC-389
INT/V TIM V/CIR-B1	P1111	1111	—	—	2	×	EC-393
ETC ACTR	P1121	1121	—	—	1	×	EC-397
ETC FUNCTION/CIRC	P1122	1122	—	—	1	×	EC-399
ETC MOT PWR	P1124	1124	—	—	1	×	EC-406
ETC MOT PWR	P1126	1126	—	—	1	×	EC-406

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL lighting up	Reference page
	CONSULT-II GST*2	ECM*3					
ETC MOT	P1128	1128	—	—	1	×	EC-411
VARI SWL CON/SV-B1*8	P1132	1132	—	—	2	×	EC-416
SWL CON/V POSI SEN*8	P1137	1137	—	—	2	×	EC-421
SWIRL CONT VALVE*8	P1138	1138	—	—	2	×	EC-429
HO2S2 (B1)	P1146	1146	×	×	2	×	EC-437
HO2S2 (B1)	P1147	1147	×	×	2	×	EC-445
CLOSED LOOP-B1	P1148	1148	—	—	1	×	EC-453
ENG OVER TEMP	P1217	1217	—	—	1	×	EC-454
CTP LEARNING	P1225	1225	—	—	2	—	EC-469
CTP LEARNING	P1226	1226	—	—	2	—	EC-471
SENSOR POWER/CIRC	P1229	1229	—	—	1	×	EC-473
A/F SENSOR1 (B1)	P1271	1271	—	×	2	×	EC-478
A/F SENSOR1 (B1)	P1272	1272	—	×	2	×	EC-484
A/F SENSOR1 (B1)	P1273	1273	—	×	2	×	EC-490
A/F SENSOR1 (B1)	P1274	1274	—	×	2	×	EC-497
A/F SENSOR1 (B1)	P1276	1276	—	×	2	×	EC-504
A/F SENSOR1 (B1)	P1278	1278	×	×	2	×	EC-510
A/F SENSOR1 (B1)	P1279	1279	×	×	2	×	EC-518
PURG VOLUME CONT/V	P1444	1444	—	—	2	×	EC-526
VENT CONTROL VALVE	P1446	1446	—	—	2	×	EC-534
ASCD SW	P1564	1564	—	—	1	—	EC-541
ASCD BRAKE SW	P1572	1572	—	—	1	—	EC-548
ASCD VHL SPD SEN	P1574	1574	—	—	1	—	EC-560
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	—	—	2	—	BL-97
TPV SEN/CIRC A/T	P1705	1705	—	—	1	×	AT-187
P-N POS SW/CIRCUIT	P1706	1706	—	—	2	×	EC-562
O/R CLTCH SOL/CIRC	P1760	1760	—	—	2	×	AT-193
BRAKE SW/CIRCUIT	P1805	1805	—	—	2	—	EC-566
APP SEN 1/CIRC	P2122	2122	—	—	1	×	EC-572
APP SEN 1/CIRC	P2123	2123	—	—	1	×	EC-572
APP SEN 2/CIRC	P2127	2127	—	—	1	×	EC-579
APP SEN 2/CIRC	P2128	2128	—	—	1	×	EC-579
TP SENSOR	P2135	2135	—	—	1	×	EC-586
APP SENSOR	P2138	2138	—	—	1	×	EC-593

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Made II (Self-diagnostic results), this number is controlled by NISSAN.
*4: SRT code will not be set if the self-diagnostic result is NG.
*5: When the fail-safe operations for both self-diagnoses occur at the same time, the MIL illuminates.
*6: The troubleshooting for this DTC needs CONSULT-II.
*7: When the ECM is in the mode of displaying SRT status, MIL may flash. For the details, refer to EC-60, "How to Display SRT Status" .
*8: SULEV models.

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
For malfunctions in which 1st trip DTCs are displayed, refer to EC-52, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" . These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.
1st trip DTC is specified in Service $07 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step II, refer to EC-97, "WORK FLOW" . Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

WITH CONSULT-II

WITH GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P1148, P1706, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

NO TOOLS

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 1148, 1706, etc.
These DTCs are controlled by NISSAN.

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, GST or the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.**

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.
If the DTC is being detected currently, the time data will be 0.
If a 1st trip DTC is stored in the ECM, the time data will be [1t].

DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	1t

PBIB0911E

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-56, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in EC-52, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" .

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service $01 of SAE J1979.
As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.
If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.
In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.
Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.

NOTE:
The SRT will also indicate “INCMP” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.
If, during the state emissions inspection, the SRT indicates “CMPLT” for all test items, the inspector will continue with the emissions test. However, if the SRT indicates “INCMP” for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:
If MIL is ON during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates “CMPLT” for all test items. Therefore, it is important to check SRT (“CMPLT”) and DTC (No DTCs) before the inspection.

SRT Item

The table below shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item (CONSULT-II indication)	Performance Priority*1	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
EVAP SYSTEM	1	EVAP control system	P0442
	2	EVAP control system	P0456
	2	EVAP control system purge flow monitoring	P0441
HO2S	2	Air fuel ratio (A/F) sensor 1	P1278, P1279
		Heated oxygen sensor 2	P0139
		Heated oxygen sensor 2	P1146
		Heated oxygen sensor 2	P1147
HO2S HTR	2	Air fuel ratio (A/F) sensor heater	P1031, P1032
		Heated oxygen sensor 2 heater	P0037, P0038

*1: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT-II.

SRT Set Timing

SRT is set as “CMPLT” after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON →	OFF ← ON →	OFF ← ON →	OFF ← ON →
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MIL “ON”)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

OK: Self-diagnosis is carried out and the result is OK.
NG: Self-diagnosis is carried out and the result is NG.
—: Self-diagnosis is not carried out.

When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above
If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”. → Case 3 above

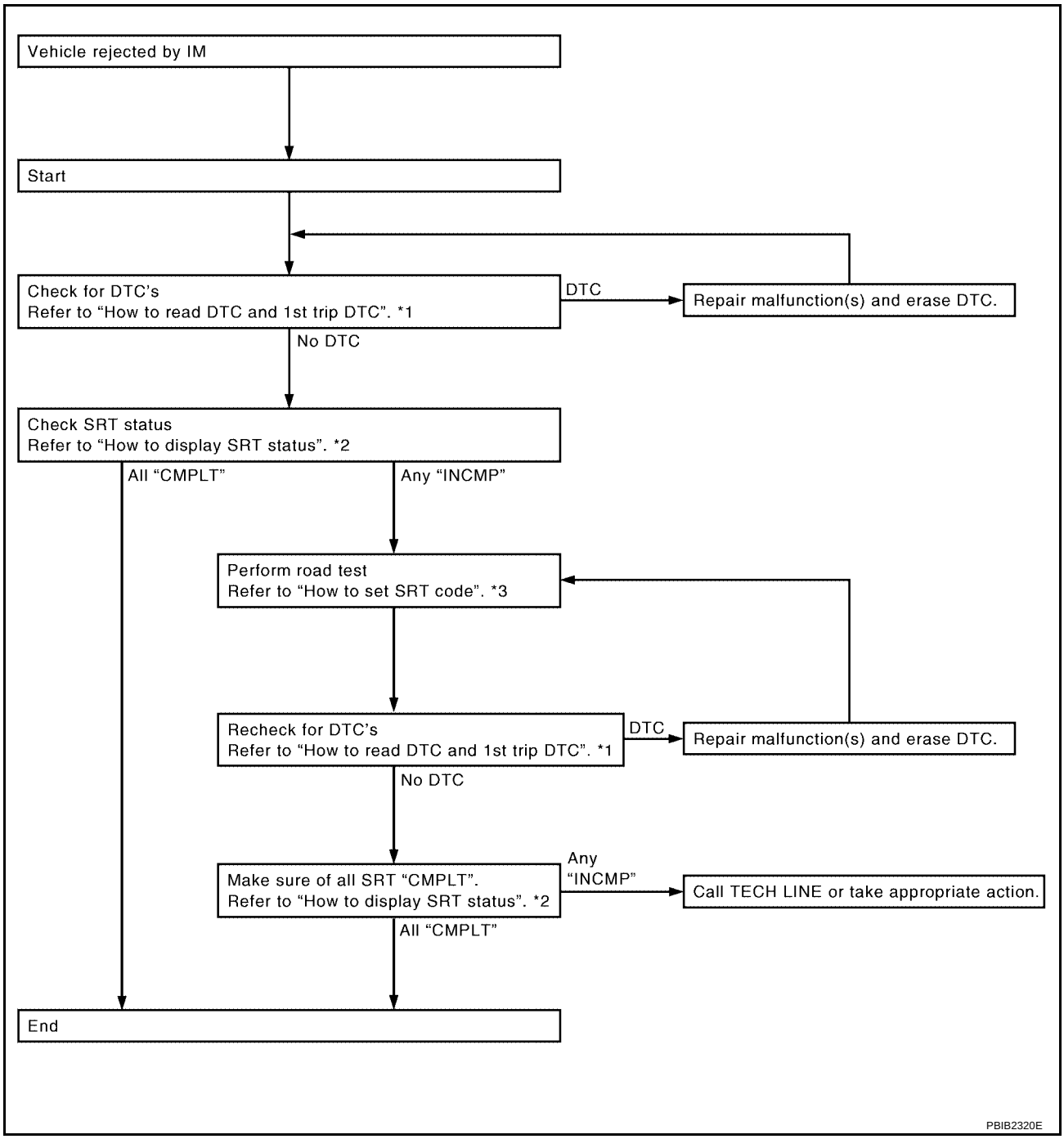
The table above shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “CMPLT” of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate “INCMP”.

NOTE:
SRT can be set as “CMPLT” together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates “CMPLT”.

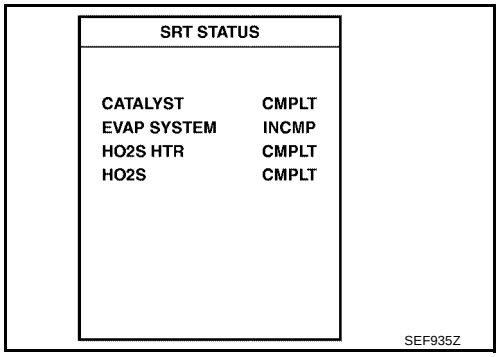
SRT Service Procedure

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating “INCMP”, review the flowchart diagnostic sequence on the next page.



*1 EC-55 *2 EC-60 *3 EC-60

How to Display SRT Status



WITH CONSULT-II

Selecting “SRT STATUS” in “DTC CONFIRMATION” mode with CONSULT-II.

For items whose SRT codes are set, a “CMPLT” is displayed on the CONSULT-II screen; for items whose SRT codes are not set, “INCMP” is displayed.

A sample of CONSULT-II display for SRT code is shown in the figure.

“INCMP” means the self-diagnosis is incomplete and SRT is not set.

“CMPLT” means the self-diagnosis is complete and SRT is set.

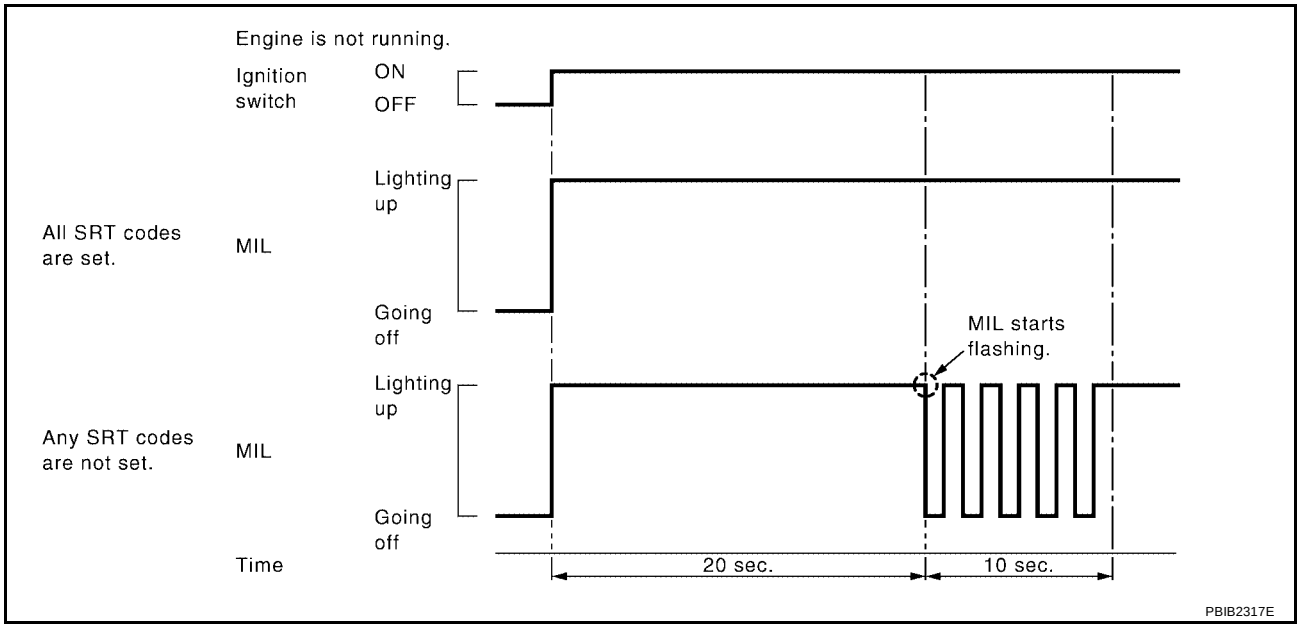
WITH GST

Selecting Service $01 with GST (Generic Scan Tool)

NO TOOLS

A SRT code itself can not be displayed while only SRT status can be.

1. Turn ignition switch ON and wait 20 seconds.
2. SRT status is indicated as shown below.
   - When all SRT codes are set, MIL lights up continuously.
   - When any SRT codes are not set, MIL will flash periodically for 10 seconds.



How to Set SRT Code

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

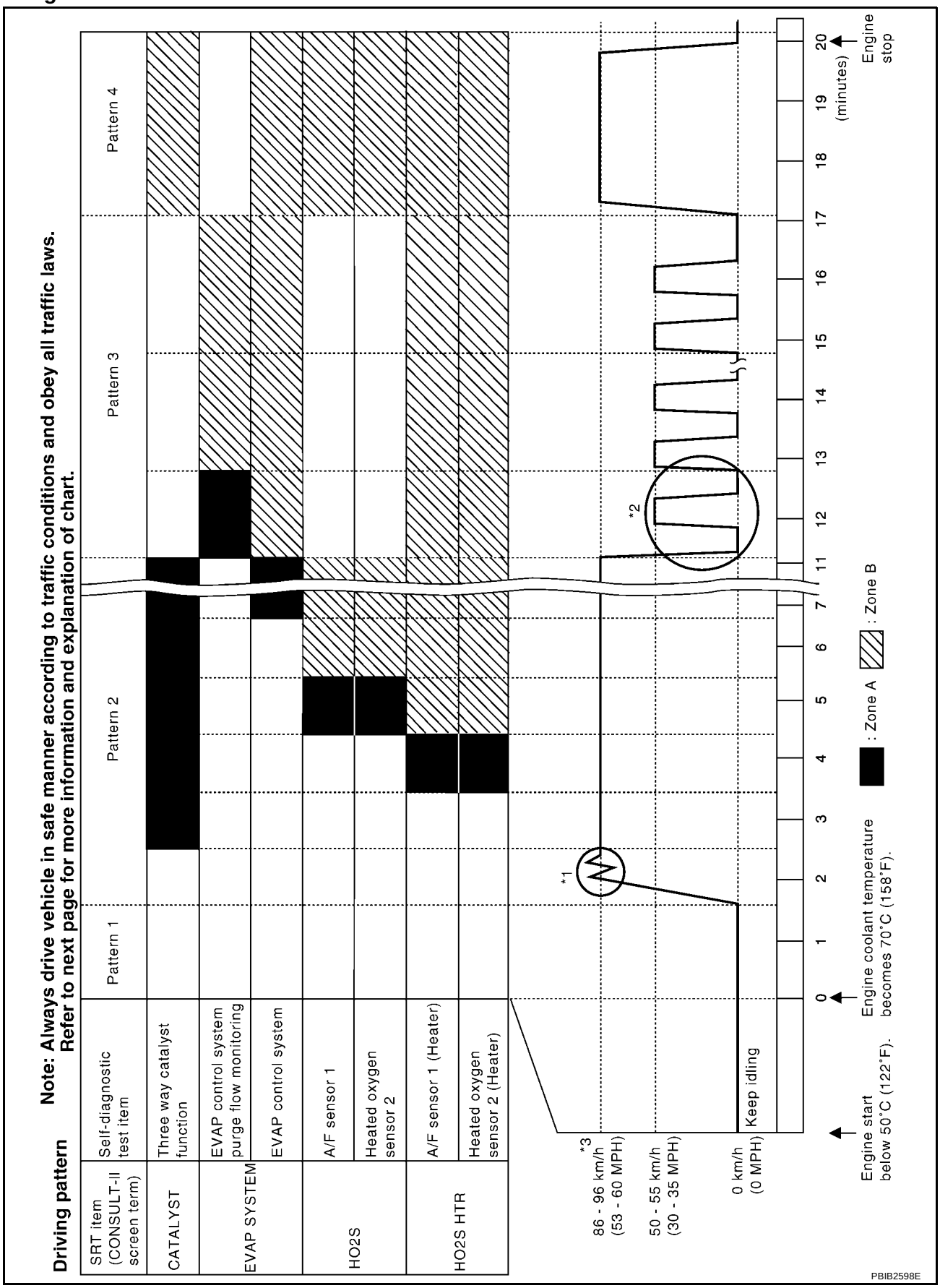
WITH CONSULT-II

Perform corresponding DTC Confirmation Procedure one by one based on “Performance Priority” in the table on EC-57, "SRT Item" .

WITHOUT CONSULT-II

The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern



- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
  Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.
  Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
  Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

- **The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 73 and ground is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 73 and ground is lower than 1.4V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 107 and ground is less than 4.1V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- The driving pattern outlined in *2 must be repeated at least 3 times.

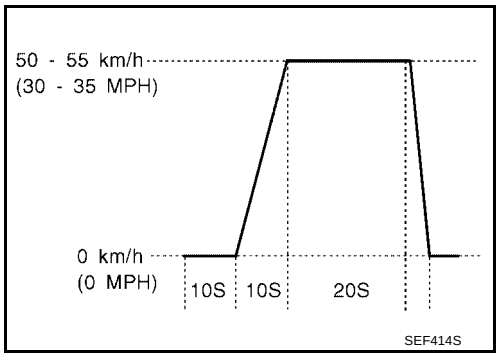
Pattern 4:

- Tests are performed after the engine has been operated for at least 17 minutes.
- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.
*2: Operate the vehicle in the following driving pattern.

1. Decelerate vehicle to 0 km/h (0 MPH) and let engine idle.
2. Repeat driving pattern shown below at least 10 times.

– **During acceleration, hold the accelerator pedal as steady as possible.**



Suggested Transmission Gear Position for A/T Models
Set the selector lever in the D position with the overdrive switch turned ON.
Suggested upshift speeds for M/T models
Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:	For quick acceleration in low altitude areas and high attitude areas [over 1,219m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	km/h (MPH)
1st to 2nd	24 (15)	24 (15)

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:	For quick acceleration in low altitude areas and high attitude areas [over 1,219m (4,000 ft)]:
2nd to 3rd	40 (25)	40 (25)
3rd to 4th	65 (40)	65 (40)
4th to 5th	75 (45)	75 (45)

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.
Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH)
1st	50 (30)
2nd	90 (55)
3rd	130 (80)
4th	—
5th	—

TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-II)

The following is the information specified in Service $06 of SAE J1979.
The test value is a parameter used to determine whether a system/circuit diagnostic test is “OK” or “NG” while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit	Conversion
			TID	CID		
CATALYST	Three way catalyst function	P0420	01H	01H	Max.	1/128
		P0420	02H	81H	Min.	1
EVAP SYSTEM	EVAP control system (Small leak)	P0442	05H	03H	Max.	1/128 mm^2
	EVAP control system purge flow monitoring	P0441	06H	83H	Min.	20 mV
	EVAP control system (Very small leak)	P0456	07H	03H	Max.	1/128 mm^2
HO2S	A/F sensor 1	P1271	41H	8EH	Min.	5 mV
		P1272	42H	0EH	Max.	5 mV
		P1273	43H	0EH	Max.	0.002
		P1274	44H	8EH	Min.	0.002
		P1278	45H	8EH	Min.	0.002
		P1276	46H	0EH	Max.	5 mV
		P1276	47H	8EH	Min.	5 mV
		P1279	48H	8EH	Min.	0.002
	Heated oxygen sensor 2	P0139	19H	86H	Min.	10mV/500 ms
		P1147	1AH	86H	Min.	10 mV
		P1146	1BH	06H	Max.	10 mV
		P0138	1CH	06H	Max.	10 mV
HO2S HEATER	A/F sensor 1 heater	P1032	57H	10H	Max.	5 mV
		P1031	58H	90H	Min.	5 mV
	Heated oxygen sensor 2 heater	P0038	2DH	0AH	Max.	20 mV
		P0037	2EH	8AH	Min.	20 mV

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

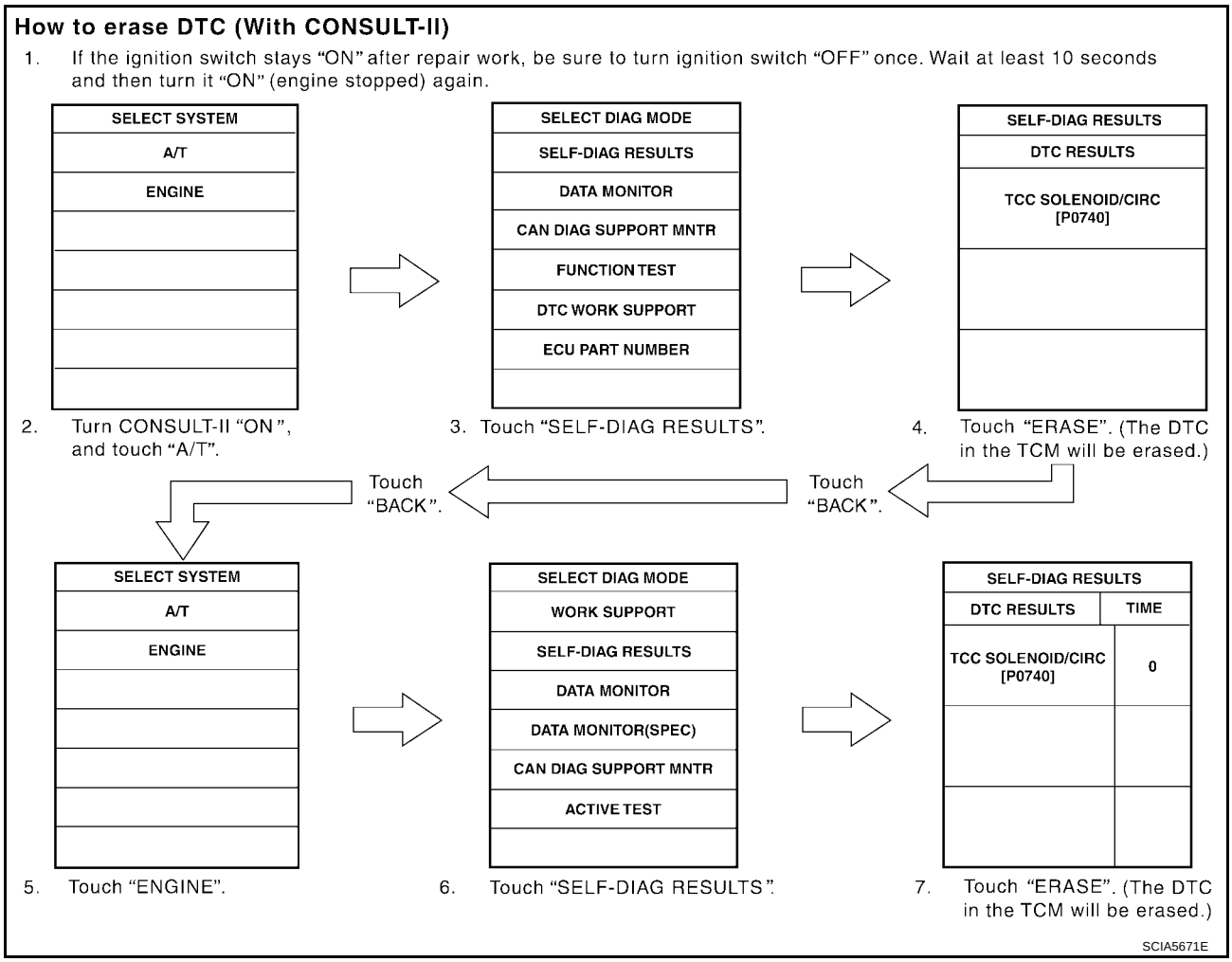
How to Erase DTC

With CONSULT-II

The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.
If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).

NOTE:
If the DTC is not for A/T related items (see EC-15, "INDEX FOR DTC"), skip steps 2 through 4.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Turn CONSULT-II ON and touch “A/T”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. [The DTC in the TCM (Transmission control module) will be erased.] Then touch “BACK” twice.
5. Touch “ENGINE”.
6. Touch “SELF-DIAG RESULTS”.
7. Touch “ERASE”. (The DTC in the ECM will be erased.)



With GST

The emission related diagnostic information in the ECM can be erased by selecting Service $04 with GST.

NOTE:
If the DTC is not for A/T related items (see EC-15, "INDEX FOR DTC" , skip step 2.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.

2. Perform AT-41, "HOW TO ERASE DTC (WITH GST)" . (The DTC in the TCM will be erased.)
3. Select “Service $04” with GST (Generic Scan Tool).

No Tools

NOTE:
If the DTC is not for A/T related items (see EC-15, "INDEX FOR DTC"), skip step 2.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Perform AT-41, "HOW TO ERASE DTC (NO TOOLS)" . (The DTC in the TCM will be erased.)
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to EC-66, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

– Diagnostic trouble codes
– 1st trip diagnostic trouble codes
– Freeze frame data
– 1st trip freeze frame data
– System readiness test (SRT) codes
– Test values

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

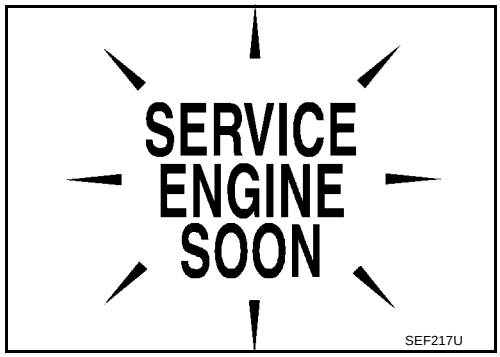
Malfunction Indicator Lamp (MIL)

UBS00JS5

DESCRIPTION

The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MIL does not light up, refer to DI-27, "WARNING LAMPS" , or see EC-654, "MIL & DATA LINK CONNECTORS" .
2. When the engine is started, the MIL should go off.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following 3 functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position Engine stopped	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. ● Misfire (Possible three way catalyst damage) ● One trip detection diagnoses
Mode II	Ignition switch in ON position Engine stopped	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.
Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MIL circuit are detected, and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

MIL Flashing Without DTC

When any SRT codes are not set, MIL may flash without DTC. For the details, refer to EC-60, "How to Display SRT Status" .

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

How to Set Diagnostic Test Mode II (Self-diagnostic Results)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

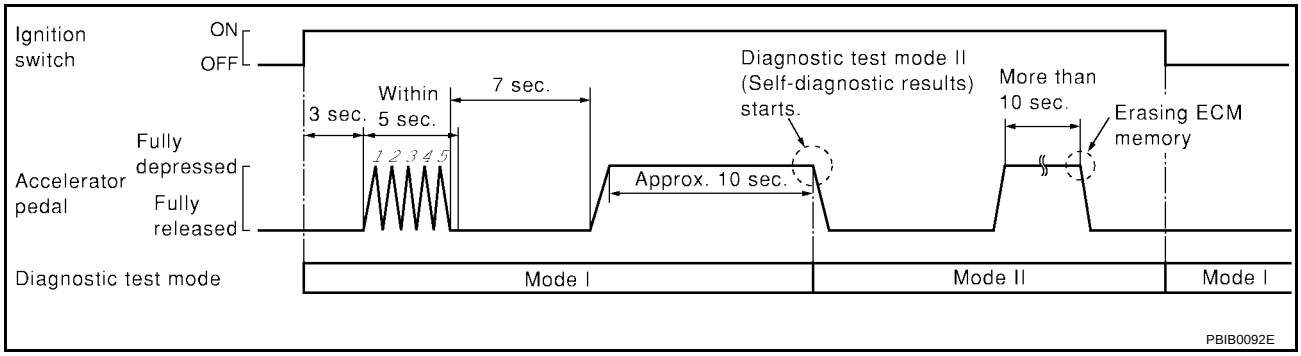
a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.

NOTE:
Do not release the accelerator pedal for 10 seconds if MIL may start blinking on the halfway of this 10 seconds. This blinking is displaying SRT status and is continued for another 10 seconds. For the details, refer to EC-60 .

4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).

NOTE:
Wait until the same DTC (or 1st trip DTC) appears to confirm all DTCs certainly.



How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-66, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to DI-27, "WARNING LAMPS" .

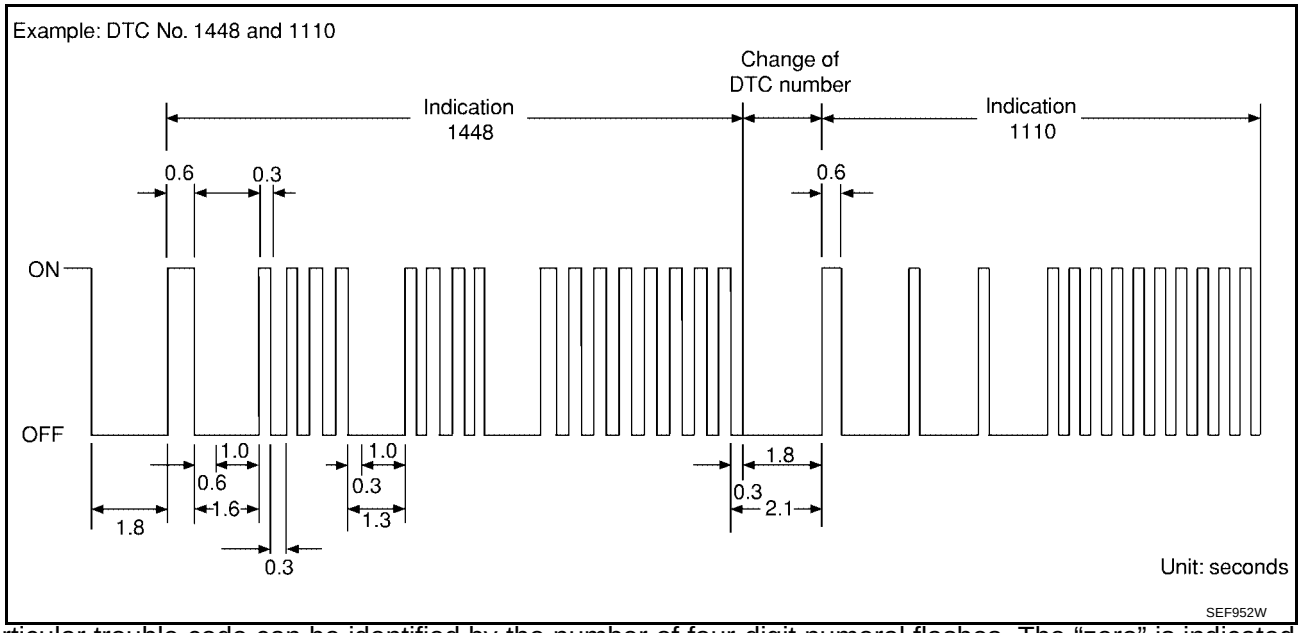
DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MIL	Condition
ON	When the malfunction is detected.
OFF	No malfunction

These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below. The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-II or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-15, "INDEX FOR DTC")

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back-up memory in the ECM by depressing accelerator pedal. Refer to EC-67, "How to Erase Diagnostic Test Mode II (Self-diagnostic Results)" .

- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

OBD System Operation Chart

UBS00JS6

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to EC-51, "Two Trip Detection Logic" .
- The MIL will go off after the vehicle is driven 3 times with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

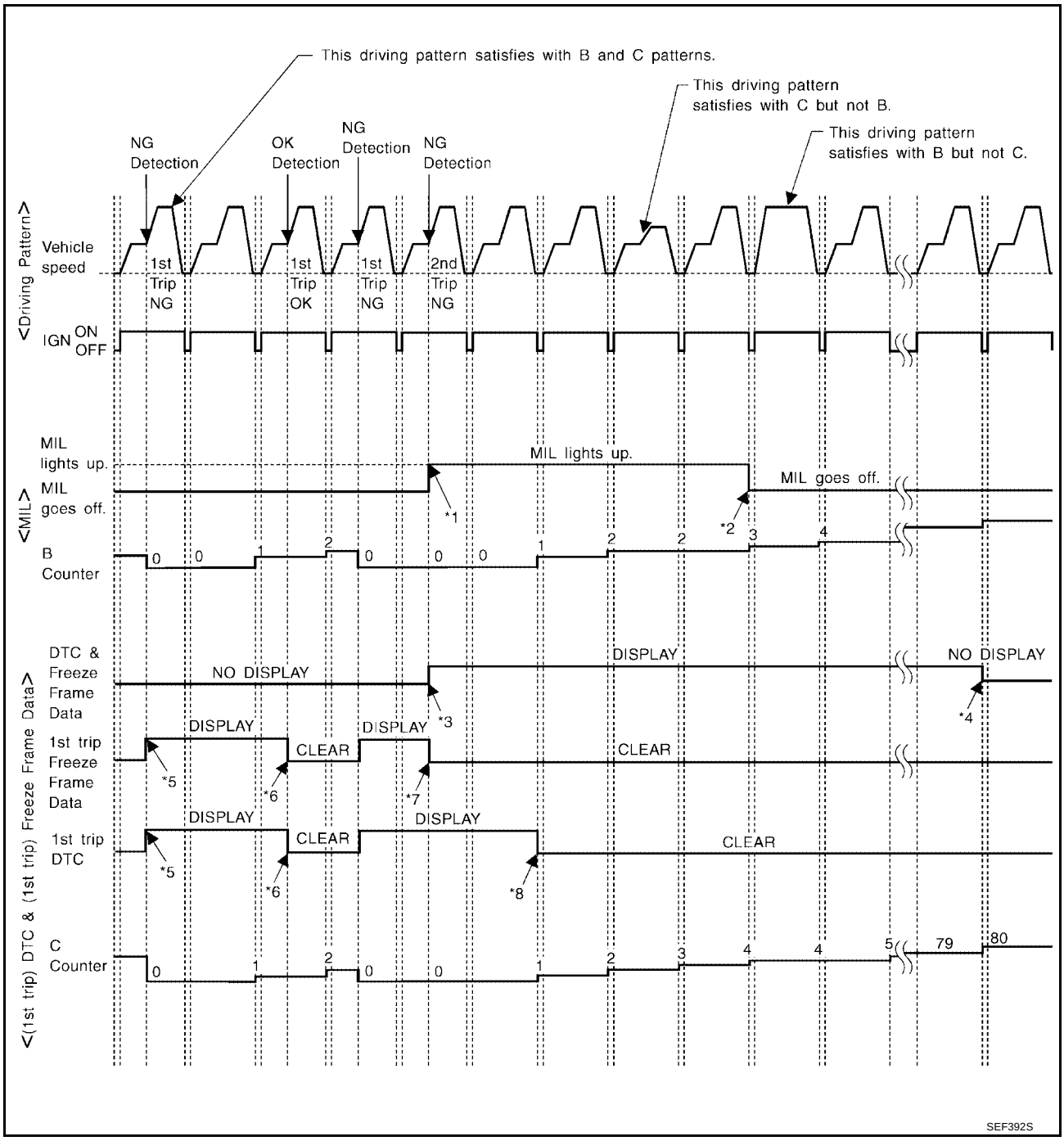
SUMMARY CHART

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)

Items	Fuel Injection System	Misfire	Other
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns B and C under “Fuel Injection System” and “Misfire”, see EC-71 .
For details about patterns A and B under “Other”, see EC-73 .
*1: Clear timing is at the moment OK is detected.
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MIL will go off when the B counter reaches 3. (*2 in “OBD SYSTEM OPERATION CHART”)

<Driving Pattern C>

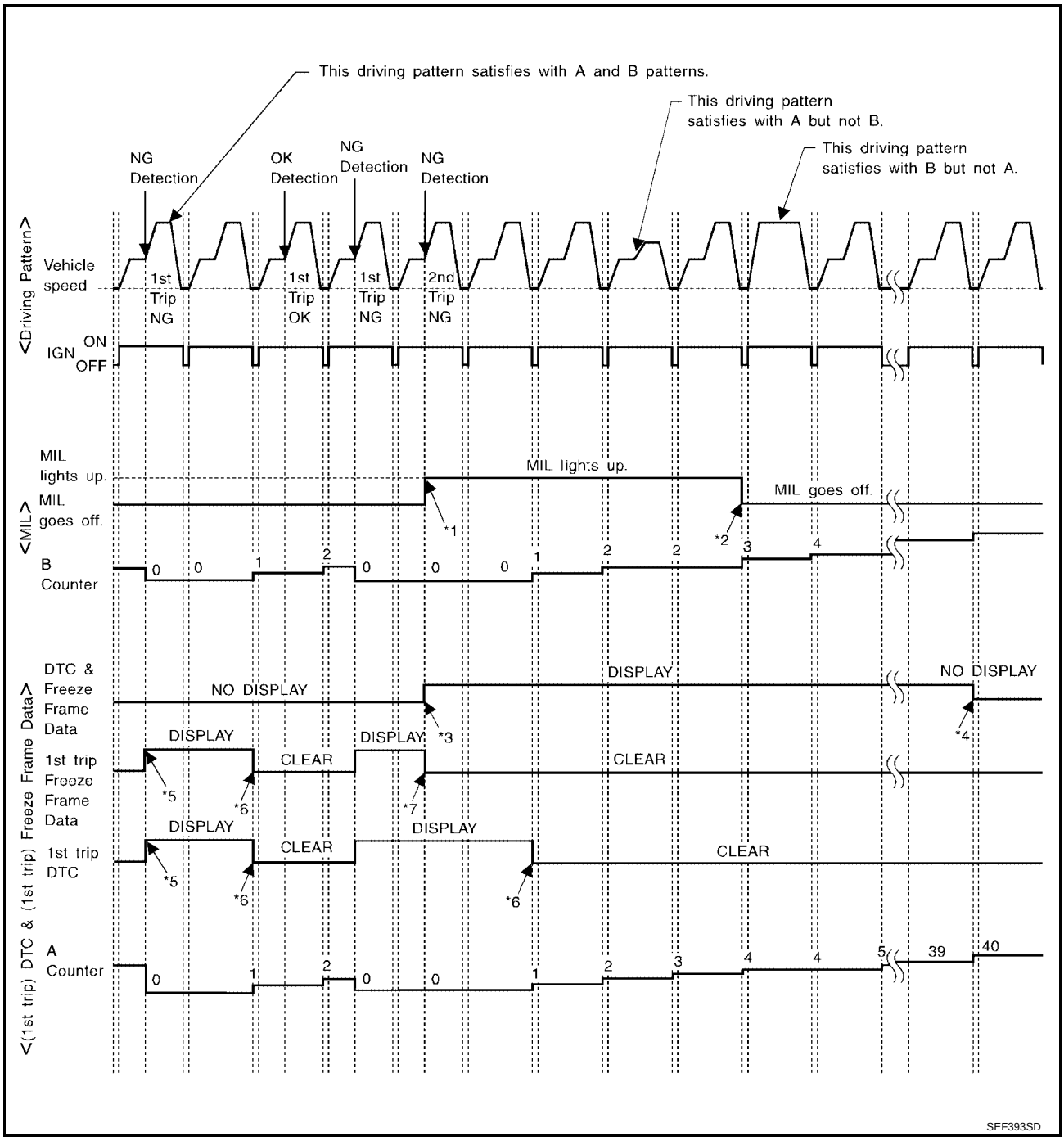
Driving pattern C means the vehicle operation as follows:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature (T) condition:

- When the freeze frame data shows lower than 70°C (158°F), “T” should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), “T” should be higher than or equal to 70°C (158°F).

Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of vehicle conditions above.
- The C counter will be counted up when vehicle conditions above is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

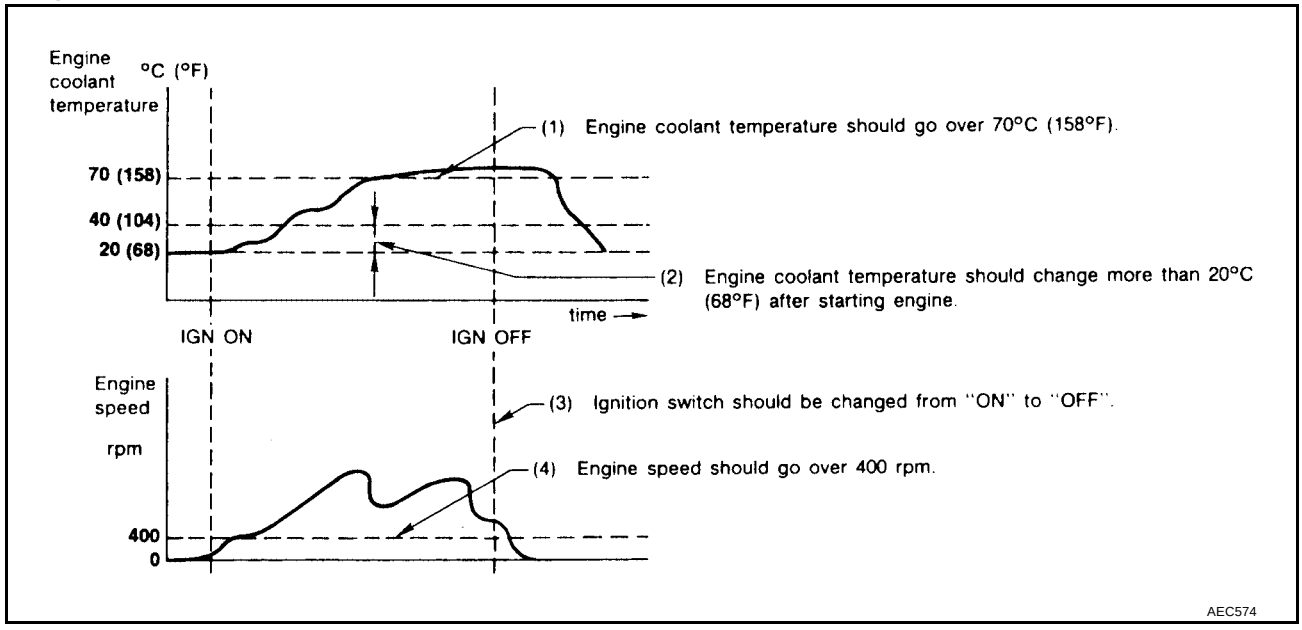
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

<Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in "OBD SYSTEM OPERATION CHART").

BASIC SERVICE PROCEDURE

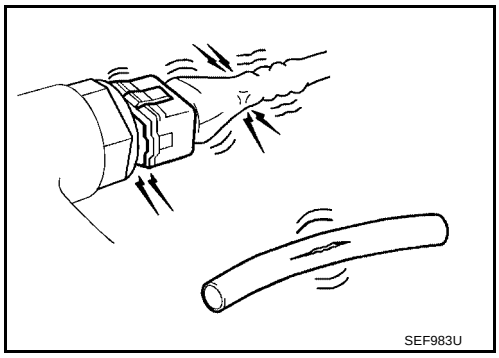
PFP:00018

Basic Inspection

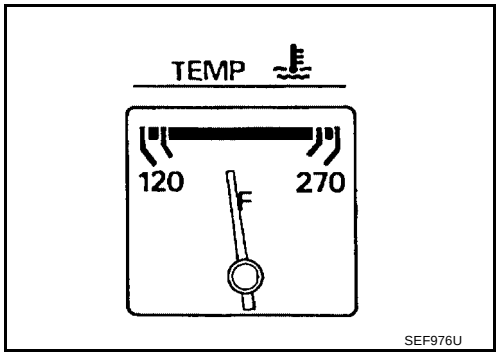
UBS00JS7

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket


SEF983U

3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
Ensure engine stays below 1,000 rpm.

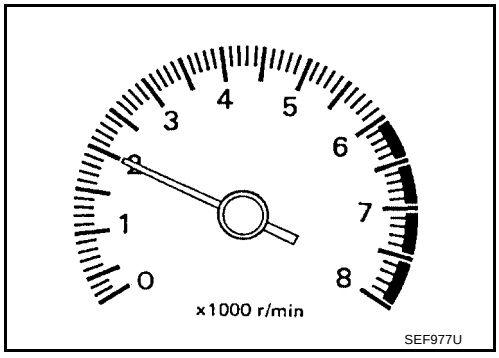


SEF976U

5. Run engine at about 2,000 rpm for about 2 minutes under no-load.
6. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



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2. REPAIR OR REPLACE

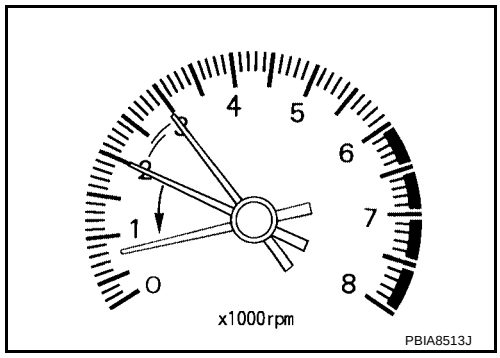
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

3. CHECK TARGET IDLE SPEED

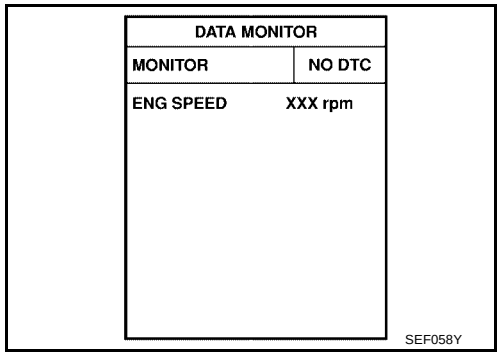
With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.



3. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-137 .

M/T: 650 ± 50 rpm
A/T: 800 ± 50 rpm (in P or N position)



Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.
3. Check idle speed. Refer to EC-79 .

M/T: 650 ± 50 rpm
A/T: 800 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-92, "Accelerator Pedal Released Position Learning" .

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-92, "Throttle Valve Closed Position Learning" .

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-92, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 7.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-79 .

M/T: 650 ± 50 rpm
A/T: 800 ± 50 rpm (in P or N position)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-79 .

M/T: 650 ± 50 rpm
A/T: 800 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-290 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-283 .

OK or NG

OK >> GO TO 9.
NG >> 1. Repair or replace.
2. GO TO 4.

9. CHECK ECM FUNCTION

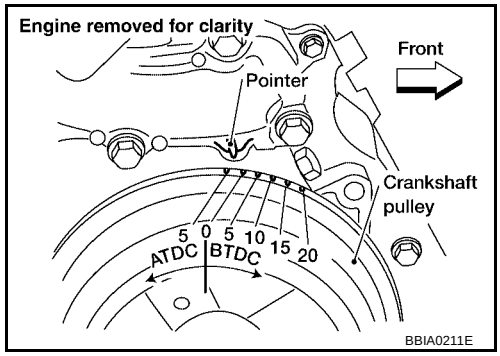
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light. Refer to EC-79 .

M/T: 7 ± 5° BTDC
A/T: 18 ± 5° BTDC (in P or N position)



OK or NG

OK >> GO TO 19.
NG >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-92, "Accelerator Pedal Released Position Learning" .

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-92, "Throttle Valve Closed Position Learning" .

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-92, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 14.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-79 .

M/T: 650 ± 50 rpm
A/T: 800 ± 50 rpm (in P or N position)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-79 .

M/T: 650 ± 50 rpm
A/T: 800 ± 50 rpm (in P or N position)

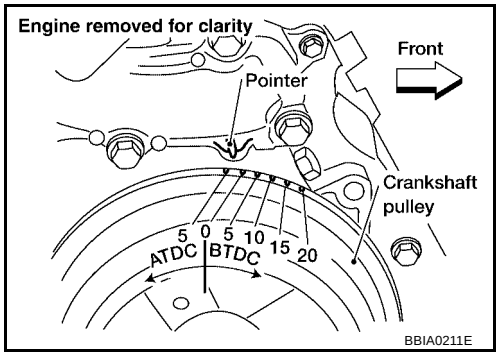
OK or NG

OK >> GO TO 15.
NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light. Refer to EC-79 .

M/T: 7 ± 5° BTDC
A/T: 18 ± 5° BTDC (in P or N position)



OK or NG

OK >> GO TO 19
NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-42, "TIMING CHAIN" .

OK or NG

OK >> GO TO 17.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-290 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-283 .

OK or NG

OK >> GO TO 18.
NG >> 1. Repair or replace.
2. GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .

>> GO TO 4.

19. INSPECTION END

Did you replace ECM, referring this Basic Inspection procedure?

Yes or No

Yes >> 1. Perform EC-91, "VIN Registration" .
2. **INSPECTION END**
No >> **INSPECTION END**

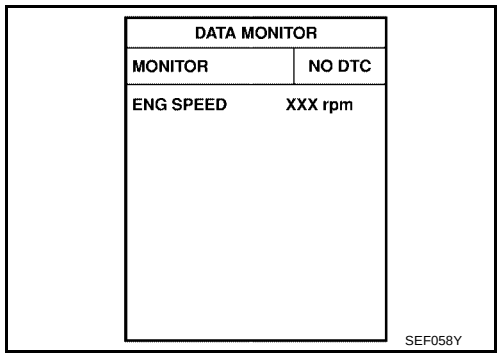
Idle Speed and Ignition Timing Check

UBS00JS8

IDLE SPEED

With CONSULT-II

Check idle speed in “DATA MONITOR” mode with CONSULT-II.



With GST

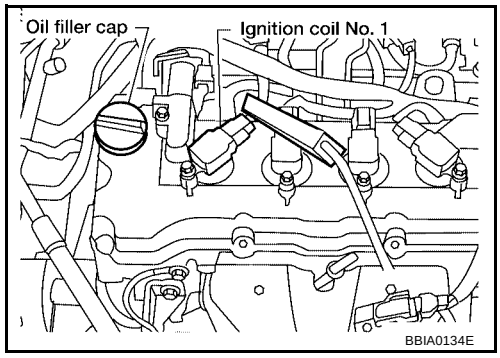
Check idle speed in “Service $01” with GST.

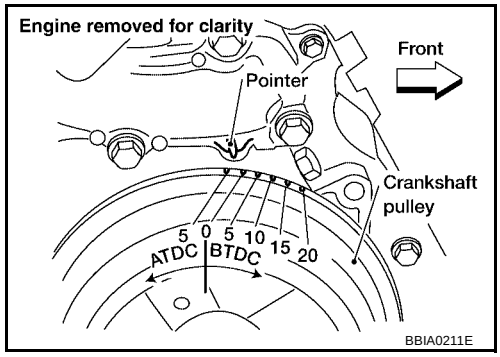
IGNITION TIMING

Any of following two methods may be used.

Method A

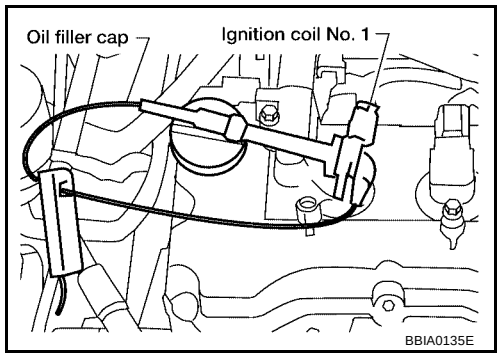
1. Slide the harness protector of ignition coil No.1 to clear the wires.
2. Attach timing light to the ignition coil No.1 wires as shown in the figure.
3. Check ignition timing.



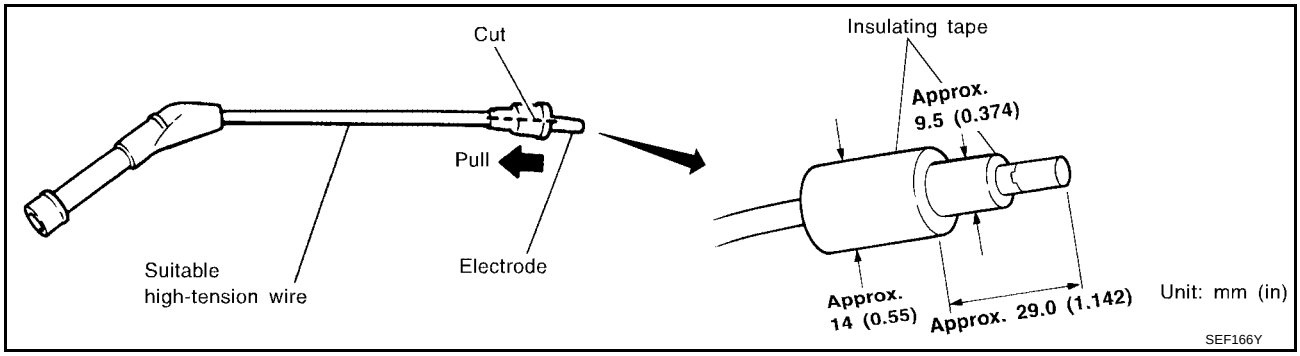


Method B

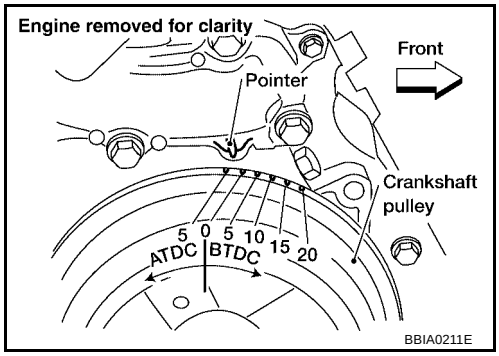
1. Remove ignition coil No.1.



2. Connect ignition coil No.1 and spark plug No.1 with suitable high-tension wire as shown, and attach timing light clamp to this wire.



3. Check ignition timing.



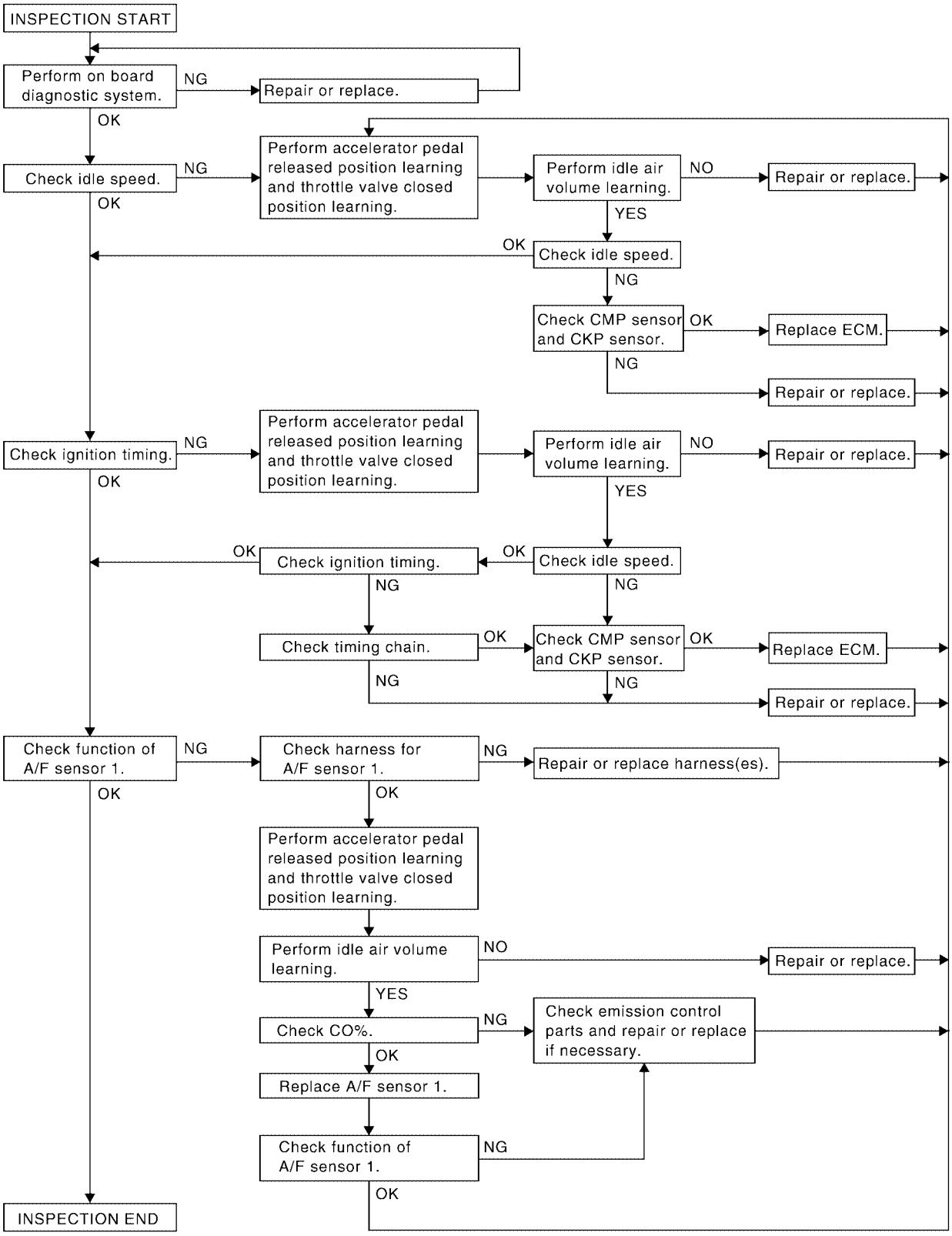
Idle Mixture Ratio Adjustment

UBS00JS9

PREPARATION

1. Make sure that the following parts are in good order.
   - Battery
   - Ignition system
   - Engine oil and coolant levels
   - Fuses
   - ECM harness connector
   - Vacuum hoses
   - Air intake system
     (Oil filler cap, oil level gauge, etc.)
   - Fuel pressure
   - Engine compression
   - Throttle valve
   - Evaporative emission system
2. On air conditioner equipped models, checks should be carried out while the air conditioner is OFF.
3. On automatic transaxle equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in P or N position.
4. When measuring CO percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
5. Turn off headlamps, heater blower, rear window defogger.
6. Keep front wheels pointed straight ahead.
7. Make the check after the cooling fans has stopped.

OVERALL SEQUENCE



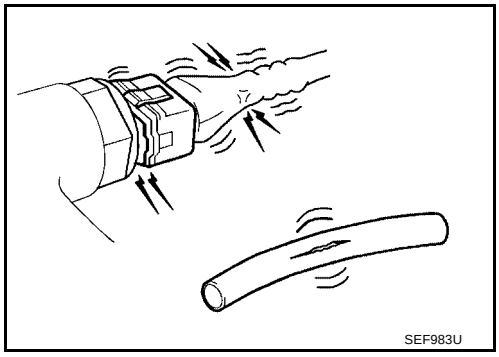
NOTE:
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected to detect the resulting malfunction.

PBIB2061E

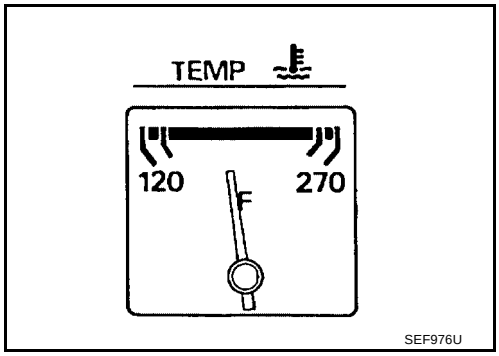
DETAILED PROCEDURE

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket


SEF983U

3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
Ensure engine stays below 1,000 rpm.

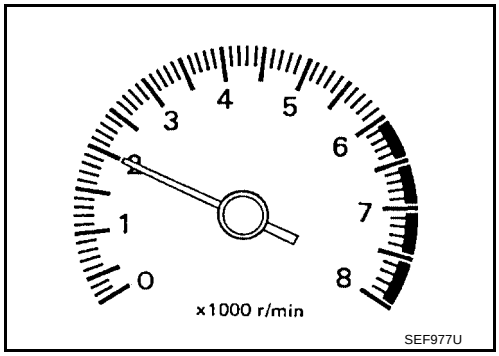


SEF976U

5. Run engine at about 2,000 rpm for about 2 minutes under no-load.
6. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



SEF977U

2. REPAIR OR REPLACE

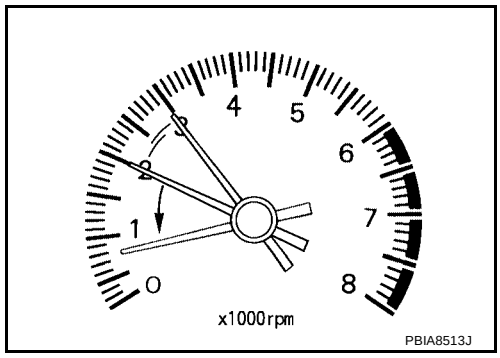
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

3. CHECK TARGET IDLE SPEED

With CONSULT-II

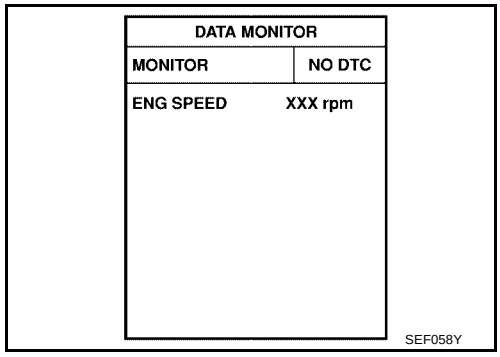
1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.



3. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-79 .

   M/T: 650 ± 50 rpm

   A/T: 800 ± 50 rpm (in P or N position)



Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no-load, then run engine at idle speed for about 1 minute.
3. Check idle speed. Refer to EC-79 .

   M/T: 650 ± 50 rpm

   A/T: 800 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-92, "Accelerator Pedal Released Position Learning" .

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-92, "Throttle Valve Closed Position Learning" .

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-92, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 7.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-79

M/T: 650 ± 50 rpm
A/T: 800 ± 50 rpm (in P or N position)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-79 .

M/T: 650 ± 50 rpm
A/T: 800 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-290 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-283 .

OK or NG

OK >> GO TO 9.
NG >> 1. Repair or replace.
2. GO TO 4.

9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" (if so equipped).

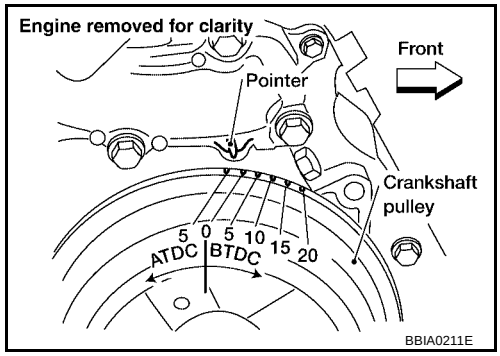
>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light. Refer to EC-79

M/T: 7 ± 5° BTDC

A/T: 18 ± 5° BTDC (in P or N position)



OK or NG

OK (With CONSULT-II)>>GO TO 19.
OK (Without CONSULT-II)>>GO TO 20.
NG >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-92, "Accelerator Pedal Released Position Learning" .

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-92, "Throttle Valve Closed Position Learning" .

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-92, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

Yes or No

Yes >> GO TO 14.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-726 .

M/T: 650 ± 50 rpm

A/T: 800 ± 50 rpm (in P or N position)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-79 .

M/T: 650 ± 50 rpm

A/T: 800 ± 50 rpm (in P or N position)

OK or NG

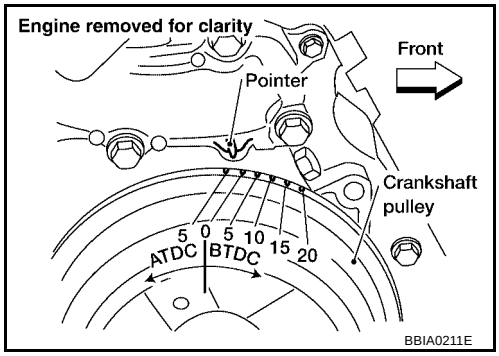
OK >> GO TO 15.
NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light. Refer to EC-79 .

M/T: 7 ± 5° BTDC

A/T: 18 ± 5° BTDC (in P or N position)



OK or NG

OK (With CONSULT-II)>>GO TO 19.
OK (Without CONSULT-II)>>GO TO 20.
NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-42, "TIMING CHAIN" .

OK or NG

OK >> GO TO 17.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-290 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-283 .

OK or NG

OK >> GO TO 18.
NG >> 1. Repair or replace.
2. GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" (if so equipped).

>> GO TO 4.

19. CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

With CONSULT-II

1. Turn ignition switch OFF and wait at a least 10 seconds.
2. Start engine and warm it up to normal operating temperature.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position with OD OFF (A/T models) or 4th position (M/T models).

   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.
4. Set OD ON, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

   NOTE:
   Never apply brake during releasing the accelerator pedal.
5. Repeat steps 3 to 4 for five times.
6. Stop the vehicle and connect CONSULT-II to the vehicle.
7. Make sure that no (1st trip) DTC is displayed in “SELF-DIAG RESULTS” mode.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 21.

20. CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

With GST

1. Turn ignition switch OFF and wait at a least 10 seconds.
2. Start engine and warm it up to normal operating temperature.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position with OD OFF (A/T models) or 4th position (M/T models).

   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.
4. Set OD ON, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

   NOTE:
   Never apply brake during releasing the accelerator pedal.
5. Repeat steps 3 to 4 for five times.
6. Stop the vehicle and connect GST to the vehicle.
7. Make sure that no (1st trip) DTC is displayed.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 21.

21. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HARNESS

1. Turn ignition switch OFF and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect A/F sensor 1 harness connector.
4. Check harness continuity between the following terminals. Refer to EC-481, "Wiring Diagram" .

A/F sensor 1 terminal	ECM terminal
4	2
1	16
5	35
6	56
2	75

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 22.
NG >> 1. Repair open circuit or short to ground or short to power in harness or connectors between ECM and A/F sensor 1.
2. GO TO 4.

22. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Reconnect ECM harness connector.
2. Perform EC-92, "Accelerator Pedal Released Position Learning" .

>> GO TO 23.

23. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-92, "Throttle Valve Closed Position Learning" .

>> GO TO 24.

24. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-92, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

Yes or No

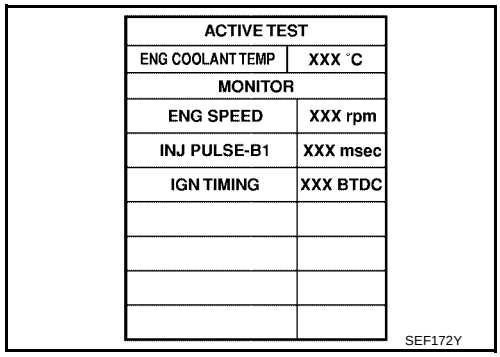
Yes (With CONSULT-II)>>GO TO 25.
Yes (Without CONSULT-II)>>GO TO 26.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

25. CHECK CO%

With CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Select “ENG COOLANT TEMP” in “ACTIVE TEST” mode.
4. Set “ENG COOLANT TEMP” to 5°C (41°F) by touching “DWN” and “Qd”.
5. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed.
6. Check CO%.

Idle CO: 3 – 11% and engine runs smoothly.



OK or NG

OK >> GO TO 28.
NG >> GO TO 27.

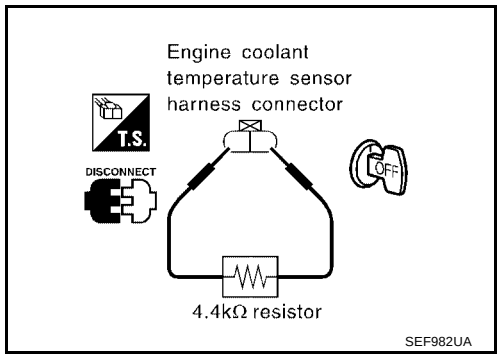
26. CHECK CO%

Without CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.
2. Turn ignition switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.
5. Start engine and rev it (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed.
6. Check CO%.

Idle CO: 3 – 11% and engine runs smoothly.

7. After checking CO%, turn ignition switch OFF, disconnect the resistor from the terminals of engine coolant temperature sensor harness connector, and then connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.



OK or NG

OK >> GO TO 28.
NG >> GO TO 27.

27. RECONNECT AIR FUEL RATIO (A/F) SENSOR 1 HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Reconnect A/F sensor 1 harness connector.

>> GO TO 31.

28. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

1. Stop engine.
2. Replace A/F sensor 1.

With CONSULT-II>>GO TO 29.
Without CONSULT-II>>GO TO 30.

29. CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

With CONSULT-II

1. Turn ignition switch OFF and wait at a least 10 seconds.
2. Start engine and warm it up to normal operating temperature.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position with OD OFF (A/T models) or 4th position (M/T models).

   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.
4. Set OD ON, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

   NOTE:
   Never apply brake during releasing the accelerator pedal.
5. Repeat steps 3 to 4 for five times.
6. Stop the vehicle and connect CONSULT-II to the vehicle.
7. Make sure that no (1st trip) DTC is displayed in “SELF-DIAG RESULTS” mode.

OK or NG

OK >> GO TO 4.
NG >> GO TO 31.

30. CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

With GST

1. Turn ignition switch OFF and wait at a least 10 seconds.
2. Start engine and warm it up to normal operating temperature.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position with OD OFF (A/T models) or 4th position (M/T models).

   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.
4. Set OD ON, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

   NOTE:
   Never apply brake during releasing the accelerator pedal.
5. Repeat steps 3 to 4 for five times.
6. Stop the vehicle and connect GST to the vehicle.
7. Make sure that no (1st trip) DTC is displayed.

OK or NG

OK >> GO TO 4.
NG >> GO TO 31.

31. DETECT MALFUNCTIONING PART

Check the following.

- Check fuel pressure regulator, and repair or replace if necessary.
  Refer toEC-94, "Fuel Pressure Check"
- Check mass air flow sensor and its circuit, and repair or replace if necessary.
  Refer to EC-185, "DTC P0101 MAF SENSOR" and EC-195, "DTC P0102, P0103 MAF SENSOR" .
- Check injector and its circuit, and repair or replace if necessary.
  Refer to EC-614, "INJECTOR" .
- Check engine coolant temperature sensor and its circuit, and repair or replace if necessary.
  Refer to EC-207, "DTC P0117, P0118 ECT SENSOR" and EC-219, "DTC P0125 ECT SENSOR" .

OK or NG

OK >> GO TO 33.
NG >> 1. Repair or replace.
2. GO TO 32.

32. ERASE UNNECESSARY DTC

After this inspection, unnecessary DTC might be displayed.
Erase the stored memory in ECM and TCM.
Refer to EC-64, "How to Erase DTC" and EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 4.

33. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
   Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" (if so equipped).

>> GO TO 4.

VIN Registration

UBS00JSA

DESCRIPTION

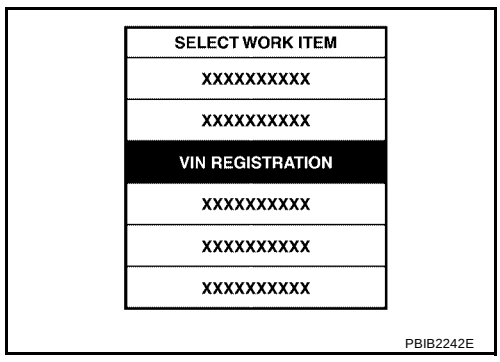
VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.

NOTE:
Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

OPERATION PROCEDURE

With CONSULT-II

1. Check the VIN of the vehicle and note it. Refer to GI-46, "IDENTIFICATION INFORMATION" .
2. Turn ignition switch ON and engine stopped.
3. Select “VIN REGISTRATION” in “WORK SUPPORT” mode.
4. Follow the instruction of CONSULT-II display.



Accelerator Pedal Released Position Learning

UBS00JSB

DESCRIPTION

Accelerator Pedal Released Position Learning is an operation to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF wait at least 10 seconds.
4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF wait at least 10 seconds.

Throttle Valve Closed Position Learning

UBS00JSC

DESCRIPTION

Throttle Valve Closed Position Learning is an operation to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

Idle Air Volume Learning

UBS00JSD

DESCRIPTION

Idle Air Volume Learning is an operation to learn the idle air volume that keeps each engine within the specific range. It must be performed under any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

PREPARATION

Before performing Idle Air Volume Learning, make sure that all of the following conditions are satisfied. Learning will be cancelled if any of the following conditions are missed for even a moment.

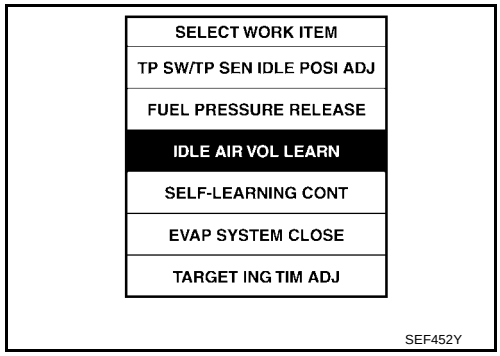
- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 95°C (158 - 203°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
  On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started the headlamp will not be illuminated.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
  For A/T models with CONSULT-II, drive vehicle until “FLUID TEMP SE” in “DATA MONITOR” mode of “A/T” system indicates less than 0.9V.
  For A/T models without CONSULT-II and M/T models, drive vehicle for 10 minutes.

OPERATION PROCEDURE

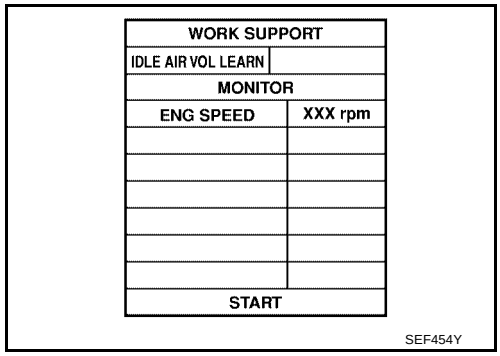
With CONSULT-II

1. Perform EC-92, "Accelerator Pedal Released Position Learning" .
2. Perform EC-92, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.

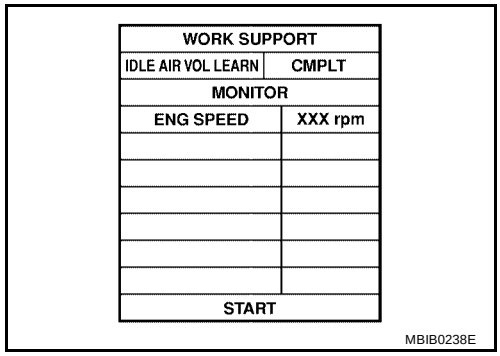
5. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.



6. Touch “START” and wait 20 seconds.



7. Make sure that “CMPLT” is displayed on CONSULT-II screen. If “CMPLT” is not displayed, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the Diagnostic Procedure below.
8. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. Refer to EC-79 .



ITEM	SPECIFICATION
Idle speed	M/T: 650 ± 50 rpm A/T: 800 ± 50 rpm (in P or N position)
Ignition timing	M/T: 7 ± 5° BTDC A/T: 18 ± 5° BTDC (in P or N position)

Without CONSULT-II

NOTE:

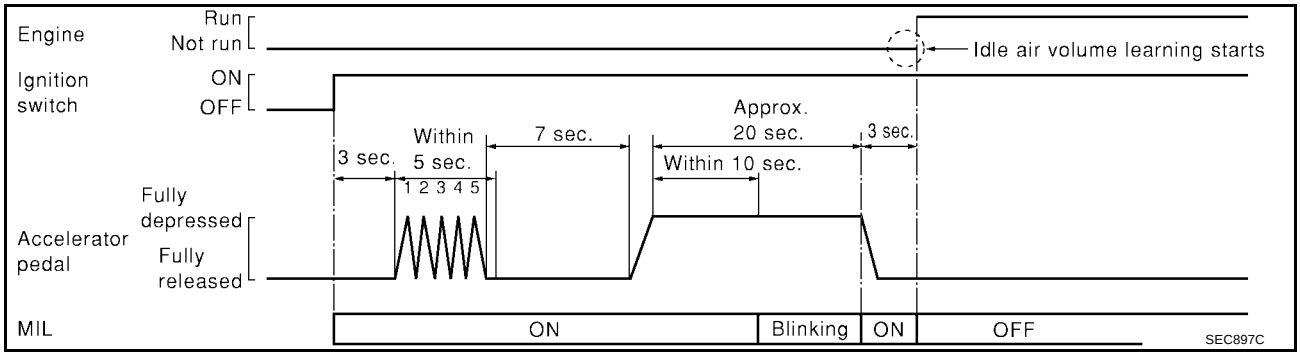
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform EC-92, "Accelerator Pedal Released Position Learning" .
2. Perform EC-92, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
7. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

8. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
9. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.

10. Start engine and let it idle.
11. Wait 20 seconds.



12. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications. Refer to EC-79 .

ITEM	SPECIFICATION
Idle speed	M/T: 650 ± 50 rpm A/T: 800 ± 50 rpm (in P or N position)
Ignition timing	M/T: 7 ± 5° BTDC A/T: 18 ± 5° BTDC (in P or N position)

13. If idle speed and ignition timing are not within the specification, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the Diagnostic Procedure below.

DIAGNOSTIC PROCEDURE

If idle air volume learning cannot be performed successfully, proceed as follows:

1. **Check that throttle valve is fully closed.**
2. **Check PCV valve operation.**
3. **Check that downstream of throttle valve is free from air leakage.**
4. **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.**
   It is useful to perform EC-153, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .
5. **If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle air volume learning all over again:**

- **Engine stalls.**
- **Erroneous idle.**

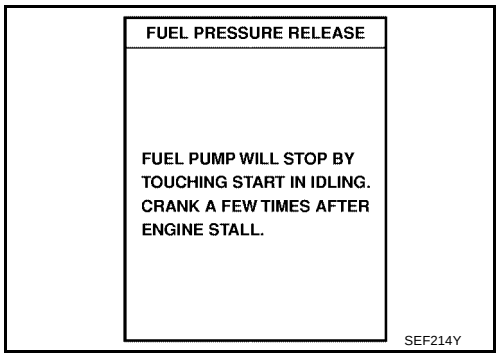
Fuel Pressure Check

UBS00JSE

FUEL PRESSURE RELEASE

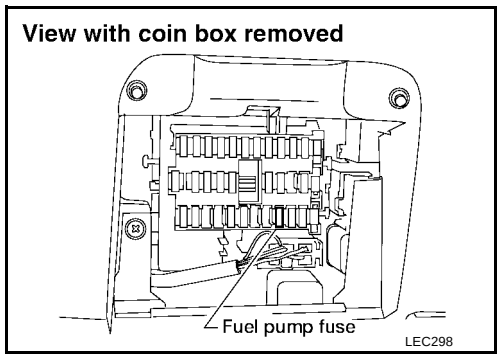
With CONSULT-II

1. Turn ignition switch ON.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-II.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.



Without CONSULT-II

1. Remove fuse for fuel pump.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF and reconnect fuel pump fuse.
5. Reinstall fuel pump fuse after servicing fuel system.

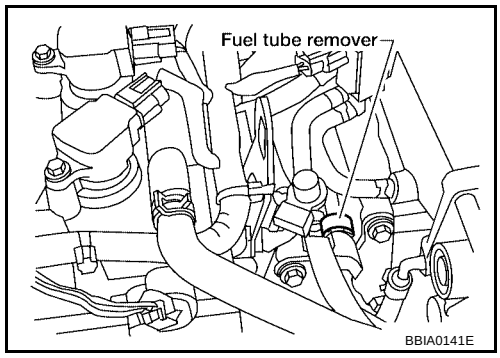


FUEL PRESSURE CHECK

CAUTION:

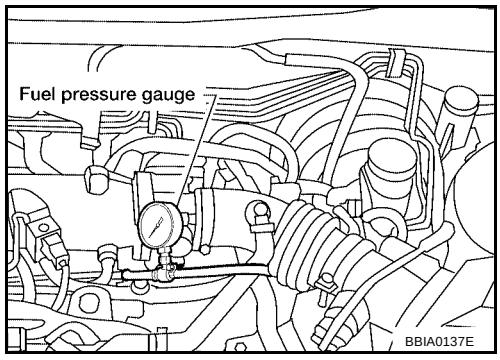
- **Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.**
- **Be careful not to scratch or get the fuel hose connection area dirty when servicing, so that the quick connector o-ring maintains sealability.**
- **When reconnecting fuel line, always use new clamps.**
- **Make sure that clamp screws do not contact adjacent parts.**
- **Use a torque driver to tighten clamps.**
- **Use Fuel Pressure Gauge Kit J-44321 to check fuel pressure.**

NOTE:
Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because B15 models do not have fuel return system.



1. Release fuel pressure to zero.
2. Disconnect fuel hose from fuel feed tube (engine side) using fuel tube quick connect removal tool.
3. Release quick connector and disconnect fuel hose from fuel feed tube (underbody side). Remove fuel hose assembly.

   CAUTION:
   Do not install hose clamps over flared portions of fuel feed tubes or damage to fuel feed tubes may result.
4. Install fuel pressure gauge from kit J-44321 between fuel tubes using hose and clamps from kit.
5. Turn ignition switch ON and check for fuel leakage.
6. Start engine and read the indication on fuel pressure gauge.



At idle speed:

Approximately 350 kPa (3.57 kg/cm^2 , 51 psi)

If results are unsatisfactory, check for fuel leakage in fuel line between fuel tank and injector.
If OK, replace fuel level sensor unit and fuel pump assembly. Refer to EC-620 .

TROUBLE DIAGNOSIS

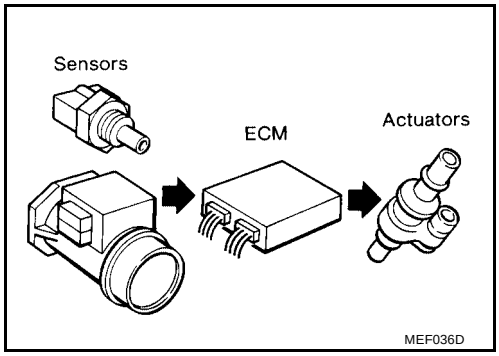
PFP:00004

Trouble Diagnosis Introduction

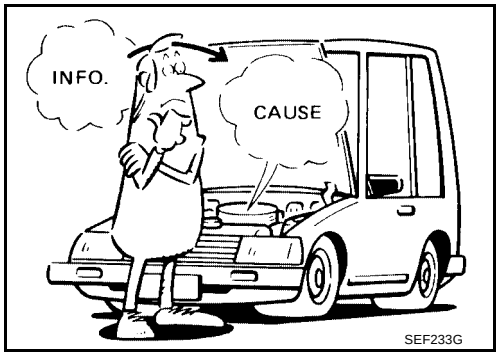
UBS00JSF

INTRODUCTION

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine.



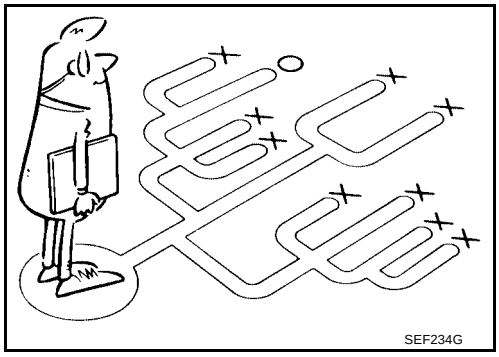
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



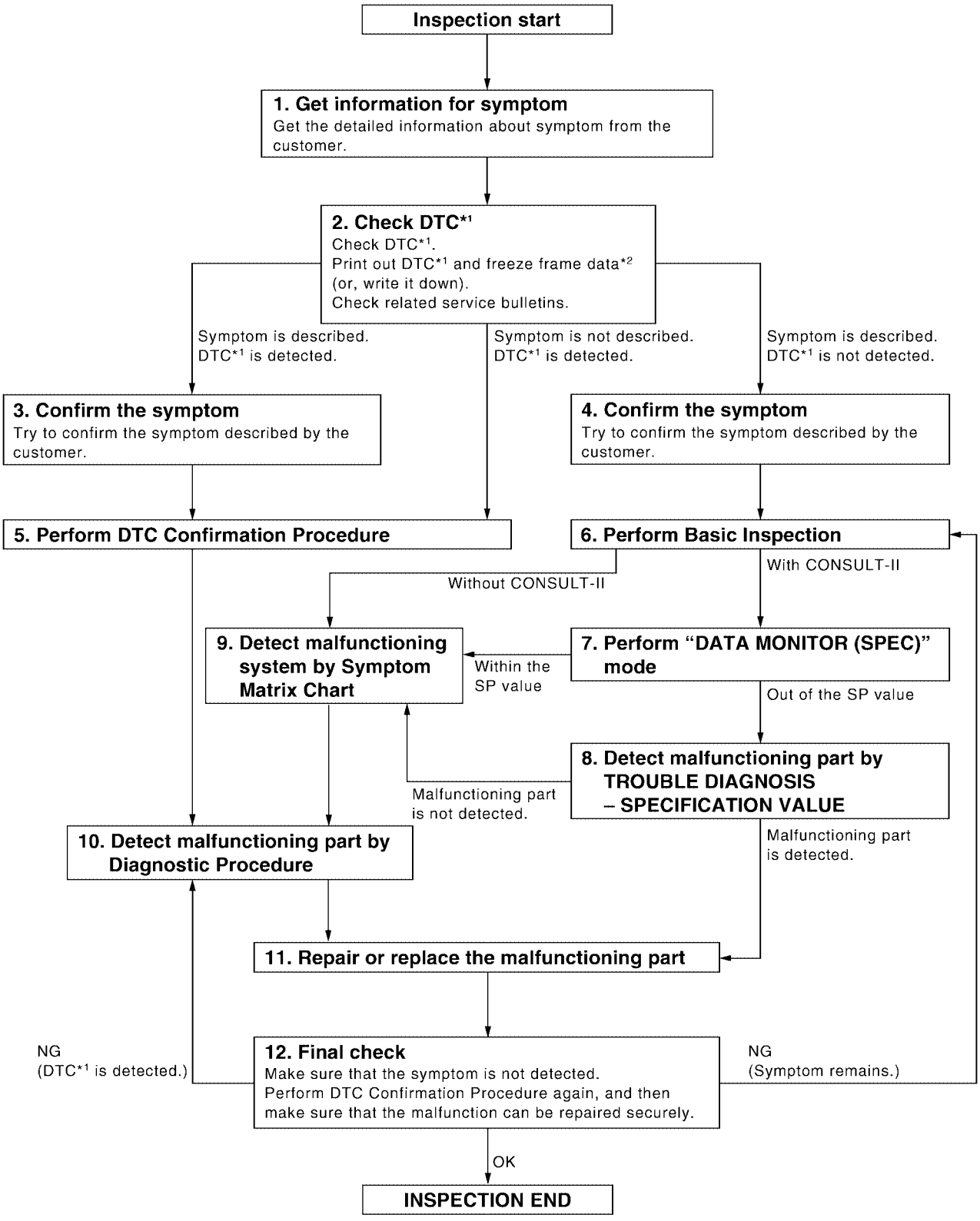
A visual check only may not find the cause of the incidents. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the Work Flow on EC-97 .

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on EC-100 should be used.

Start your diagnosis by looking for conventional malfunctions first. This will help troubleshoot driveability malfunctions on an electronically controlled engine vehicle.



WORK FLOW
Overall Sequence



*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

PBIB2267E

Detailed Flow

1. GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the EC-100, "DIAGNOSTIC WORKSHEET" .

>> GO TO 2.

2. CHECK DTC*1

1. Check DTC*1 .
2. Perform the following procedure if DTC*1 is displayed.

- Record DTC*1 and freeze frame data*2 . (Print them out with CONSULT-II or GST.)
- Erase DTC*1 . (Refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .)
- Study the relationship between the cause detected by DTC*1 and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to EC-105 .)

3. Check related service bulletins for information.

Is any symptom described and any DTC detected?

Symptom is described, DTC*1 is displayed>>GO TO 3.
Symptom is described, DTC*1 is not displayed>>GO TO 4.
Symptom is not described, DTC*1 is displayed>>GO TO 5.

3. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).
DIAGNOSIS WORK SHEET is useful to verify the incident.
Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
DIAGNOSIS WORK SHEET is useful to verify the incident.
Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC Confirmation Procedure for the displayed DTC*1 , and then make sure that DTC*1 is detected again.
At this time, always connect CONSULT-II to the vehicle, and check diagnostic results in real time on “DATA MONITOR (AUTO TRIG)”.
If two or more DTCs*1 are detected, refer to EC-102, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

- Freeze frame data*2 is useful if the DTC*1 is not detected.
- Perform Overall Function Check if DTC Confirmation Procedure is not included on Service Manual. This simplified check procedure is an effective alternative though DTC*1 cannot be detected during this check. If the result of Overall Function Check is NG, it is the same as the detection of DTC*1 by DTC Confirmation Procedure.

Is DTC*1 detected?

Yes >> GO TO 10.
No >> Check according to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

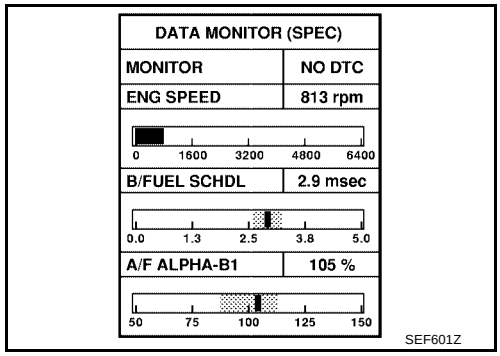
6. PERFORM BASIC INSPECTION

Perform EC-74, "Basic Inspection" .

With CONSULT-II>>GO TO 7.
Without CONSULT-II>>GO TO 9.

7. PERFORM DATA MONITOR (SPEC) MODE

With CONSULT-II
Make sure that “MAS A/F SE-B1”, “B/FUEL SCHDL”, and “A/F ALPHA-B1” are within the SP value using CONSULT-II “DATA MONITOR (SPEC)” mode. Refer to EC-154, "Diagnostic Procedure" .



Are they within the SP value?

Yes >> GO TO 9.
No >> GO TO 8.

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according toEC-153, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .

Is malfunctioning part detected?

Yes >> GO TO 11.
No >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM MATRIX CHART

Detect malfunctioning system according toEC-105, "Symptom Matrix Chart" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSTIC PROCEDURE

Inspect according to Diagnostic Procedure of the system.

NOTE:
The Diagnostic Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to Circuit Inspection in GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" .

Is malfunctioning part detected?

Yes >> GO TO 11.
No >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT-II. Refer to EC-147, "CONSULT-II Reference Value in Data Monitor" , EC-125, "ECM Terminals and Reference Value" .

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnostic Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it, refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC Confirmation Procedure or Overall Function Check again, and then make sure that the malfunction have been repaired securely.
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

OK or NG

NG (DTC*1 is detected)>>GO TO 10.
NG (Symptom remains)>>GO TO 6.
OK >> 1. Before returning the vehicle to the customer, make sure to erase unnecessary DTC*1 in ECM and TCM (Transmission Control Module). (Refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and EC-64, "How to Erase DTC" .)
2. If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to EC-61, "Driving Pattern" .
3. **INSPECTION END**

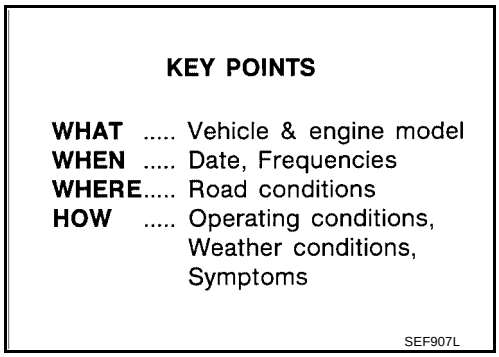
*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

DIAGNOSTIC WORKSHEET

Description

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about an incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.
Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.



Worksheet Sample

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp		☐ Turned on ☐ Not turned on	

MTBL0017

DTC Inspection Priority Chart

UBS00JSG

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

NOTE:
If DTC U1000 and/or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000 and U1001. Refer to EC-172 .

Priority	Detected items (DTC)
1	● U1000 U1001 CAN communication line ● P0101 P0102 P0103 Mass air flow sensor ● P0112 P0113 P0127 Intake air temperature sensor ● P0117 P0118 P0125 Engine coolant temperature sensor ● P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor ● P0128 Thermostat function ● P0181 P0182 P0183 Fuel tank temperature sensor ● P0327 P0328 Knock sensor ● P0335 Crankshaft position sensor (POS) ● P0340 Camshaft position sensor (PHASE) ● P0460 P0461 P0462 P0463 Fuel level sensor ● P0500 Vehicle speed sensor ● P0605 ECM ● P1229 Sensor power supply ● P1610-P1615 NATS ● P1705 Park/Neutral position (PNP) switch ● P1706 Park/Neutral position (PNP) switch ● P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor

Priority	Detected items (DTC)
2	● P0037 P0038 Heated oxygen sensor 2 heater ● P0138 P0139 P1146 P1147 Heated oxygen sensor 2 ● P0441 EVAP control system purge flow monitoring ● P0444 P0445 P1444 EVAP canister purge volume control solenoid valve ● P0447 P1446 EVAP canister vent control valve ● P0451 P0452 P0453 EVAP control system pressure sensor ● P0550 power steering pressure sensor ● P0705-P0725, P0740-P0755, P1705, P1706, P1760 A/T related sensors and solenoid valves and switches ● P1031 P1032 A/F sensor 1 heater ● P1065 ECM power supply ● P1122 Electric throttle control function ● P1124 P1126 P1128 Electric throttle control actuator ● P1137 Swirl control valve control position sensor ● P1138 Swirl control valve ● P1217 Engine over temperature (OVERHEAT) ● P1271 P1272 P1273 P1274 P1276 P1278 P1279 A/F sensor 1 ● P1805 Brake switch
3	● P0011 Intake valve timing control ● P0171 P0172 Fuel injection system function ● P0300 - P0304 Misfire ● P0420 Three way catalyst function ● P0442 P0456 EVAP control system (SMALL LEAK, VERY SMALL LEAK) ● P0455 EVAP control system (GROSS LEAK) ● P0731-P0734 A/T function ● P1111 Intake valve timing control solenoid valve ● P1121 Electric throttle control actuator ● P1132 Swirl control valve ● P1148 Closed loop control ● P1564 ASCD steering switch ● P1572 ASCD brake switch ● P1574 ASCD vehicle speed sensor

Fail-safe Chart

UBS00JSH

When the DTC listed below is detected, the ECM enters fail-safe mode and the MIL lights up.

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-II display)
		Just as ignition switch is turned ON or Start	40°C (104°F)
		More than approx. 4 minutes after ignition ON or Start	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	
P1121	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.	
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.	
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position, and engine speed will not exceed 1,000 rpm or more.	
P1122	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1124 P1126	Throttle control relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1128	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1229	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	

- When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.
  Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.
  The fail-safe function also operates when above diagnoses except MIL circuit are detected, and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Symptom Matrix Chart

UBS00JSI

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-620
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-94
	Injector circuit	1	1	2	3	2		2	2			2			EC-614
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-36
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-49
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-74
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-397EC-397, EC-406 , EC-411
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-79
	Ignition circuit	1	1	2	2	2		2	2			2			EC-601
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3		2	EC-164
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-185, EC-195
Engine coolant temperature sensor circuit		1	1	2	2	2	3	2	2	3	1	2			EC-207, EC-219
Throttle position sensor circuit			1	2		2	2	2	2	2		2			EC-212, EC-264 , EC-469 , EC-471 , EC-586
Accelerator pedal position sensor circuit				3	2	1	2			2					EC-473, EC-572 , EC-579 , EC-593
A/F sensor 1 circuit			1	2	3	2		2	2			2			EC-478, EC-484 , EC-490 , EC-497 , EC-504 , EC-510 , EC-518
Knock sensor circuit				2	2							3			EC-278
Crankshaft position sensor (POS) circuit		2	2												EC-283

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor (PHASE) circuit	2	2												EC-290
Vehicle speed signal circuit		2	3		3						3			EC-370
Power steering pressure sensor circuit						3	3	3	3					EC-376
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-381, EC-389
Intake valve timing control solenoid valve circuit		3	3		3		3				3			EC-175
Swirl control valve circuit	3	3						2						EC-416
PNP switch circuit			3		3	3	3	3	3		3			EC-562
Refrigerant pressure sensor circuit		2				3	3	3	3		4			EC-625
Electrical load signal circuit						3	3	3	3					EC-630
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	MTC-33

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-7
	Fuel piping			5	5	5		5	5			5			EM-21
	Vapor lock														—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct		5	5		5		5	5			5			—
	Air cleaner														—
	Air leakage from air duct (Mass air flow sensor —electric throttle control actuator)	5			5		5			5					—
	Electric throttle control actuator														EM-15
	Air leakage from intake manifold/ Collector/Gasket														EM-15
Cranking	Battery	1	1	1		1		1	1			1		1	SC-4
	Generator circuit														SC-22
	Starter circuit	3													SC-9
	Signal plate/Flywheel/Drive plate	6													EM-92
	PNP switch	4													MT-12 or AT-115
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-55
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-69
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														

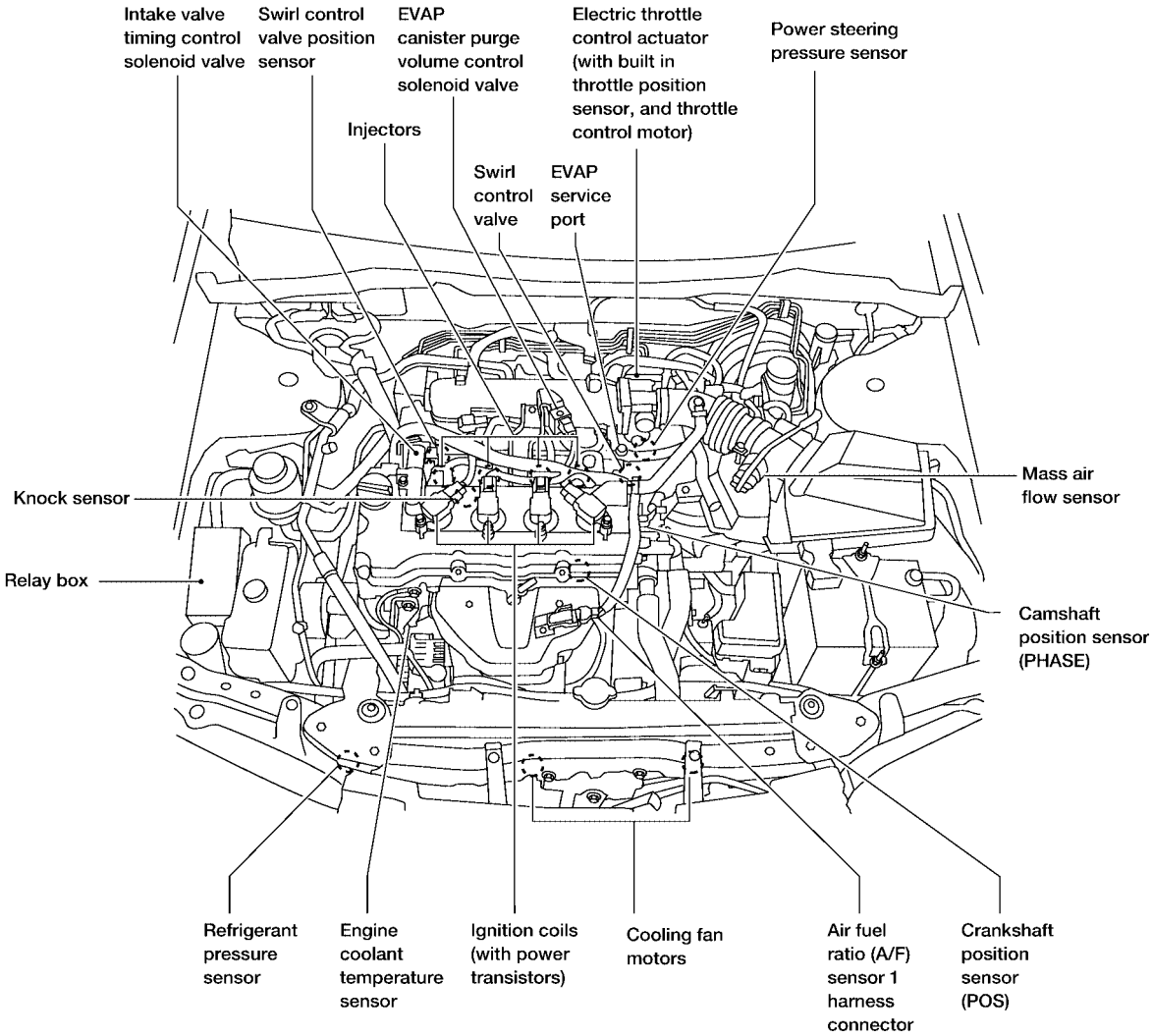
		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM-42
	Camshaft														EM-28
	Intake valve timing control														EC-393
	Intake valve												3		EM-55
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EX-3, EM-15
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5	2		EM-18, LU-8 , LU-7 , LU-4
	Oil level (Low)/Filthy oil														MA-20
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		2	5			CO-14
	Thermostat									5					CO-12
	Water pump														CO-10
	Water gallery														EM-15, CO-14
	Cooling fan									5					CO-19
	Coolant level (low)/Contaminated coolant														MA-16
NVIS (NISSAN Vehicle Immobilizer System — NATS)		1	1												BL-97

1 - 6: The numbers refer to the order of inspection.

Engine Control Component Parts Location

UBS00JSJ

SULEV MODELS



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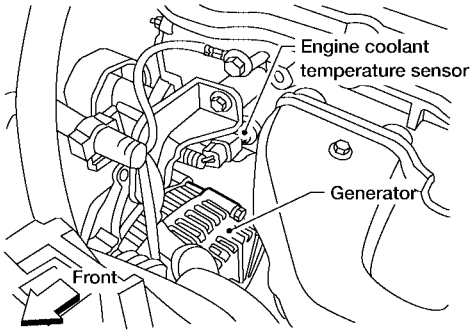
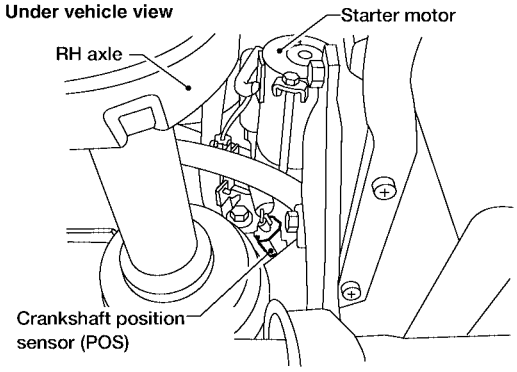
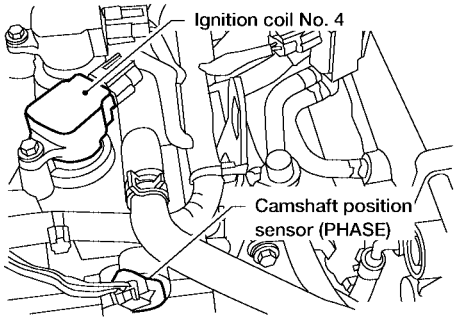
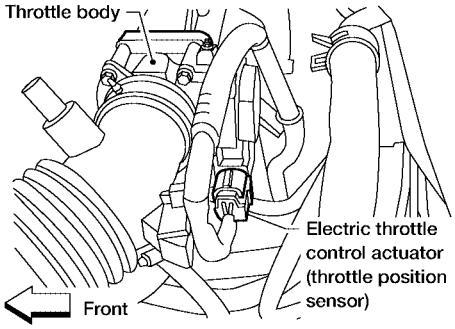
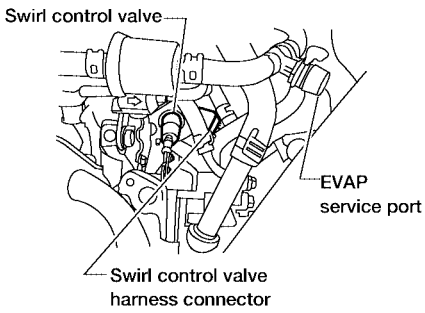
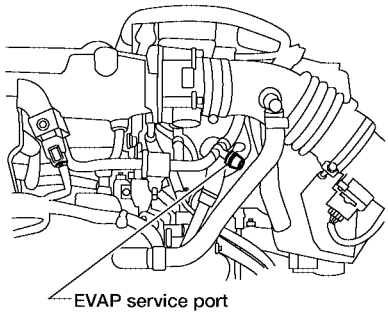

Engine coolant temperature sensor
Generator
Front


Under vehicle view
Starter motor
RH axle
Crankshaft position sensor (POS)


Ignition coil No. 4
Camshaft position sensor (PHASE)


Throttle body
Electric throttle control actuator (throttle position sensor)
Front


Swirl control valve
EVAP service port
Swirl control valve harness connector


EVAP service port

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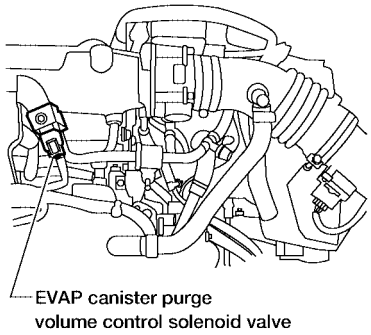
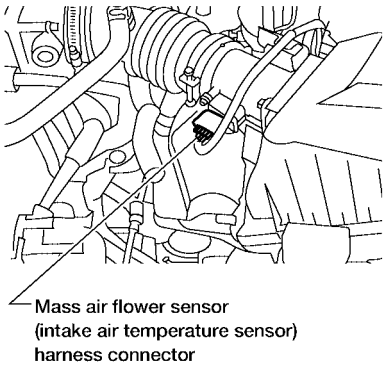
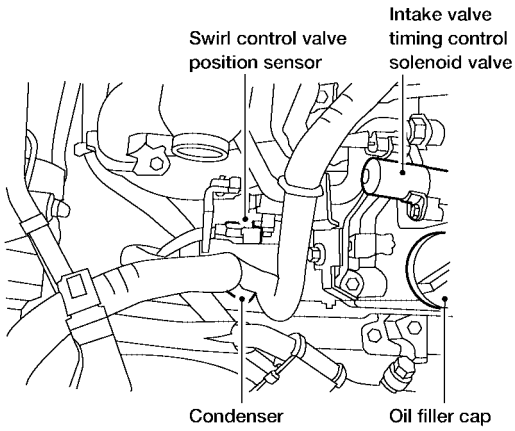
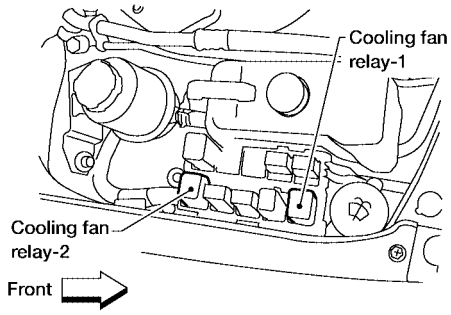
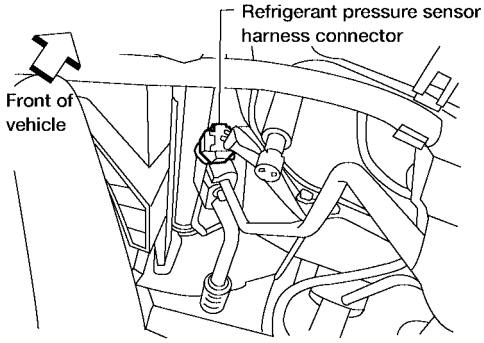






View With Relay Box Cover Removed





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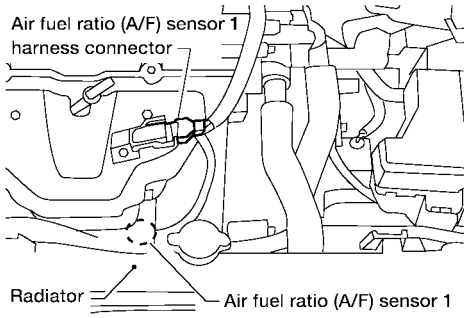
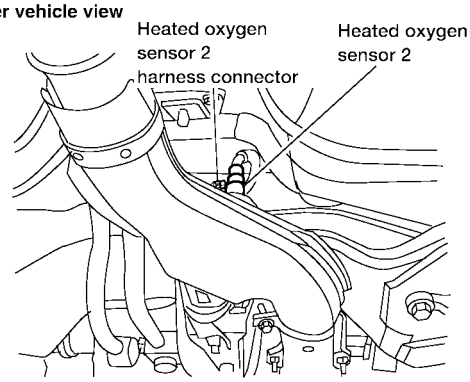
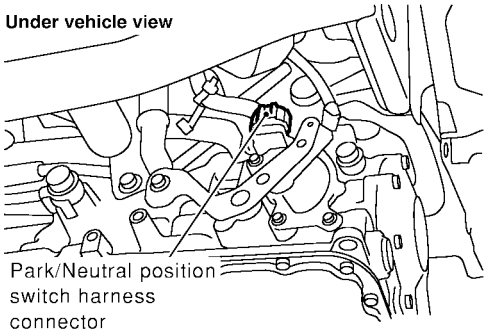


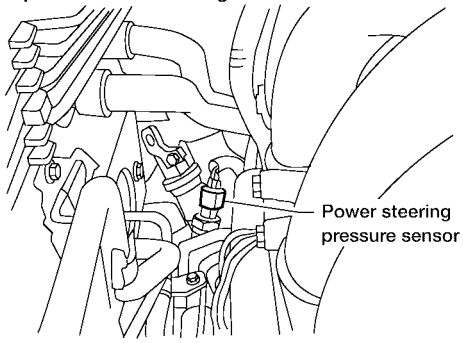
Under vehicle view



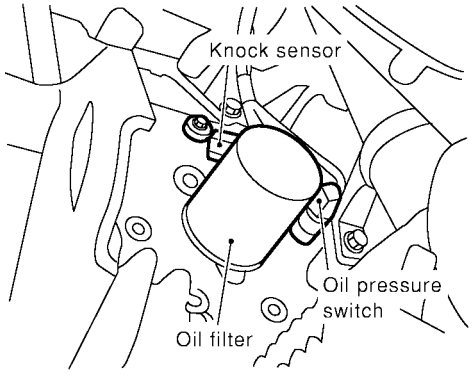
Under vehicle view

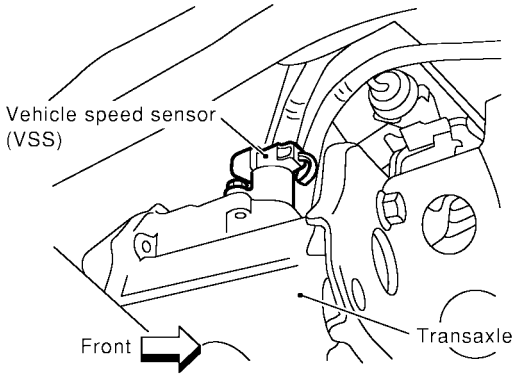


Top view from rear of engine



Under vehicle view





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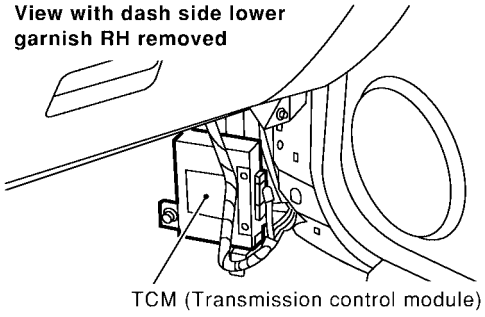
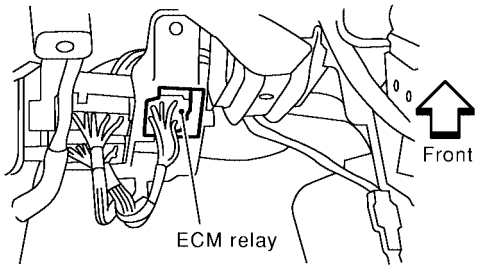
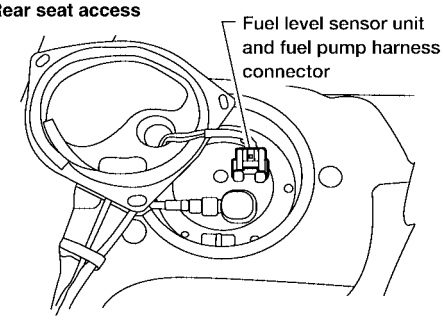
View with dash side lower garnish RH removed

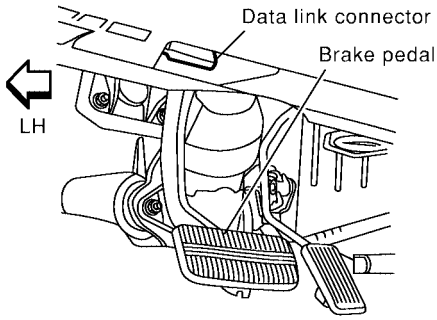


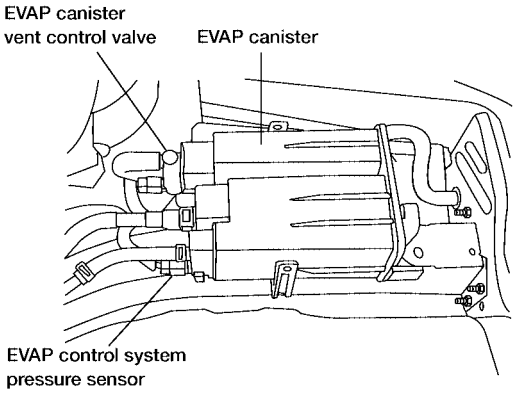
Passenger side view with instrument panel removed for clarity



Rear seat access







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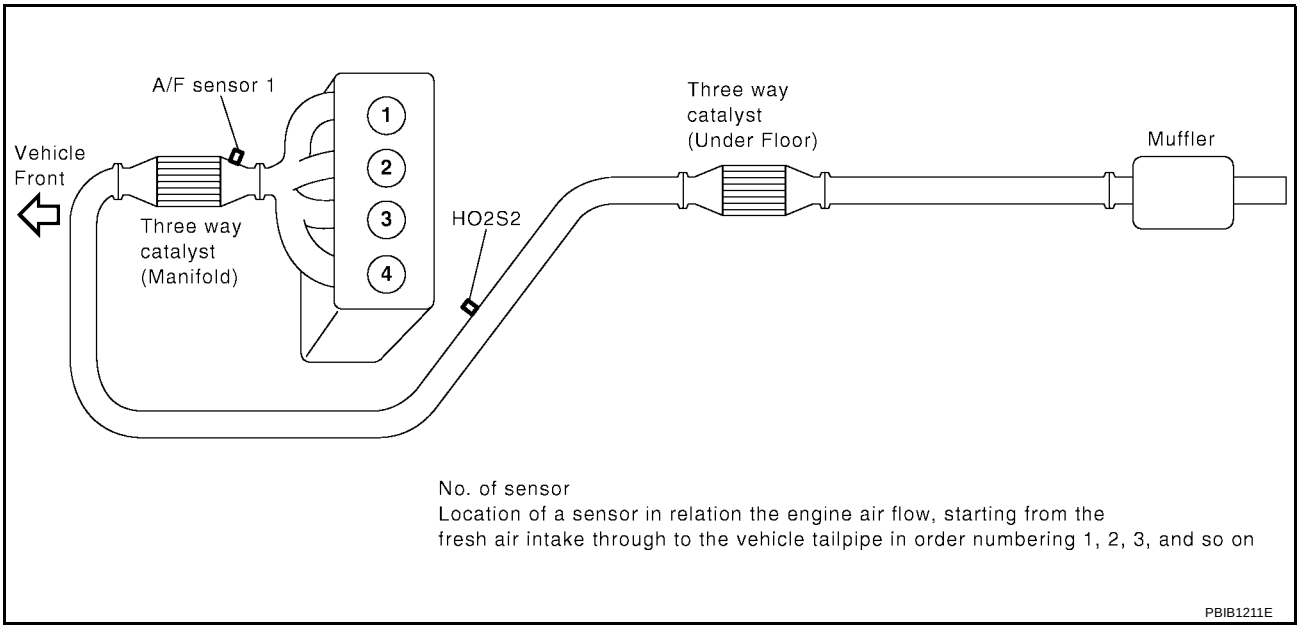
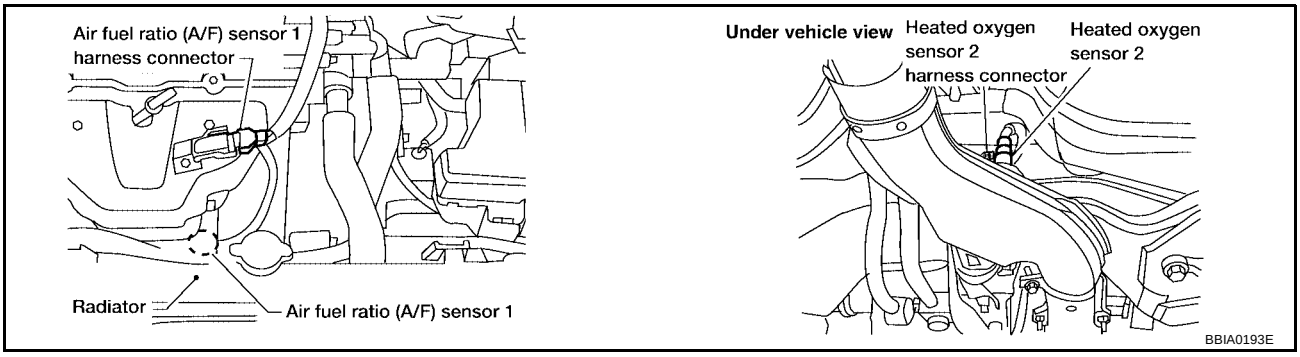
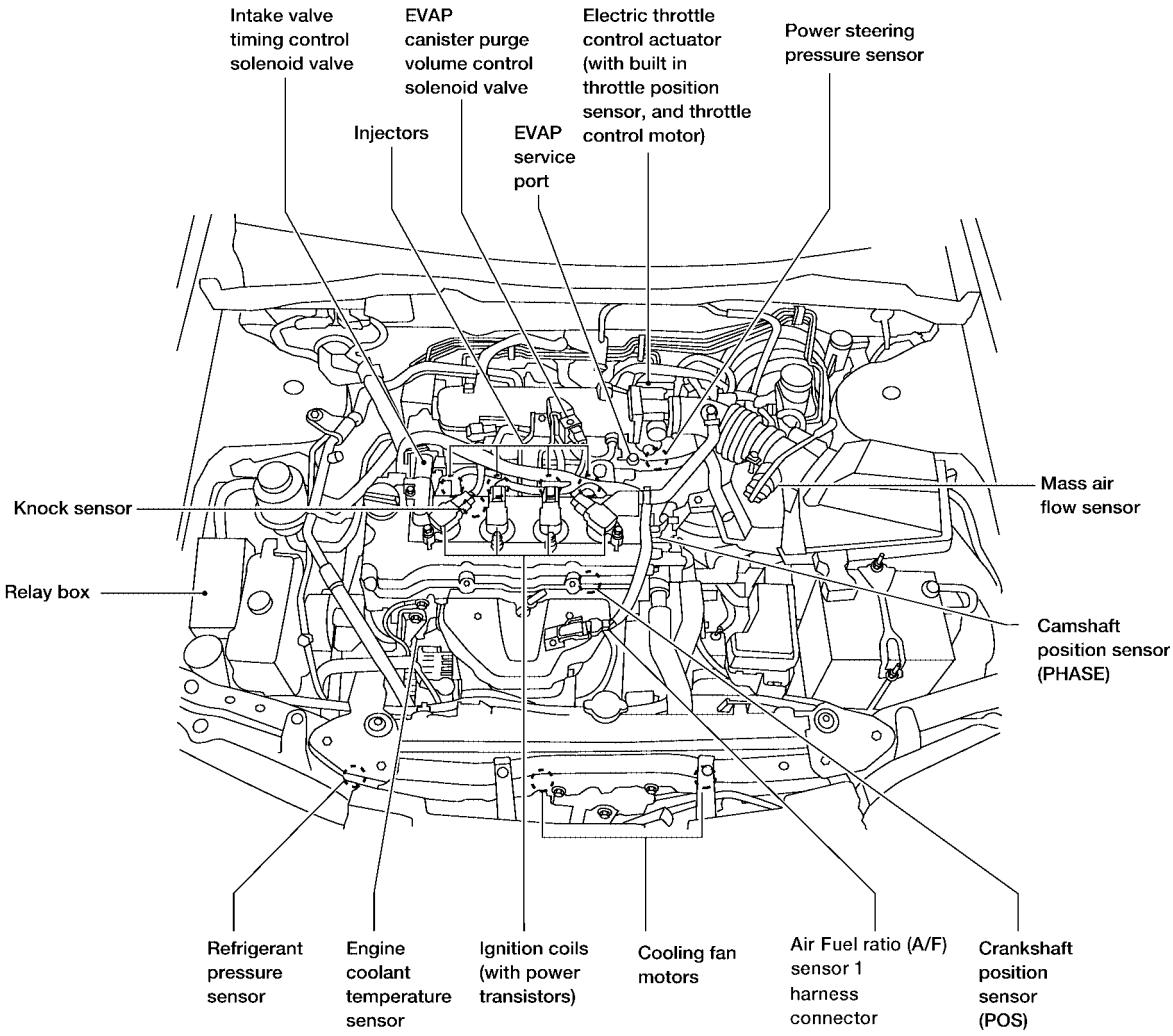
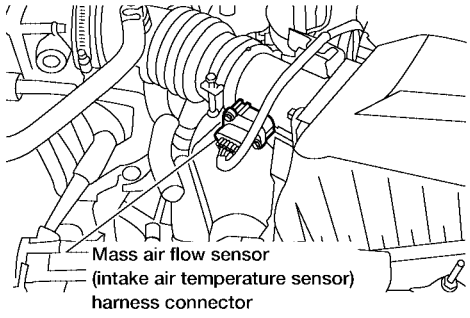

A/F sensor 1
Vehicle
Front
Three way
catalyst
(Manifold)
1
2
3
4
HO2S2
Three way
catalyst
(Under Floor)
Muffler
No. of sensor
Location of a sensor in relation the engine air flow, starting from the
fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on
PBIB1211E

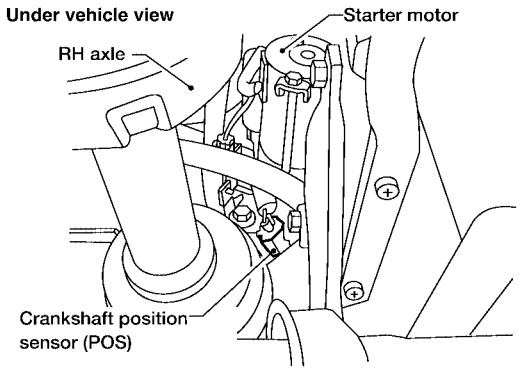

Air fuel ratio (A/F) sensor 1
harness connector
Radiator
Air fuel ratio (A/F) sensor 1
Under vehicle view
Heated oxygen
sensor 2
harness connector
Heated oxygen
sensor 2
BBIA0193E

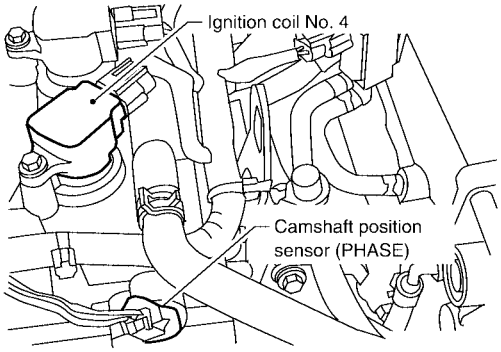
EXCEPT SULEV MODELS

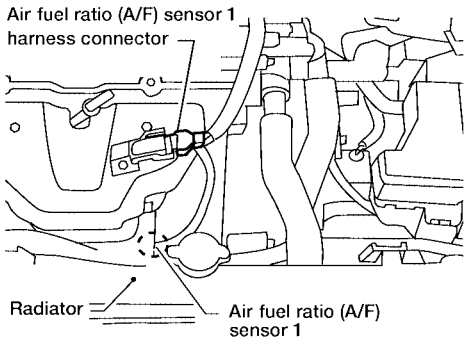


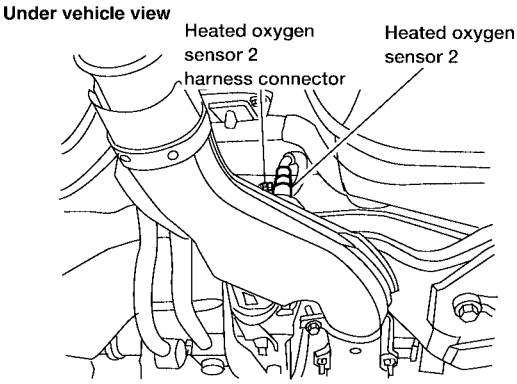
BBIA0297E

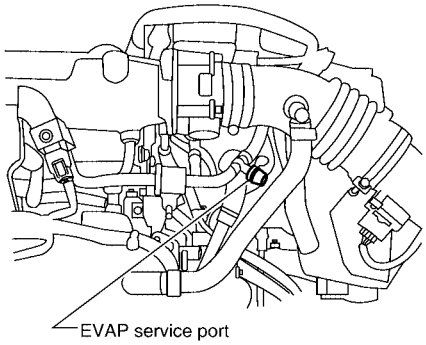

Mass air flow sensor
(intake air temperature sensor)
harness connector


Under vehicle view
Starter motor
RH axle
Crankshaft position
sensor (POS)

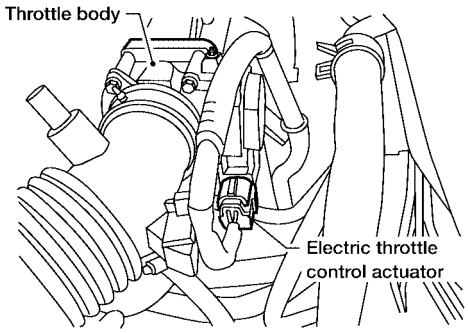

Ignition coil No. 4
Camshaft position
sensor (PHASE)

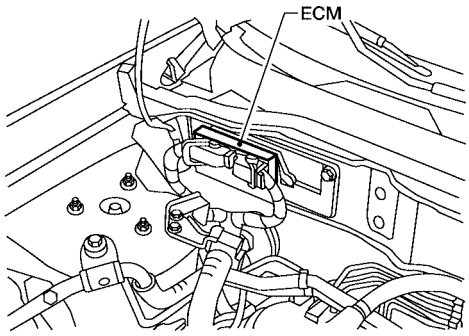

Air fuel ratio (A/F) sensor 1
harness connector
Radiator
Air fuel ratio (A/F)
sensor 1


Under vehicle view
Heated oxygen
sensor 2
harness connector
Heated oxygen
sensor 2

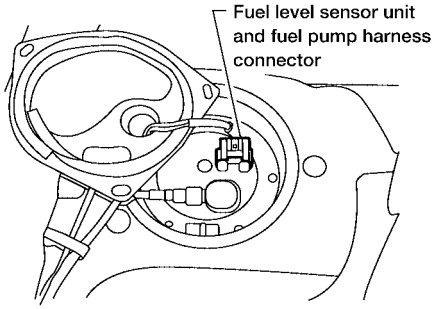

EVAP service port

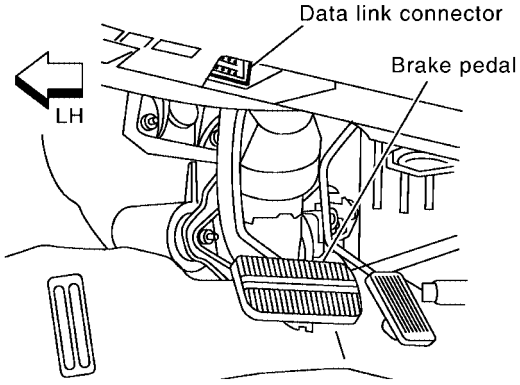
BBIA0522E

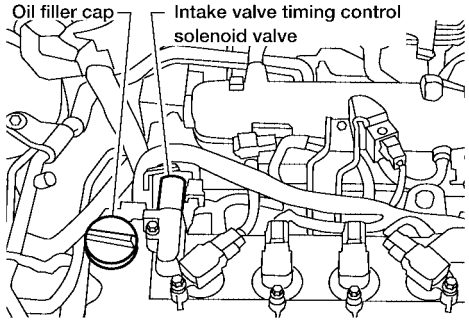




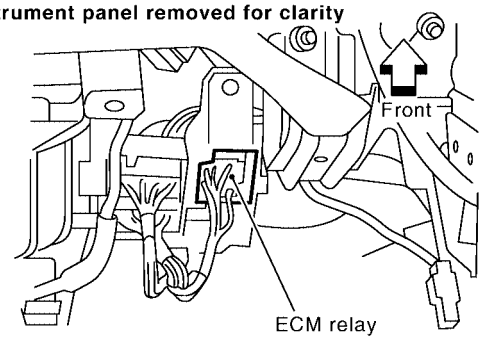
Rear seat access



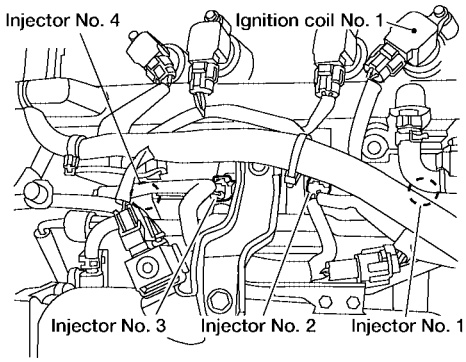


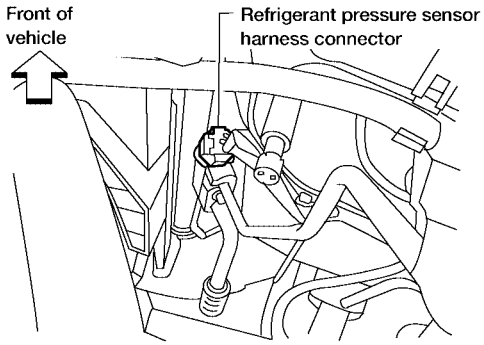


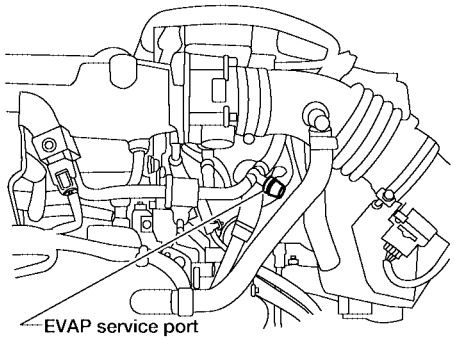
Instrument panel removed for clarity

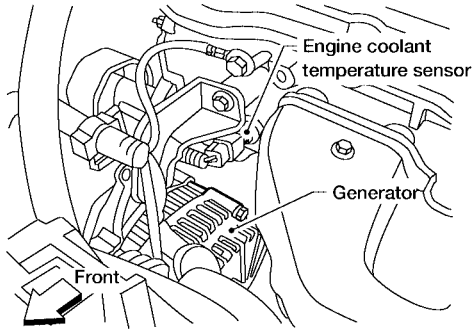


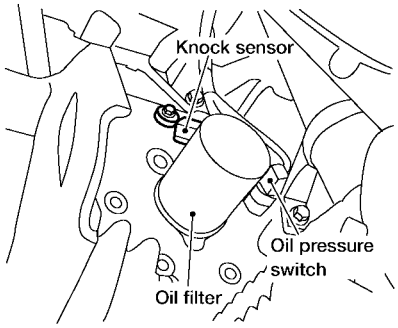
BBIA0143E

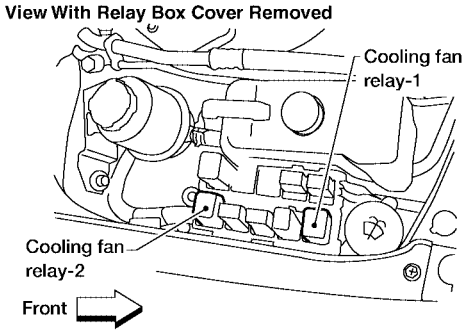

Injector No. 4
Ignition coil No. 1
Injector No. 3
Injector No. 2
Injector No. 1


Front of vehicle
Refrigerant pressure sensor harness connector

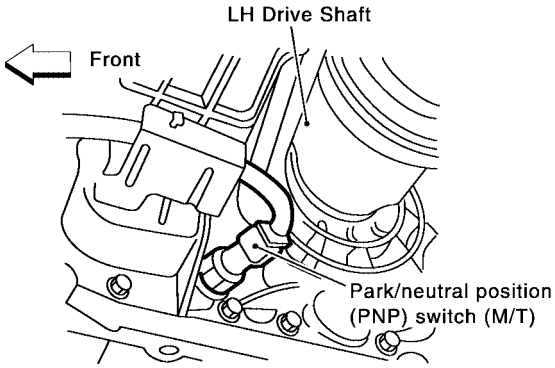

EVAP service port


Engine coolant temperature sensor
Generator
Front

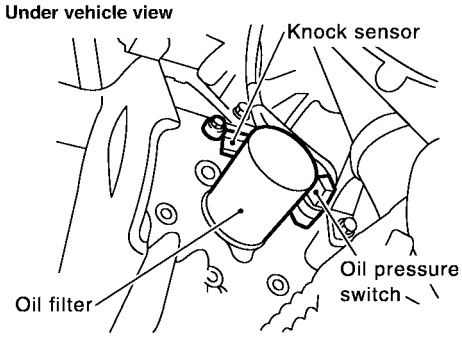

Knock sensor
Oil pressure switch
Oil filter


View With Relay Box Cover Removed
Cooling fan relay-1
Cooling fan relay-2
Front

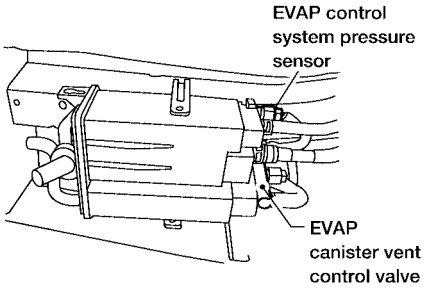
BBIA0523E

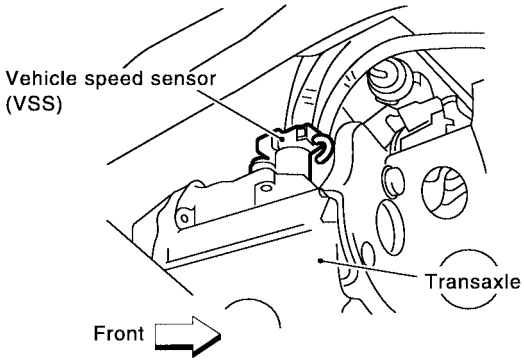


Under vehicle view

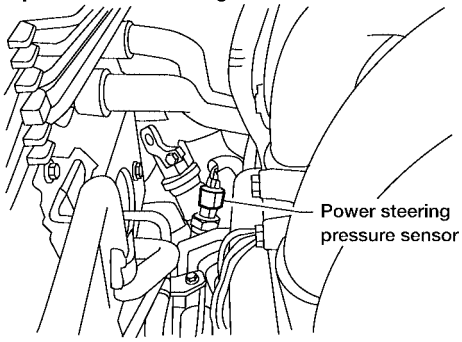


Under vehicle view

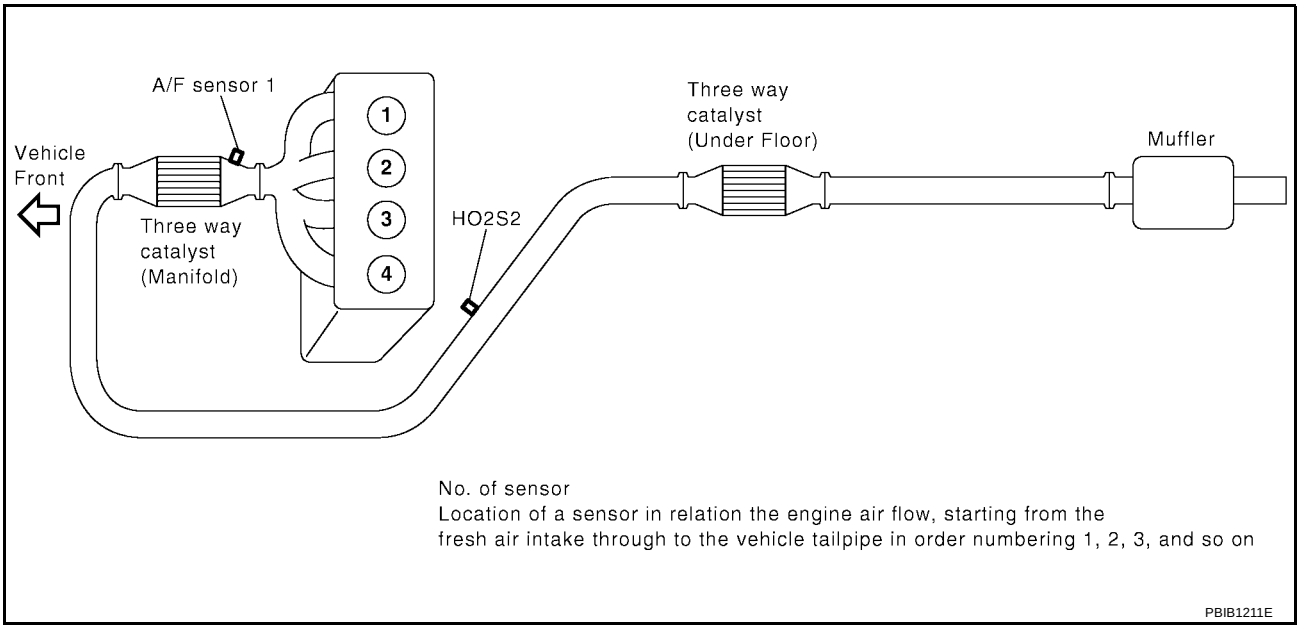


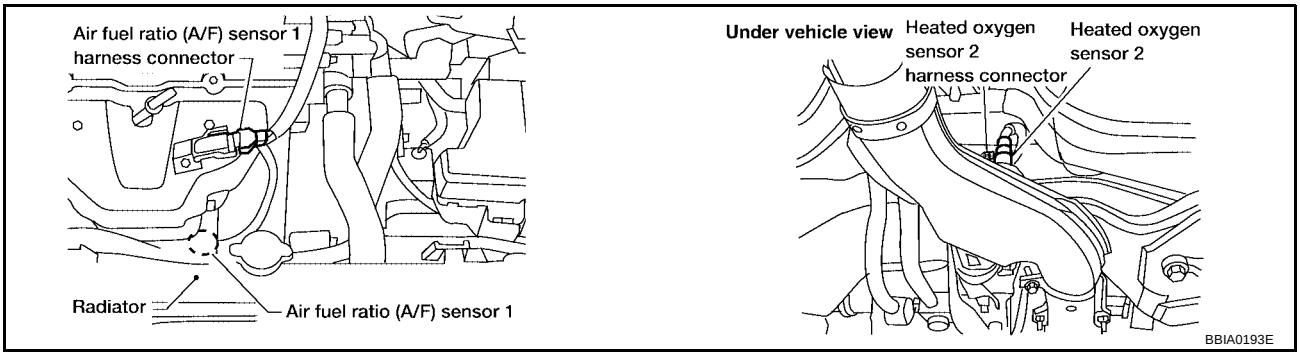


Top view from rear of engine



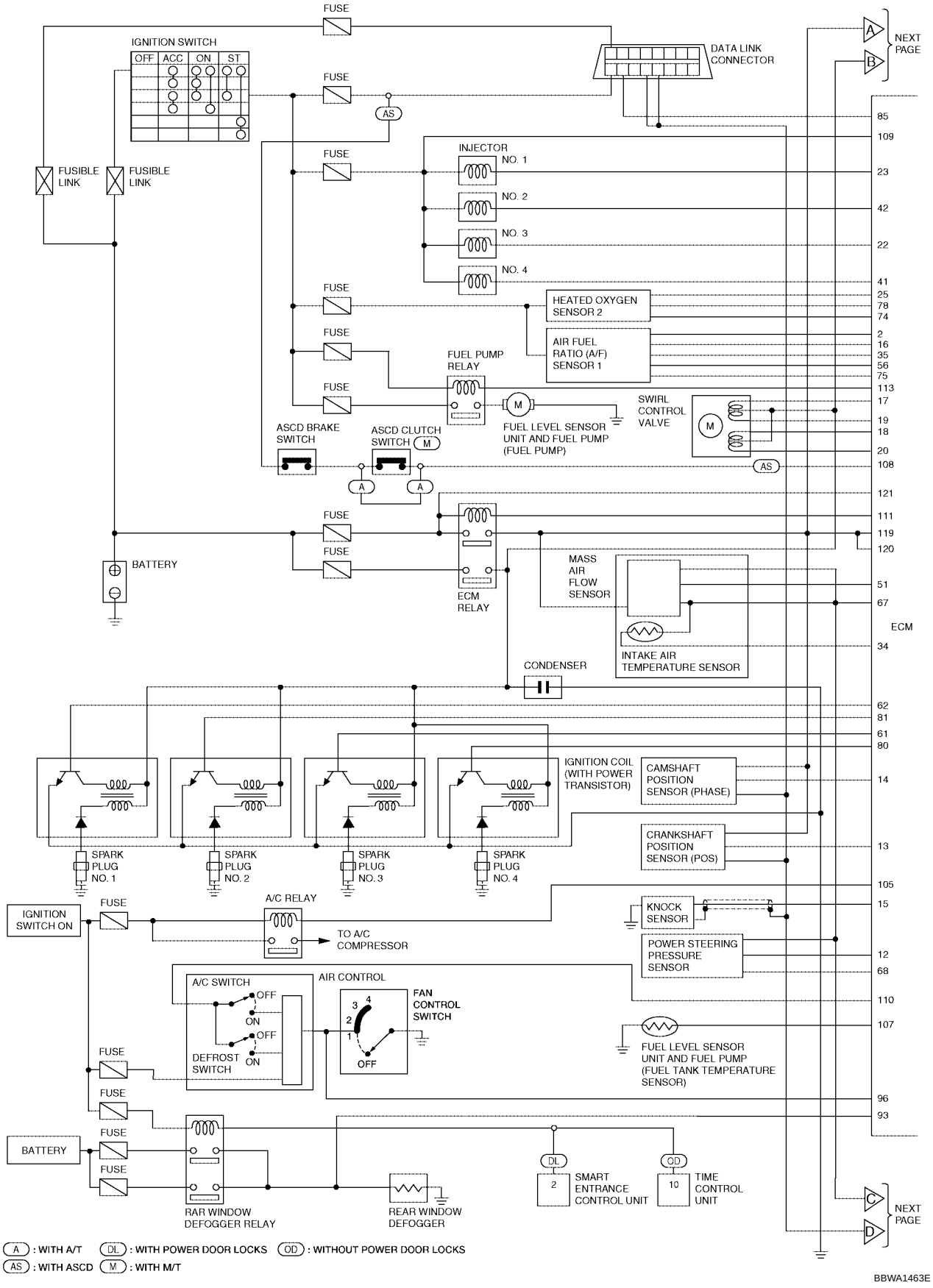
BBIA0145E

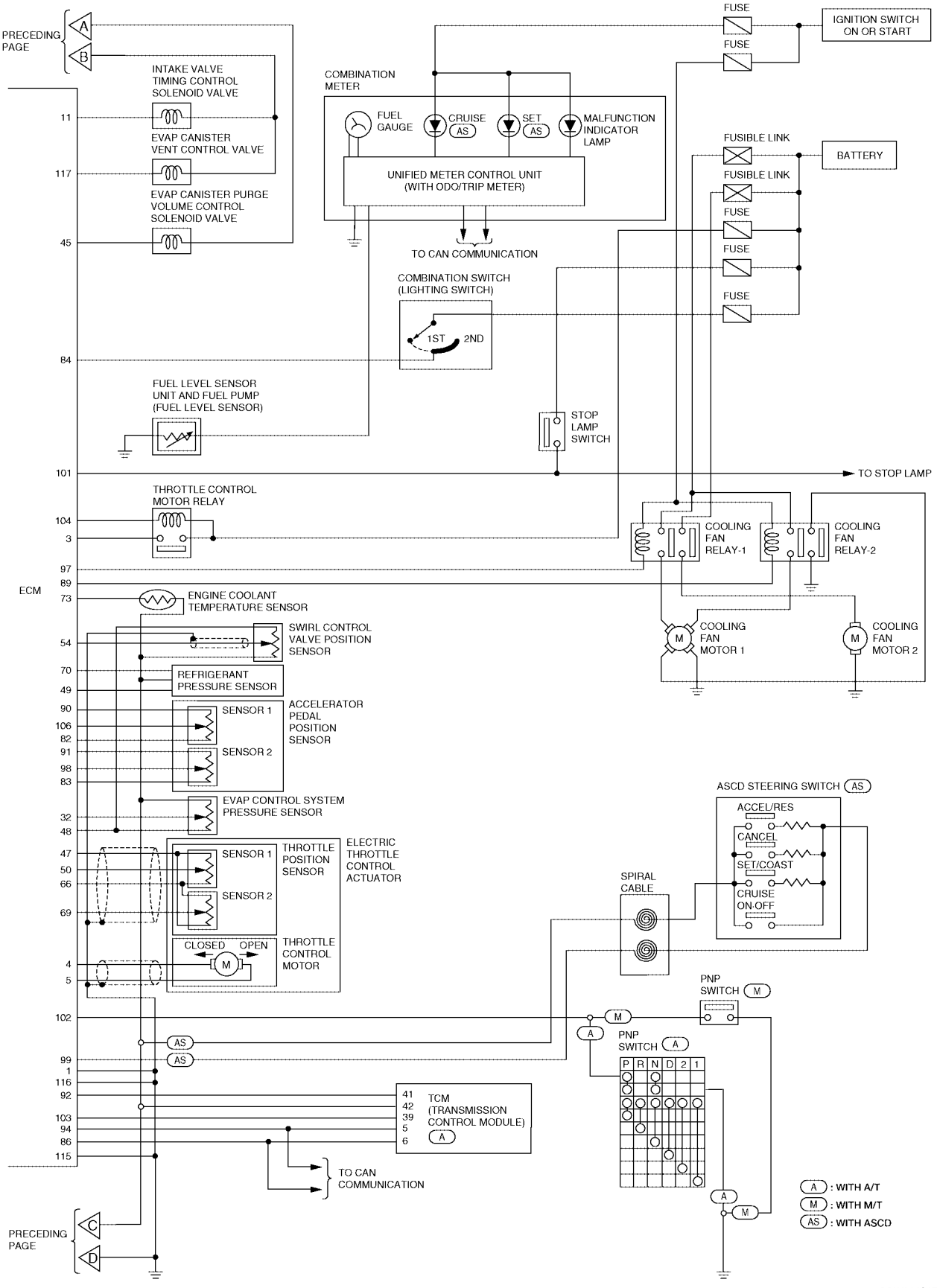

A/F sensor 1
Vehicle
Front
Three way
catalyst
(Manifold)
1
2
3
4
HO2S2
Three way
catalyst
(Under Floor)
Muffler
No. of sensor
Location of a sensor in relation the engine air flow, starting from the
fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on
PBIB1211E


Air fuel ratio (A/F) sensor 1
harness connector
Radiator
Air fuel ratio (A/F) sensor 1
Under vehicle view
Heated oxygen
sensor 2
harness connector
Heated oxygen
sensor 2
BBIA0193E

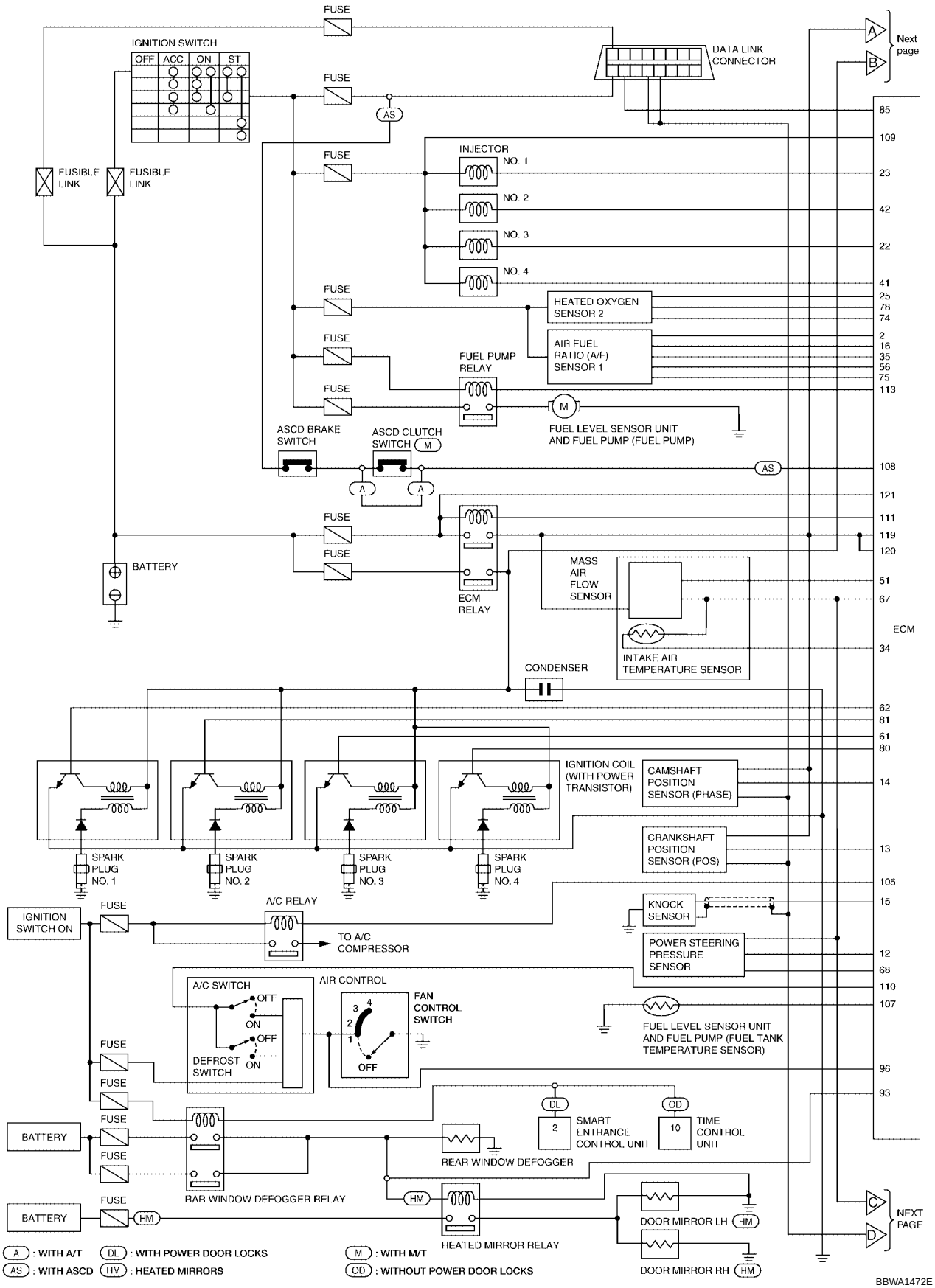
Circuit Diagram
SULEV MODELS

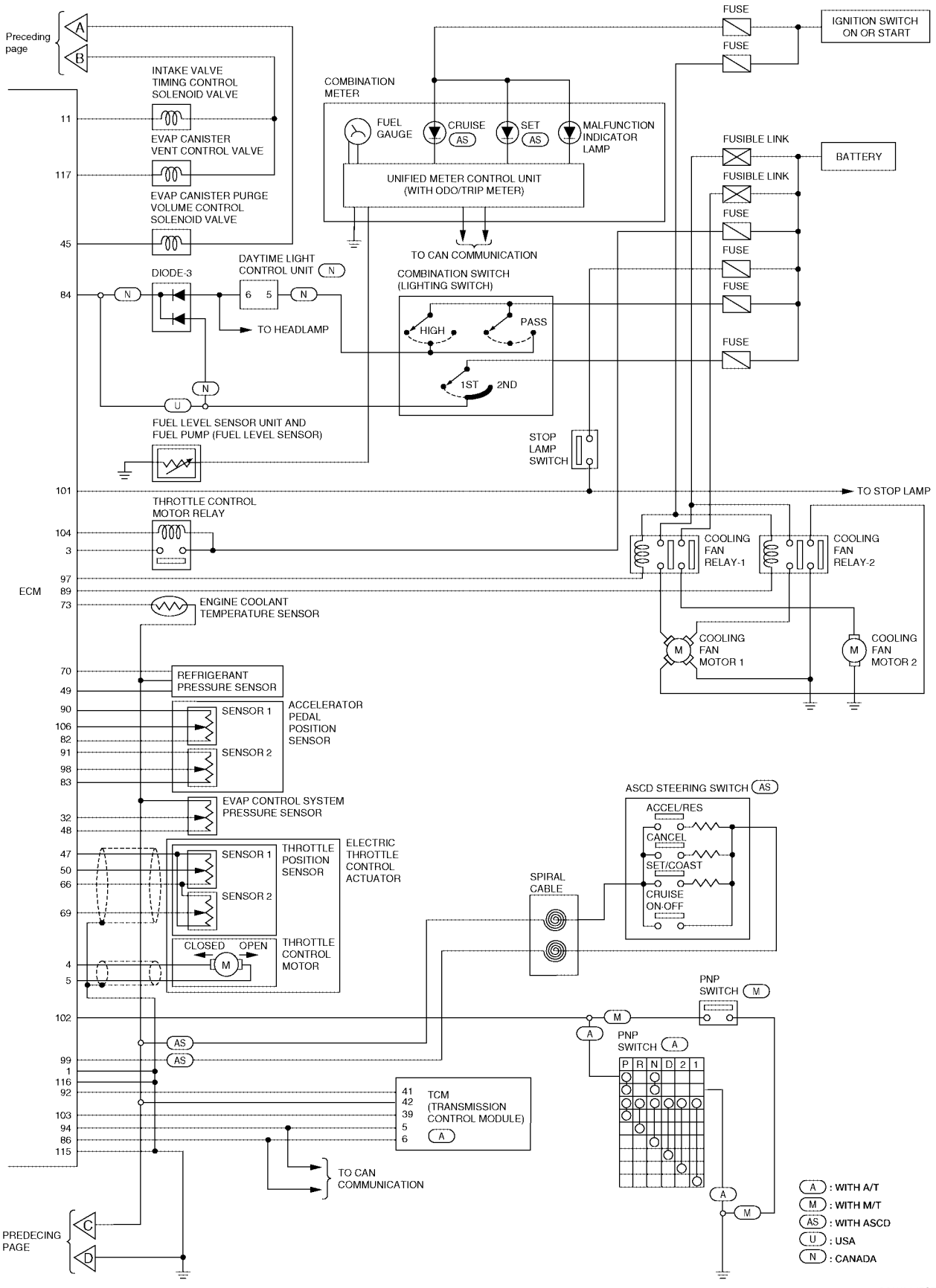
UBS00JSL




PRECEDING PAGE
A
B
INTAKE VALVE TIMING CONTROL SOLENOID VALVE
11
EVAP CANISTER VENT CONTROL VALVE
117
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
45
COMBINATION METER
FUEL GAUGE
CRUISE AS
SET AS
MALFUNCTION INDICATOR LAMP
UNIFIED METER CONTROL UNIT (WITH ODO/TRIP METER)
TO CAN COMMUNICATION
FUSE
FUSE
IGNITION SWITCH ON OR START
FUSIBLE LINK
BATTERY
FUSIBLE LINK
FUSE
FUSE
FUSE
COMBINATION SWITCH (LIGHTING SWITCH)
1ST
2ND
84
FUEL LEVEL SENSOR UNIT AND FUEL PUMP (FUEL LEVEL SENSOR)
STOP LAMP SWITCH
101
TO STOP LAMP
THROTTLE CONTROL MOTOR RELAY
104
3
97
89
73
COOLING FAN RELAY-1
COOLING FAN RELAY-2
ECM
ENGINE COOLANT TEMPERATURE SENSOR
SWIRL CONTROL VALVE POSITION SENSOR
54
70
49
REFRIGERANT PRESSURE SENSOR
ACCELERATOR PEDAL POSITION SENSOR
90
106
82
91
98
83
SENSOR 1
SENSOR 2
EVAP CONTROL SYSTEM PRESSURE SENSOR
32
48
ELECTRIC THROTTLE CONTROL ACTUATOR
47
50
66
69
THROTTLE POSITION SENSOR
SENSOR 1
SENSOR 2
CLOSED
OPEN
THROTTLE CONTROL MOTOR
4
5
M
COOLING FAN MOTOR 1
COOLING FAN MOTOR 2
ASCD STEERING SWITCH AS
ACCEL/RES
CANCEL
SET/COAST
CRUISE ON·OFF
SPIRAL CABLE
PNP SWITCH M
102
M
A
PNP SWITCH A
P R N D 2 1
AS
AS
99
1
116
92
103
94
86
115
41
42
39
5
6
A
TCM (TRANSMISSION CONTROL MODULE)
TO CAN COMMUNICATION
PRECEDING PAGE
C
D
A : WITH A/T
M : WITH M/T
AS : WITH ASCD
BBWA1464E

EXCEPT SULEV MODELS

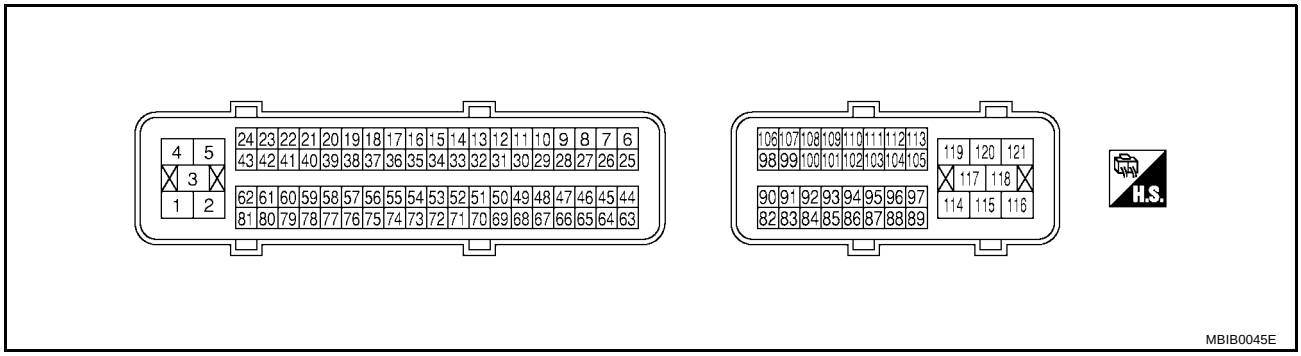



Preceding page
A
B
INTAKE VALVE TIMING CONTROL SOLENOID VALVE
EVAP CANISTER VENT CONTROL VALVE
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
11
117
45
COMBINATION METER
FUEL GAUGE
CRUISE
SET
MALFUNCTION INDICATOR LAMP
AS
UNIFIED METER CONTROL UNIT (WITH ODO/TRIP METER)
TO CAN COMMUNICATION
FUSE
IGNITION SWITCH ON OR START
FUSIBLE LINK
BATTERY
DIODE-3
DAYTIME LIGHT CONTROL UNIT
N
84
6 5
TO HEADLAMP
COMBINATION SWITCH (LIGHTING SWITCH)
HIGH
PASS
1ST
2ND
U
FUEL LEVEL SENSOR UNIT AND FUEL PUMP (FUEL LEVEL SENSOR)
STOP LAMP SWITCH
101
TO STOP LAMP
THROTTLE CONTROL MOTOR RELAY
104
3
97
89
73
ECM
ENGINE COOLANT TEMPERATURE SENSOR
COOLING FAN RELAY-1
COOLING FAN RELAY-2
COOLING FAN MOTOR 1
COOLING FAN MOTOR 2
M
70
49
REFRIGERANT PRESSURE SENSOR
90
106
82
91
98
83
ACCELERATOR PEDAL POSITION SENSOR
SENSOR 1
SENSOR 2
32
48
EVAP CONTROL SYSTEM PRESSURE SENSOR
47
50
66
69
ELECTRIC THROTTLE CONTROL ACTUATOR
THROTTLE POSITION SENSOR
THROTTLE CONTROL MOTOR
CLOSED
OPEN
4
5
ASCD STEERING SWITCH
AS
ACCEL/RES
CANCEL
SET/COAST
CRUISE ON-OFF
SPIRAL CABLE
102
PNP SWITCH
M
A
99
1
116
92
103
94
86
115
41
42
39
5
6
TCM (TRANSMISSION CONTROL MODULE)
TO CAN COMMUNICATION
P R N D 2 1
PREDECING PAGE
C
D
A : WITH A/T
M : WITH M/T
AS : WITH ASCD
U : USA
N : CANADA

BBWA1473E

ECM Harness Connector Terminal Layout

UBS00JSM

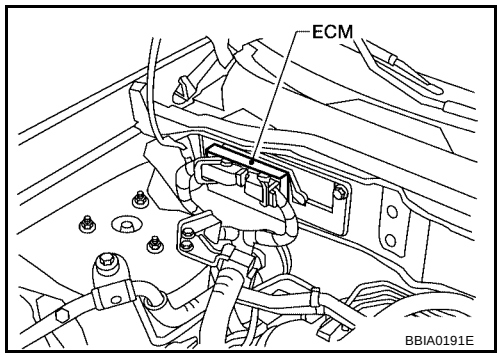


ECM Terminals and Reference Value

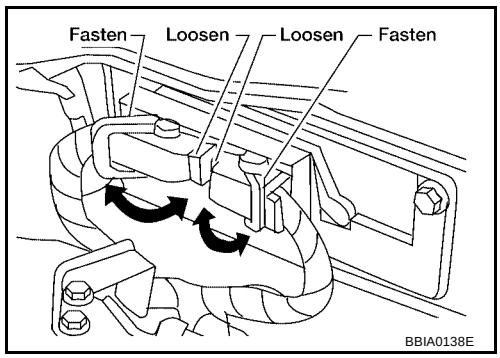
UBS00JSN

PREPARATION

1. ECM is located in the right side of the cowl top (behind the strut tower).
2. Remove ECM harness protector.



3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as show at right.
4. Connect a bread-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.

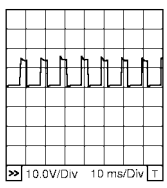


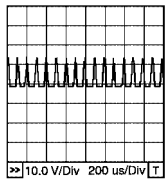
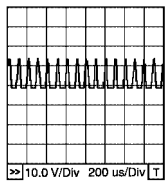
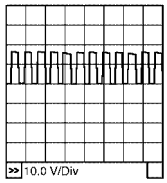
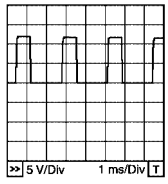
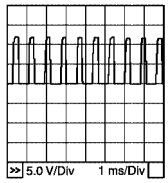
ECM INSPECTION TABLE

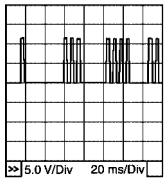
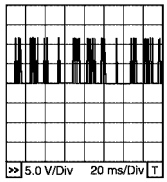
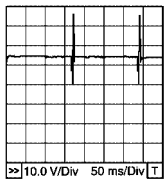
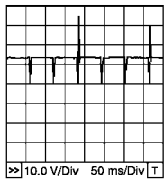
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

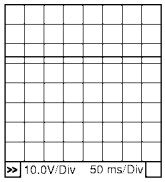
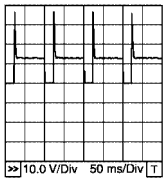
CAUTION:

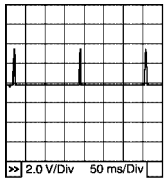
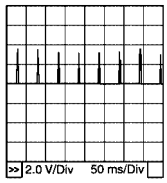
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
2	R	A/F sensor 1 heater	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	R/W	Throttle control motor power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	P	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB0534E
5	L	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB0533E
11	G/Y	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● When revving engine up to 2,500 rpm-quickly.	7 - 10V★  PBIB1790E
12	P	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned	0.4 - 0.8V
13	Y	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	Approximately 3.0V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	W/R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0526E
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
16	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	B/Y			Approximately 2.6V
56	OR			2 - 3V
75	W/L			2 - 3V
17 18 19 20	LG R/W PU/W L/Y	Swirl control valve	**[Engine is running]** ● Idle speed	0.1 - 14V
22 23 41 42	G/B R/B L/B Y/B	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	W/B	Heated oxygen sensor 2 heater	**[Engine is running]** ● **Warm-up condition** ● Engine speed: Below 3,600 rpm after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under on load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped. **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
32	L	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V
34	Y/G	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
45	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed ● Accelerator pedal is not depressed even slightly, after engine starting.	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E
47	B	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
48	R/W	Sensor power supply (EVAP control system pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
49	R/Y	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	L/R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.9 - 1.2V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.4 - 1.8V
54	Y	Swirl control valve position sensor	**[Engine is running]** ● Idle speed ● Engine coolant temperature is below 44°C (111°F).	Approximately 5V
			[Engine is running] ● **Warm-up condition** ● Idle speed ● Engine coolant temperature is above 45°C (113°F).	0 - 1.0V
61 62 80 81	L/W BR GY/R PU	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E
66	R	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	G/R	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
69	G	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
70	L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are ON (Compressor operates.)	1.0 - 4.0V
73	BR/W	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
74	R/L	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
82	B/Y	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	G	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
84	PU	Electrical load signal (Headlamp signal)	**[Lighting switch: ON]** ● Lighting switch is 2nd position	BATTERY VOLTAGE (11 - 14V)
			[Lighting switch: ON] ● Lighting switch is OFF	Approximately 0V
85	LG	DATA link connector	**[Ignition switch: ON]** ● CONSULT-II or GST is disconnected.	BATTERY VOLTAGE (11 - 14V)
86	Y	CAN communication line	**[Ignition switch: ON]**	Approximately 2.3V
89	LG/B	Cooling fan relay-2 (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is high speed operating	0 - 1.0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	R/G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
93	L/W	Electrical load signal (Rear window defogger signal)	**[Ignition switch: ON]** ● Rear window defogger switch: ON	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Rear window defogger switch: OFF	Approximately 0V
94	L	CAN communication line	**[Ignition switch: ON]**	Approximately 2.8V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
96	Y/G	Electrical load signal (Heater fan signal)	**[Engine is running]** ● Heater fan switch: ON	Approximately 0V
			[Engine is running] ● Heater fan switch: OFF	Approximately 5V
97	LG/R	Cooling fan relay-1 (Low)	**[Ignition switch: ON]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Cooling fan is operating	0 - 1.0V
98	R/B	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.28 - 0.48V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 2.0V
99	W/R	ASCD steering switch	**[Ignition switch: ON]** ● ASCD steering switch: OFF	Approximately 4V
			[Ignition switch: ON] ● MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] ● CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] ● SET/COAST switch: Pressed	Approximately 2V
101	R/G	Stop lamp switch	**[Ignition switch: ON]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Depressed	BATTERY VOLTAGE (11 - 14V)
102	G/OR	PNP switch	**[Ignition switch: ON]** ● Gear position: P or N	Approximately 0V
			[Ignition switch: ON] ● Except the above gear position	**A/T models** BATTERY VOLTAGE (11 - 14V) **M/T models** Approximately 5V
104	P	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.65 - 0.87V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 4.3V
107	OR	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	P/L	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal: Slightly depressed ● Clutch pedal and/or brake pedal: Slightly depressed (M/T models)	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Fully released ● Clutch pedal and brake pedal: Fully released (M/T models)	BATTERY VOLTAGE (11 - 14V)
109	B/R	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
113	B/P	Fuel pump relay	**[Ignition switch: ON]** ● For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.0V
			[Ignition switch: ON] ● More than 1 second after turning ignition switch ON.	BATTERY VOLTAGE (11 - 14V)
115 116	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
117	L/Y	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Buck-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

CONSULT-II Function (ENGINE)

UBS00JSO

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output of the specification for Basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECM part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

1. Diagnostic trouble codes
2. 1st trip diagnostic trouble codes
3. Freeze frame data
4. 1st trip freeze frame data
5. System readiness test (SRT) codes
6. Test values

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×	×			
		Camshaft position sensor (PHASE)		×		×	×			
		Mass air flow sensor		×		×	×			
		Engine coolant temperature sensor		×	×	×	×	×		
		A/F sensor 1		×		×			×	×
		Heated oxygen sensor 2		×		×	×		×	×
		Vehicle speed sensor		×	×	×	×			
		Accelerator pedal position sensor		×		×	×			
		Throttle position sensor		×		×	×			
		Fuel tank temperature sensor		×		×	×	×		
		EVAP control system pressure sensor		×		×	×			
		Intake air temperature sensor		×		×	×			
		Knock sensor		×						
		Refrigerant pressure sensor				×	×			
		Closed throttle position switch (accelerator pedal position sensor signal)				×	×			
		Air conditioner switch				×	×			
		Park/neutral position (PNP) switch		×		×	×			
		Stop lamp switch		×		×	×			
		Power steering pressure sensor		×		×	×			
		Battery voltage				×	×			
		Load signal				×	×			
		Swirl control valve position sensor		×		×	×			
		Fuel level sensor		×		×	×			
		ASCD steering switch		×		×	×			
		ASCD brake switch		×		×	×			
		ASCD clutch switch		×		×	×			

Item			DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injector				×	×	×		
		Power transistor (Ignition timing)				×	×	×		
		Throttle control motor relay		×		×	×			
		Throttle control motor		×						
		EVAP canister purge volume control solenoid valve		×		×	×	×		×
		Air conditioner relay				×	×			
		Fuel pump relay	×			×	×	×		
		Cooling fan relay		×		×	×	×		
		A/F sensor 1 heater		×		×	×		×	
		Heated oxygen sensor 2 heater		×		×	×		×	
		EVAP canister vent control valve	×	×		×	×	×		
		Swirl control valve		×		×	×	×		
		Intake valve timing control solenoid valve		×		×	×	×		
		Calculated load value			×	×	×			

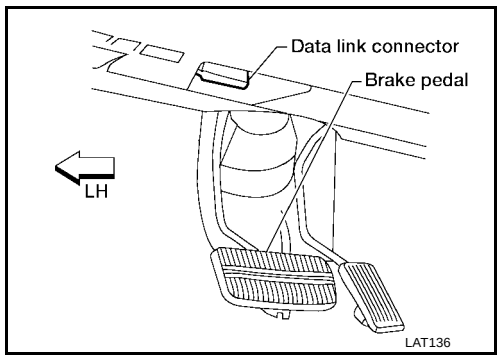
X: Applicable

*1: This item includes 1st trip DTCs.

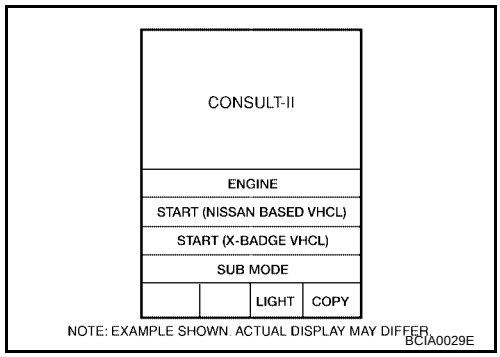
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-55 .

INSPECTION PROCEDURE

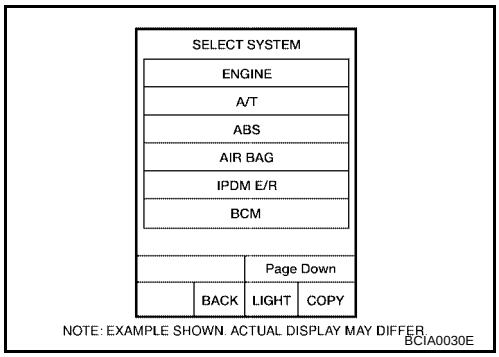
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to data link connector, which is located under LH dash panel near the fuse box cover.
3. Turn ignition switch ON.



4. Touch “START” (NISSAN BASED VHCL).

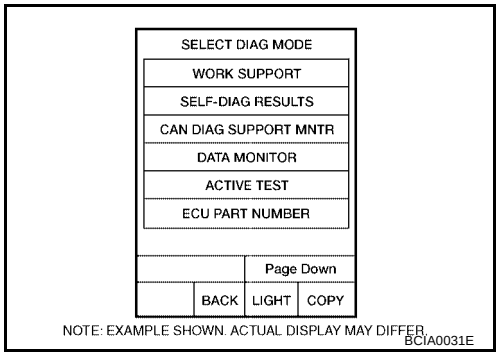


5. Touch “ENGINE”.
   If “ENGINE” is not indicated, go to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.



WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	● FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	● THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing the coefficient of self-learning control value
EVAP SYSTEM CLOSE	CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. ● IGN SW ON ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● FUEL TANK TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING “EVAP SYSTEM CLOSE” ● WHEN TRYING TO EXECUTE “EVAP SYSTEM CLOSE” UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. **NOTE:** **WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY “BATTERY VOLTAGE IS LOW. CHARGE BATTERY”, EVEN IN USING CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system
VIN REGISTRATION	● IN THIS MODE, VIN IS REGISTERED IN ECM	When registering VIN in ECM

WORK ITEM	CONDITION	USAGE
TARGET IDLE RPM ADJ*	● IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	● IDLE CONDITION	When adjusting target ignition timing

*: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of “DTC and 1st trip DTC”, refer to EC-15, "INDEX FOR DTC" .

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to EC-15, "INDEX FOR DTC" .)
FUEL SYS-B1	● “Fuel injection system status” at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. “Mode 2”: Open loop due to detected system malfunction “Mode 3”: Open loop due to driving conditions (power enrichment, deceleration enleanment) “Mode 4”: Closed loop - using oxygen sensor(s) as feedback for fuel control “Mode 5”: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	● “Long-term fuel trim” at the moment a malfunction is detected is displayed. ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	● “Short-term fuel trim” at the moment a malfunction is detected is displayed. ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	● The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	● The intake air temperature at the moment a malfunction is detected is displayed.

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE

Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the signals of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	● Accuracy becomes poor if engine speed drops below the idle rpm. ● If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor is displayed.	● When the engine is stopped, a certain value is indicated.

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
B/FUEL SCHDL [msec]		×	● "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When the engine is stopped, a certain value is indicated. ● This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S [°C] or [°F]	×	×	● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	● When the engine coolant temperature sensor is open or short-circulated, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1) [V]	×	×	● The A/F signal computed from the input signal of the A/F sensor 1 is displayed.	
HO2S2 (B1) [V]	×		● The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S2 MNTR (B1) [RICH/LEAN]	×		● Display of heated oxygen sensor 2 signal: RICH... means the amount of oxygen after three way catalyst is relatively small. LEAN... means the amount of oxygen after three way catalyst is relatively large.	● When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	×	×	● The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT [V]	×	×	● The power supply voltage of ECM is displayed.	
ACCEL SEN 1 [V]	×	×	● The accelerator pedal position sensor signal voltage is displayed.	● ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2 [V]	×			
THRTL SEN 1 [V]	×	×	● The throttle position sensor signal voltage is displayed.	● THRTL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
THRTL SEN 2 [V]	×			
FUEL T/TMP SE [°C] or [°F]	×		● The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	
VEHICLE SPEED [km/h] or [MPH]	×	×	● Indicates the vehicle speed computed from the revolution sensor signal.	
INT/A TEMP SE [°C] or [°F]	×	×	● The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
EVAP SYS PRES [V]	×		● The signal voltage of EVAP control system pressure sensor is displayed.	
FUEL LEVEL SE [V]	×		● The signal voltage of the fuel level sensor is displayed.	
START SIGNAL [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the starter signal.	● After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	×	×	● Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
AIR COND SIG [ON/OFF]	×	×	● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	×	×	● [ON/OFF] condition of the power steering pressure sensor as determined by the power steering pressure sensor signal is indicated.	
LOAD SIGNAL [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the electrical load signal. ON... Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF... Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from ignition switch.	
HEATER FAN SW [ON/OFF]	×		● Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW [ON/OFF]	×		● Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1 [msec]		×	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	● When the engine is stopped, a certain computed value is indicated.
IGN TIMING [BTDC]		×	● Indicates the ignition timing computed by ECM according to the input signals.	● When the engine is stopped, a certain value is indicated.
CAL/LD VALUE [%]			● “Calculated load value” indicates the value of the current airflow divided by peak airflow.	
MASS AIRFLOW [g·m/s]			● Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V [%]			● Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
SWRL C/V (B1) [STEP]			● Indicates the swirl control valve computed by the ECM according to the input signal. ● The opening becomes larger as the valve increases.	
INT/V TIM (B1) [°CA]			● Indicates [°CA] of intake camshaft advanced angle.	
INT/V SOL (B1) [%]			● The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signal) is indicated. ● The advance angle becomes larger as the value increases.	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
AIR COND RLY [ON/OFF]		×	● The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY [ON/OFF]		×	● Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
VENT CONT/V [ON/OFF]			● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. ON... Closed OFF... Open	
THRTL RELAY [ON/OFF]		×	● Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN [HI/LOW/OFF]			● Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI... High speed operation LOW... Low speed operation OFF... Stop	
HO2S2 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
IDL A/V LEARN [YET/CMPLT]			● Display the condition of idle air volume learning YET... Idle air volume learning has not been performed yet. CMPLT... Idle air volume learning has already been performed successfully.	
TRVL AFTER MIL [km] or [mile]			● Distance traveled while MIL is activated.	
A/F S1 HTR (B1) [%]			● Indicates A/F sensor 1 heater control value computed by ECM according to the input signals. ● The current flow to the heater becomes larger as the value increases.	
AC PRESS SEN [V]	×		● The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE [km/h] or [mph]			● The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
SET VHCL SPD [km/h] or [mph]			● The preset vehicle speed is displayed.	
MAIN SW [ON/OFF]			● Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW [ON/OFF]			● Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW [ON/OFF]			● Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW [ON/OFF]			● Indicates [ON/OFF] condition from SET/COAST switch signal.	

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
BRAKE SW1 [ON/OFF]			● Indicates [ON/OFF] condition from ASCD brake switch signal, and ASCD clutch switch signal (M/T models).	
BRAKE SW2 [ON/OFF]			● Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT [NON/CUT]			● Indicates the vehicle cruise condition. NON... Vehicle speed is maintained at the ASCD set speed. CUT...Vehicle speed increased to excessively high compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT [NON/CUT]			● Indicates the vehicle cruise condition. NON... Vehicle speed is maintained at the ASCD set speed. CUT...Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
AT OD MONITOR [ON/OFF]			● Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM.	● For M/T models always “OFF” is displayed.
AT OD CANCEL [ON/OFF]			● Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM.	● For M/T models always “OFF” is displayed.
CRUISE LAMP [ON/OFF]			● Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SWL/C POSI SE [degree]			● Indicates the swirl control valve opening angle computed by ECM according to signal voltage of the swirl control valve position sensor.	
SET LAMP [ON/OFF]			● Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
Voltage [V]			● Voltage, frequency, duty cycle or pulse width measured by the probe.	● Only “#” is displayed if item is unable to be measured. ● Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequency [msec], [Hz] or [%]				
DUTY-HI				
DUTY-LOW				
PLS WIDTH-HI				
PLS WIDTH-LOW				

DATA MONITOR (SPEC) MODE
Monitored Item

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
ENG SPEED [rpm]	×		● Indicates the engine speed computed from the signal of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor specification is displayed.	● When engine is running specification range is indicated.

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
B/FUEL SCHDL [msec]			● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	● When engine is running specification range is indicated.
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When engine is running specification range is indicated. ● This data also includes the data for the air-fuel ratio learning control.

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	● Engine: Return to the original trouble condition ● Change the amount of fuel injection using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Fuel injector ● A/F sensor 1
IGNITION TIMING	● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Perform Idle Air Volume Learning.
POWER BALANCE	● Engine: After warming up, idle the engine. ● A/C switch OFF ● Shift lever: P or N ● Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injector ● Power transistor ● Spark plug ● Ignition coil
COOLING FAN	● Ignition switch: ON ● Turn the cooling fan “HI”, “LOW” and “OFF” with CONSULT-II.	Cooling fan moves and stops.	● Harness and connectors ● Cooling fan relay ● Cooling fan motor
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injector
FUEL PUMP RELAY	● Ignition switch: ON (Engine stopped) ● Turn the fuel pump relay “ON” and "OFF" using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	● Harness and connectors ● Fuel pump relay
VALVE TIMING SOL	● Ignition switch: ON (Engine stopped) ● Turn solenoid valve “ON” and “OFF” with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	● Harness and connectors ● Solenoid valve
PURG VOL CONT/V	● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connectors ● Solenoid valve

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL/T TEMP SEN	● Change the fuel tank temperature using CONSULT-II.		
VENT CONTROL/V	● Ignition switch: ON (Engine stopped) ● Turn solenoid valve “ON” and “OFF” with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	● Harness and connectors ● Solenoid valve
SWIRL CONTROL VALVE	● Ignition switch: ON (Engine stopped) ● Changes swirl control valve opening step using CONSULT-II.	Swirl control valve makes an operating sound.	● Harness and connectors ● Swirl control valve

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to EC-56, "SYSTEM READINESS TEST (SRT) CODE" .

SRT WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC WORK SUPPORT Mode

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	PURGE FLOW P0441	Refer to corresponding trouble diagnosis for DTC.	EC-302
	EVAP SML LEAK P0442/P1442*		EC-308
	EVAP V/S SML LEAK P0456/P1456*		EC-355
	PURG VOL CN/V P1444		EC-526
A/F SEN1	A/F SEN 1 (B1) P1273		EC-490
	A/F SEN 1 (B1) P1274		EC-490
	A/F SEN1 (B1) P1276		EC-504
	A/F SEN1 (B1) P1278		EC-510
	A/F SEN1 (B1) P1279		EC-518
HO2S2	HO2S2 (B1) P0139		EC-233
	HO2S2 (B1) P1146		EC-437
	HO2S2 (B1) P1147		EC-445

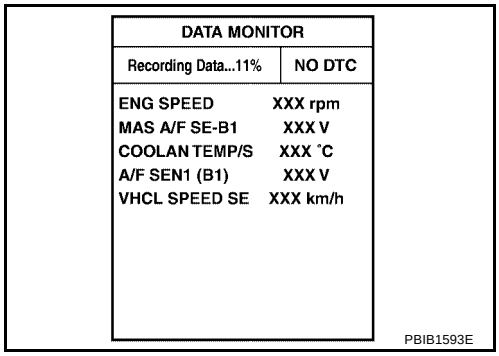
*: DTC P1442 and P1456 does not apply to B15 models but appears in DTC Work Support Mode screens.

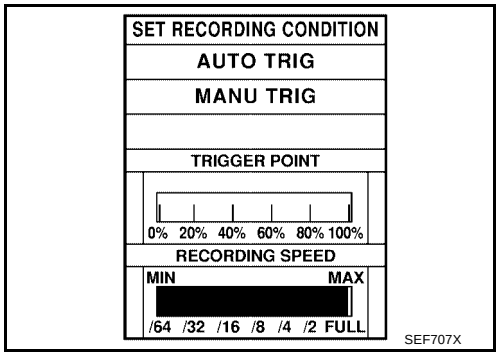
REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

Description

CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

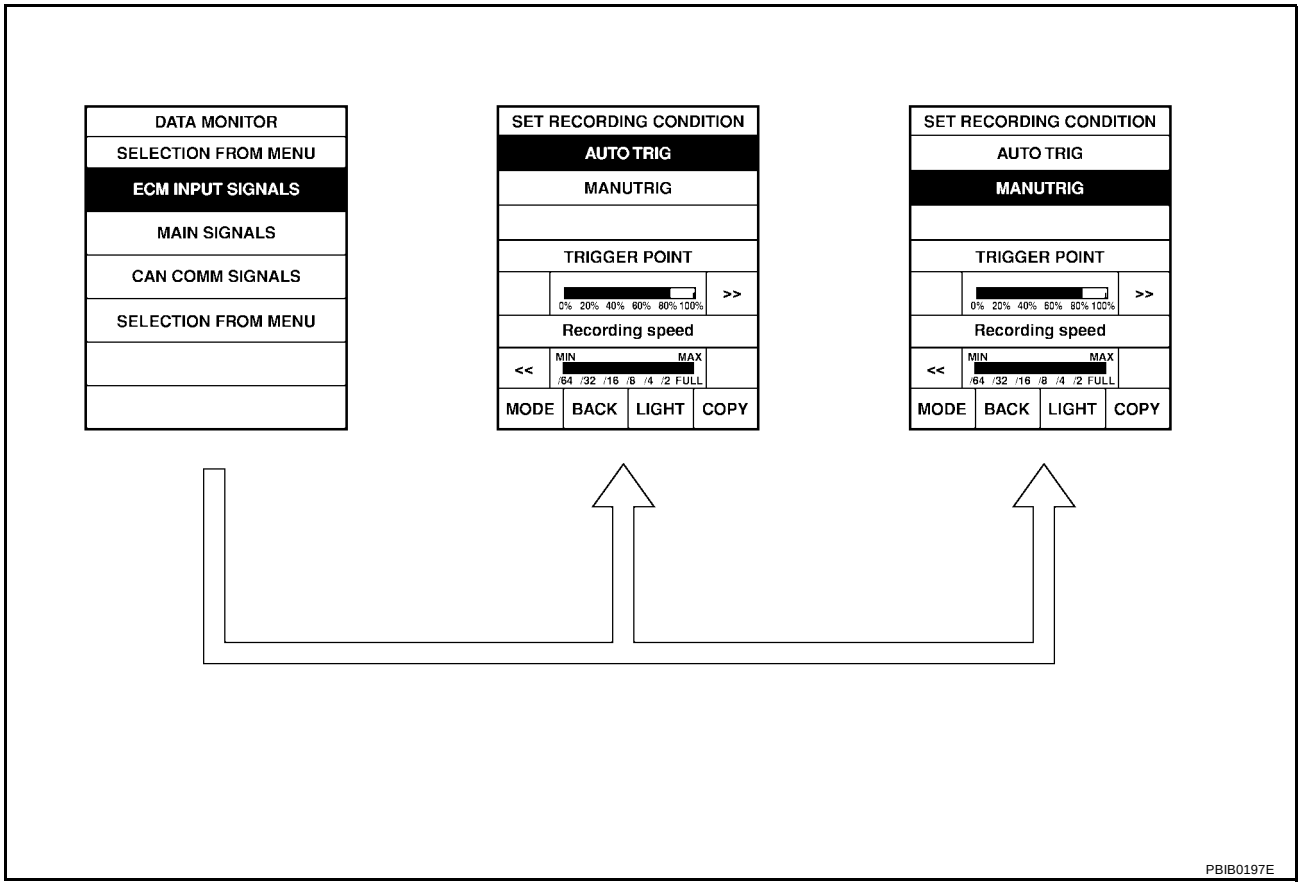
1. “AUTO TRIG” (Automatic trigger):
   - The malfunction will be identified on the CONSULT-II screen in real time.
     In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
     At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown at right, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed.
     The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II OPERATION MANUAL.
2. “MANU TRIG” (Manual trigger):
   - DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
     DATA MONITOR can be performed continuously even though a malfunction is detected.





Operation

1. “AUTO TRIG”
   - While trying to detect the DTC/1st trip DTC by performing the DTC Confirmation Procedure, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.
   - While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.
     When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the DTC Confirmation Procedure, the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to “Incident Simulation Tests” in GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" .)
2. “MANU TRIG”
   - If the malfunction is displayed as soon as “DATA MONITOR” is selected, reset CONSULT-II to “MANU TRIG”. By selecting “MANU TRIG” you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.

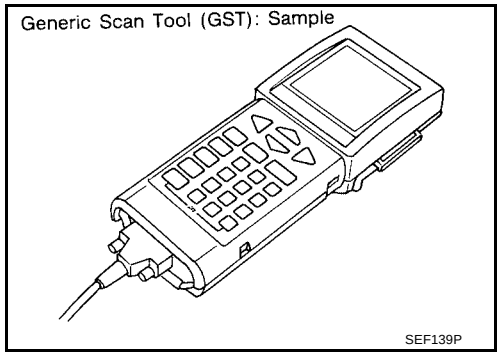


Generic Scan Tool (GST) Function

UBS00JSP

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained below.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



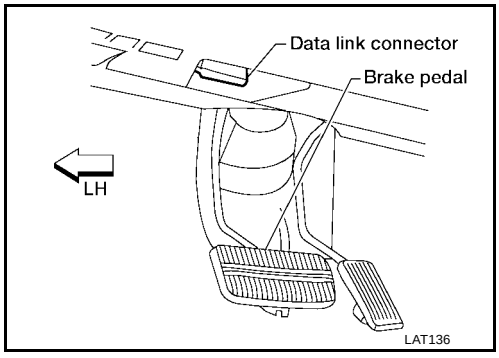
FUNCTION

Diagnostic service		Function
Service $01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service $02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-56, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .
Service $03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.

Diagnostic service		Function
Service $04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (Service $01) ● Clear diagnostic trouble codes (Service $03) ● Clear trouble code for freeze frame data (Service $01) ● Clear freeze frame data (Service $02) ● Reset status of system monitoring test (Service $01) ● Clear on board monitoring test results (Service $06 and $07)
Service $06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service $07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service $08	—	This diagnostic service can close EVAP system in ignition switch ON position (Engine stopped). When this diagnostic service is performed, EVAP canister vent control valve can be closed. In the following conditions, this diagnostic service cannot function. ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch OFF ● Low fuel temperature ● Too much pressure is applied to EVAP system
Service $09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

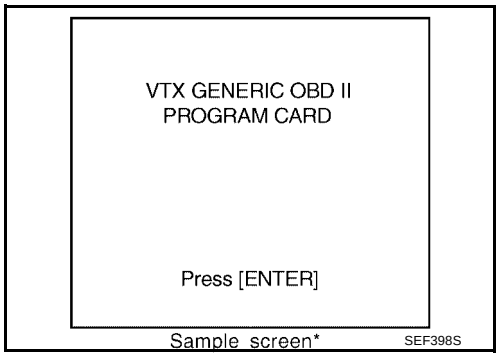
INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect GST to data link connector, which is located under LH dash panel near the fuse box cover.
3. Turn ignition switch ON.



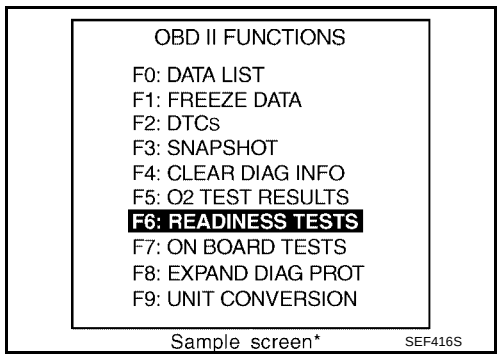
4. Enter the program according to instruction on the screen or in the operation manual.

(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic service according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.



CONSULT-II Reference Value in Data Monitor

UBS00JSQ

Remarks:
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
  * Specification data may not be directly related to their components signals/values/operations.
  (i.e., Adjust ignition timing with a timing light before monitoring IGN TIMING. Specification data might be displayed even when ignition timing is not adjusted to specification. This IGN TIMING monitors the data calculated by the ECM according to the input signals from the camshaft position sensor and other ignition timing related sensors.)

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-153, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
B/FUEL SCHDL	See EC-153, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
A/F ALPHA-B1	See EC-153, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ←→ 0.6 - 1.0V
HO2S2 MNTR (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle to 3,000 rpm quickly	LEAN ←→ RICH
VHCL SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication.		Almost the same speed as the speedometer indication.
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.65 - 0.87V
		Accelerator pedal: Fully depressed	More than 4.3V
ACCEL SEN2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.56 - 0.96V
		Accelerator pedal: Fully depressed	More than 4.0V
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D(A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
EVAP SYS PRES	● Ignition switch: ON		1.8 - 4.8V
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	● Engine: After warming up, idle the engine	A/C switch: OFF	OFF
		A/C switch: ON (Compressor operates)	ON
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Except above	OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel in neutral position (Forward direction)	OFF
		The steering wheel being is turned	ON
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch and/or lighting switch is in 2nd	ON
		Rear window defogger switch is OFF and lighting switch is OFF	OFF
IGNITION SW	● Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	● Engine: After warming up, idle the engine	Heater fan is operating	ON
		Heater fan is not operating	OFF
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 3.2 msec
IGN TIMING	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No-load	Idle	A/T 18°+5° BTDC M/T 7°±5° BTDC
		2,000 rpm	More than 25° BTDC
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No-load	Idle	20.0 - 35.5%
		2,500 rpm	12.0 - 30.0%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No-load	Idle	1.4 - 4.0 g·m/s
		2,500 rpm	5.0 - 10.0 g·m/s
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No-load	Idle (Accelerator pedal is not depressed even slightly, after engine starting.)	0%
		2,000 rpm	—
SWL C/V (B1)	● Engine: Idle the engine	Engine coolant temperature is below 44°C (111°F)	0 - 5 step
		Engine coolant temperature is above 45°C (113°F)	115 - 120 step
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No - load	Idle	0% - 2%
		When revving engine up to 2,000 rpm quickly	Approx. 0% - 80%
AIR COND RLY	● Air conditioner switch: OFF → ON		OFF → ON

MONITOR ITEM	CONDITION		SPECIFICATION
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 1 seconds) ● Engine running and cranking ● When engine is stopped (Stops in 1 seconds)		ON
	● Except as shown above		OFF
VENT CONT/V	● Ignition switch: ON		OFF
THRTL RELAY	● Ignition switch: ON		ON
INT/V TIM (B1)	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No - load	Idle	–5° - 5°CA
		When revving engine up to 2,000 rpm quickly	Approx. 0° - 30°CA
COOLING FAN	● After warming up engine, idle the engine. ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 104°C (219°F)	LOW
		Engine coolant temperature is 105°C (221°F) or more	HIGH
HO2S2 HTR (B1)	● Engine speed: Above 3,600 rpm		OFF
	● Engine speed is below 3,600 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.		ON
TRVL AFTER MIL	● Ignition switch: ON	Vehicle has traveled after MIL has turned ON	0 - 65,535 km (0 - 40,723 mile)
A/F S1 HTR (B1)	● Engine: After warming up, idle the engine		0 - 100%
SWL/C POSI SE	● Engine: Idle the engine	Engine coolant temperature is below 44°C (111°F)	Approx. 0 deg.
		Engine coolant temperature is above 45°C (113°F)	Approx. 80 deg.
AC PRESS SEN	● Ignition switch: ON (Engine stopped)		Approx. 0V
	● Engine: Idle ● Air conditioner switch: OFF		1.0 - 4.0V
VHCL SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication.		Almost the same speed as the speedometer indication.
SET VHCL SPD	● Engine: Running	ASCD: Operating	The preset vehicle speed is displayed.
MAIN SW	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	● Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	● Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1	● Ignition switch: ON	Clutch pedal (M/T) and brake pedal: Fully released	ON
		Clutch pedal (M/T) and/or brake pedal: Depressed	OFF

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW2	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly Depressed	ON
CRUISE LAMP	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
SET LAMP	● MAIN switch: ON ● When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD is operating	ON
		ASCD is not operating	OFF

*: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.

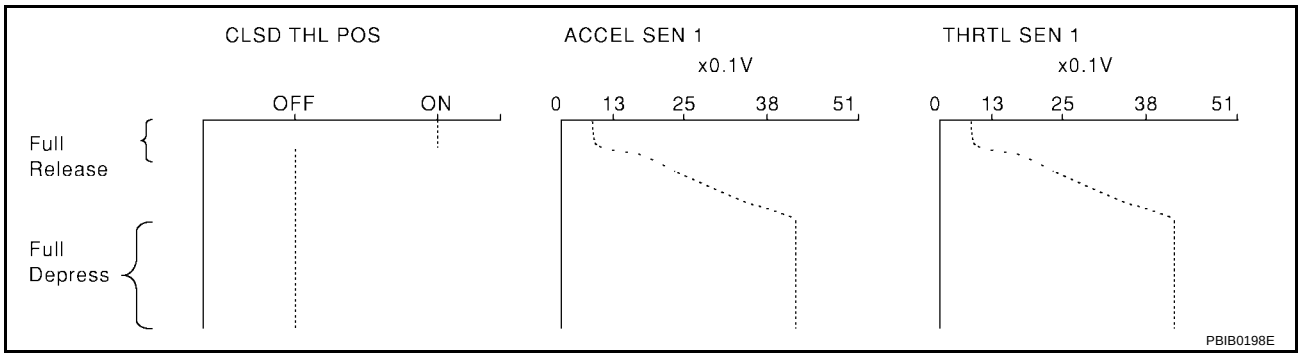
Major Sensor Reference Graph in Data Monitor Mode

UBS00JSR

The following are the major sensor reference graphs in “DATA MONITOR” mode.

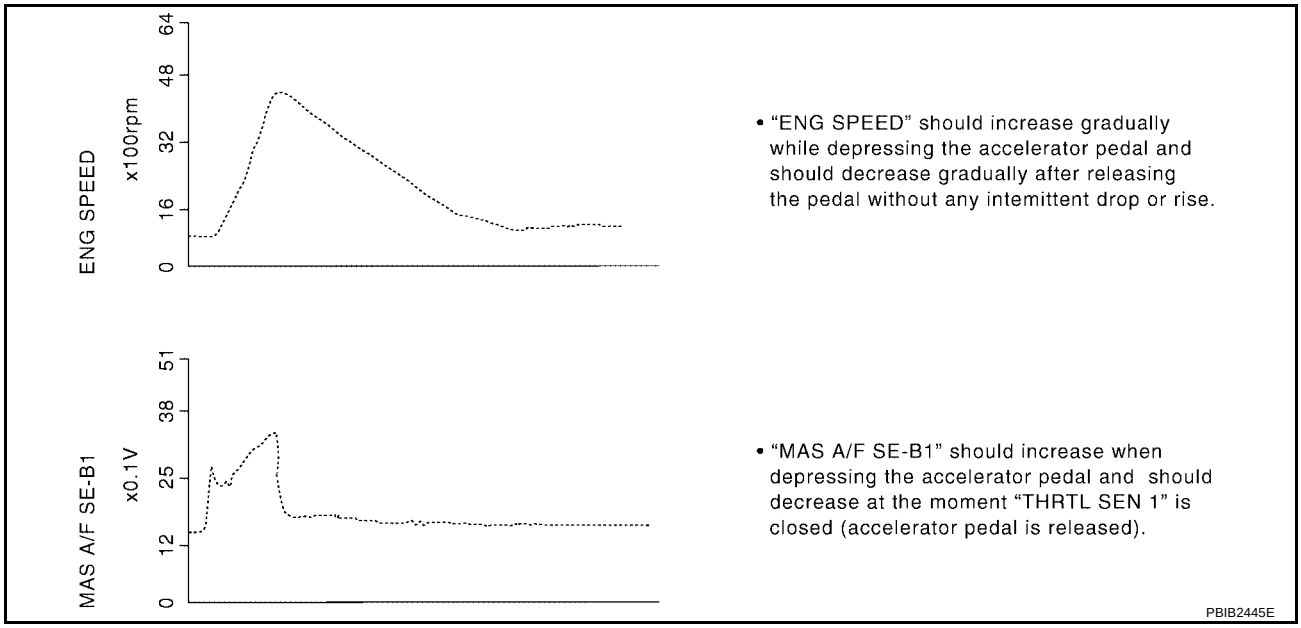
CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

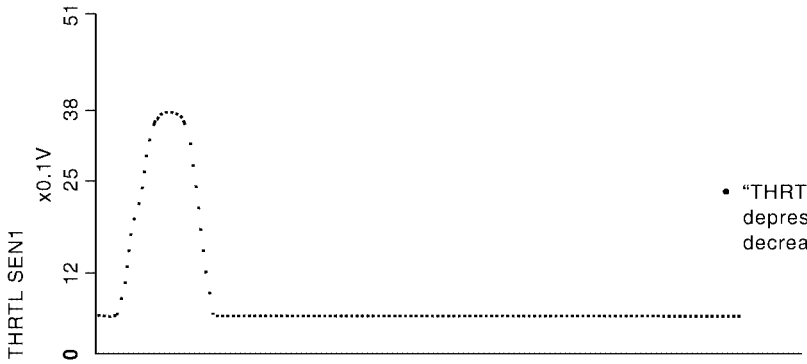
Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch ON and with selector lever in D position (A/T models) or with shift lever in 1st position (M/T models).
The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from ON to OFF.



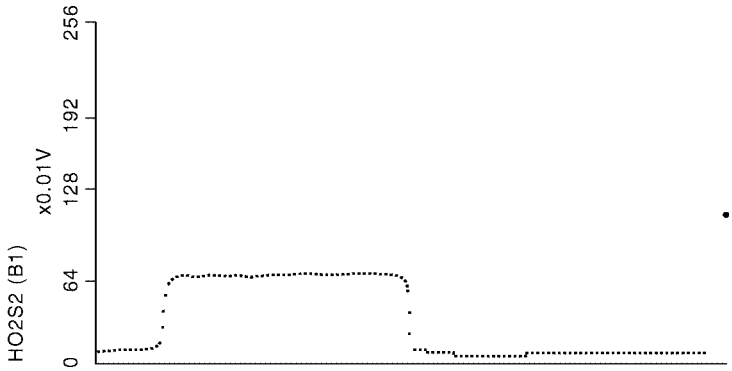
ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), INJ PULSE-B1

Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL SEN 1”, “HO2S2 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.
Each value is for reference, the exact value may vary.

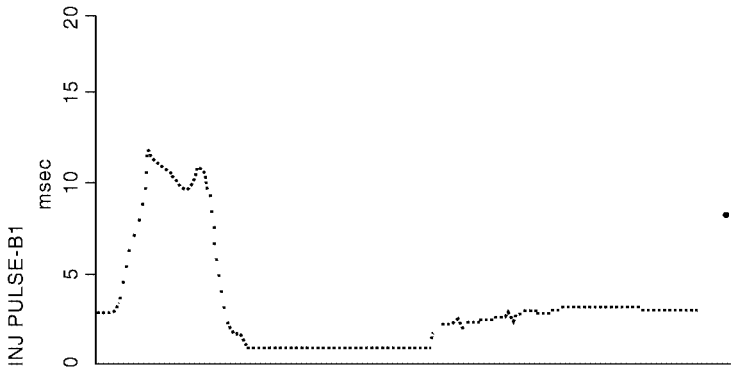




- "THRTL SEN1" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

PBIB2099E

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

UBS00JSS

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.
The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

UBS00JST

- Vehicle driven distance: More than 5,000 km (3,017 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm^2 , 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up*1
- Electrical load: Not applied*2
- Engine speed: Idle

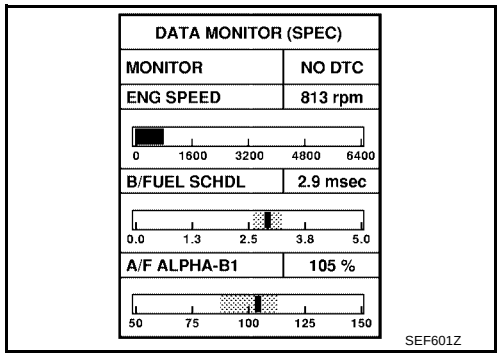
*1: For A/T models, after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
For M/T models, after the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
*2: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

Inspection Procedure

UBS00JSU

NOTE:
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

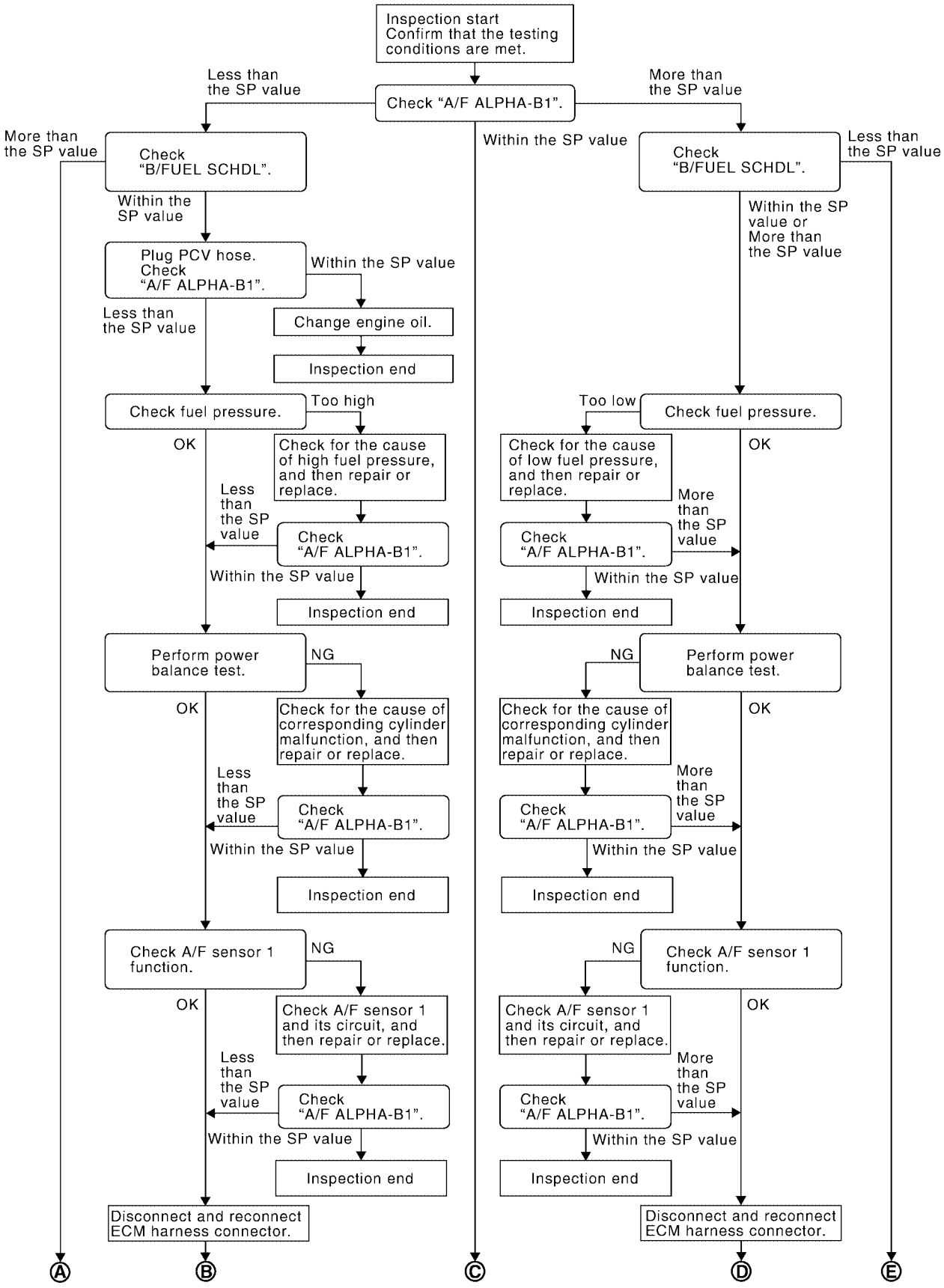
1. Perform EC-74, "Basic Inspection" .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go toEC-154, "Diagnostic Procedure" .



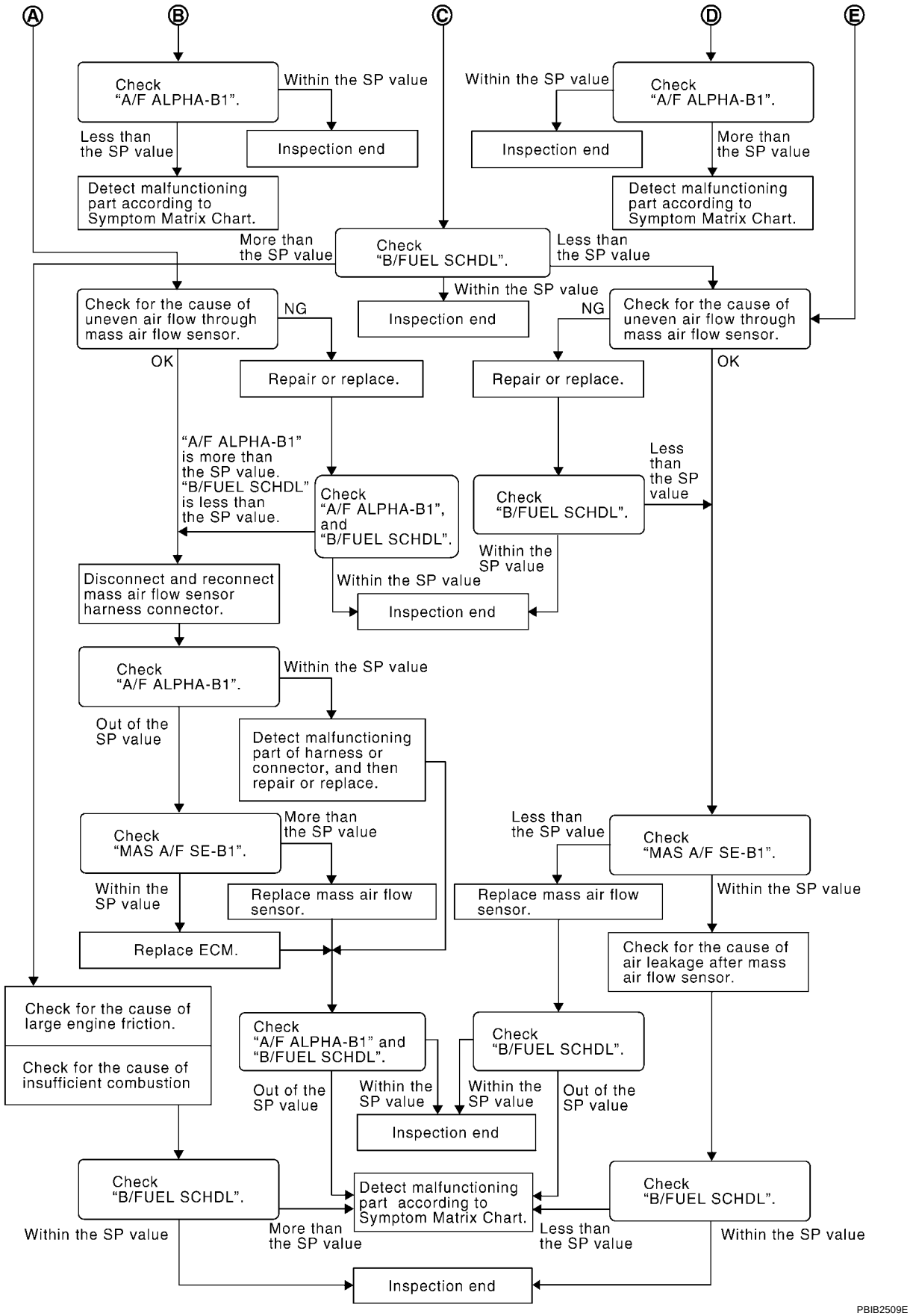
Diagnostic Procedure

UBS00JSV

OVERALL SEQUENCE



PBIB2318E

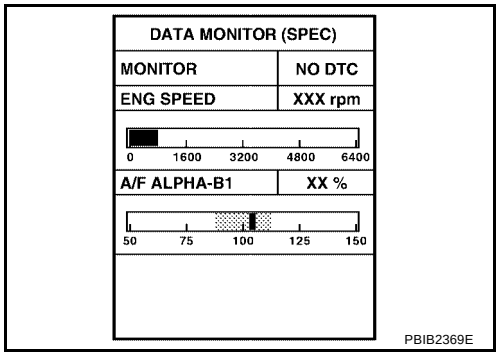

Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Check "A/F ALPHA-B1".
Within the SP value
Less than the SP value
Inspection end
Detect malfunctioning part according to Symptom Matrix Chart.
Within the SP value
Check "A/F ALPHA-B1".
Inspection end
More than the SP value
Detect malfunctioning part according to Symptom Matrix Chart.
More than the SP value
Check "B/FUEL SCHDL".
Less than the SP value
Within the SP value
Inspection end
Check for the cause of uneven air flow through mass air flow sensor.
NG
OK
Repair or replace.
NG
Check for the cause of uneven air flow through mass air flow sensor.
OK
Repair or replace.
"A/F ALPHA-B1" is more than the SP value. "B/FUEL SCHDL" is less than the SP value.
Check "A/F ALPHA-B1", and "B/FUEL SCHDL".
Within the SP value
Inspection end
Check "B/FUEL SCHDL".
Less than the SP value
Within the SP value
Disconnect and reconnect mass air flow sensor harness connector.
Check "A/F ALPHA-B1".
Within the SP value
Out of the SP value
Detect malfunctioning part of harness or connector, and then repair or replace.
Check "MAS A/F SE-B1".
More than the SP value
Within the SP value
Replace mass air flow sensor.
Replace ECM.
Less than the SP value
Check "MAS A/F SE-B1".
Within the SP value
Replace mass air flow sensor.
Check for the cause of air leakage after mass air flow sensor.
Check for the cause of large engine friction.
Check for the cause of insufficient combustion
Check "A/F ALPHA-B1" and "B/FUEL SCHDL".
Out of the SP value
Within the SP value
Check "B/FUEL SCHDL".
Within the SP value
Out of the SP value
Inspection end
Check "B/FUEL SCHDL".
Within the SP value
More than the SP value
Detect malfunctioning part according to Symptom Matrix Chart.
Less than the SP value
Check "B/FUEL SCHDL".
Within the SP value
Inspection end
PBIB2509E

DETAILED PROCEDURE

1. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-153, "Testing Condition" .
3. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

   NOTE:
   Check “A/F ALPHA-B1” for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

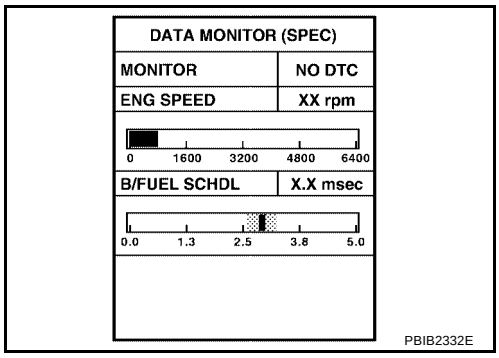


OK or NG

OK >> GO TO 17.
NG (Less than the SP value)>>GO TO 2.
NG (More than the SP value)>>GO TO 3.

2. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

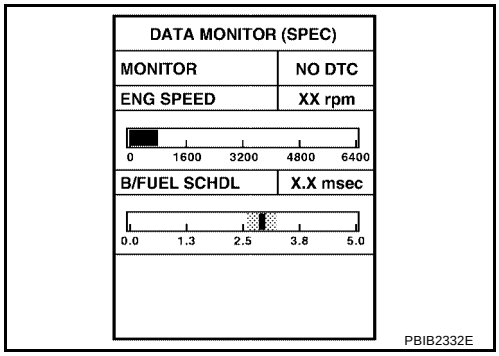


OK or NG

OK >> GO TO 4.
NG (More than the SP value)>>GO TO 19.

3. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.



OK or NG

OK >> GO TO 6.
NG (More than the SP value)>>GO TO 6.
NG (Less than the SP value)>>GO TO 25.

4. CHECK “A/F ALPHA-B1”

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 5.
NG >> GO TO 6.

5. CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil.

NOTE:
This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> **INSPECTION END**

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-94, "Fuel Pressure Check" .)

OK or NG

OK >> GO TO 9.
NG (Fuel pressure is too high)>>Replace fuel pressure regulator, refer to EM-21 . GO TO 8.
NG (Fuel pressure is too low)>>GO TO 7.

7. DETECT MALFUNCTIONING PART

1. Check the following.

- Clogged and bent fuel hose and fuel tube
- Clogged fuel filter
- Fuel pump and its circuit (Refer to EC-620 .)

2. If NG, repair or replace the malfunctioning part. (Refer to EC-94 .)
If OK, replace fuel pressure regulator.

>> GO TO 8.

8. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

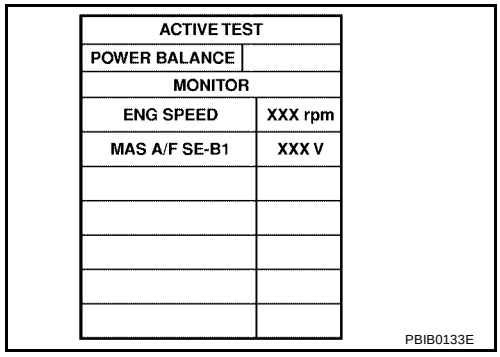
OK >> **INSPECTION END**
NG >> GO TO 9.

9. PERFORM POWER BALANCE TEST

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Make sure that the each cylinder produces a momentary engine speed drop.

OK or NG

OK >> GO TO 12.
NG >> GO TO 10.



10. DETECT MALFUNCTIONING PART

1. Check the following.
- Ignition coil and its circuit (Refer to EC-601 .)
- Fuel injector and its circuit (Refer to EC-614 .)
- Intake air leakage
- Low compression pressure (Refer to EM-55 .)
2. If NG, repair or replace the malfunctioning part.
   If OK, replace fuel injector. (It may be caused by leakage from fuel injector or clogging.)

>> GO TO 11.

11. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 12.

12. CHECK A/F SENSOR 1 FUNCTION

Perform all DTC Confirmation Procedure related with A/F sensor 1.

- For DTC P1271, refer to EC-478, "DTC Confirmation Procedure" .
- For DTC P1272, refer to EC-484, "DTC Confirmation Procedure" .
- For DTC P1273, refer to EC-490, "DTC Confirmation Procedure" .
- For DTC P1274, refer to EC-497, "DTC Confirmation Procedure" .
- For DTC P1276, refer to EC-504, "DTC Confirmation Procedure" .
- For DTC P1278, refer to EC-511, "DTC Confirmation Procedure" .
- For DTC P1279, refer to EC-518, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 15.
NG >> GO TO 13.

13. CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnostic Procedure according to corresponding DTC.

>> GO TO 14.

14. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

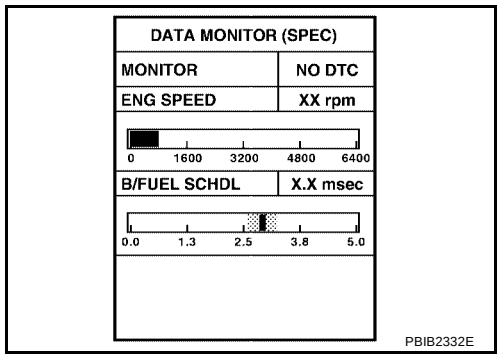
OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-105, "Symptom Matrix Chart" .

17. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG (More than the SP value)>>GO TO 18.
NG (Less than the SP value)>>GO TO 25.



18. DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of power steering, alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.
2. Check for the cause of insufficient combustion. Refer to the following.
- Valve clearance malfunction
- Intake valve timing control function malfunction
- Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

OK >> GO TO 21.
NG >> Repair or replace malfunctioning part, and then GO TO 20.

20. CHECK “A/F ALPHA-B1” AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG (“B/FUEL SCHDL” is more, “A/F ALPHA-B1” is less than the SP value)>>GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

22. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

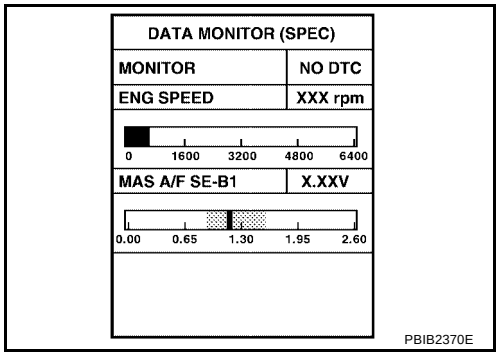
OK >> 1. Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-185 .
2. GO TO 29.
NG >> GO TO 23.

23. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 24.
NG (More than the SP value)>>Replace mass air flow sensor, and then GO TO 29.



24. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS(NATS) system and registration of all NVIS(NATS) ignition key IDs. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .
3. Perform EC-91, "VIN Registration" .
4. Perform EC-92, "Accelerator Pedal Released Position Learning" .
5. Perform EC-92, "Throttle Valve Closed Position Learning" .
6. Perform EC-92, "Idle Air Volume Learning" .

>> GO TO 29.

25. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

OK >> GO TO 27.
NG >> Repair or replace malfunctioning part, and then GO TO 26.

26. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

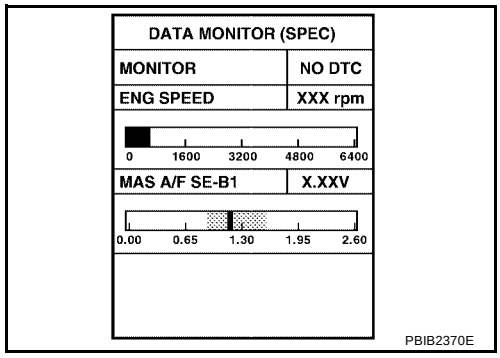
OK >> **INSPECTION END**
NG (Less than the SP value)>>GO TO 27.

27. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 28.
NG (Less than the SP value)>>Replace mass air flow sensor, and then GO TO 30.



28. CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.

- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

29. CHECK “A/F ALPHA-B1” AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-105, "Symptom Matrix Chart" .

30. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and then make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-105, "Symptom Matrix Chart" .

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

UBS00JSW

Intermittent incidents (I/I) may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common I/I Report Situations

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than 0 or [1t].
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.

Diagnostic Procedure

UBS00JSX

1. INSPECTION START

Erase (1st trip) DTCs. Refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" , “CIRCUIT INSPECTION”, “Ground Inspection”.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" , “INCIDENT SIMULATION TESTS”.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK CONNECTOR TERMINALS

Refer to GI-23, "How to Check Terminal" , “HOW TO PROBE CONNECTORS”, “How to Check Enlarged Contact Spring of Terminal”.

OK or NG

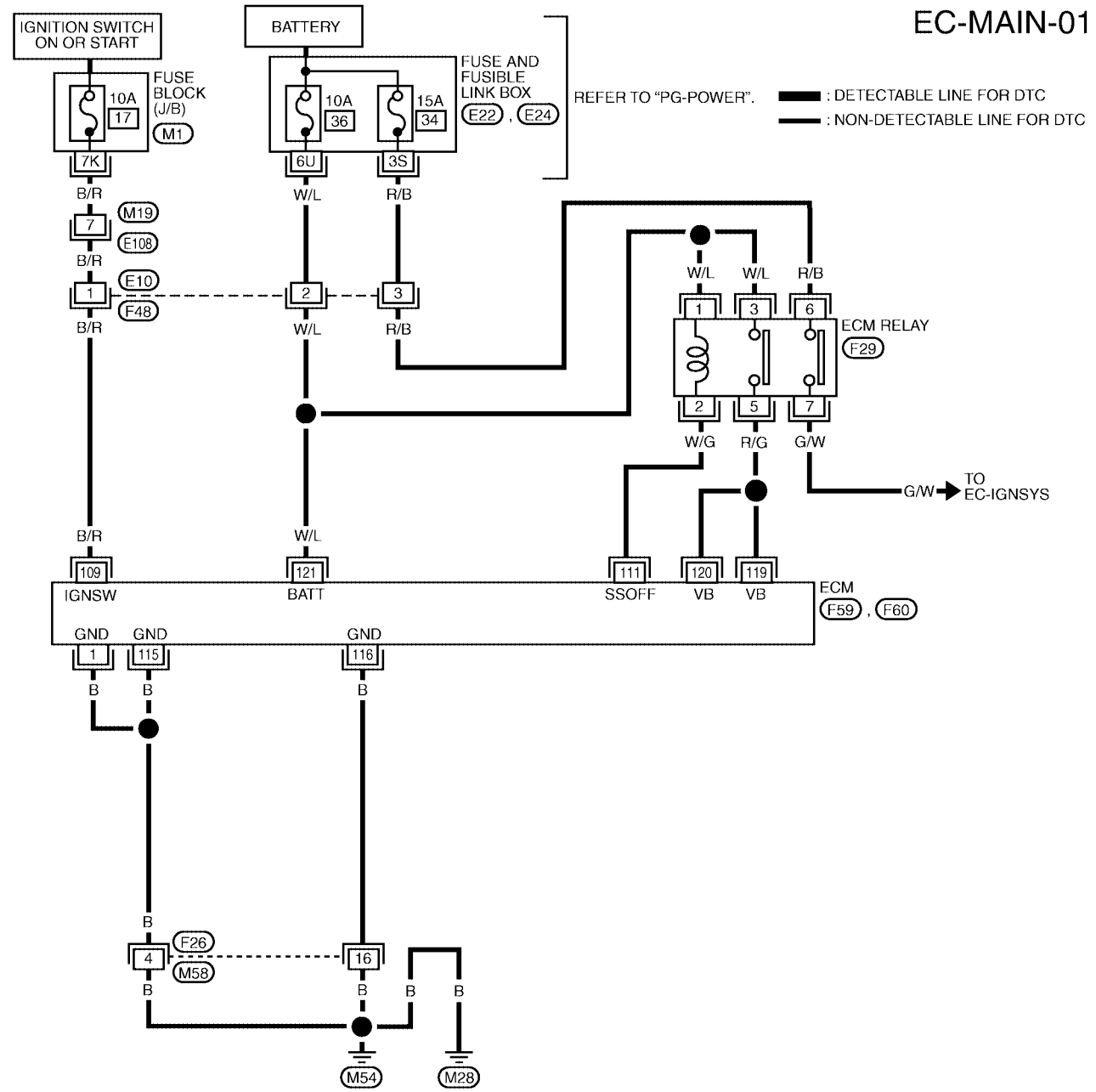
OK >> **INSPECTION END**
NG >> Repair or replace connector.

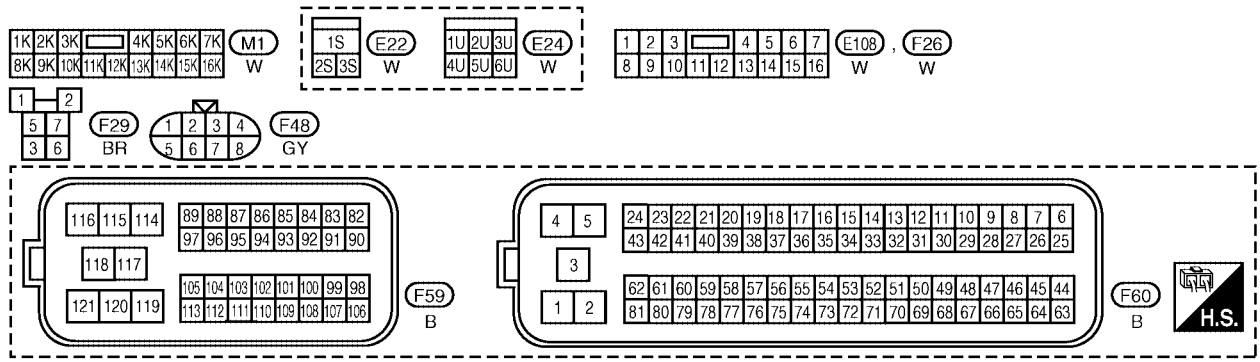
POWER SUPPLY AND GROUND CIRCUIT

PFP:24110

Wiring Diagram

UBS00JSY





BBWA1422E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
109	B/R	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
115 116	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00KJU

1. INSPECTION START

Start engine.

Is engine running?

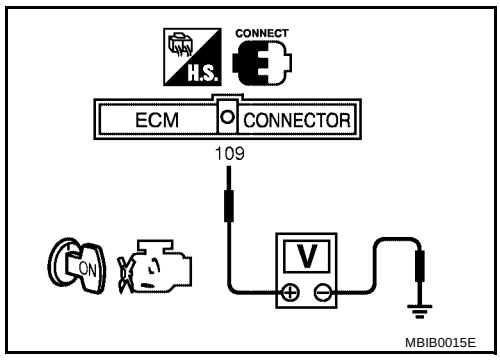
Yes or No

Yes >> GO TO 10.
No >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check voltage between ECM terminal 109 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

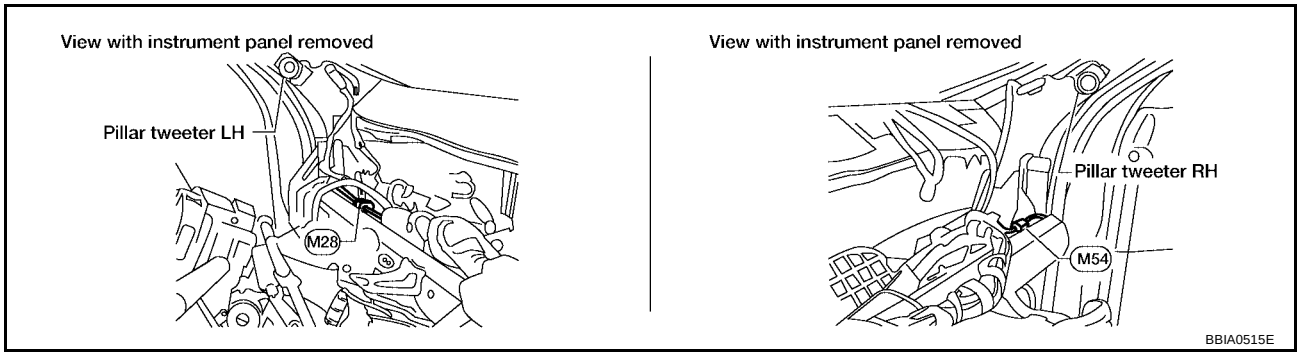
Check the following.

- Harness connectors E10, F48
- Harness connectors M19, E108
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170 .



OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 1, 115, 116, and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

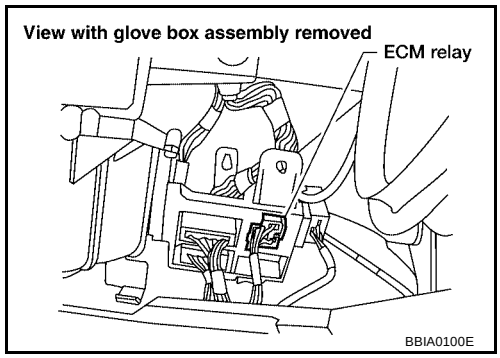
Check the following.

- Harness connectors F26, M58
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

7. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Disconnect ECM relay.

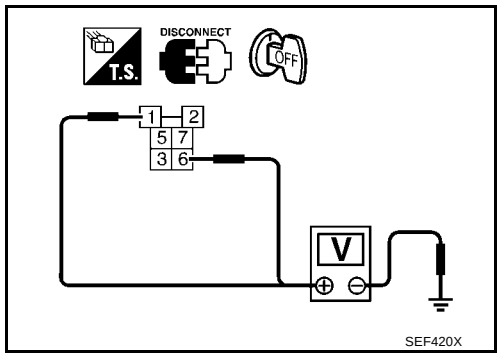


2. Check voltage between ECM relay terminals 1, 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Fuse and fusible link box connectors E22, E24
- 10A fuse
- 15A fuse
- Harness for open or short between ECM relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ECM RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Check harness continuity between ECM terminal 111 and ECM relay terminal 2.

Continuity should exist.

2. Also check harness for short to ground and short to power.

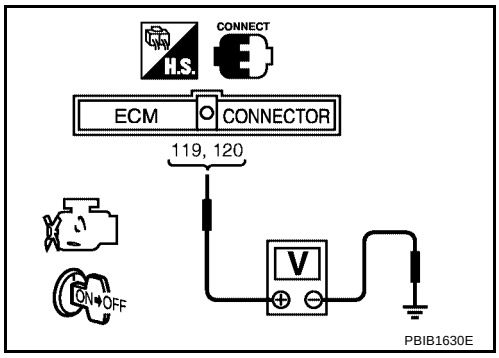
OK or NG

OK >> Go to EC-601, "IGNITION SIGNAL" .
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Stop engine.
2. Turn ignition switch ON and then OFF.
3. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.

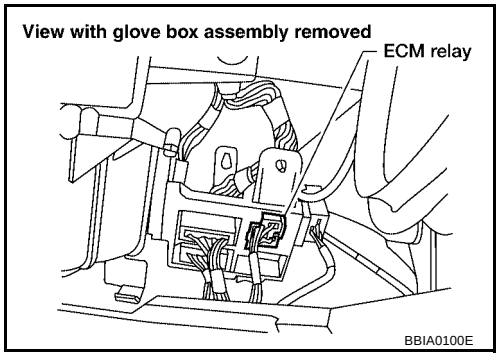


OK or NG

OK >> GO TO 16.
NG (Battery voltage does not exist.)>>GO TO 11.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 13.

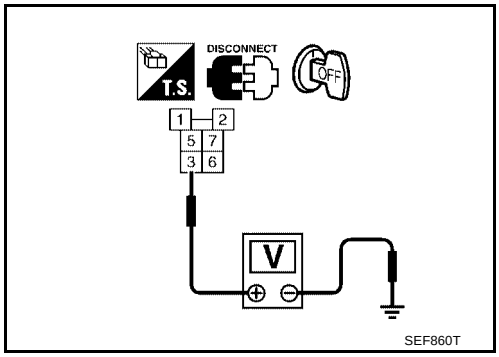
11. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM harness connector.
2. Disconnect ECM relay.



3. Check voltage between ECM relay terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the harness for open or short between ECM relay and harness connector F48.

>> Repair harness or connectors.

13. CHECK ECM POWER SUPPLY CIRCUIT-V

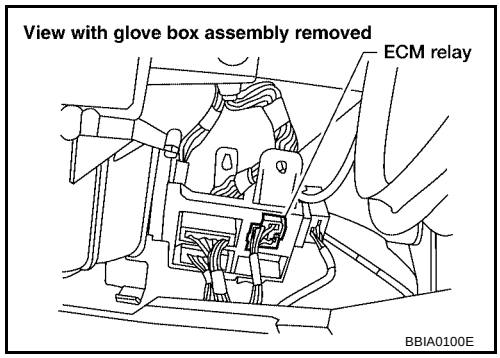
1. Check harness continuity between ECM terminals 119, 120 and ECM relay terminal 5.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



14. CHECK ECM RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Check harness continuity between ECM terminal 111 and ECM relay terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

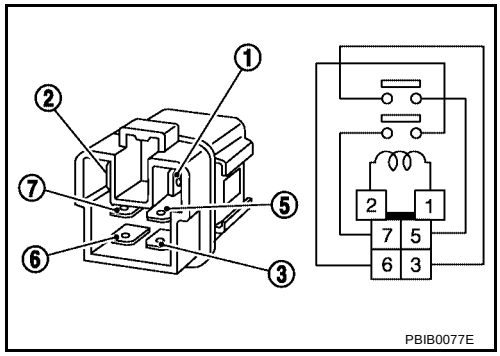
15. CHECK ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between ECM relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

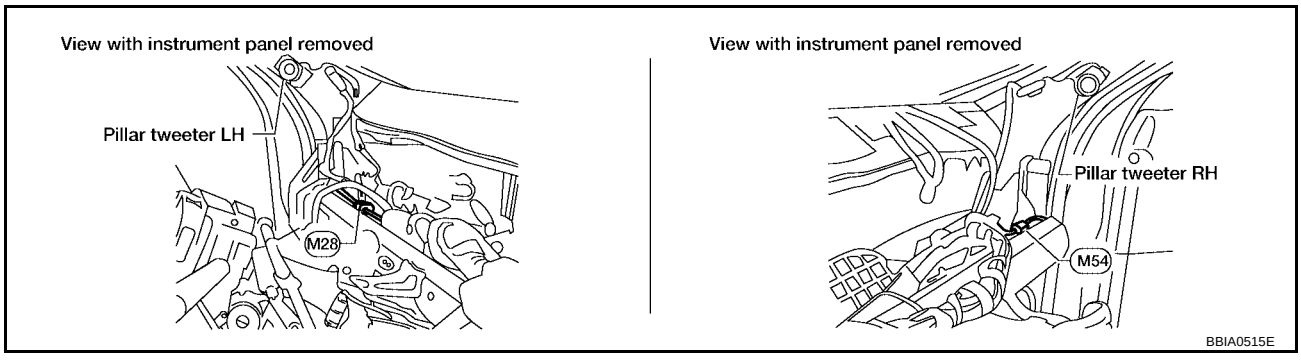
OK or NG

OK >> GO TO 16.
NG >> Replace ECM relay.



16. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170 .



OK or NG

OK >> GO TO 17.
NG >> Repair or replace ground connections.

17. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 1, 115, 116, and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 19.
NG >> GO TO 18.

18. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F26, M58
- Harness for open or short between ECM and ground

>> Repair open circuit or short to power in harness or connectors.

19. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Ground Inspection

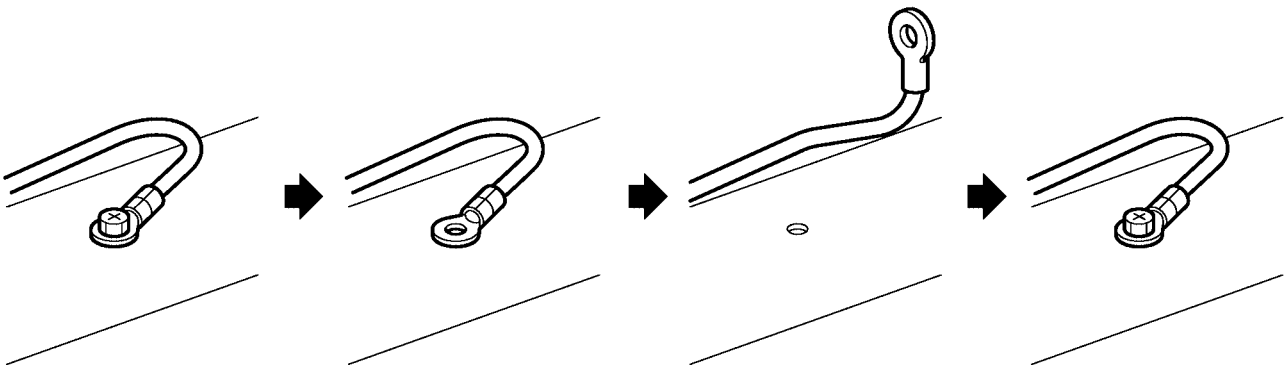
UBS00JT0

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:PG-13, "Ground Distribution"

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to PG-13, "Ground Distribution" .

Ground Inspection



DTC U1000, U1001 CAN COMMUNICATION LINE

PFP:23710

Description

UBS00B3P

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

UBS00B3Q

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000*1 1000*1	CAN communication line	● ECM cannot communicate to other control units. ● ECM cannot communicate for more than the specified time.	● Harness or connectors (CAN communication line is open or shorted)
U1001*2 1001*2			

*1: **This self-diagnosis has the one trip detection logic.**
*2: **The MIL will not light up for this diagnosis.**

DTC Confirmation Procedure

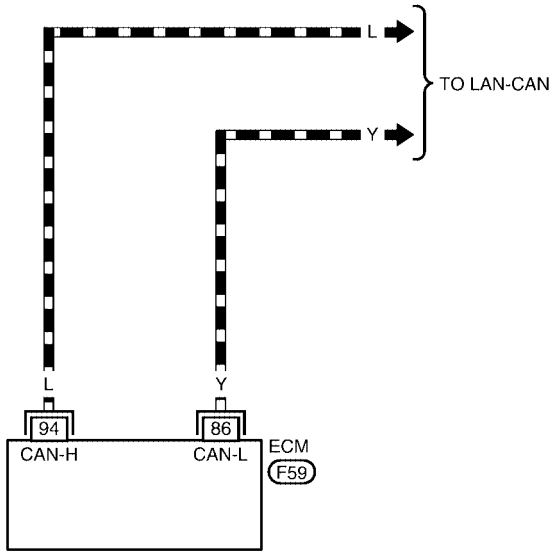
UBS00B3R

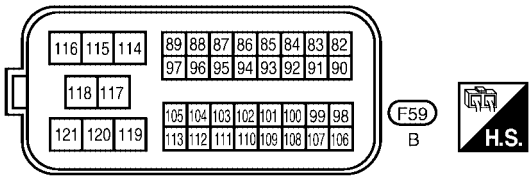
1. Turn ignition switch ON and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-174, "Diagnostic Procedure" .

Wiring Diagram

UBS00B3S

EC-CAN-01





BBWA0274E

Diagnostic Procedure

UBS00B3T

Go to LAN-4, "CAN COMMUNICATION"

DTC P0011 IVT CONTROL

PFP:23796

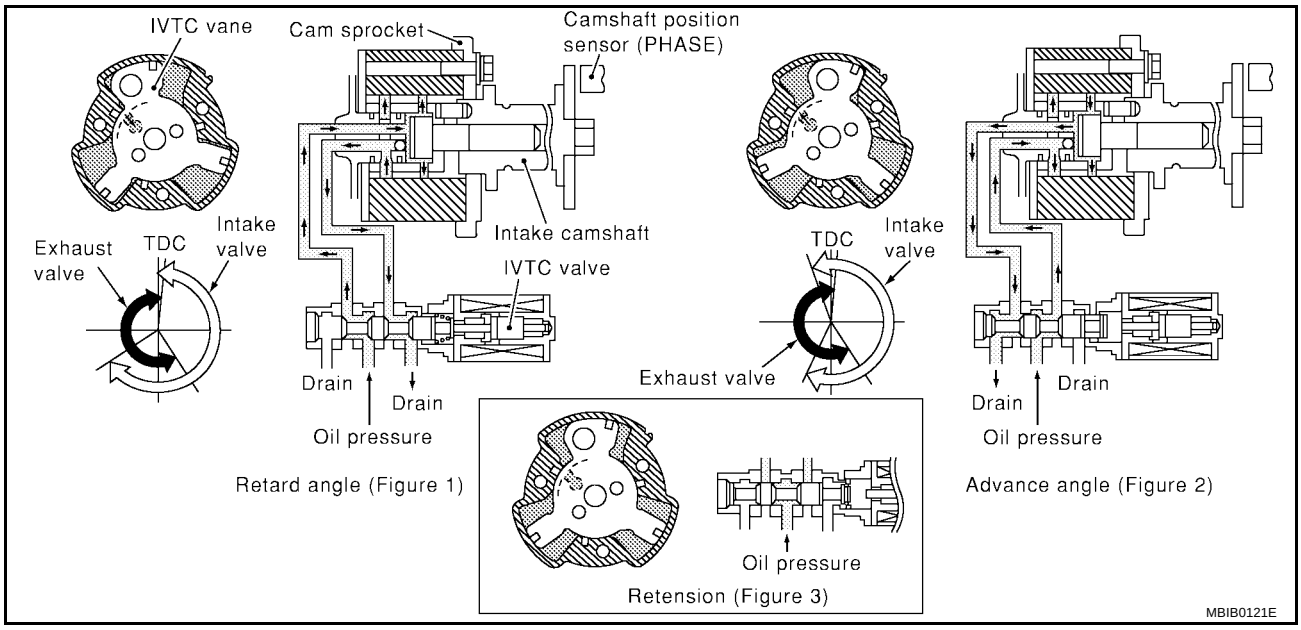
Description

UBS00B3U

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS)	Engine speed	Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)			
Engine coolant temperature sensor	Engine coolant temperature		
Vehicle speed signal*	Vehicle speed		

*: This signal is sent to the ECM through CAN communication line.



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

CONSULT-II Reference Value in Data Monitor Mode

UBS00B3V

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1)	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	–5° - 5°CA
		When revving engine up to 2,000 rpm quickly	Approx. 0° - 30°CA
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		When revving engine up to 2,000 rpm quickly	Approx. 0% - 80%

On Board Diagnosis Logic

UBS00B3W

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011 0011	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	● Crankshaft position sensor (POS) ● Camshaft position sensor (PHASE) ● Intake valve control solenoid valve ● Accumulation of debris to the signal pick-up portion of the camshaft ● Timing chain installation ● Foreign matter caught in the oil groove for intake valve timing control

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

Detected items	Engine operating condition in fail-safe mode
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function

DTC Confirmation Procedure

UBS00B3X

CAUTION:

Always drive at a safe speed.

NOTE:

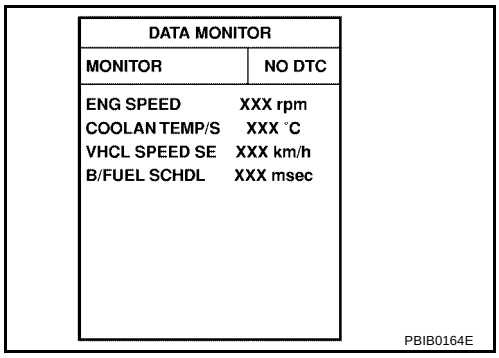
- **If DTC P0011 is displayed with DTC P1111, first perform trouble diagnosis for DTC P1111. Refer to EC-393, "DTC P1111 IVT CONTROL SOLENOID VALVE" .**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds.
   Hold the accelerator pedal as steady as possible.



VHCL SPEED SE	100 - 120 km/h (63 - 75 MPH)
ENG SPEED	600 - 2,000 rpm
COOLANT TEMP/S	60 - 120 °C (140 - 248 °F)
B/FUEL SCHDL	More than 6.0 msec
Selector lever	AT models: D position MT models: 5th position

4. Stop vehicle with engine running and let engine idle for 10 seconds.
5. If 1st trip DTC is detected, go to EC-177, "Diagnostic Procedure" .
   If 1st trip DTC is not detected, go to next step.
6. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	1,800 - 3,175 rpm (A constant rotation is maintained.)
COOLANT TEMP/S	More than 70 °C
Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

7. If 1st trip DTC is detected, go to EC-177, "Diagnostic Procedure" .

WITH GST

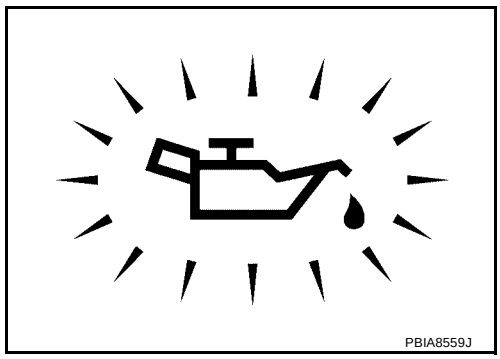
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00B3Y

1. CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.



OK or NG

OK >> GO TO 2.
NG >> Go to DI-27 .

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-175 .

OK or NG

OK >> GO TO 3.
NG >> Replace intake valve timing control solenoid valve.

3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-296, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace crankshaft position sensor (POS).

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-296, "Component Inspection" .

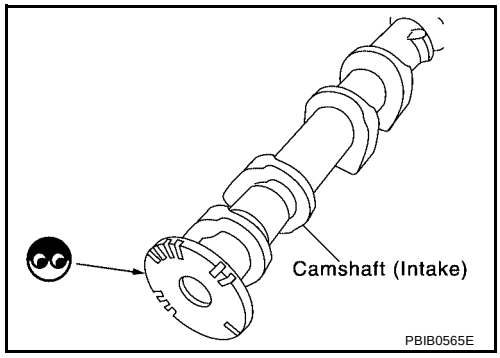
OK or NG

OK >> GO TO 5.
NG >> Replace camshaft position sensor (PHASE).

5. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end



OK or NG

OK >> GO TO 8.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

6. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

OK or NG

OK >> Check timing chain installation. Refer to EM-48 .
NG >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-37, "INSPECTION OF CAMSHAFT SPROCKET (INT) OIL GROOVE" .

OK or NG

OK >> GO TO 8.
NG >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For wiring diagram refer to EC-285, "Wiring Diagram" for CKP sensor (POS) and EC-292, "Wiring Diagram" for CMP sensor (PHASE).

>> **INSPECTION END**

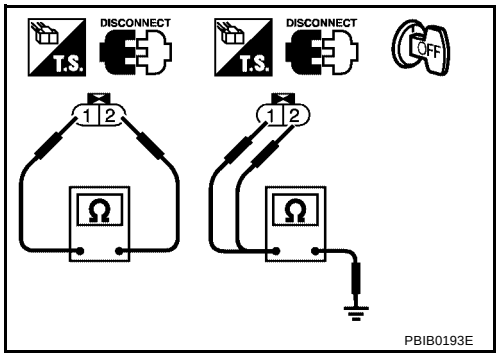
Component Inspection

UBS00KJZ

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

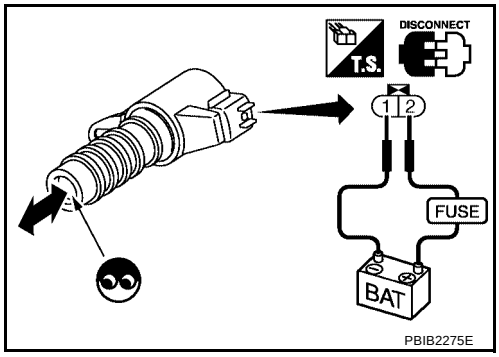
1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.

Terminal	Resistance
1 and 2	Approximately 8Ω at 20°C (68°F)
1 or 2 and ground	(Continuity should not exist.)



If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.

3. Remove intake valve timing control solenoid valve.
4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. Make sure that the plunger moves as shown in the figure.



CAUTION:
Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
If NG, replace intake valve timing control solenoid valve.

NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.

Removal and Installation

UBS00KK0

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-42, "TIMING CHAIN" .

DTC P0037, P0038 HO2S2 HEATER

PFP:226A0

Description

UBS00B3Z

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Crankshaft position sensor (POS)			
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
● Below 3,600 rpm after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

CONSULT-II Reference Value in Data Monitor Mode

UBS00B40

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	● Engine speed: Below 3,600 rpm after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	ON
	● Engine speed: Above 3,600 rpm	OFF

On Board Diagnosis Logic

UBS00B41

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037 0037	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) ● Heater oxygen sensor 2 heater
P0038 0038	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) ● Heater oxygen sensor 2 heater

DTC Confirmation Procedure

UBS00B42

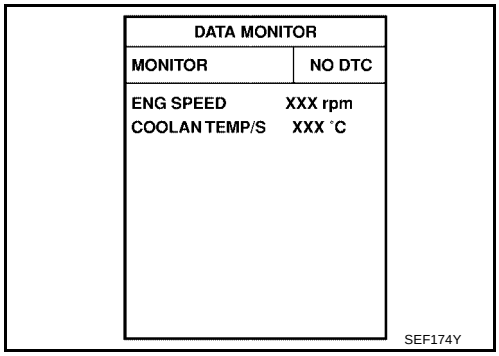
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.

4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. If 1st trip DTC is detected, go to EC-182, "Diagnostic Procedure" .



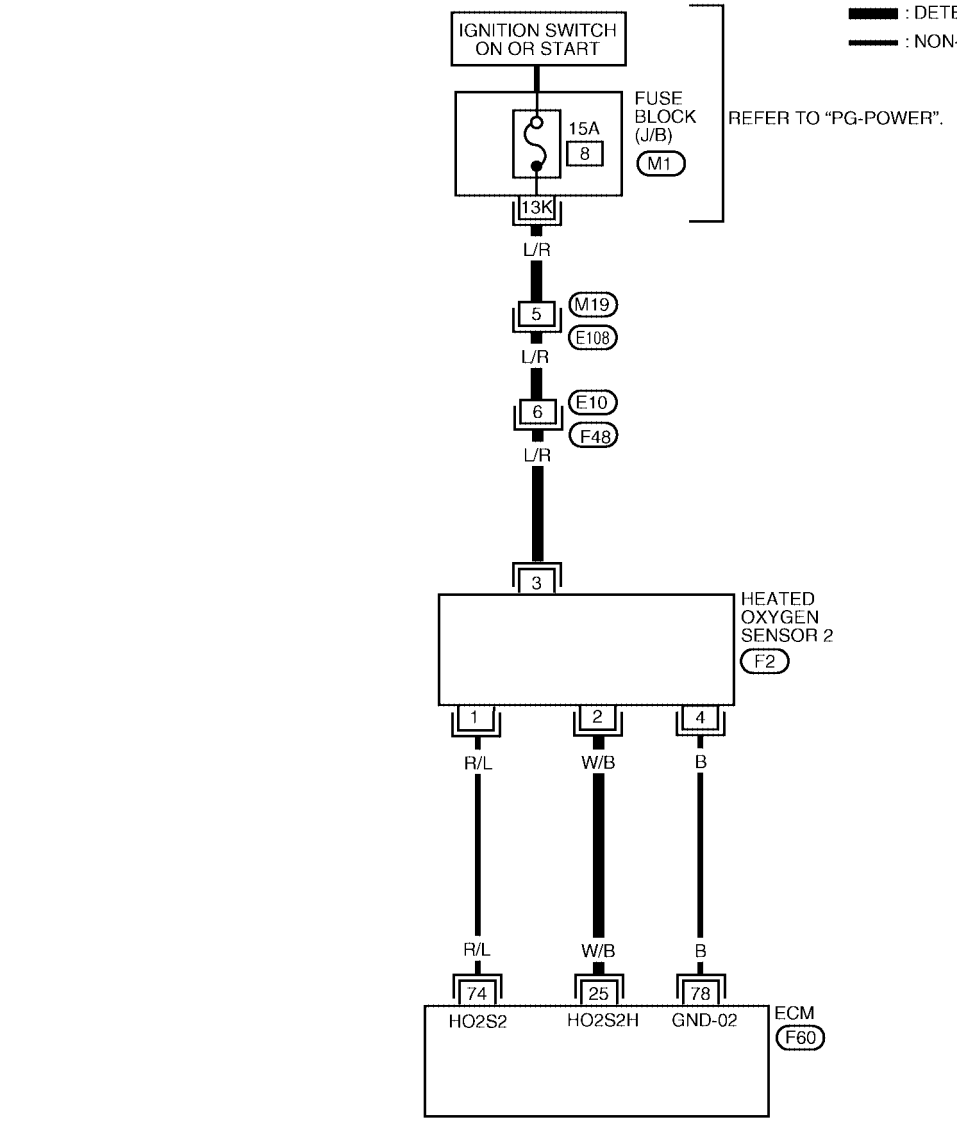
WITH GST

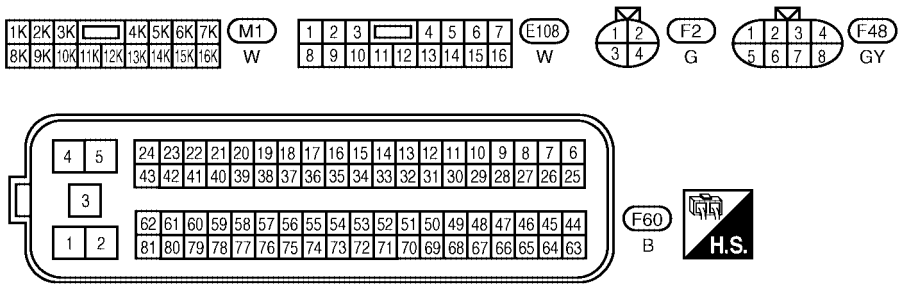
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00B43

EC-HO2S2H-01





BBWA1423E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

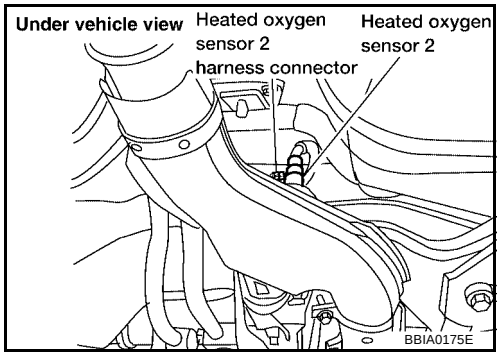
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	W/B	Heated oxygen sensor 2 heater	**[Engine is running]** ● **Warm-up condition** ● Engine speed: Below 3,600 rpm after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under on load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped. **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00B44

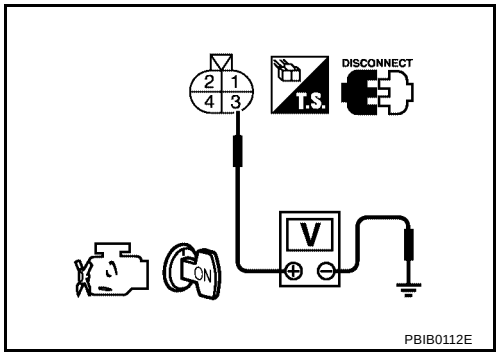
1. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Turn ignition switch ON.



4. Check voltage between HO2S2 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness connectors E108, M19
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 25 and HO2S2 terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-184, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 2.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

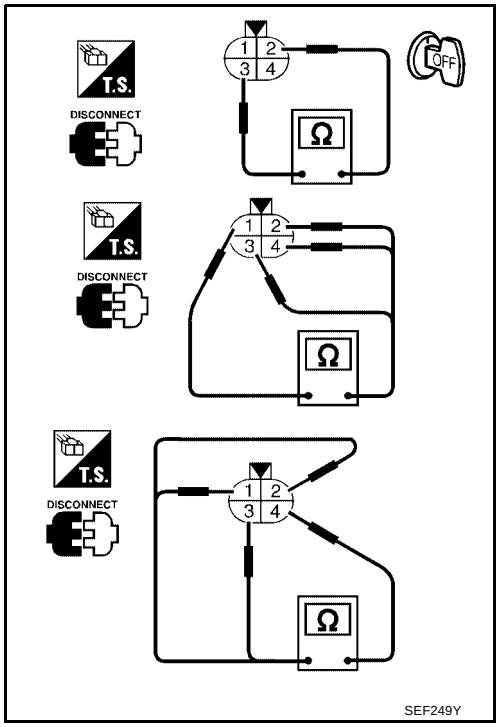
Component Inspection

UBS00B45

HEATED OXYGEN SENSOR 2 HEATER

1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
2 and 3	8 -10 Ω at 25°C (77°F)
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	



2. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00B46

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

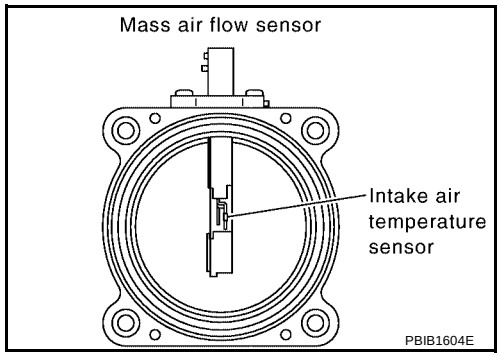
DTC P0101 MAF SENSOR

PFP:22680

Component Description

UBS00B47

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

UBS00B48

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	See EC-153, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No-load	Idle	20.0 - 35.5%
		2,500 rpm	12.0 - 30.0%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No-load	Idle	1.4 - 4.0 g·m/s
		2,500 rpm	5.0 - 10.0 g·m/s

On Board Diagnosis Logic

UBS00B49

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0101 0101	Mass air flow sensor circuit range/performance problem	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor ● EVAP control system pressure sensor ● Intake air temperature sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor ● EVAP control system pressure sensor ● Intake air temperature sensor

DTC Confirmation Procedure

UBS00B4A

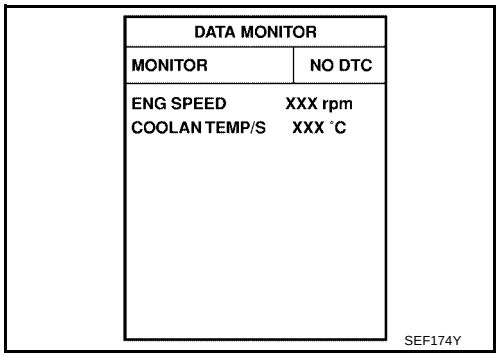
Perform PROCEDURE FOR MALFUNCTION A first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.

PROCEDURE FOR MALFUNCTION A

NOTE:
If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and warm it up to normal operating temperature.
4. Run engine for at least 10 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-189, "Diagnostic Procedure" .



With GST

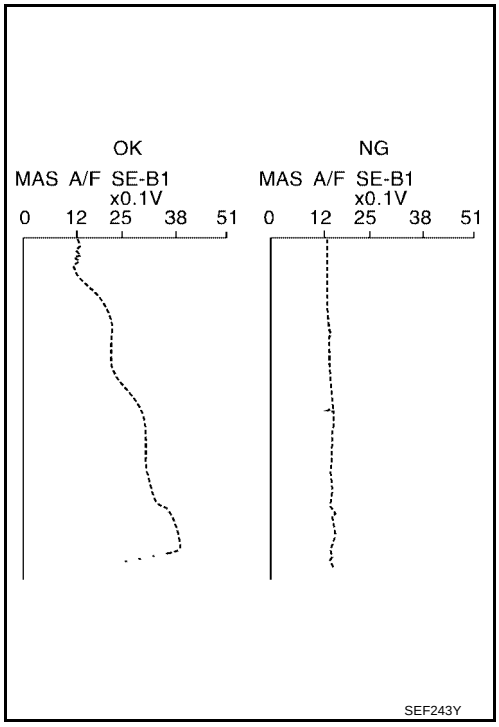
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

CAUTION:
Always driver vehicle at a safe speed.

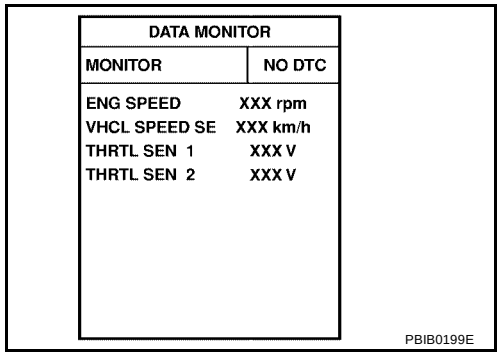
With CONSULT-II

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
   If engine cannot be started, go to EC-189, "Diagnostic Procedure" .
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Check the voltage of “MAS A/F SE-B1” with “DATA MONITOR”.
5. Increases engine speed to about 4,000 rpm.
6. Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to EC-189, "Diagnostic Procedure" .
   If OK, go to following step.



7. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
THRTL SEN 1	More than 3.0V
THRTL SEN 2	More than 3.0V
Selector lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.



8. If 1st trip DTC is detected, go to EC-189, "Diagnostic Procedure" .

Overall Function Check

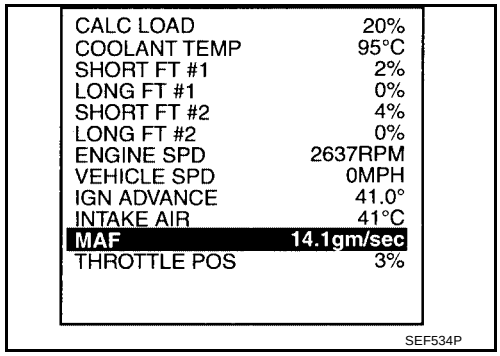
UBS00B4B

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a DTC might not be confirmed.

PROCEDURE FOR MALFUNCTION B

With GST

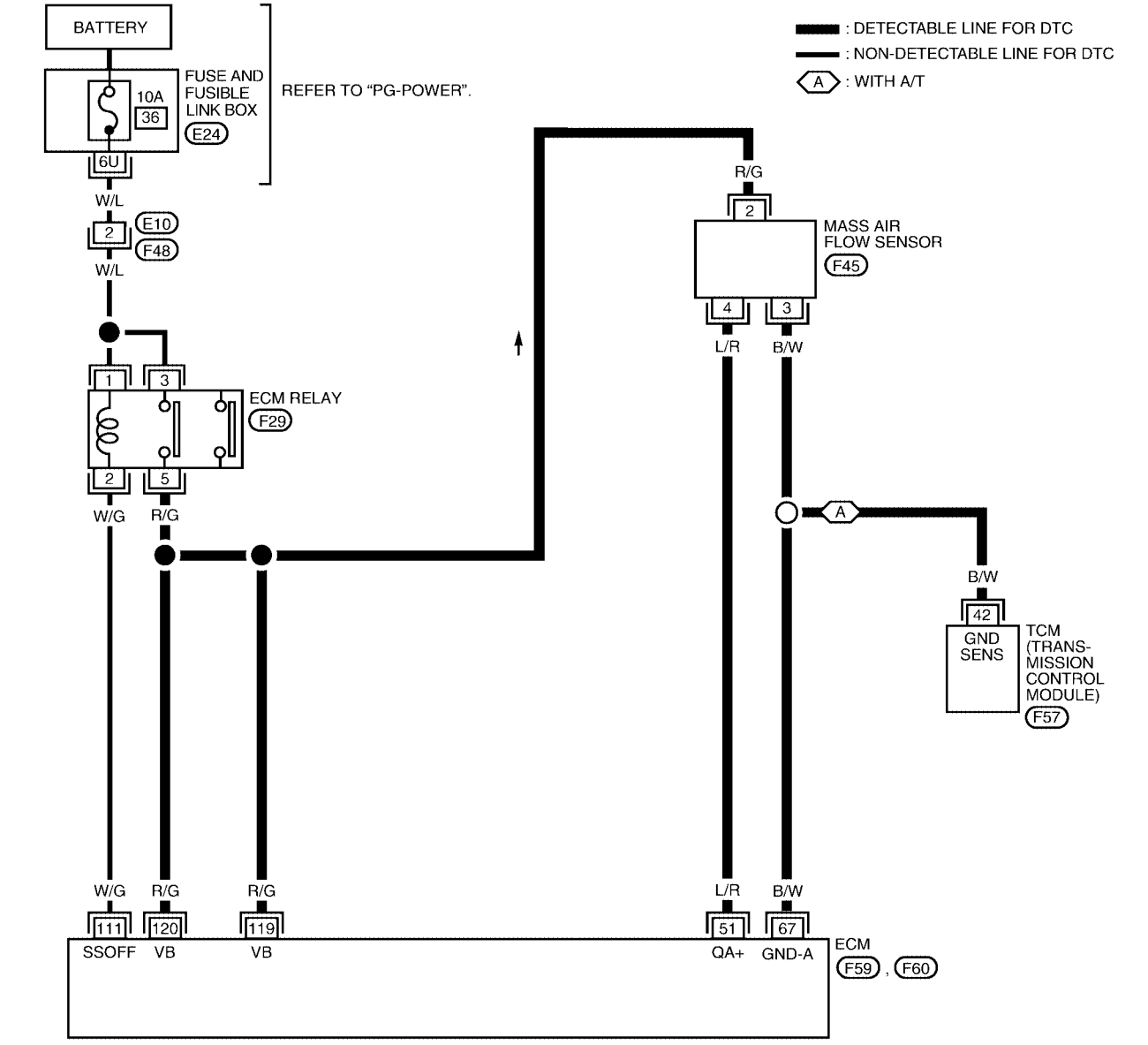
1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
3. Select “Service $01” with GST.
4. Check the mass air flow sensor signal with “Service $01”.
5. Check for linear mass air flow rise in response to increases to about 4,000 rpm in engine speed.
6. If NG, go to EC-189, "Diagnostic Procedure" .

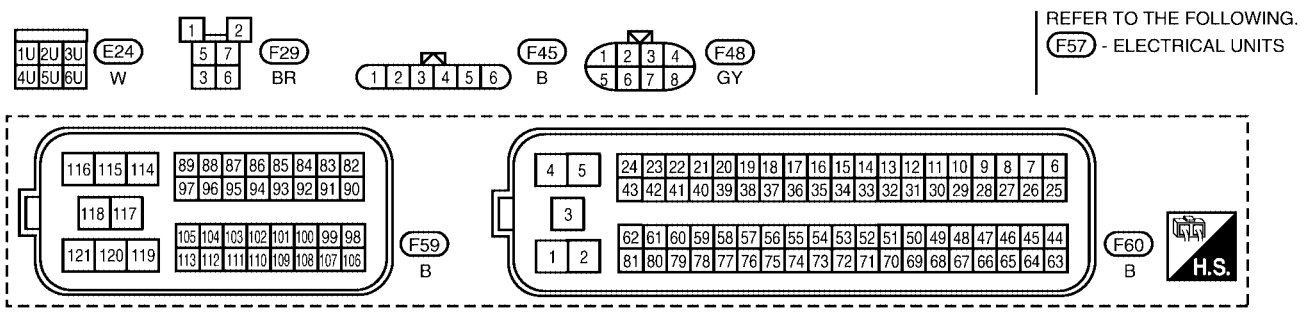


Wiring Diagram

UBS00B4C

EC-MAFS-01





BBWA1424E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	L/R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.9 - 1.2V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.4 - 1.8V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00B4D

1. INSPECTION START

Which malfunction (A or B) is duplicated?

A or B

A >> GO TO 3.
B >> GO TO 2.

2. CHECK INTAKE AIR LEAK

Check the following for connections.

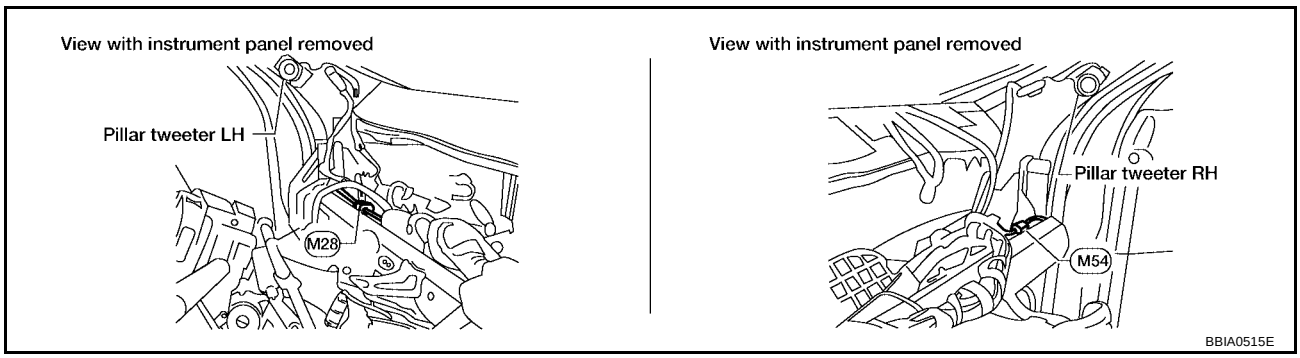
- Air duct
- Vacuum hoses
- Intake air passage between air duct and collector

OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. RETIGHTEN GROUND SCREWS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .

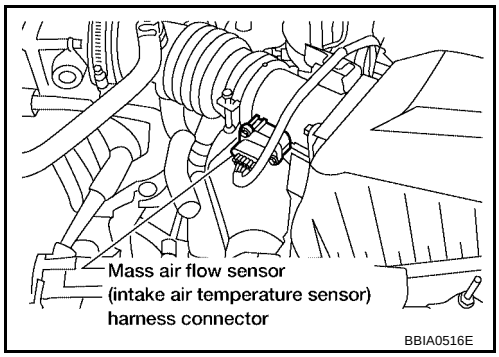


OK or NG

OK >> GO TO 4.
NG >> Repair or replace ground connections.

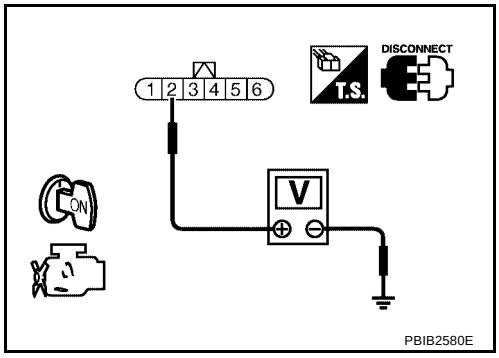
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminals 2 and ground with CONSULT-II or tester.

Voltage : Battery voltage.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector.
4. Check harness continuity between MAF sensor terminal 3 and ECM terminal 67, TCM terminal 42. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and TCM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 51. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-193, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace intake air temperature sensor.

10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-193, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP control system pressure sensor.

11. CHECK MASS AIR FLOW SENSOR

Refer to EC-193, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace mass air flow sensor.

12. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

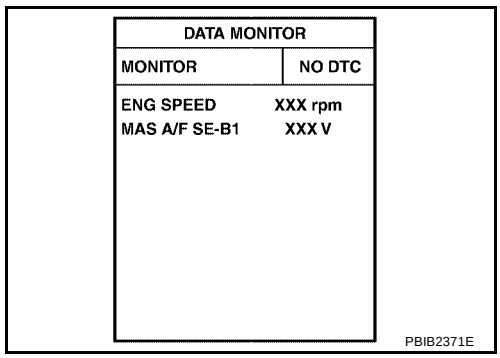
Component Inspection

UBS00B4E

MASS AIR FLOW SENSOR

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-II and select “DATA MONITOR” mode.
4. Select “MAS A/F SE-B1” and check indication under the following conditions.



Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.8
Idle to about 4,000 rpm*	0.9 - 1.2 to 2.4

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.

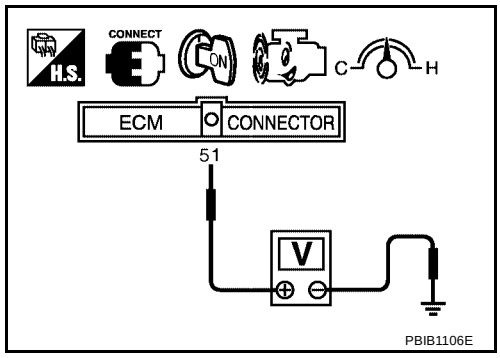
a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 51 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.8
Idle to about 4,000 rpm*	0.9 - 1.2 to 2.4

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.
5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

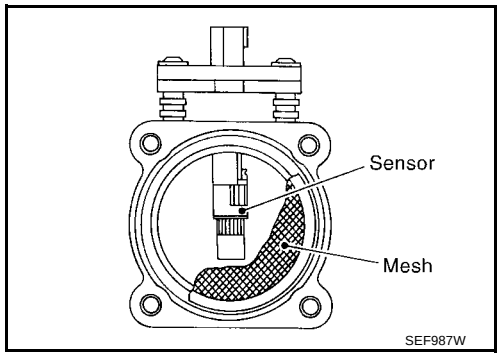
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

UBS00B4F

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

UBS00B4G

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	See EC-153, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No-load	Idle	20.0 - 35.5%
		2,500 rpm	12.0 - 30.0%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No-load	Idle	1.4 - 4.0 g·m/s
		2,500 rpm	5.0 - 10.0 g·m/s

On Board Diagnosis Logic

UBS00B4H

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

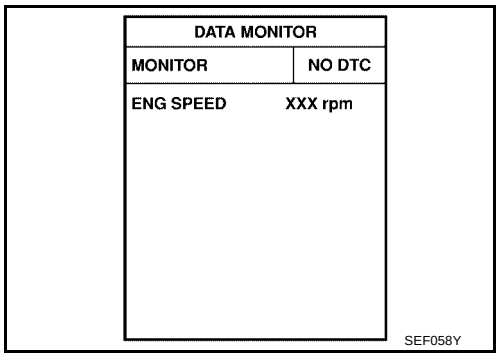
UBS00B4I

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P0102

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If DTC is detected, go to EC-205, "Diagnostic Procedure" .



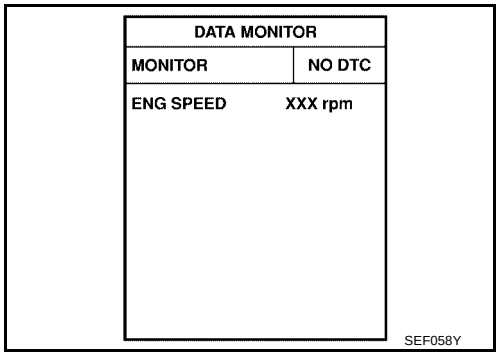
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR DTC P0103

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-205, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Start engine and wait at least 5 seconds.
6. If DTC is detected, go to EC-205, "Diagnostic Procedure" .



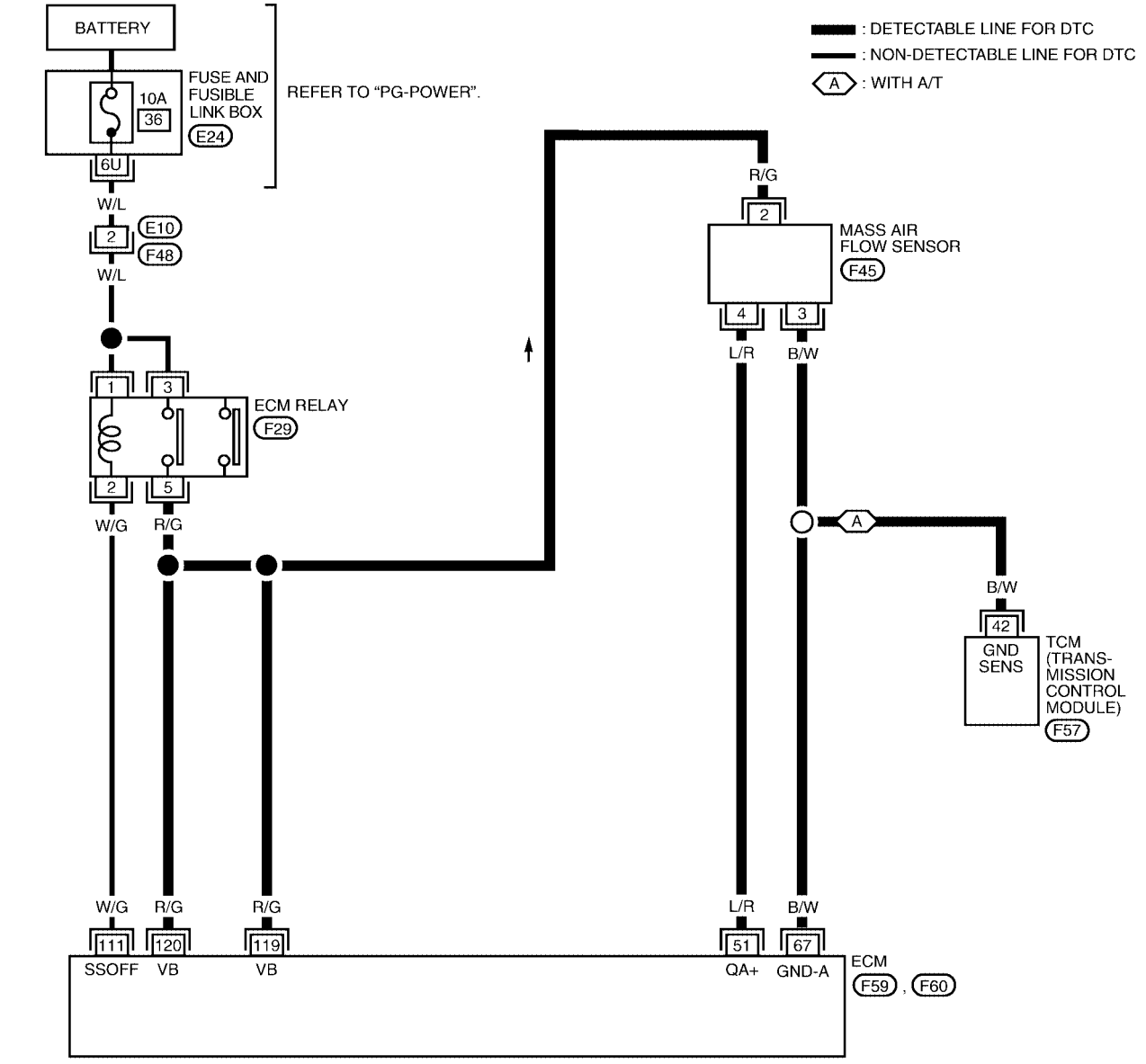
With GST

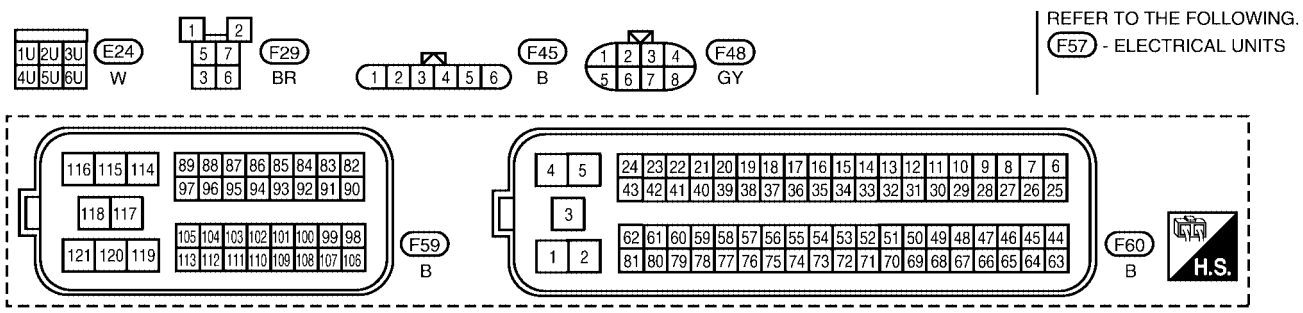
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00B4J

EC-MAFS-01





BBWA1424E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	L/R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.9 - 1.2V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.4 - 1.8V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00B4K

1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connections.

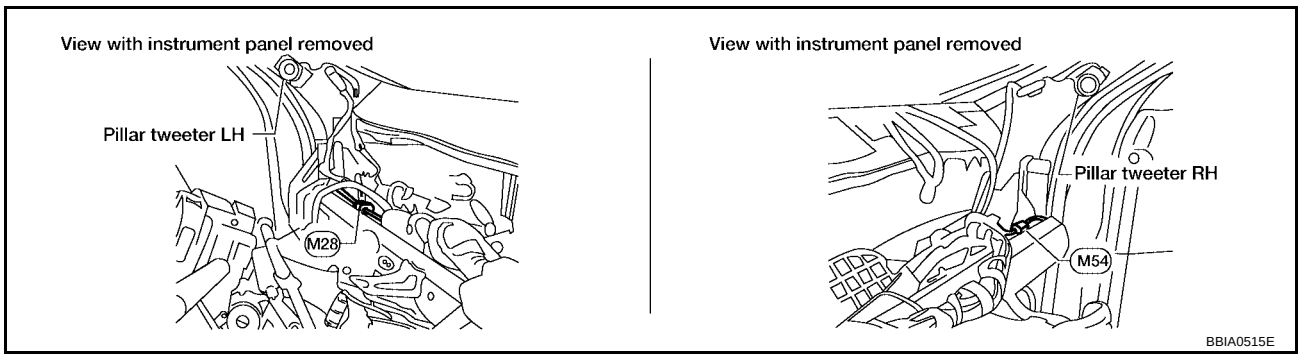
- Air duct
- Vacuum hoses
- Intake air passage between air duct to manifold

OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170 .

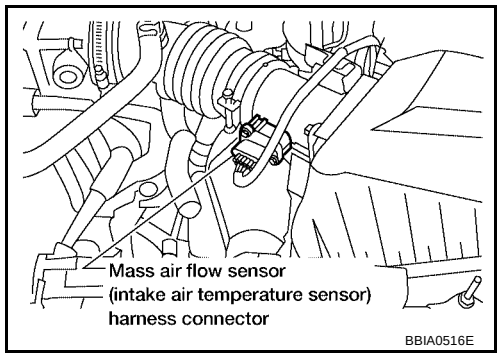


OK or NG

OK >> GO TO 4.
NG >> Repair or replace ground connections.

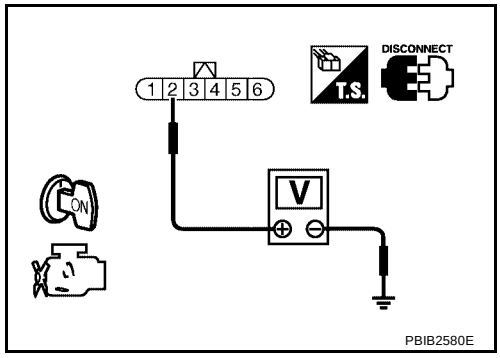
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF terminals 2 and ground with CONSULT-II or tester.

Voltage : Battery voltage.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector.
4. Check harness continuity between MAF sensor terminal 3 and ECM terminal 67, TCM terminal 42. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and TCM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR POEN AND SHORT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 51. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK MASS AIR FLOW SENSOR

Refer to EC-206, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace mass air flow sensor.

10. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

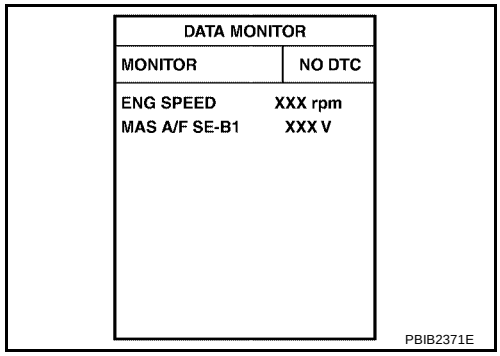
Component Inspection

UBS00B4L

MASS AIR FLOW SENSOR

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-II and select “DATA MONITOR” mode.
4. Select “MAS A/F SE-B1” and check indication under the following conditions.



Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.8
Idle to about 4,000 rpm*	0.9 - 1.2 to 2.4

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.

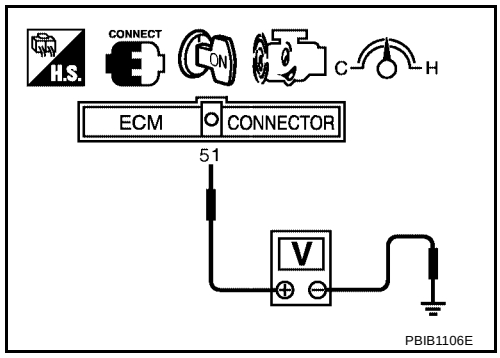
a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 51 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.2
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.4 - 1.8
Idle to about 4,000 rpm*	0.9 - 1.2 to 2.4

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

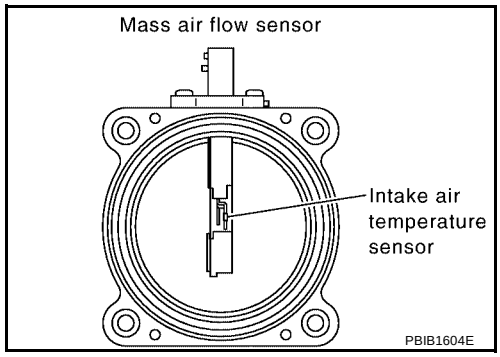
DTC P0112, P0113 IAT SENSOR

PFP:22630

Component Description

UBS00B4M

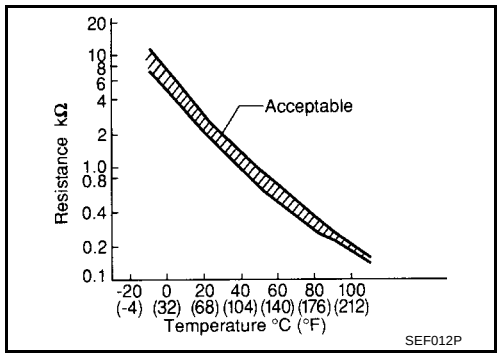
The intake air temperature sensor is built-into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
-10(14)	4.43	7.9 - 9.3
25 (77)	3.32	1.9 - 2.1
80 (176)	1.23	0.31 - 0.37

*: These data are reference values and are measured between ECM terminal 34 (Intake air temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

UBS00B4N

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112 0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor
P0113 0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

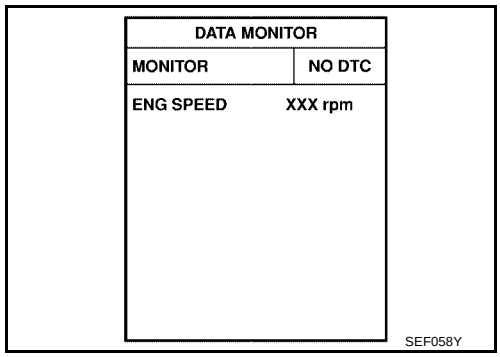
DTC Confirmation Procedure

UBS00B4O

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-205, "Diagnostic Procedure"
.



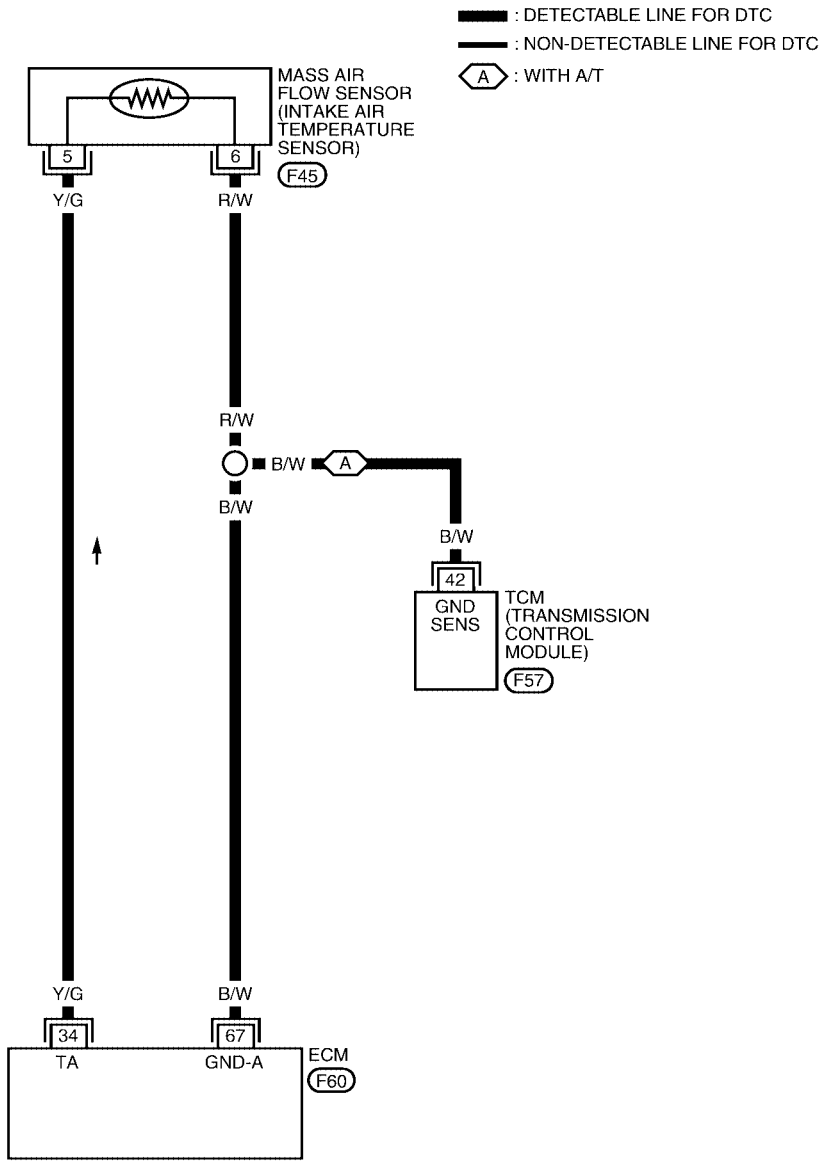
WITH GST

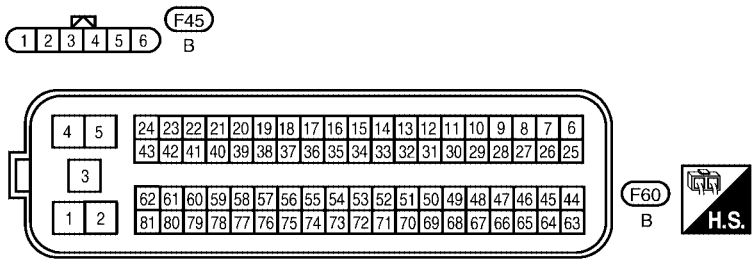
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00B4P

EC-IATS-01





REFER TO THE FOLLOWING.
F57 - ELECTRICAL UNITS

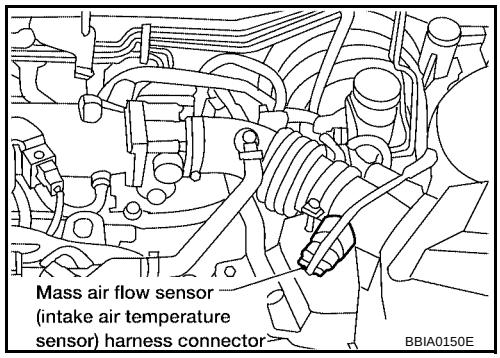
BBWA1425E

Diagnostic Procedure

UBS00B4Q

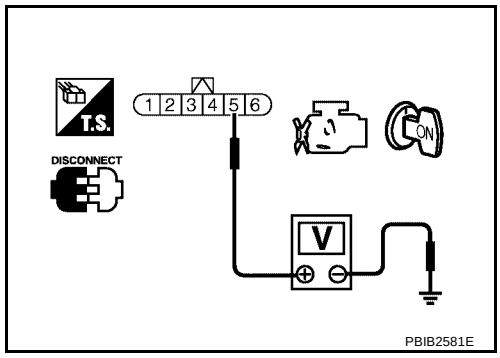
1. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect mass air flow sensor (intake air temperature sensor is built-into) sensor harness connector.
3. Turn ignition switch ON.



4. Check voltage between mass air flow sensor terminal 5 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector.
4. Check harness continuity between mass air flow sensor terminal 6 and ECM terminal 67, TCM terminal 42.
   Refer to wiring diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between TCM and intake air temperature sensor
- Harness for open or short between ECM and intake air temperature sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-206, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace mass air flow sensor with intake air temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

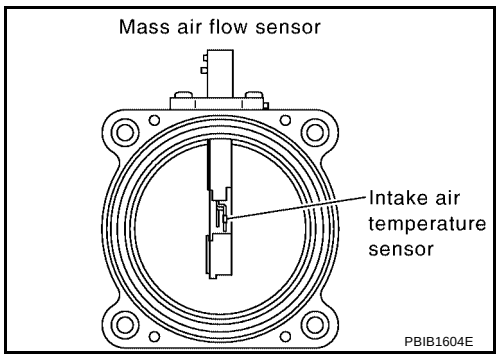
UBS00B4R

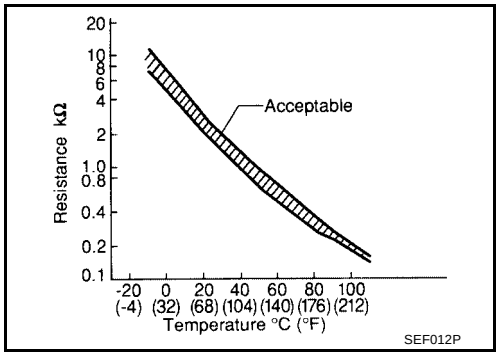
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between intake air temperature sensor terminals 5 and 6 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





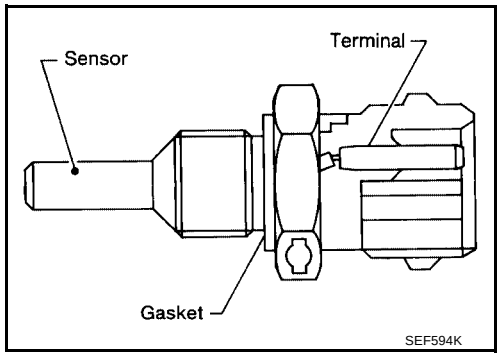
DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

UBS00B4S

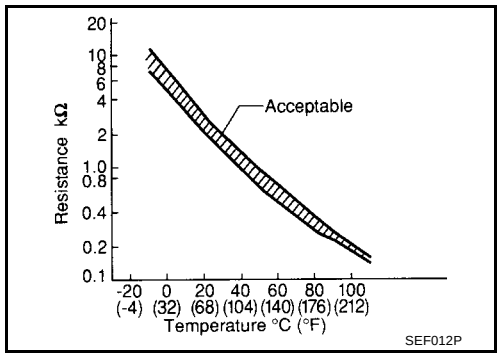
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 73 (Engine coolant temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use ground other than ECM, such as body ground.

On Board Diagnosis Logic

UBS00B4T

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

<table>
<tr><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td rowspan="5">Engine coolant temperature sensor circuit</td><td colspan="2">Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START.
CONSULT-II displays the engine coolant temperature decided by ECM.</td></tr>
<tr><td>Condition</td><td>Engine coolant temperature decided (CONSULT-II display)</td></tr>
<tr><td>Just as ignition switch is turned ON or Start</td><td>40°C (104°F)</td></tr>
<tr><td>More than approx. 4 minutes after ignition ON or Start</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
<tr><td colspan="2">When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while the engine is running.</td></tr>
</table>

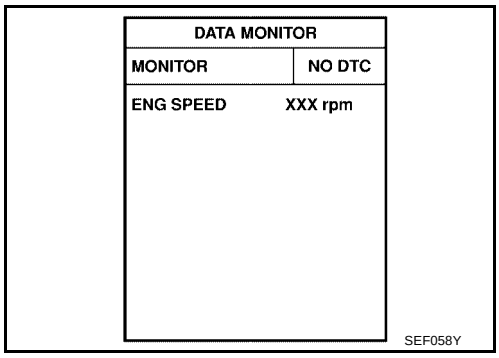
DTC Confirmation Procedure

UBS00B4U

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-210, "Diagnostic Procedure" .



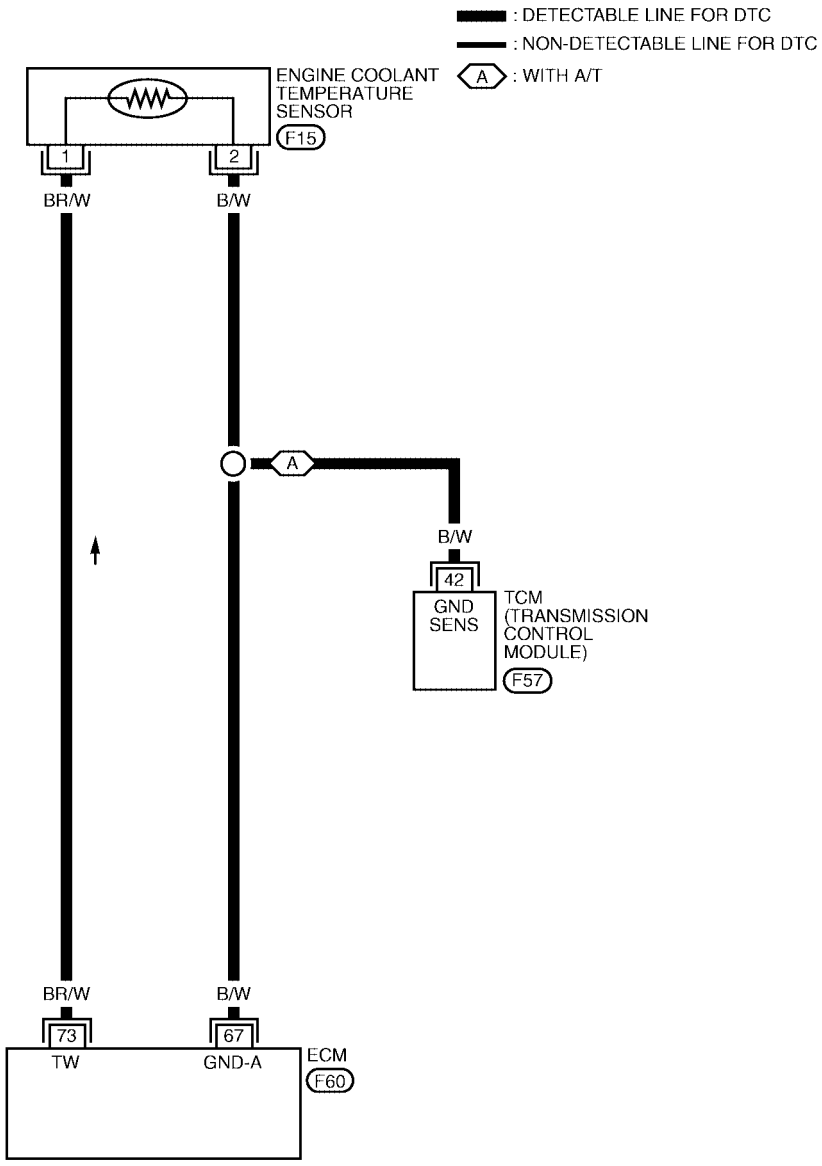
WITH GST

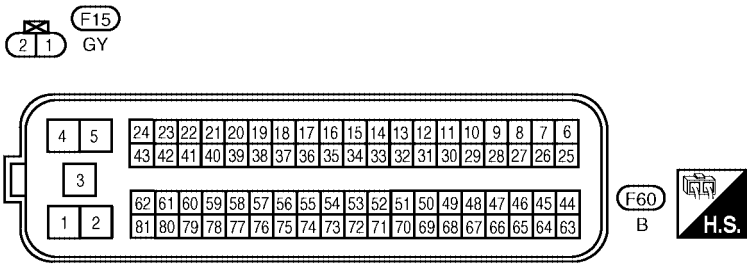
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00B4V

EC-ECTS-01





REFER TO THE FOLLOWING.
F57 - ELECTRICAL UNITS

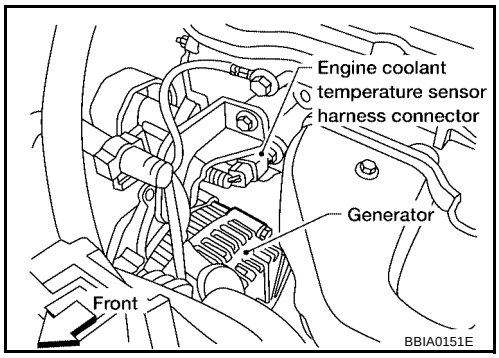
BBWA1426E

Diagnostic Procedure

UBS00B4W

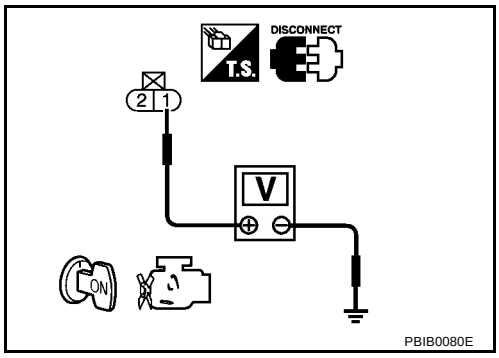
1. CHECK ETC SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect engine coolant temperature (ECT) sensor harness connector.
3. Turn ignition switch ON.



4. Check voltage between ECT terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK ETC SENSOR GROUND CIRCUIT FOR OPEN AND SHORRT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector.
4. Check harness continuity between ECT sensor terminal 2 and ECM terminal 67, TCM terminal 42. Refer to wiring diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECT sensor and ECM
- Harness for open or short between ECT sensor and TCM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-211, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace ECT sensor.

5. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

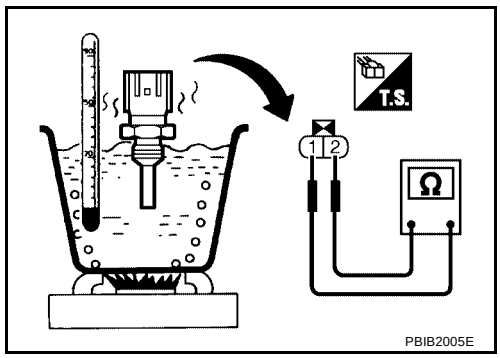
>> **INSPECTION END**

Component Inspection

UBS00B4X

ENGINE COOLANT TEMPERATURE SENSOR

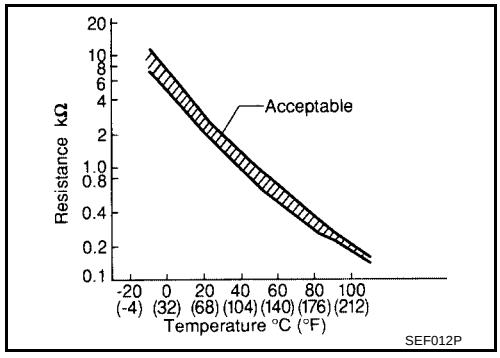
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 73 (Engine coolant temperature sensor) and ground.



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

UBS00B4Y

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

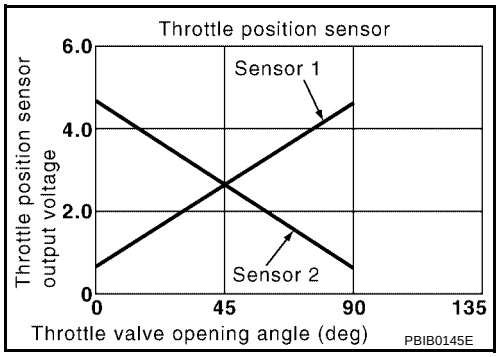
DTC P0122, P0123 TP SENSOR

PFP:16119

Component Description

UBS00B4Z

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-II Reference Value in Data Monitor Mode

UBS00B50

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

UBS00B51

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	● Harness or connectors (The TP sensor 2 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 2) Accelerator pedal position sensor.
P0123 0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

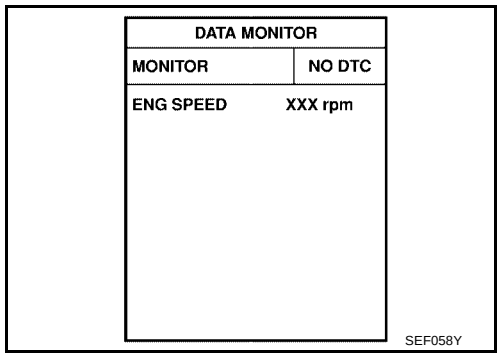
DTC Confirmation Procedure

UBS00B52

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go toEC-215, "Diagnostic Procedure" .

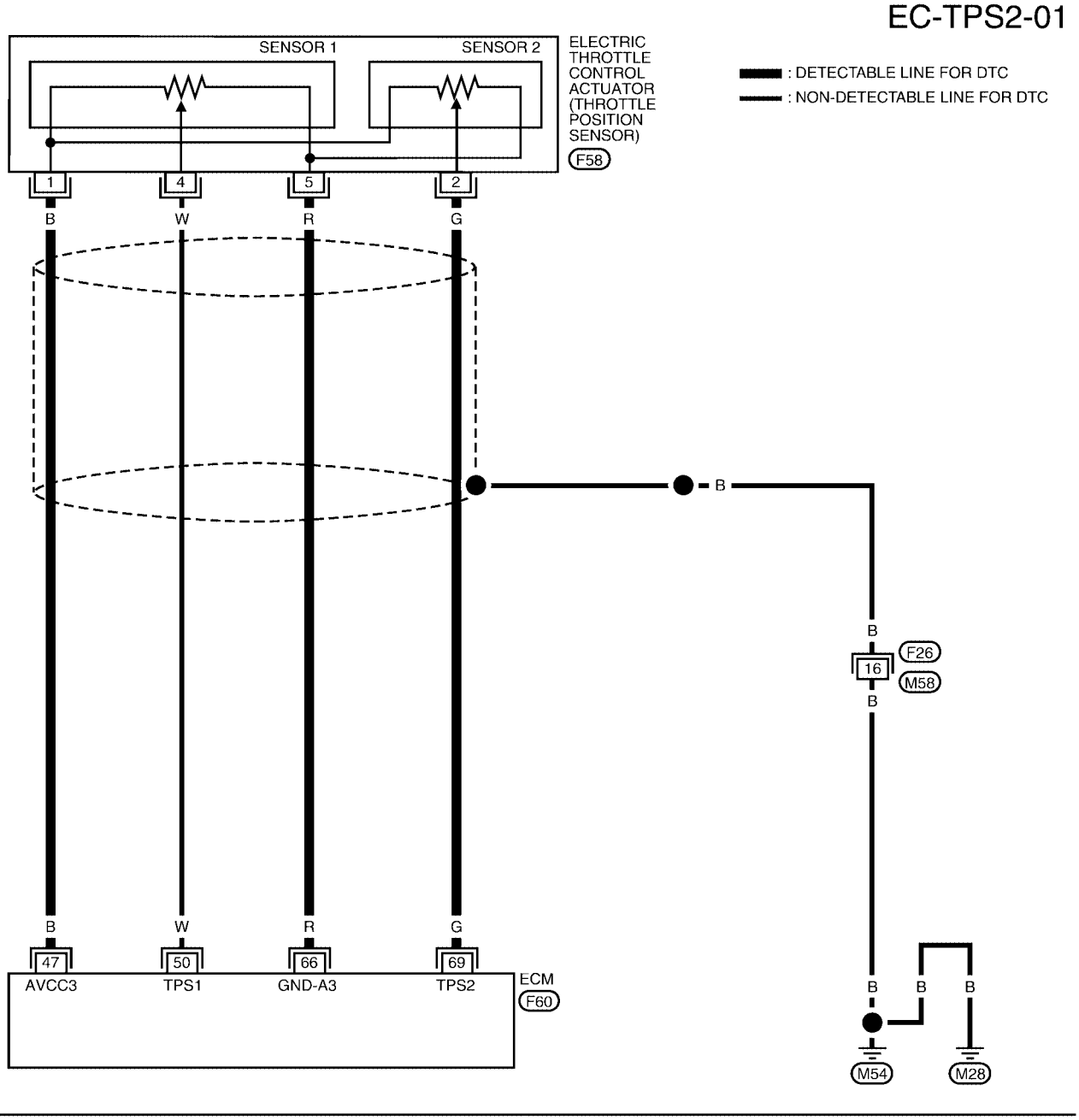


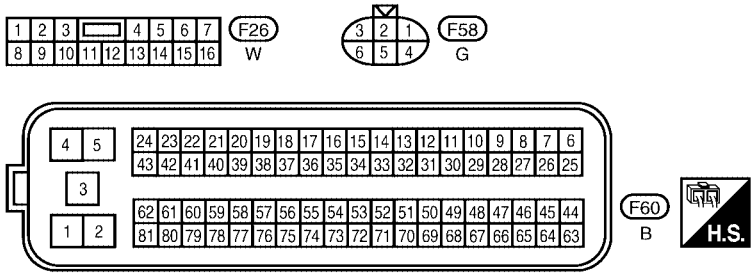
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00B53





BBWA0678E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

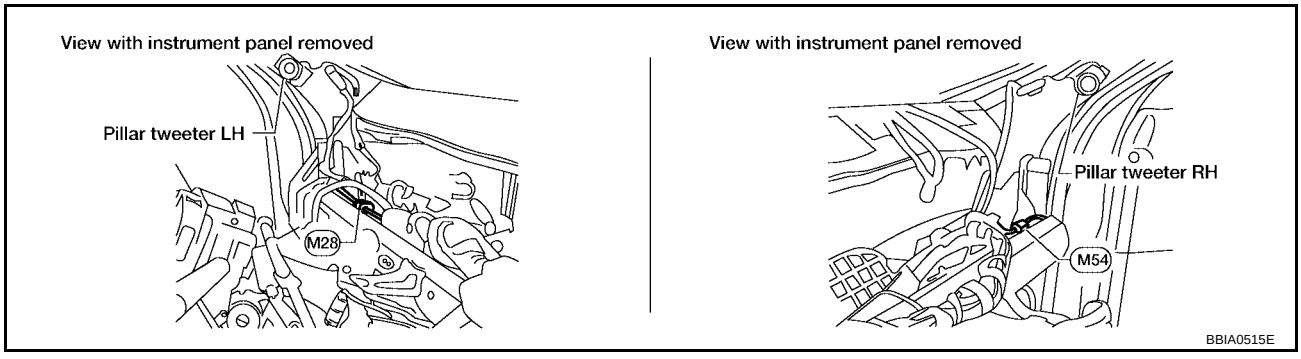
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	B	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
66	R	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
69	G	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
91	R/G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

UBS00B54

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170 .



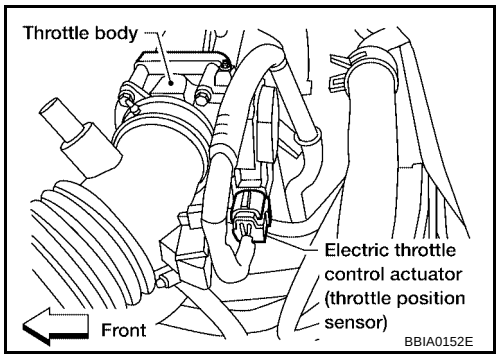
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

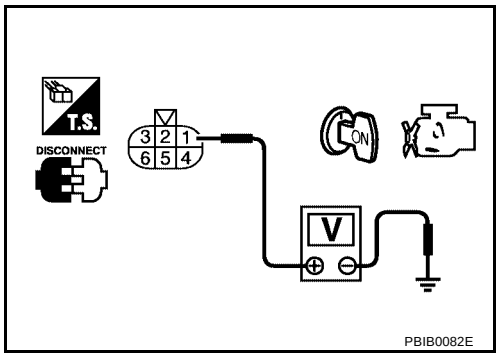


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 7.
NG >> GO TO 3.



3. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace open circuit.

4. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 1	EC-397
91	APP sensor terminal 1	EC-572

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-578, "Component Inspection"

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-92, "Accelerator Pedal Released Position Learning" .
3. Perform EC-92, "Throttle Valve Closed Position Learning" .
4. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 66 and electric throttle control actuator terminal 5. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 69 and electric throttle control actuator terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-218, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-92, "Throttle Valve Closed Position Learning" .
3. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

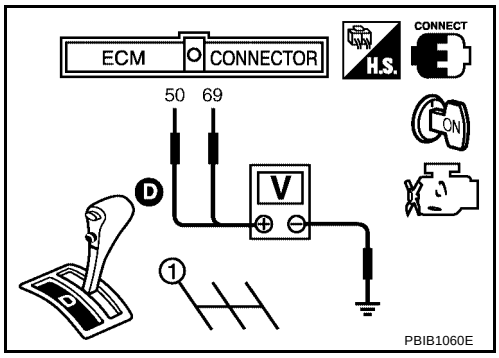
Component Inspection

UBS00B55

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-92, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T models) or 1st position (M/T models).
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-92, "Throttle Valve Closed Position Learning" .
8. Perform EC-92, "Idle Air Volume Learning" .

Remove and Installation

UBS00B56

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-15, "Removal and Installation" .

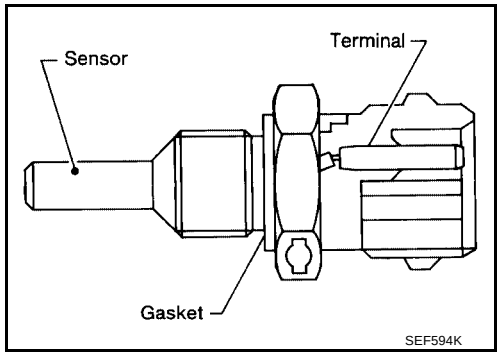
DTC P0125 ECT SENSOR

PFP:22630

Component Description

UBS00B57

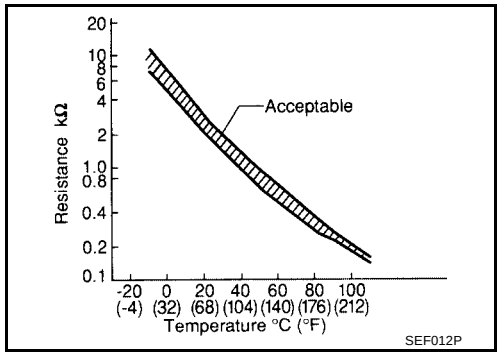
NOTE:
If DTC P0125 is displayed with P0117, P0118, first perform trouble diagnosis for EC-207, "DTC P0117, P0118 ECT SENSOR" .
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 73 (Engine coolant temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use ground other than ECM, such as body ground.

On Board Diagnosis Logic

UBS00B58

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125 0125	Insufficient engine coolant temperature for closed loop fuel control	● Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. ● Engine coolant temperature is insufficient for closed loop fuel control.	● Harness or connectors (High resistance in the circuit) ● Engine coolant temperature sensor ● Thermostat

DTC Confirmation Procedure

UBS00B59

CAUTION:

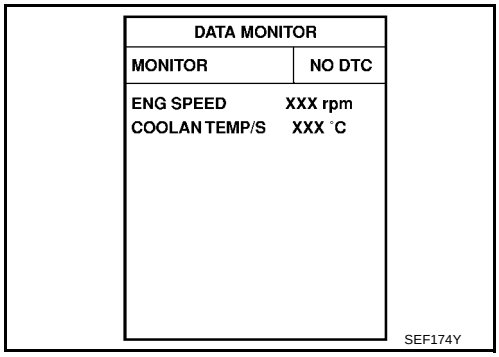
Be careful not to overheat engine.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Check that “COOLAN TEMP/S” is above 10°C (50°F).
   If it is above 10°C (50°F), the test result will be OK. If it is below 10°C (50°F), go to following step.
4. Start engine and run it for 65 minutes at idle speed.
   If “COOLAN TEMP/S” increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
5. If DTC is detected, go to EC-220, "Diagnostic Procedure" .



WITH GST

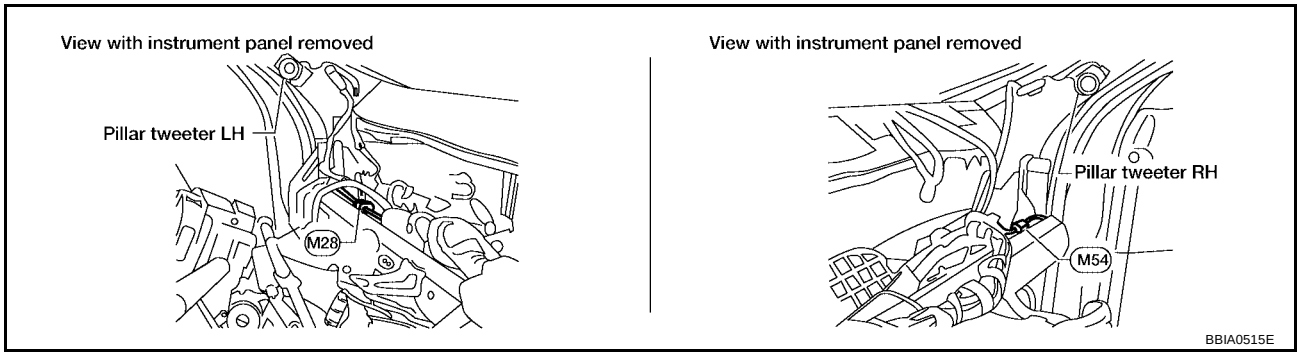
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00B5A

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170 .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-221, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace engine coolant temperature sensor.

3. CHECK THERMOSTAT OPERATION

When the engine is cooled [lower than 75°C (167°F)], grasp lower radiator hose and confirm the engine coolant does not flow.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace thermostat. Refer to CO-12, "THERMOSTAT AND THERMOSTAT HOUSING" .

4. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

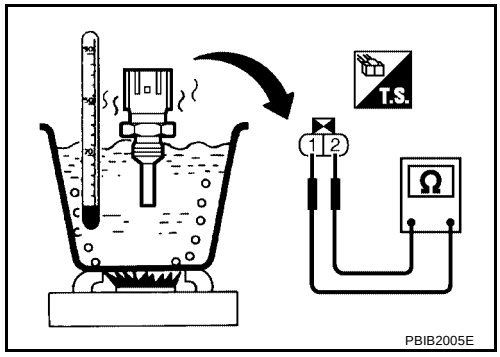
>> **INSPECTION END**

Component Inspection

UBS00B5B

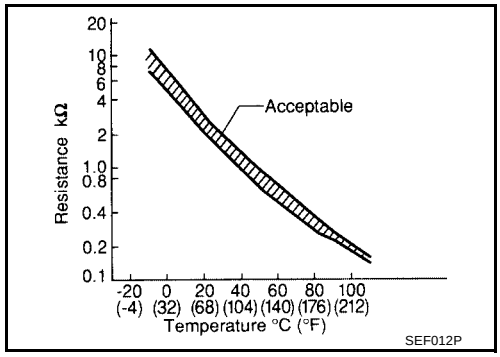
ENGINE COOLANT TEMPERATURE SENSOR

Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.0
90 (194)	0.236 - 0.260



If NG, replace engine coolant temperature sensor.

Removal and Installation

UBS00B5C

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

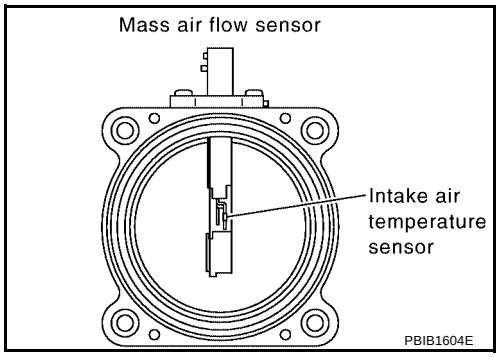
DTC P0127 IAT SENSOR

PFP:22630

Component Description

UBS00B5D

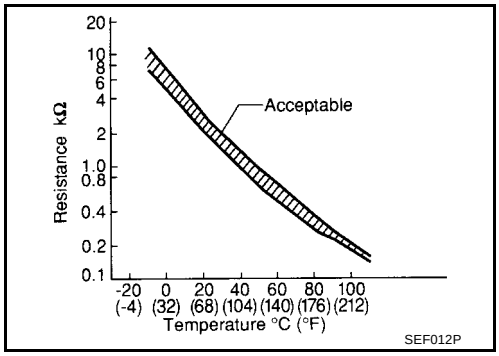
The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.43	7.9 - 9.3
25 (77)	3.32	1.9 - 2.1
80 (176)	1.23	0.31 - 0.37

*: These data are reference values and are measured between ECM terminal 34 (Intake air temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

UBS00B5E

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0127 0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	● Harness or connectors (The sensor circuit is open or shorted) ● Intake air temperature sensor

DTC Confirmation Procedure

UBS00B5F

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

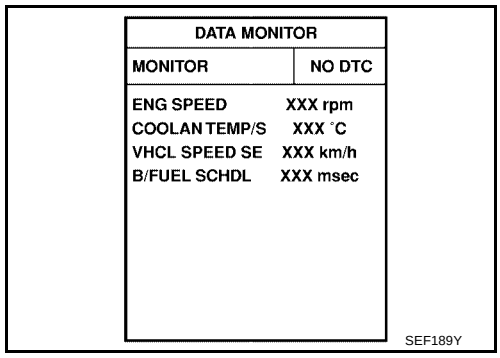
CAUTION:
Always drive vehicle at a safe speed.
TESTING CONDITION:
This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Wait until engine coolant temperature is less than 90°C (194°F)

a. Turn ignition switch ON.
b. Select “DATA MONITOR” mode with CONSULT-II.
c. Check the engine coolant temperature.
d. If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.
   - Perform the following steps before engine coolant temperature is above 90°C (194°F).

2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine.
5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
6. If 1st trip DTC is detected, go to EC-223, "Diagnostic Procedure" .



WITH GST

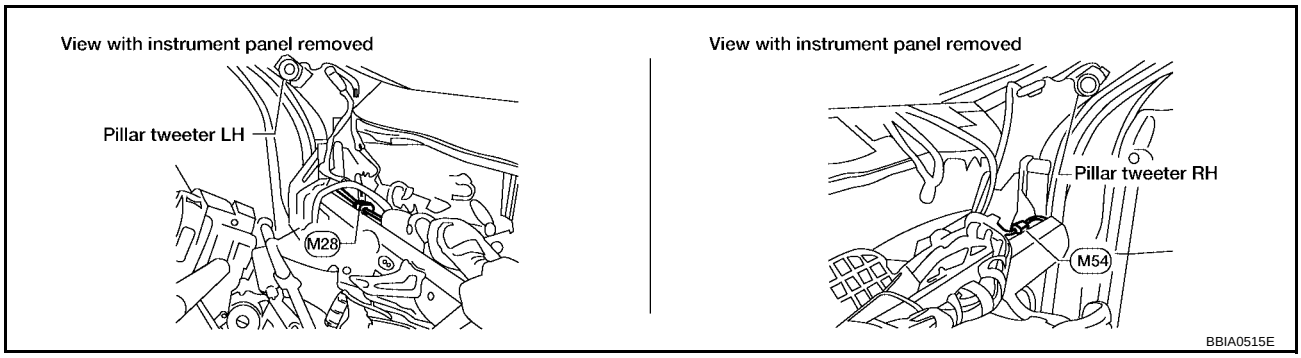
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00B5G

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170 .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-224, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

3. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

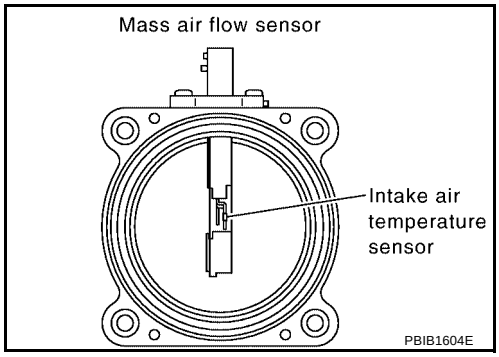
>> **INSPECTION END**

Component Inspection

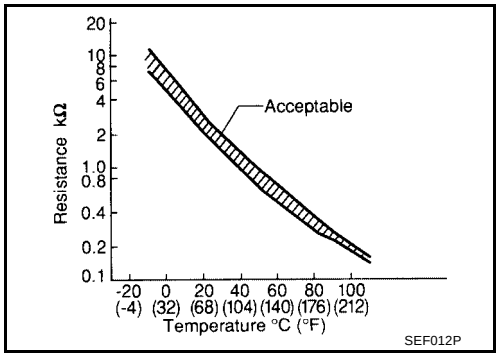
UBS00B5H

INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between intake air temperature sensor terminals 5 and 6 under the following conditions.



Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1



2. If NG, replace mass air flow sensor (with intake air temperature sensor).

DTC P0128 THERMOSTAT FUNCTION

PFP:21200

On Board Diagnosis Logic

UBS00B5I

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.
This is due to a leak in the seal or the thermostat stuck open.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128 0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	● Thermostat ● Leakage from sealing portion of thermostat ● Engine coolant temperature sensor

DTC Confirmation Procedure

UBS00B5J

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:

- **For best results, perform at ambient temperature of –10°C (14°F) or higher.**
- **For best results, perform at engine coolant temperature of –10°C (14°F) to 68°C (154°F).**

WITH CONSULT-II

1. Replace thermostat with new one. Refer to CO-12, "THERMOSTAT AND THERMOSTAT HOUSING" . Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on.
2. Turn ignition switch ON.
3. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
4. Check that the “COOLAN TEMP/S” is above 68°C (154°F).
   If it is below 68°C (154°F), go to following step.
   If it is above 68°C (154°F), cool down the engine to less than 60°C (140°F), then retry from step 1.
5. Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	80 - 120 km/h (50 - 75 MPH)

If 1st trip DTC is detected, go to EC-225, "Diagnostic Procedure" .

WITH GST

1. Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00B5K

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-226, "Component Inspection" .

OK or NG

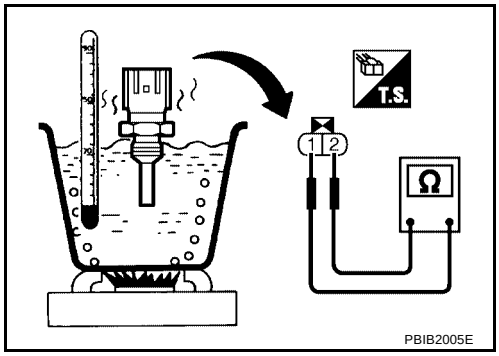
OK >> **INSPECTION END**
NG >> Replace engine coolant temperature sensor.

Component Inspection

UBS00B5L

ENGINE COOLANT TEMPERATURE SENSOR

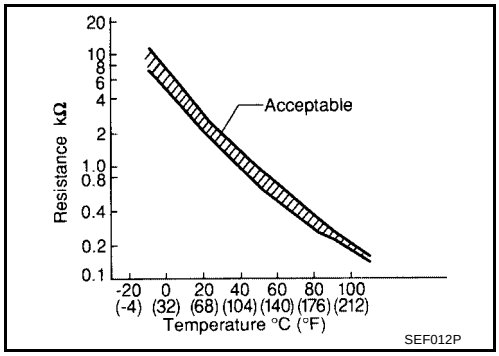
Check resistance as shown in the figure.



<Reference data>

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.0
90 (194)	0.236 - 0.260

If NG, replace engine coolant temperature sensor.



Removal and Installation

UBS00B5M

ENGINE COOLANT TEMPERATURE SENSOR

Refer to CO-12, "THERMOSTAT AND THERMOSTAT HOUSING" .

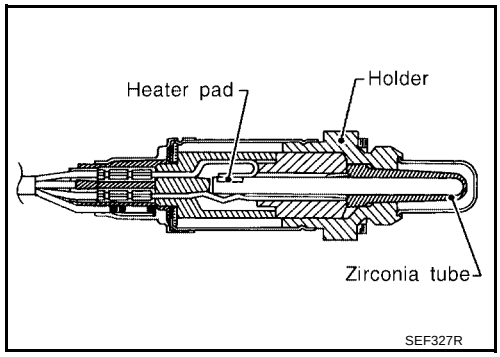
DTC P0138 HO2S2

PFP:226A0

Component Description

UBS00B5N

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00B5O

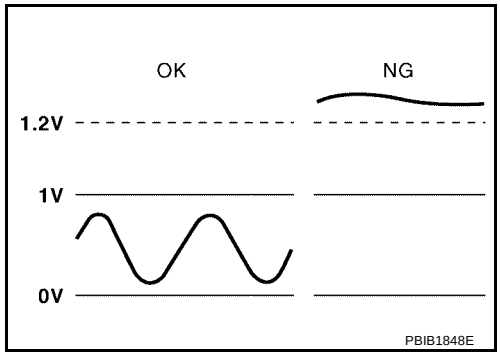
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ←→ 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS00B5P

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is too high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0138 0138 (Bank 1)	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2

DTC Confirmation Procedure

UBS00B5Q

CAUTION:

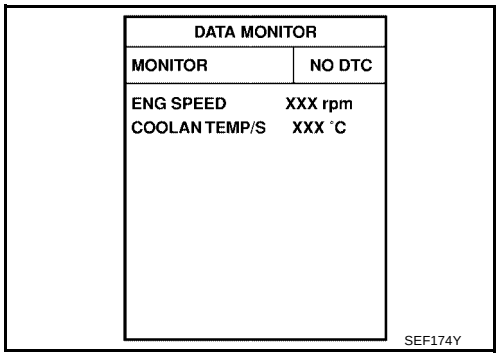
Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-230, "Diagnostic Procedure" .



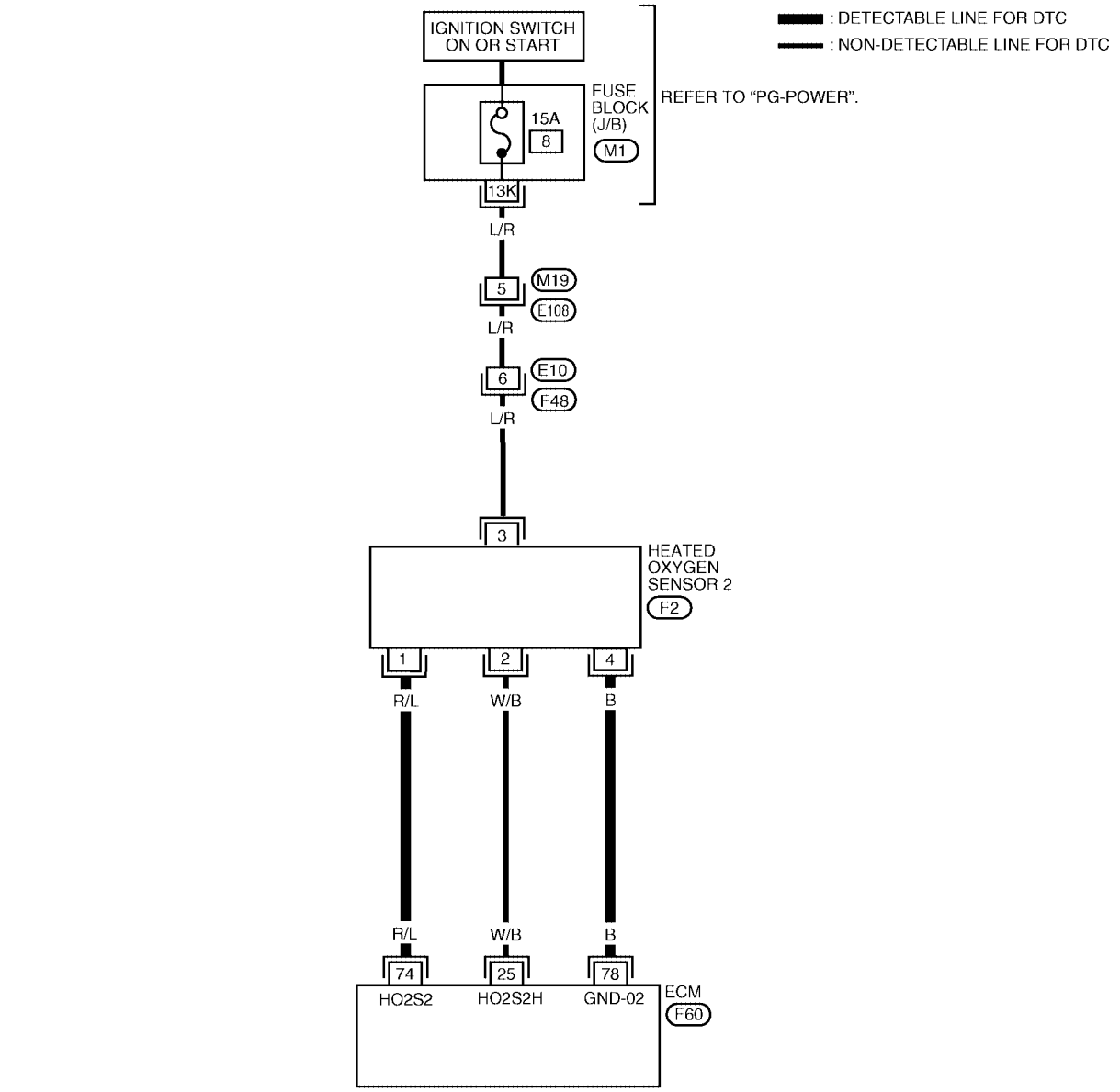
WITH GST

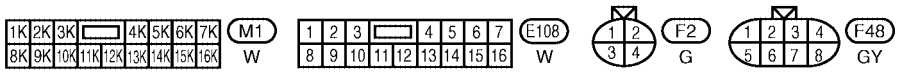
Follow the procedure “WITH CONSULT-II” above.

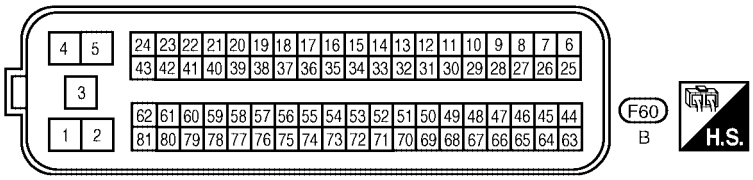
Wiring Diagram

UBS00B5R

EC-HO2S2-01







BBWA1427E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

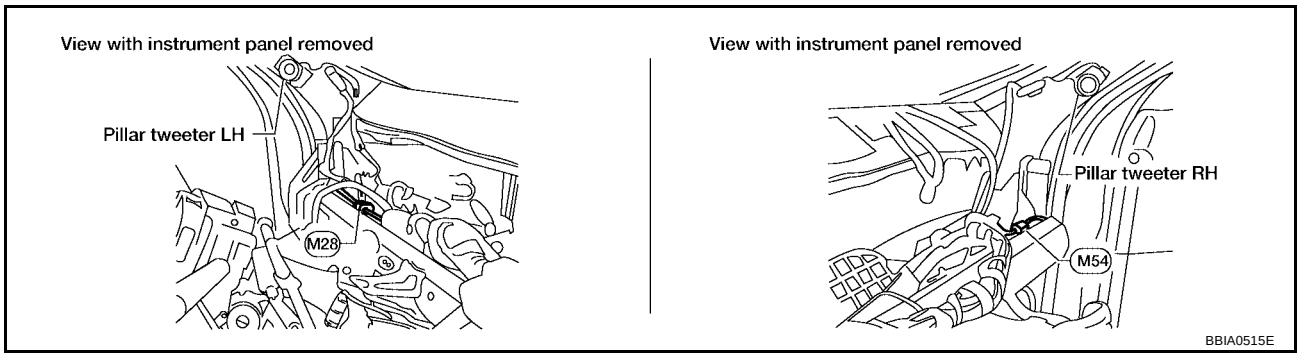
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	R/L	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00B5S

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170 .



OK or NG

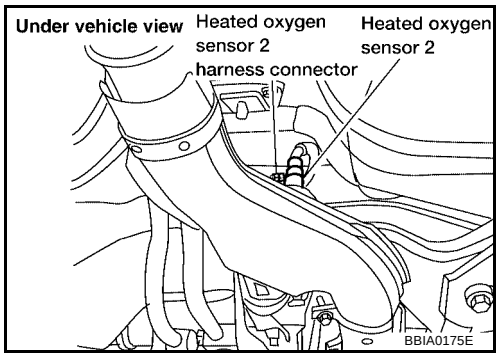
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 78 and HO2S2 terminal 4.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 74 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 74 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HARNESS CONNECTOR

Check HO2S2 harness connector for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness connector.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-231, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00B5T

HEATED OXYGEN SENSOR 2

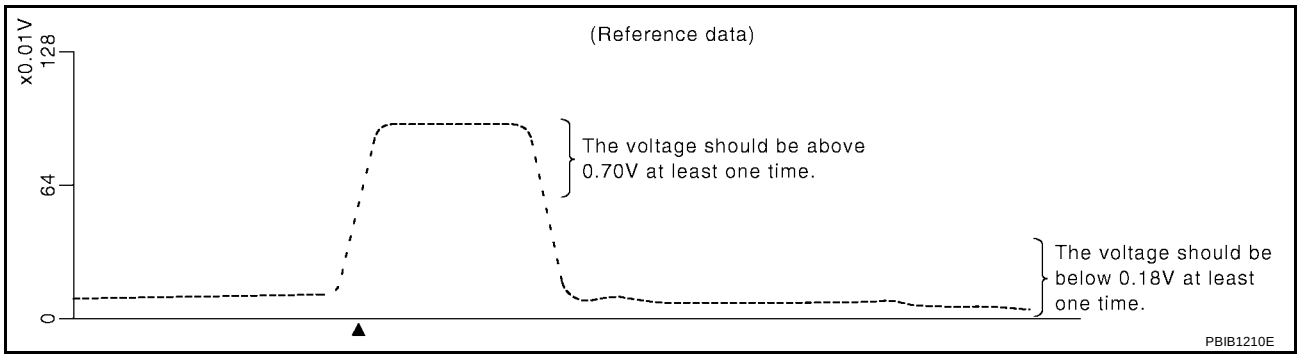
With CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V

PBIB1782E

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



“HO2S2 (B1)” should be above 0.70V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.

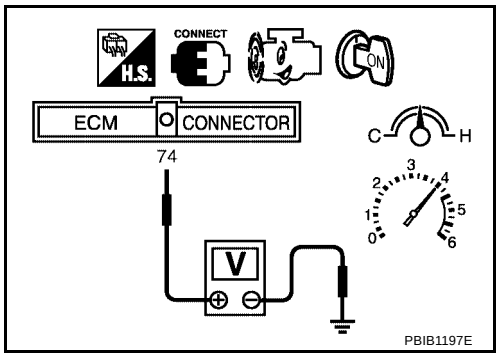
7. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed at between 3,500 to 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.70V at least once during this procedure.
   If the voltage is above 0.70V at step 6, step 7 is not necessary.



7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 4th gear position (M/T).
   The voltage should be below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00B5U

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

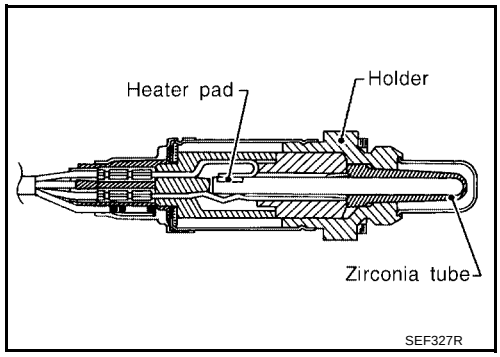
DTC P0139 HO2S2

PFP:226A0

Component Description

UBS00B5V

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00B5W

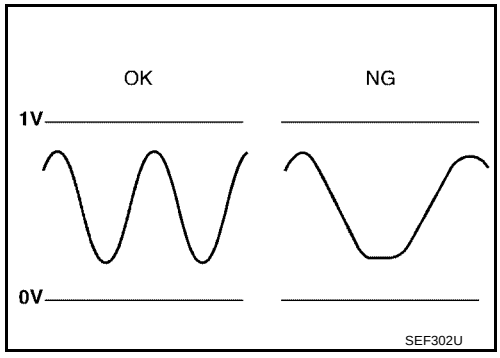
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ←→ 0.6 - 1.0V
HO2S2 MNTR (B1)	● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		LEAN ←→ RICH

On Board Diagnosis Logic

UBS00B5X

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139 0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injectors ● Intake air leaks

DTC Confirmation Procedure

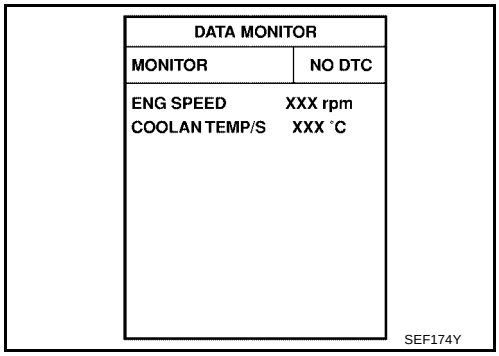
UBS00B5Y

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

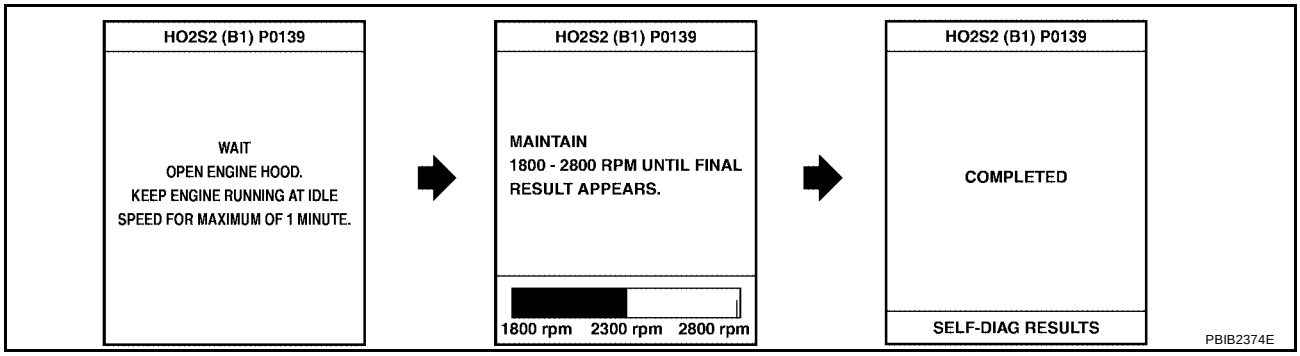
WITH CONSULT-II

For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F)

1. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that "COOLANTEMP/S" indications more than 70°C (158°F).
   If not, warm up engine and go to next step when "COOLANTEMP/S" indication reaches to 70°C (158°F).



7. Select "HO2S2 (B1) P0139" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
8. Start engine and following the instruction of CONSULT-II.



NOTE:
It will take at most 10 minutes until "COMPLETED" is displayed.

9. Make sure that OK is displayed after touching "SELF-DIAG RESULTS".
   If NG is displayed, refer to EC-237, "Diagnostic Procedure" .
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Return to step 1.

Overall Function Check

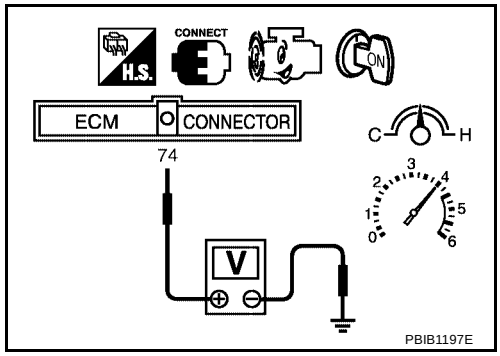
UBS00B5Z

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 signal) and ground.

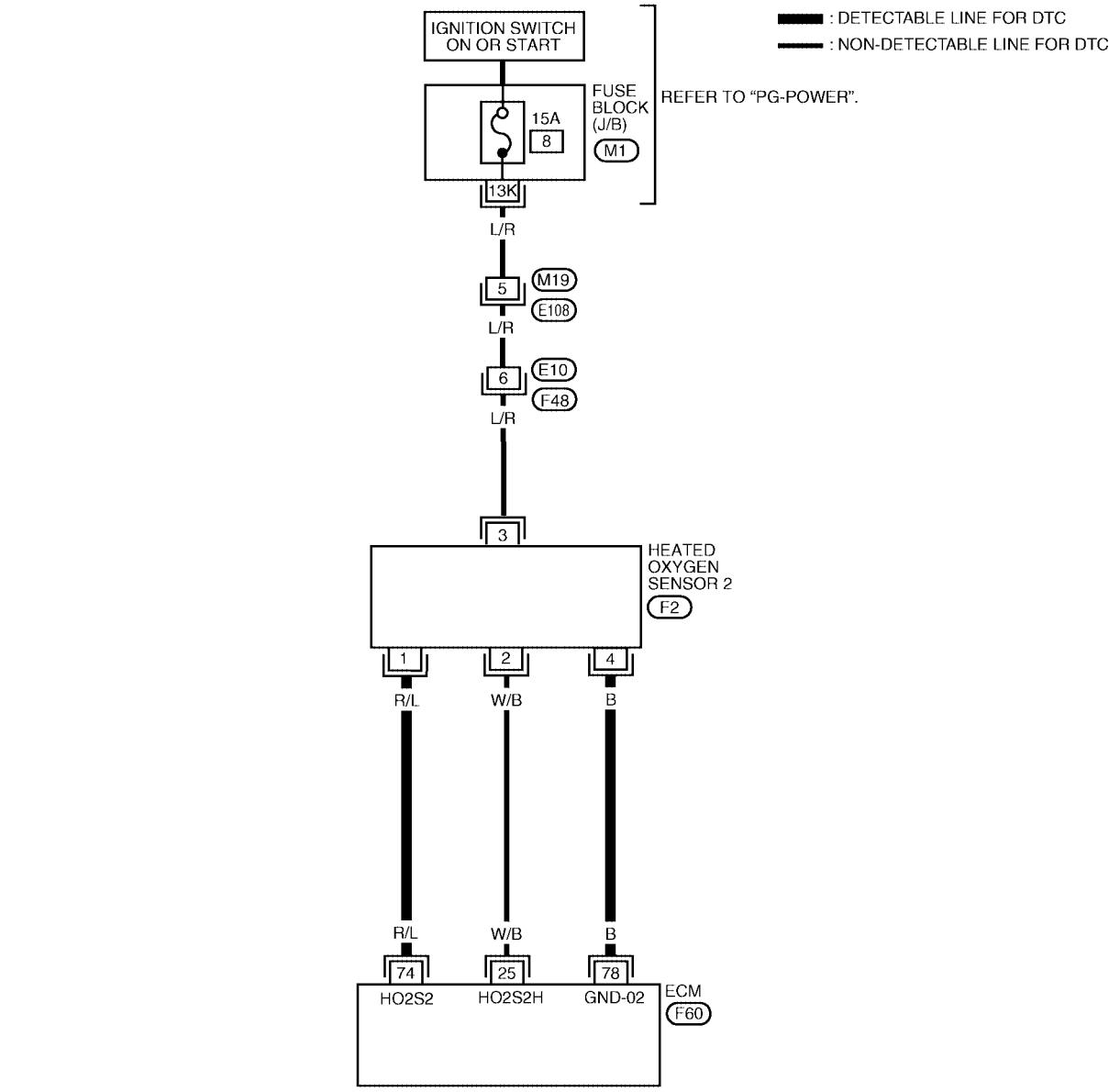
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   A change of voltage should be more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 4th gear position (M/T).
   A change of voltage should be more than 0.06V for 1 second during this procedure.
8. If NG, go to EC-237, "Diagnostic Procedure" .

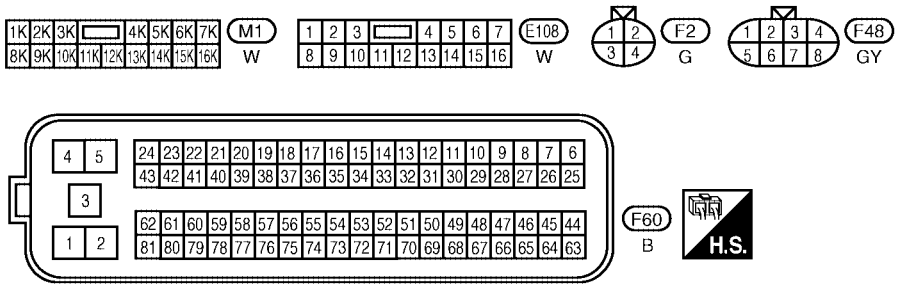


Wiring Diagram

UBS00B60

EC-HO2S2-01





BBWA1427E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

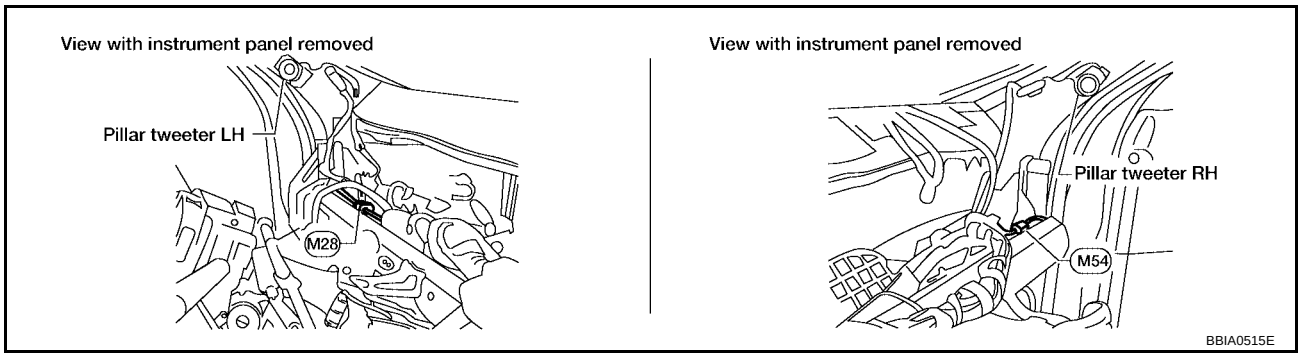
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	R/L	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00B61

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170 .



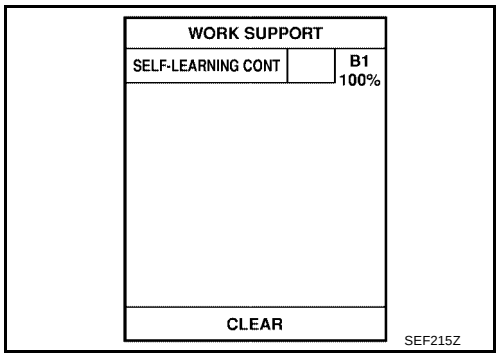
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

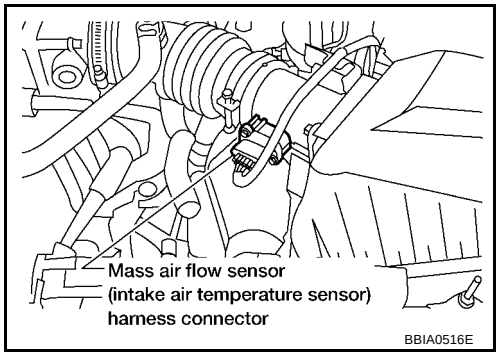
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-241, "DTC P0171 FUEL INJECTION SYSTEM FUNCTION" or EC-248, "DTC P0172 FUEL INJECTION SYSTEM FUNCTION" .

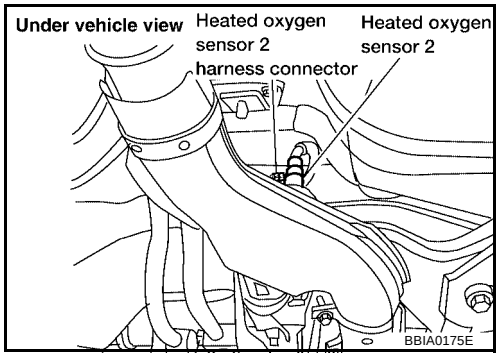
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 78 and HO2S2 terminal 4.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 74 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 74 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-239, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00B62

HEATED OXYGEN SENSOR 2

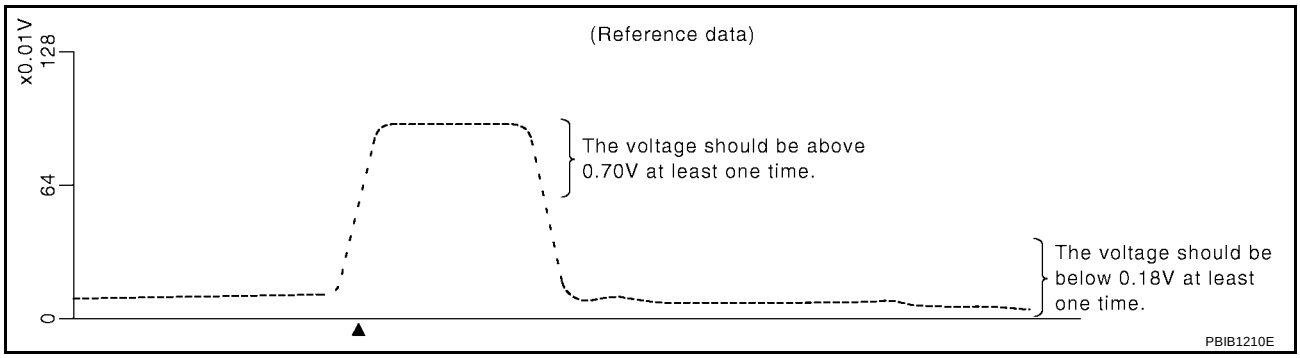
With CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V

PBIB1782E

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



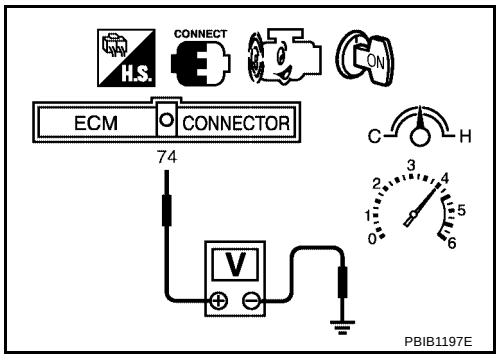
“HO2S2 (B1)” should be above 0.70V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.18V at least once when the “FUEL INJECTION” is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.70V at least once during this procedure.
   If the voltage is above 0.70V at step 6, step 7 is not necessary.



7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 4th gear position (M/T).
   The voltage should be below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00B63

HEATED OXYGEN SENSOR 2

Refer toEX-3, "EXHAUST SYSTEM" .

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS00B64

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the air fuel ratio (A/F) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0171 0171	Fuel injection system too learn	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	● Intake air leaks ● Air fuel ratio (A/F) sensor 1 ● Injectors ● Exhaust gas leaks ● Incorrect fuel pressure ● Lack of fuel ● Mass air flow sensor ● Incorrect PCV hose connection

DTC Confirmation Procedure

UBS00B65

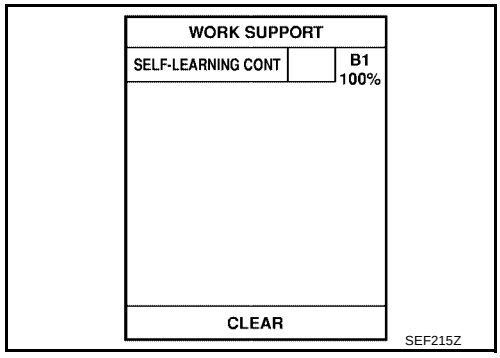
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-244, "Diagnostic Procedure" .

   NOTE:
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
   Hold the accelerator pedal as steady as possible.



The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

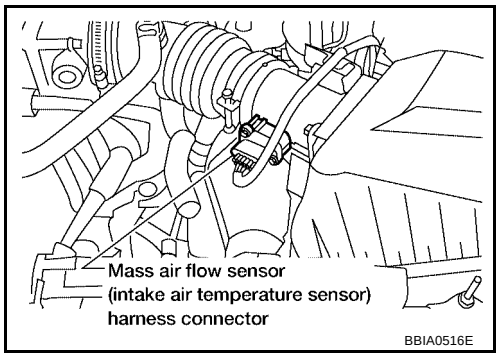
Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)

Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-244, "Diagnostic Procedure" . If engine does not start, check exhaust gas and intake air leak visually.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select “Service $03” with GST. Make sure DTC P0102 is detected.
6. Select “Service $04” with GST and erase the DTC P0102.
7. Start engine again and run it for at least 10 minutes at idle speed.



8. Select “Service $07” with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-244, "Diagnostic Procedure" .

NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
Hold the accelerator pedal as steady as possible.

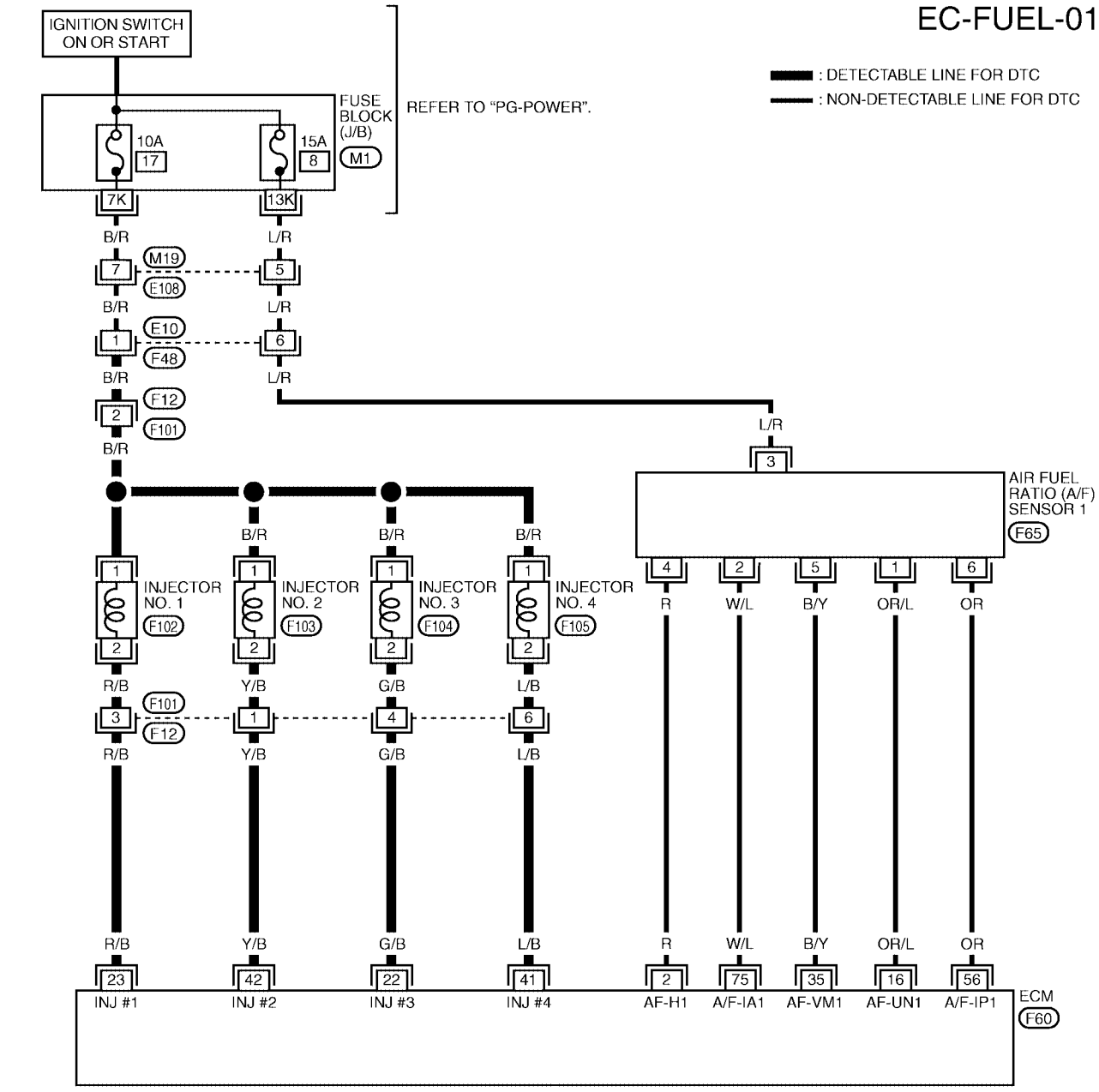
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

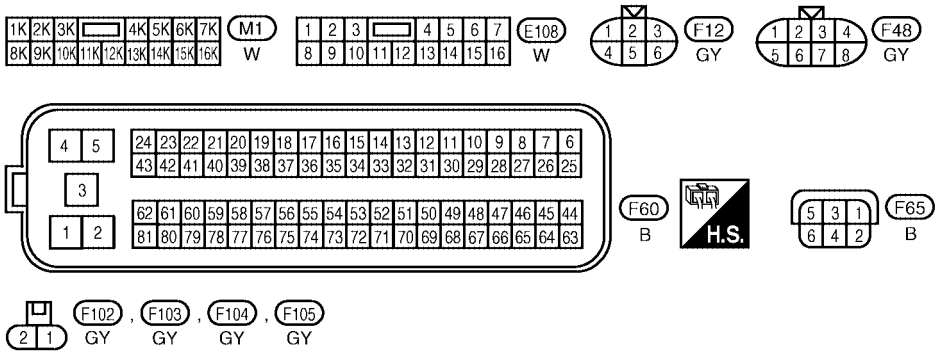
Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal. If engine starts, go to EC-244, "Diagnostic Procedure" . If engine does not start, check exhaust gas and intake air leak visually.

Wiring Diagram

UBS00B66





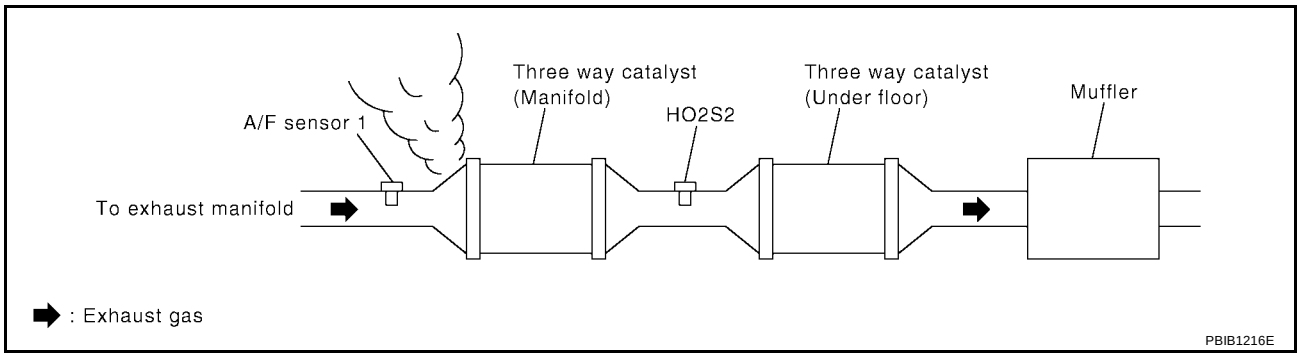
BBWA1428E

Diagnostic Procedure

UBS00B67

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

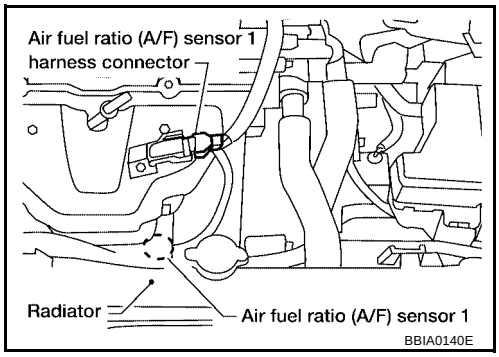
1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminals and A/F sensor 1 terminals as follows.
   Refer to Wiring Diagram.



ECM terminal	A/F sensor 1
16	1
35	5
56	6
75	2

Continuity should exist.

5. Check harness continuity between ECM terminals 16, 35, 56, 75 and ground, or A/F sensor 1 terminals 1, 2, 5, 6 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-94, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-95, "FUEL PRESSURE CHECK" .

At idling: 350 kPa (3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit. Refer to EC-620, "FUEL PUMP" .
- Fuel pressure regulator
- Fuel lines.
- Fuel filter for clogging

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

at idling: 1.4 - 4.0 g·m/sec
at 2,500 rpm: 5.0 - 10.0 g·m/sec

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

at idling: 1.4 - 4.0 g·m/sec
at 2,500 rpm: 5.0 - 10.0 g·m/sec

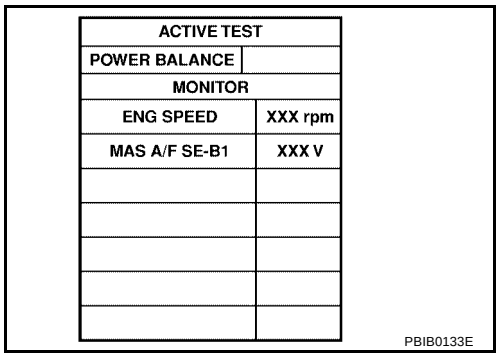
OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-185, "DTC P0101 MAF SENSOR" .

7. CHECK FUNCTION OF INJECTOR

With CONSULT-II

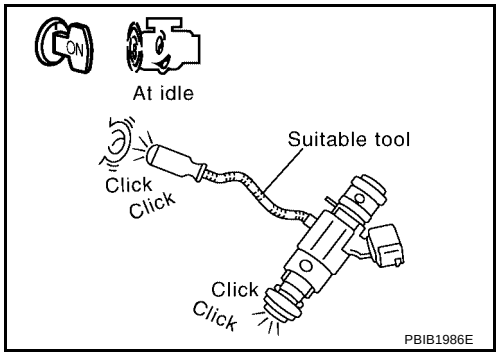
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.



OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for EC-614, "INJECTOR" .

8. REMOVE INJECTOR

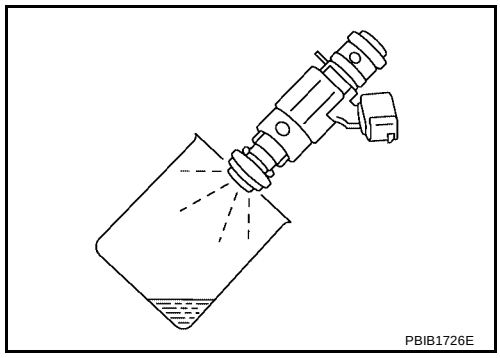
1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Remove injector with fuel tube assembly. Refer to EM-21, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery. The injector harness connectors should remain connected.

>> GO TO 9.

9. CHECK INJECTOR

1. Disconnect all ignition coil harness connectors.
2. Place pans or saucers under each injector.
3. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.

Fuel should be sprayed evenly for each cylinder.



OK or NG

OK >> GO TO 10.
NG >> Replace injectors from which fuel does not spray out. Always replace O-ring with new one.

10. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS00B68

With the Air/Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the air fuel ratio (A/F) sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Injectors

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0172 0172	Fuel injection system too rich	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	● Air fuel ratio (A/F) sensor 1 ● Injectors ● Exhaust gas leaks ● Incorrect fuel pressure ● Mass air flow sensor

DTC Confirmation Procedure

UBS00B69

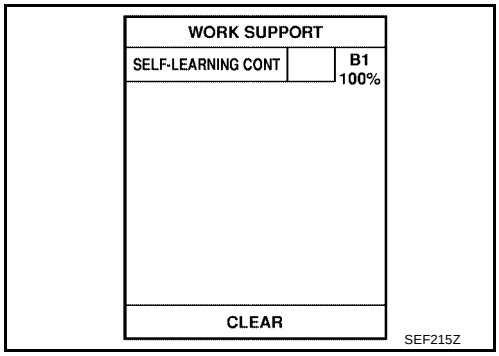
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR” or “START”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-251, "Diagnostic Procedure" .

   NOTE:
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
   Hold the accelerator pedal as steady as possible.



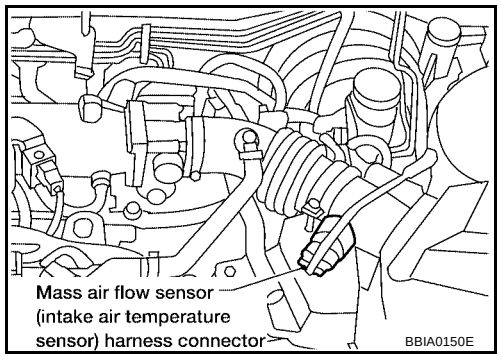
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction.
8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-251, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select Service $03 with GST. Make sure DTC P0102 is detected.
6. Select Service $04 with GST and erase the DTC P0102.
7. Start engine again and run it for at least 10 minutes at idle speed.



8. Select Service $07 with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-251, "Diagnostic Procedure" .

NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
Hold the accelerator pedal as steady as possible.

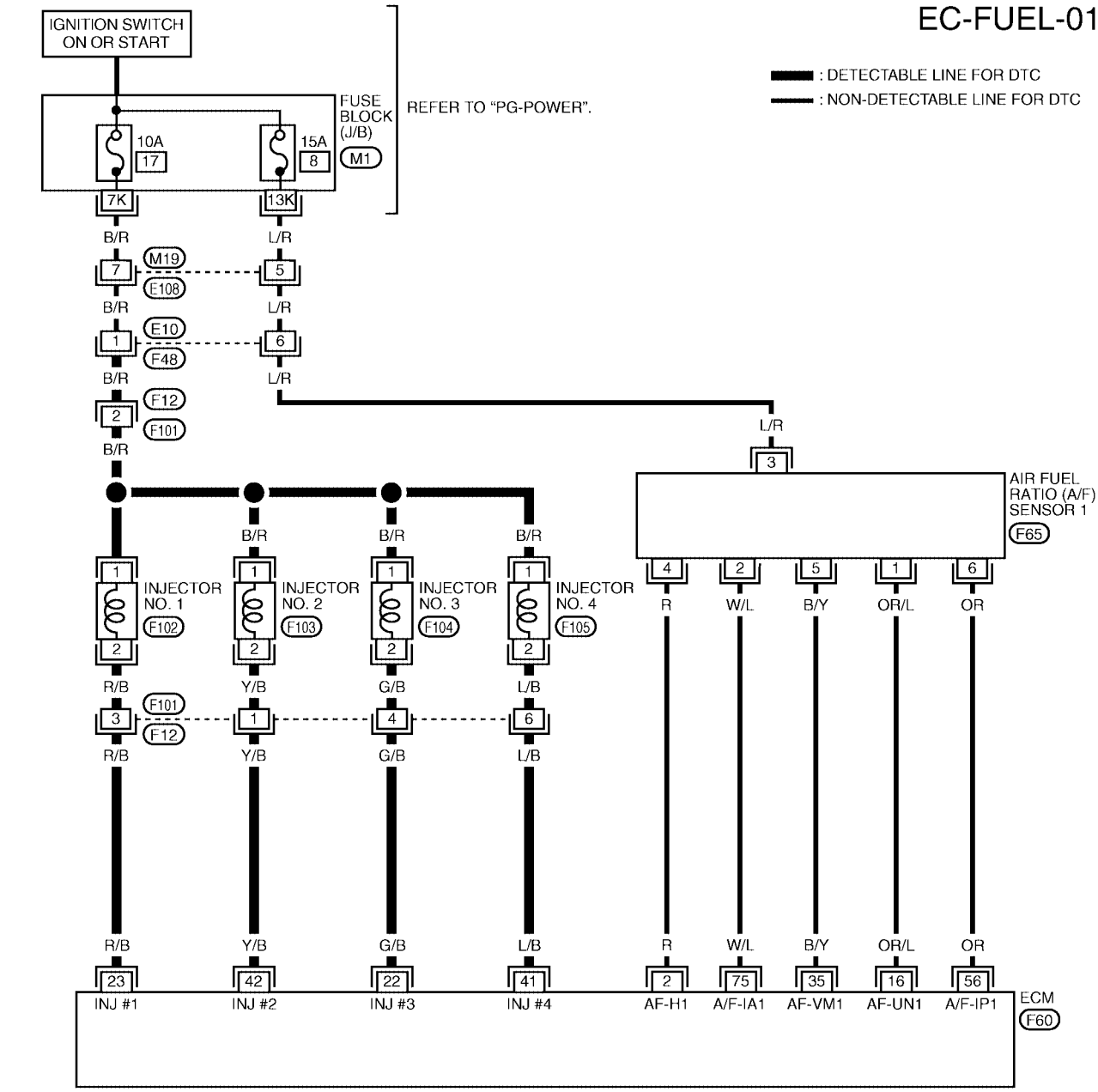
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

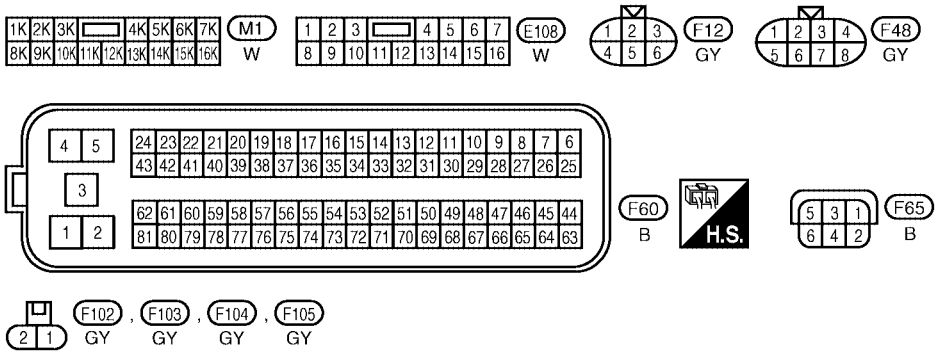
Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal.
If engine starts, go to EC-251, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram

UBS00B6A





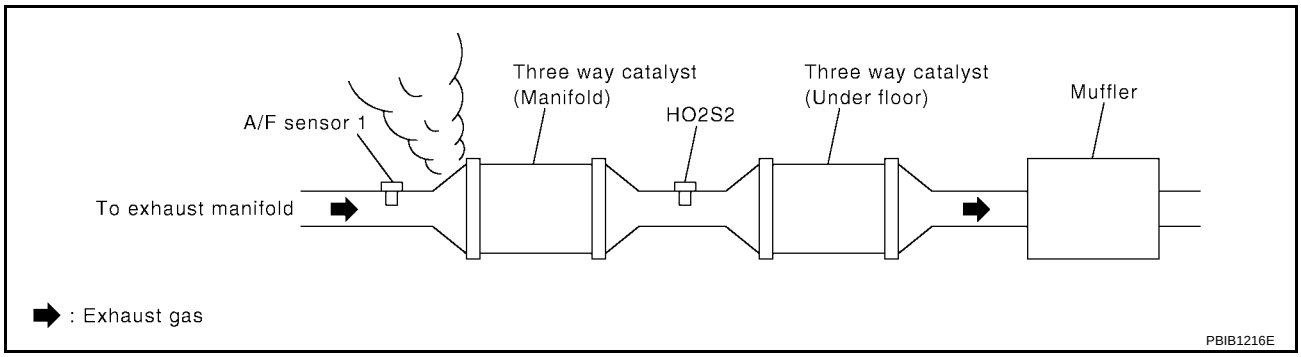
BBWA1428E

Diagnostic Procedure

UBS00B6B

1. CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).

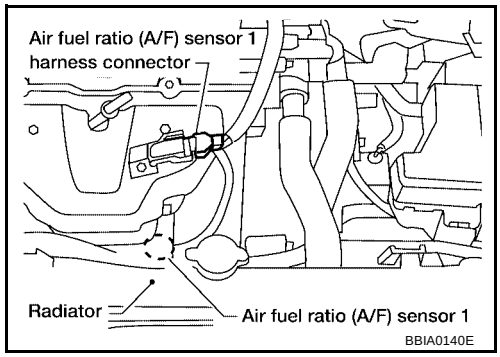


OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector and ECM harness connector.
3. Check harness continuity between ECM terminals and A/F sensor 1 terminals as follows.
   Refer to Wiring Diagram.



ECM terminal	A/F sensor 1 terminal
16	1
35	5
56	6
75	2

Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 and ground, or A/F sensor 1 terminals 1, 2, 5, 6 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-94, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure.

At idling: Approximately 350 kPa (3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-620 .)
- Fuel pressure regulator (Refer to EC-95 .)

OK or NG

OK >> Replace “fuel level sensor unit and fuel pump”.
NG >> Repair or replace.

5. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

at idling : 1.4 - 4.0 g·m/sec
at 2,500 rpm : 5.0 - 10.0 g·m/sec

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

at idling : 1.4 - 4.0 g·m/sec
at 2,500 rpm : 5.0 - 10.0 g·m/sec

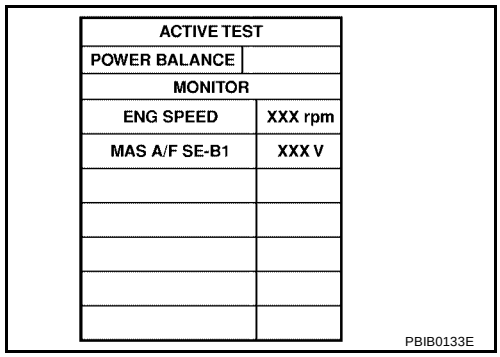
OK or NG

OK >> GO TO 6.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer toEC-185, "DTC P0101 MAF SENSOR" .

6. CHECK FUNCTION OF INJECTORS

With CONSULT-II

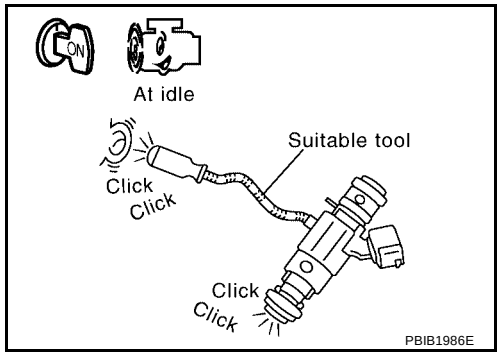
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.



OK or NG

OK >> GO TO 7.
NG >> Perform trouble diagnosis for INJECTOR, EC-614, "INJECTOR" .

7. REMOVE INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Remove injector assembly. Refer to EM-21, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.

>> GO TO 8.

8. CHECK INJECTOR

1. Disconnect injector harness connectors.
2. Disconnect all ignition coil harness connectors.
3. Prepare pans or saucers under each injectors.
4. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip)>>GO TO 9.
NG (Drips)>>Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

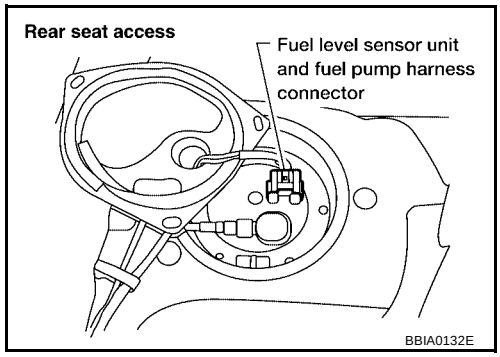
DTC P0181 FTT SENSOR

PFP:22630

Component Description

UBS00B6C

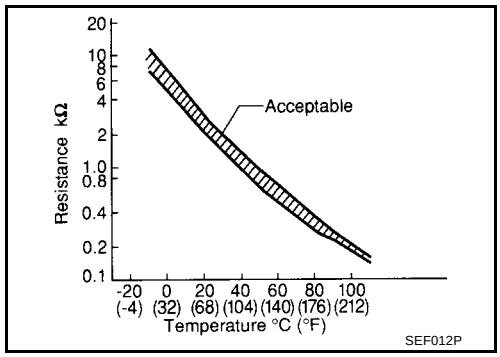
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 107 (Fuel tank temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use ground other than ECM, such as ground.

On Board Diagnosis Logic

UBS00B6D

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0181 0181	Fuel tank temperature sensor circuit range/ performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	● Harness or connectors (The sensor circuit is open or shorted) ● Fuel tank temperature sensor

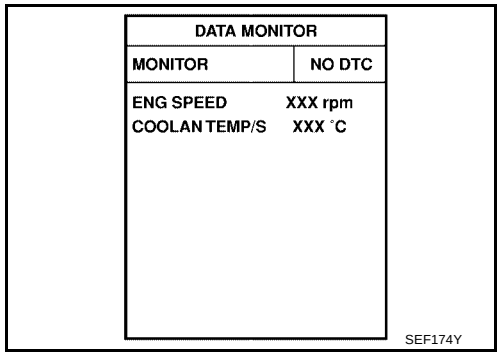
DTC Confirmation Procedure

UBS00B6E

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
   If 1st trip DTC is detected, go to EC-258, "Diagnostic Procedure" .
   If the result is OK, go to following step.
4. Check “COOLAN TEMP/S” signal.
   If the signal is less than 50°C (122°F), the result will be OK.
   If the signal is above 50°C (122°F), go to the following step.
5. Cool engine down until “COOLAN TEMP/S” signal is less than 50°C (122°F).
6. Wait at least 10 seconds.
7. If 1st trip DTC is detected, go to EC-258, "Diagnostic Procedure" .



WITH GST

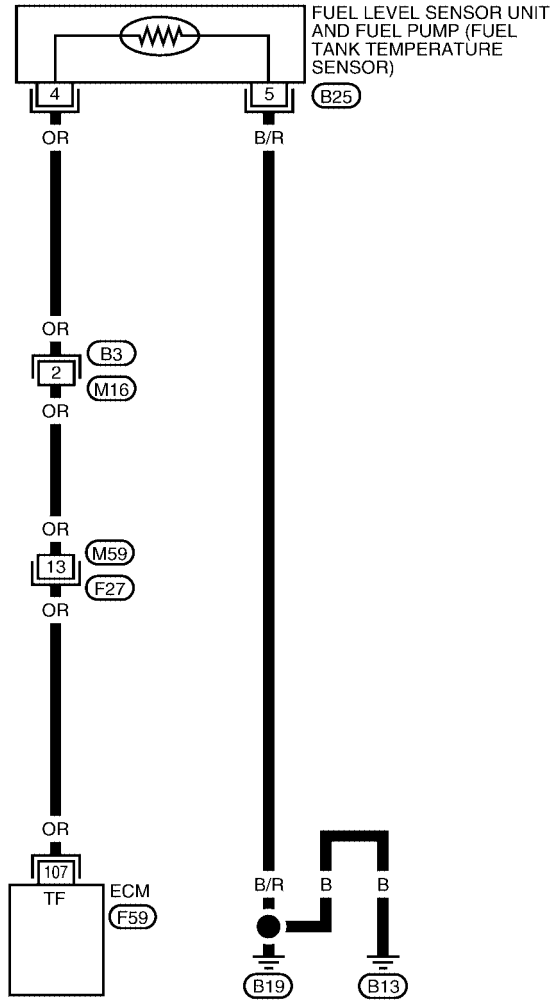
Follow the procedure “WITH CONSULT-II” above.

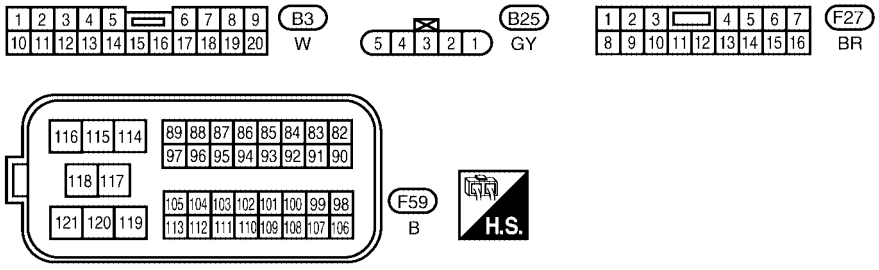
Wiring Diagram

UBS00B6F

EC-FTTS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





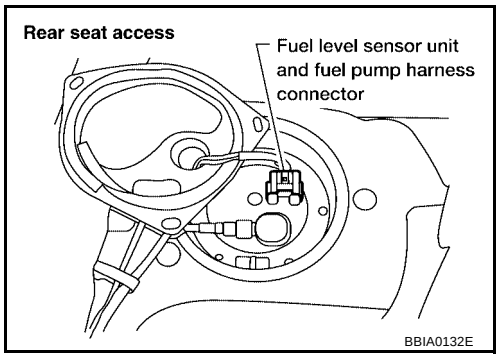
BBWA0285E

Diagnostic Procedure

UBS00B6G

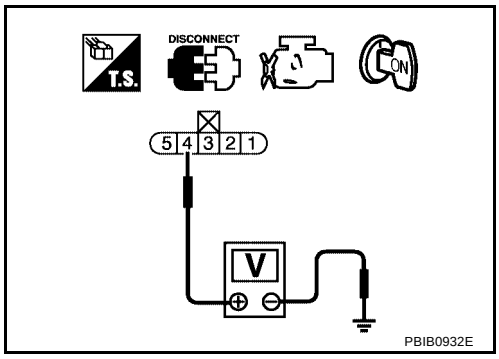
1. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Turn ignition switch ON.



4. Check voltage between “fuel level sensor unit and fuel pump” terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness connectors B3, M16
- Harness for open or short between ECM and “fuel level sensor unit and fuel pump”

>> Repair harness or connector.

3. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 5 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to, EC-259, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace fuel level sensor unit.

5. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

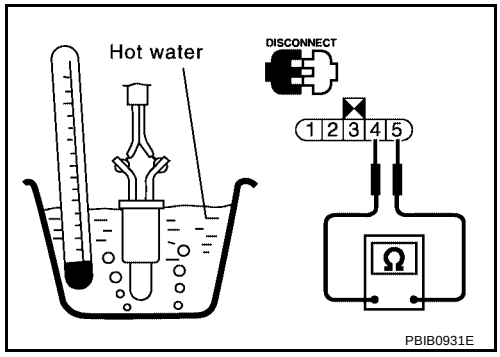
Component Inspection

UBS00B6H

FUEL TANK TEMPERATURE SENSOR

Check resistance by heating with hot water or heat gun as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90



Removal and Installation

UBS00B6I

FUEL TANK TEMPERATURE SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

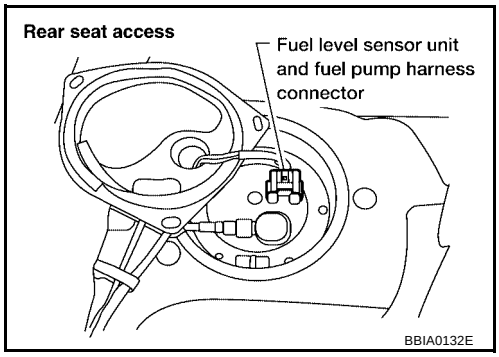
DTC P0182, P0183 FTT SENSOR

PFP:22630

Component Description

UBS00B6J

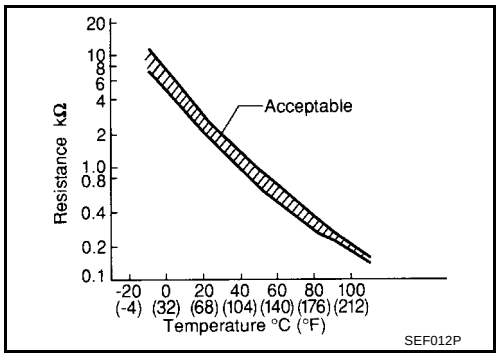
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: These data are reference values and are measured between ECM terminal 107 (Fuel tank temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use ground other than ECM, such as ground.

On Board Diagnosis Logic

UBS00B6K

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182 0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Fuel tank temperature sensor
P0183 0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

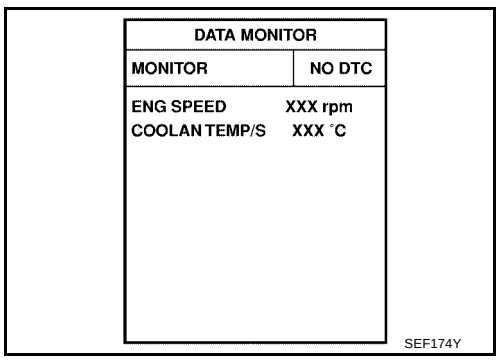
UBS00B6L

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-262, "Diagnostic Procedure"
.



WITH GST

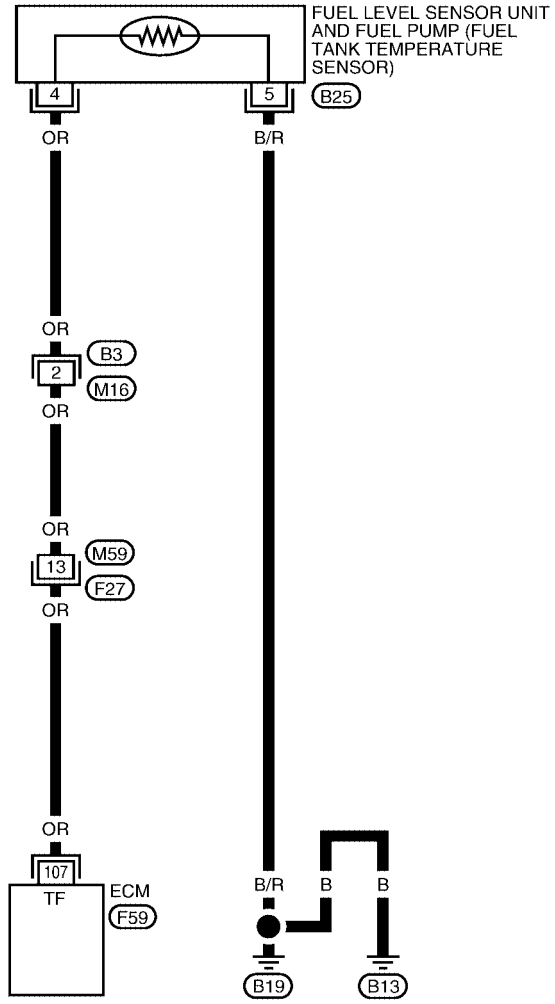
Follow the procedure “WITH CONSULT-II” above.

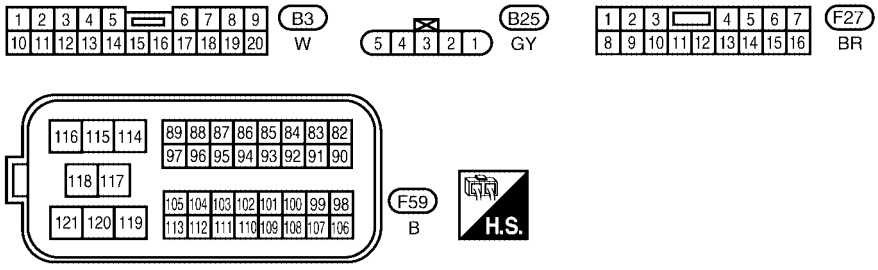
Wiring Diagram

UBS00B6M

EC-FTTS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





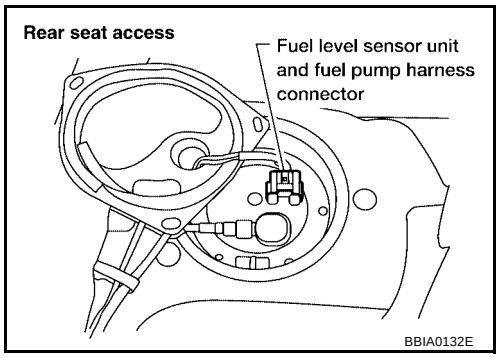
BBWA0285E

Diagnostic Procedure

UBS00B6N

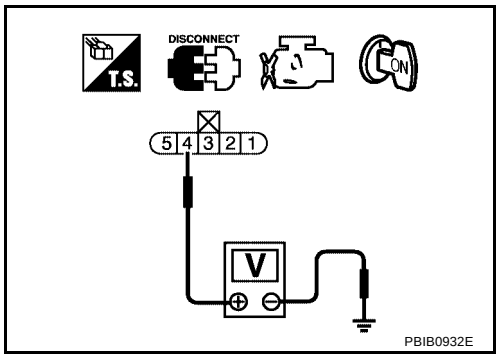
1. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Turn ignition switch ON.



4. Check voltage between “fuel level sensor unit and fuel pump” terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness connectors B3, M16
- Harness for open or short between ECM and “fuel level sensor unit and fuel pump”

>> Repair harness or connector.

3. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 5 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to, EC-263, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace “fuel level sensor unit and fuel pump”.

5. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

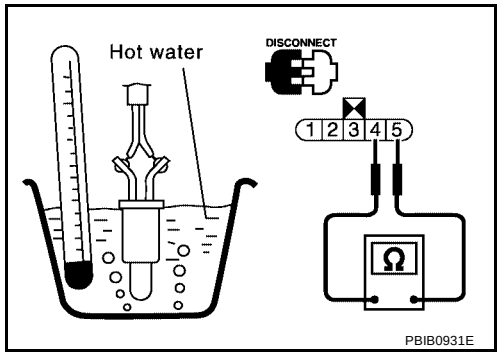
UBS00B6O

FUEL TANK TEMPERATURE SENSOR

Check resistance by heating with hot water or heat gun as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

If NG, replace fuel level sensor unit and fuel pump.



Removal and Installation

UBS00B6P

FUEL TANK TEMPERATURE SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

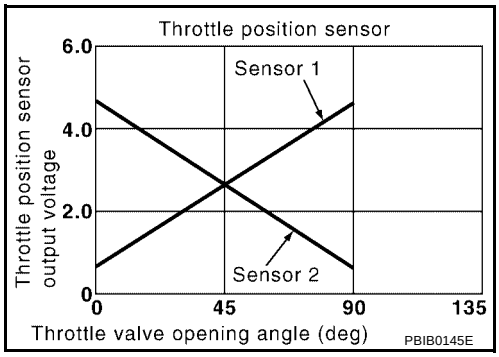
DTC P0222, P0223 TP SENSOR

PFP:16119

Component Description

UBS00B6Q

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-II Reference Value in Data Monitor Mode

UBS00B6R

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

UBS00B6S

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	● Harness or connectors (The TP sensor 1 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 1) ● Accelerator pedal position sensor
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode an the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

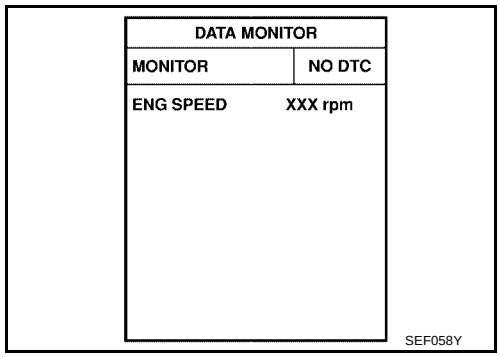
DTC Confirmation Procedure

UBS00B6T

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-267, "Diagnostic Procedure" .

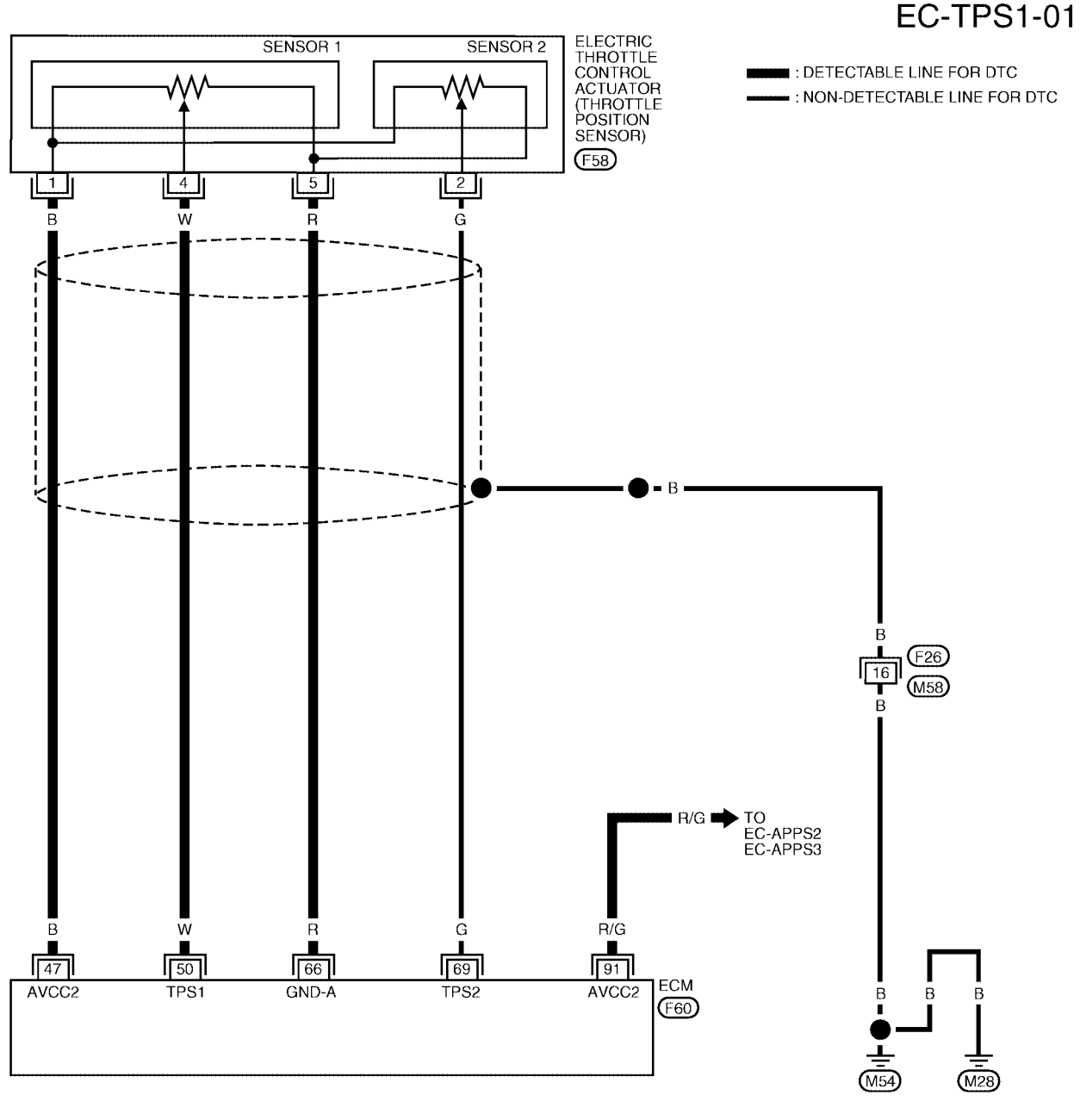


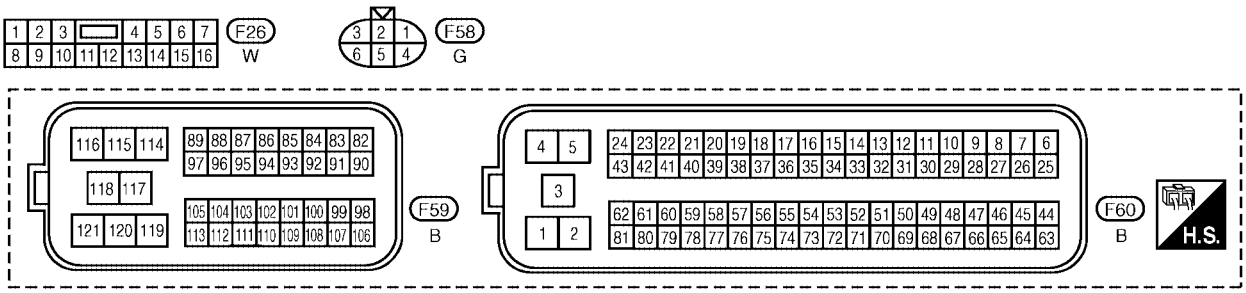
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00B6U





BBWA1461E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

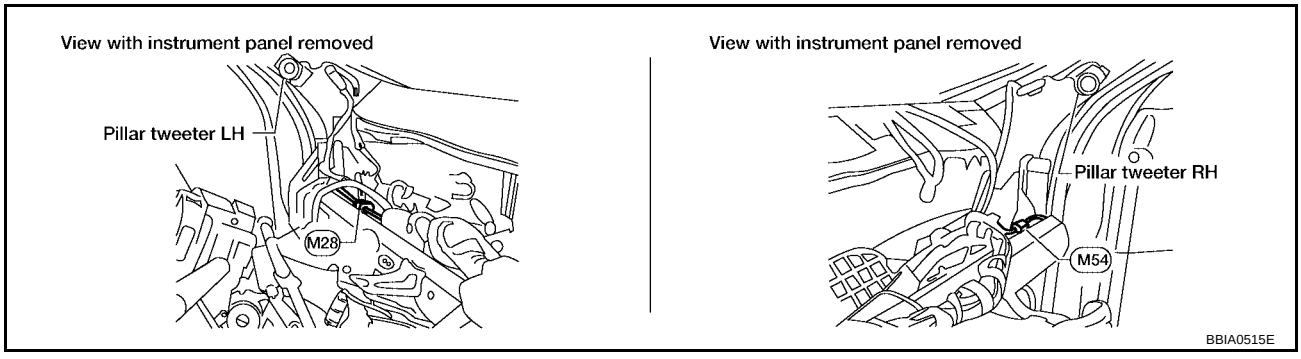
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	B	Throttle position sensor power supply	**[Ignition switch: ON]**	Approximately 5V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal fully depressed	Less than 4.75V
66	R	Throttle position sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
69	G	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal fully depressed	More than 0.36V
91	R/G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

UBS00B6V

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .

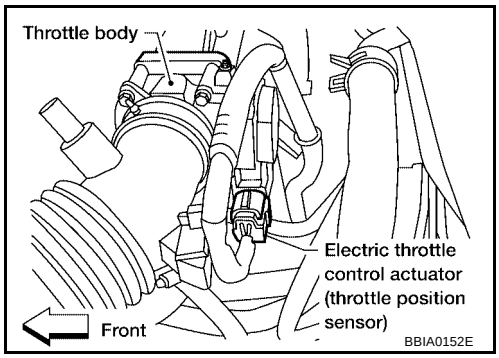


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

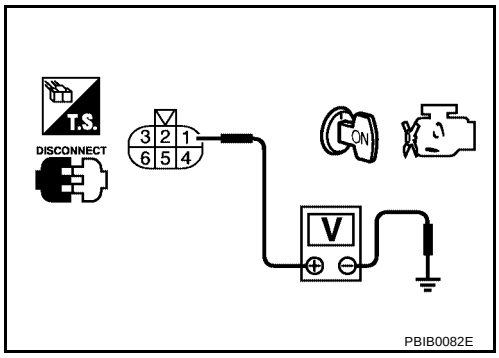


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 7.
NG >> GO TO 3.



3. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace open circuit.

4. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 1	EC-400
91	APP sensor terminal 1	EC-595

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-600, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-92, "Accelerator Pedal Released Position Learning" .
3. Perform EC-92, "Throttle Valve Closed Position Learning" .
4. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 66 and electric throttle control actuator terminal 5. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 4. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-270, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-92, "Throttle Valve Closed Position Learning" .
3. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

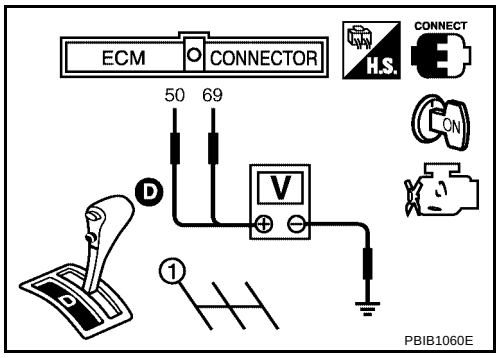
Component Inspection

UBS00B6W

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-92, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T models) or 1st position (M/T models).
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-92, "Throttle Valve Closed Position Learning" .
8. Perform EC-92, "Idle Air Volume Learning" .

Removal and Installation

UBS00B6X

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

PFP:00020

On Board Diagnosis Logic

UBS00B6Y

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300 0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	● Improper spark plug ● Insufficient compression ● Incorrect fuel pressure ● The injector circuit is open or shorted ● Injectors ● Intake air leak ● The ignition signal circuit is open or shorted ● Lack of fuel ● Signal plate ● Air fuel ratio (A/F) sensor 1 ● Incorrect PCV hose connection
P0301 0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302 0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303 0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304 0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

DTC Confirmation Procedure

UBS00B6Z

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

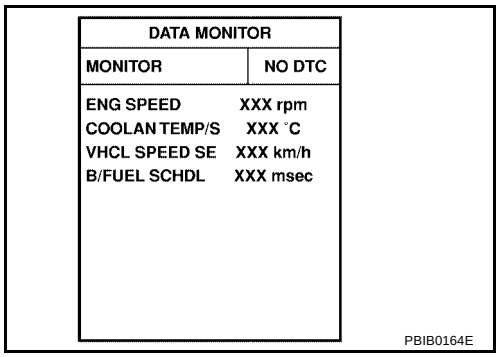
1. Turn ignition switch ON, and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart engine and let it idle for about 15 minutes.
5. If 1st trip DTC is detected, go to EC-272, "Diagnostic Procedure".

   NOTE:

   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.

b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
   Hold the accelerator pedal as steady as possible.



The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00B70

1. CHECK FOR INTAKE AIR LEAK

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

OK or NG

OK >> GO TO 2.
NG >> Discover air leak location and repair.

2. CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst (manifold) and muffler for dents.

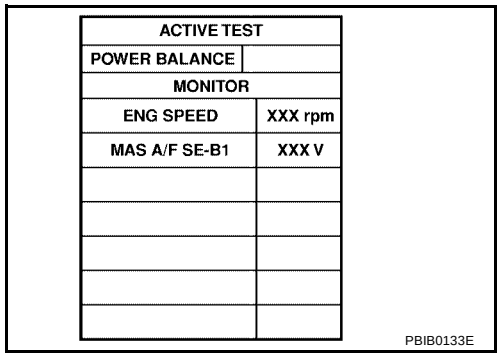
OK or NG

OK >> GO TO 3.
NG >> Repair or replace it.

3. PERFORM POWER BALANCE TEST

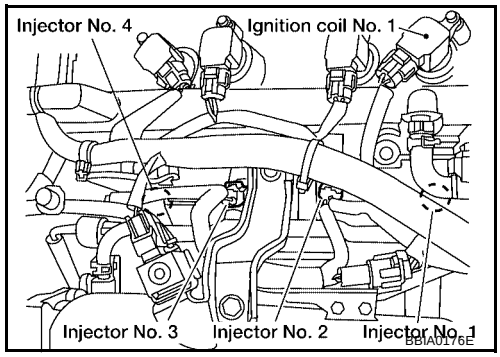
With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?



Without CONSULT-II

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



Yes or No

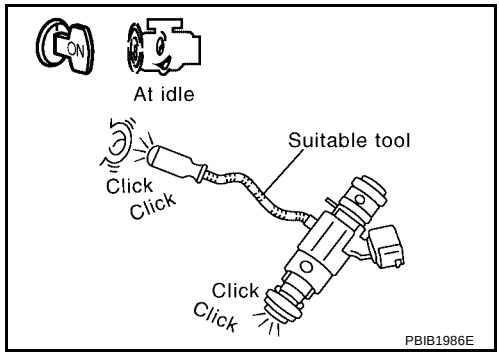
Yes >> GO TO 4.
No >> GO TO 7.

4. CHECK INJECTOR

Does each injector make an operating sound at idle?

Yes or No

Yes >> GO TO 5.
No >> Check injector(s) and circuit(s). Refer to EC-614 .



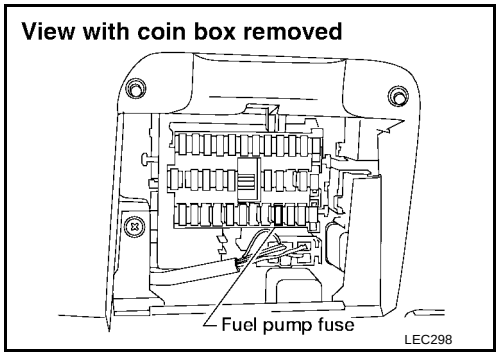
5. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:

Do the following procedure in the place where ventilation is good without the combustibles.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

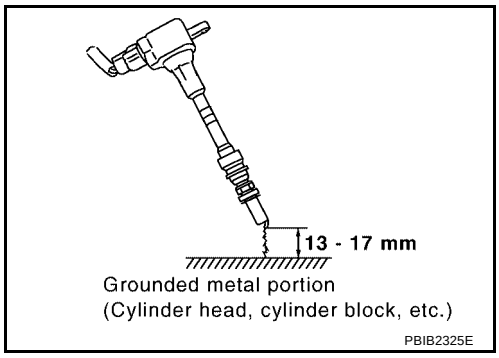
   NOTE:
   Do not use CONSULT-II to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for five seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of 17 mm or more is taken.**



NOTE:
When the gap is 13 mm or less, the spark might be generated even if the coil is malfunctioning.

OK or NG

OK >> GO TO 9.
NG >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

OK or NG

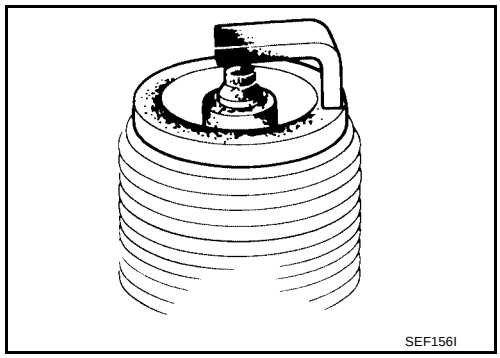
OK >> GO TO 7.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-601 .

7. CHECK SPARK PLUGS

Check the spark plugs and check for fouling, etc.

OK or NG

OK >> GO TO 8.
NG >> Repair or replace spark plug (s) with standard type one (s). For spark plug type. Refer to MA-21 .



8. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

OK or NG

OK >> **INSPECTION END**
NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-21 .

9. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-55, "CHECKING COMPRESSION PRESSURE" .

Standard	**: 1,320 kPa (13.5 kg/cm^2 , 191 psi) /300 rpm**
Minimum	**: 1,130 kPa (11.5 kg/cm^2 , 164 psi)/ 300 rpm**
Difference between each cylinder	**: 98 kPa (1.0 kg/cm^2 , 14 psi)/ 300 rpm**

OK or NG

OK >> GO TO 10.
NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

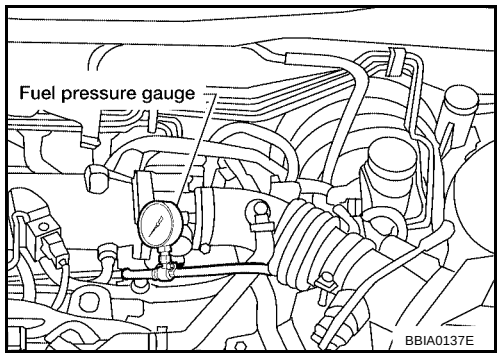
10. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-94, "FUEL PRESSURE RELEASE" .
3. Install fuel pressure gauge and check fuel pressure.

At idle: Approx. 350 kPa (3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.



11. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-620, "FUEL PUMP" .)
- Fuel pressure regulator
- Fuel lines
- Fuel filter for clogging

>> Repair or replace.

12. CHECK IGNITION TIMING

Perform EC-74, "Basic Inspection" .

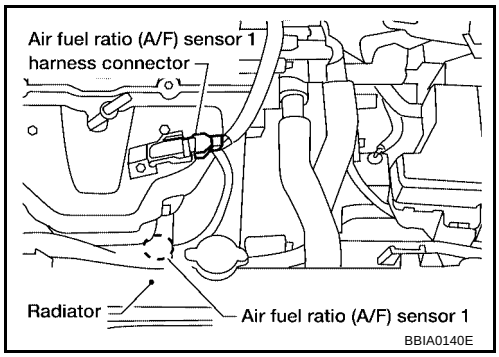
Items		Specifications
Target idle speed	A/T	800 ± 50 rpm (in P or N position)
	M/T	650 ± 50 rpm
Ignition timing	A/T	18 ± 5°BTDC (in P or N position)
	M/T	7 ± 5°BTDC

OK or NG

OK >> GO TO 13.
NG >> Follow the EC-74, "Basic Inspection" .

13. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.
3. Check harness continuity between the following terminals. Refer to EC-481, "Wiring Diagram" .



ECM terminal	A/F sensor 1 terminal
16	1
35	5
56	6
75	2

Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK A/F SENSOR 1 HEATER

Refer to EC-388, "Component Inspection" .

OK or NG

OK >> GO TO 15.
NG >> Replace A/F sensor 1.

15. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

at idling: 1.4 - 4.0 g·m/sec

at 2,500 rpm: 5.0 - 10.0 g·m/sec

With GST

Check mass air flow sensor signal in Service $01 with GST.

at idling: 1.4 - 4.0 g·m/sec

at 2,500 rpm: 5.0 - 10.0 g·m/sec

OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

16. CHECK CONNECTORS

Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds.
Refer to EC-185, "DTC P0101 MAF SENSOR" .

OK or NG

OK >> GO TO 17.
NG >> Repair or replace it.

17. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-105, "Symptom Matrix Chart" .

OK or NG

OK >> GO TO 18.
NG >> Repair or replace.

18. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 19.

19. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

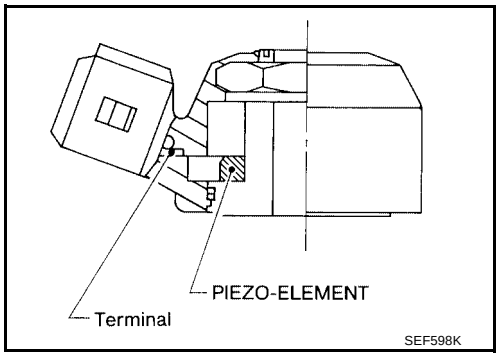
DTC P0327, P0328 KS

PFP:22060

Component Description

UBS00B71

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.



On Board Diagnosis Logic

UBS00B72

The MIL will not light up for these diagnoses.

DTC No.	Trouble Diagnosis Name	DTC Detected Condition	Possible Cause
P0327 0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Knock sensor
P0328 0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

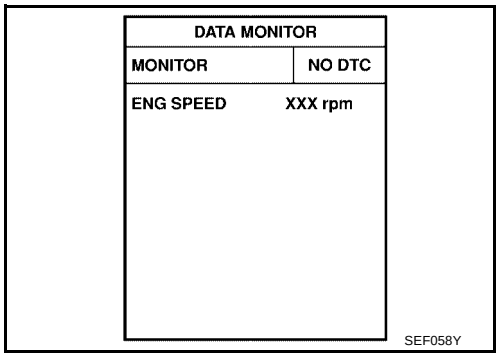
DTC Confirmation Procedure

UBS00B73

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-280, "Diagnostic Procedure"
.



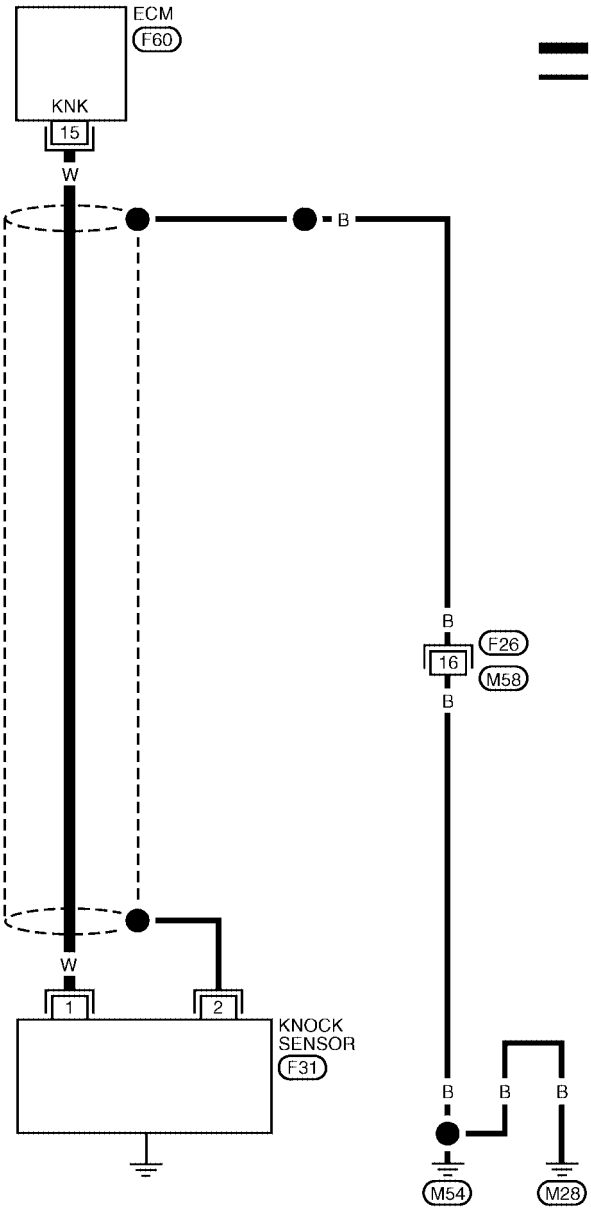
WITH GST

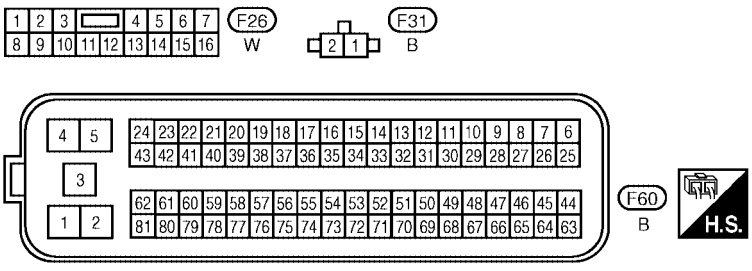
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00B74

EC-KS-01





BBWA1462E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V

Diagnostic Procedure

UBS00B75

1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 15 and ground. Refer to Wiring Diagram.

   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

   Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

4. Also check harness for short to ground and short to power.

OK or NG

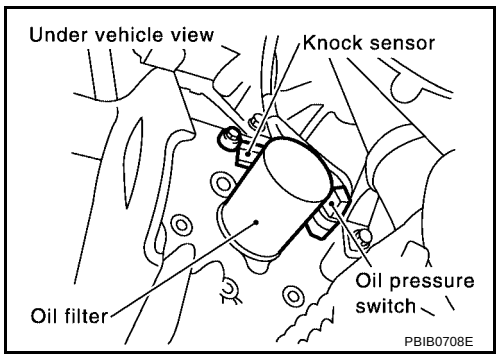
OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector and knock sensor harness connector.
2. Check harness continuity between knock sensor terminal 1 and ECM terminal 15.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK KNOCK SENSOR

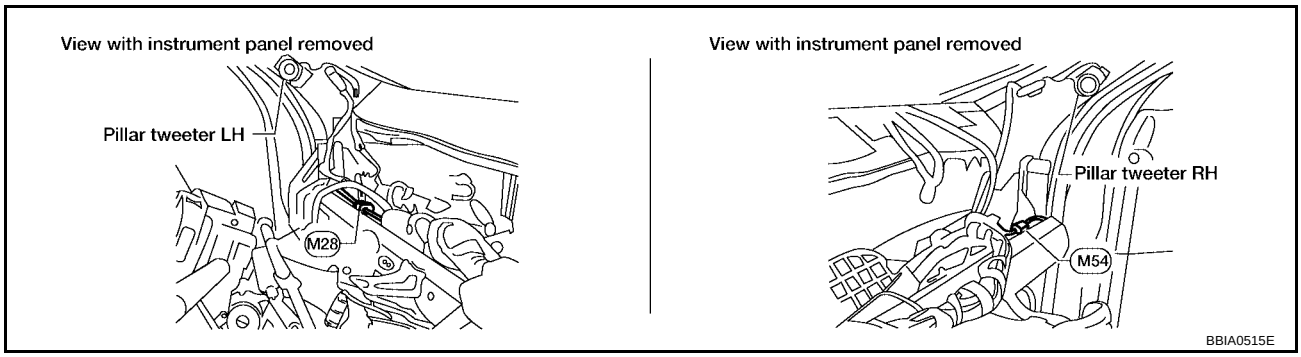
Refer to EC-281, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace knock sensor.

4. CHECK GROUND CONNECTIONS

Loosen and retighten two ground screws on the body. Refer to EC-170 .



OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Disconnect knock sensor harness connector.
2. Check harness continuity between knock sensor terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F26, M58
- Harness for open or short between knock sensor and ground

>> Repair open circuit or short to power in harness connectors

7. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00B76

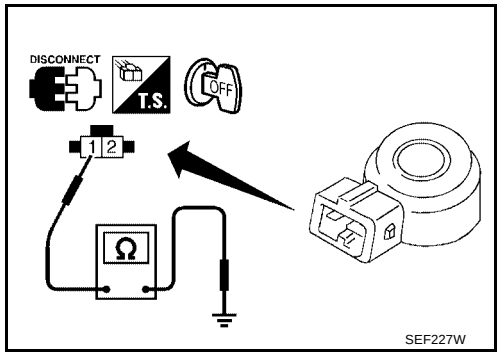
KNOCK SENSOR

Use an ohmmeter which can measure more than 10 MΩ.

1. Disconnect knock sensor harness connector.
2. Check resistance between terminal 1 and ground.

Resistance: 530 - 590 kΩ [at 20°C (68°F)]

CAUTION:
Discard any knock sensors that have been dropped or physically damaged. Use only new ones.



Removal and Installation

UBS00B77

KNOCK SENSOR

Refer to EM-69, "CYLINDER BLOCK" .

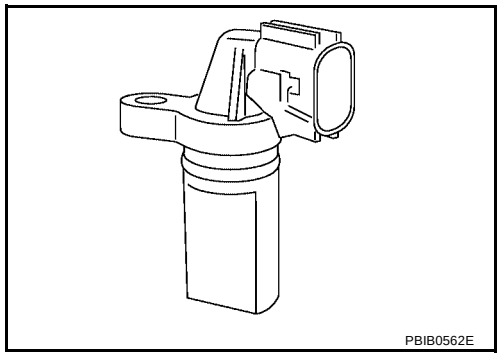
DTC P0335 CKP SENSOR (POS)

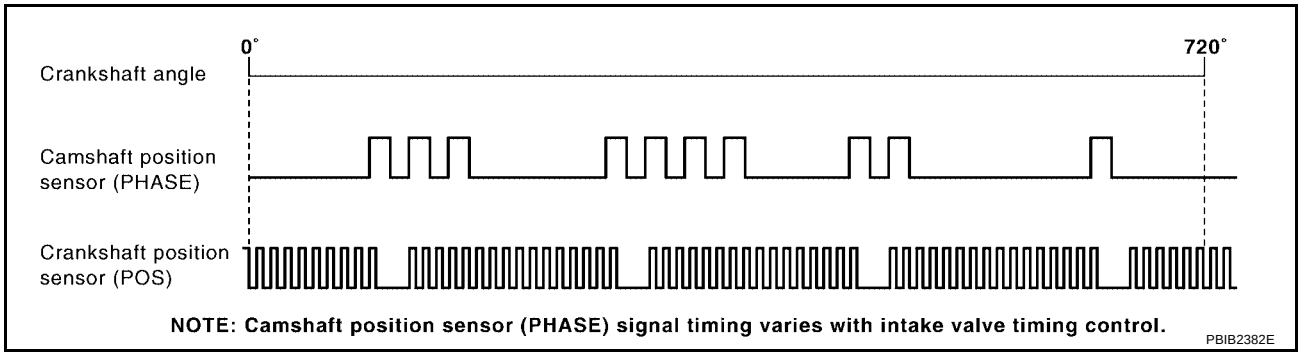
PFP:23731

Component Description

UBS00B78

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
ECM receives the signals as shown in the figure.


PBIB0562E



NOTE: Camshaft position sensor (PHASE) signal timing varies with intake valve timing control.
PBIB2382E

CONSULT-II Reference Value in Data Monitor Mode

UBS00B79

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

UBS00B7A

Specification data are reference values.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor (POS) circuit	● The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. ● The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. ● The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	● Harness or connectors (The sensor circuit is open or shorted) ● Crankshaft position sensor (POS) ● Signal plate

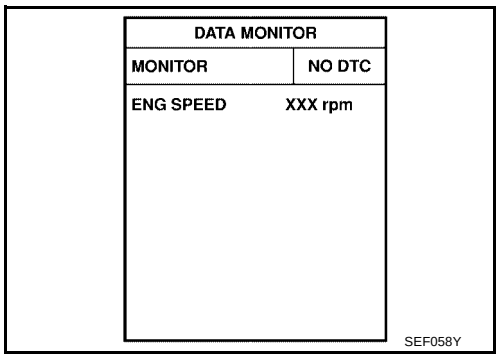
DTC Confirmation Procedure

UBS00B7B

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V with ignition switch ON.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-286, "Diagnostic Procedure".
   If 1st trip DTC is not detected, go to next step.
4. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
5. If 1st trip DTC is detected, go to EC-286, "Diagnostic Procedure".



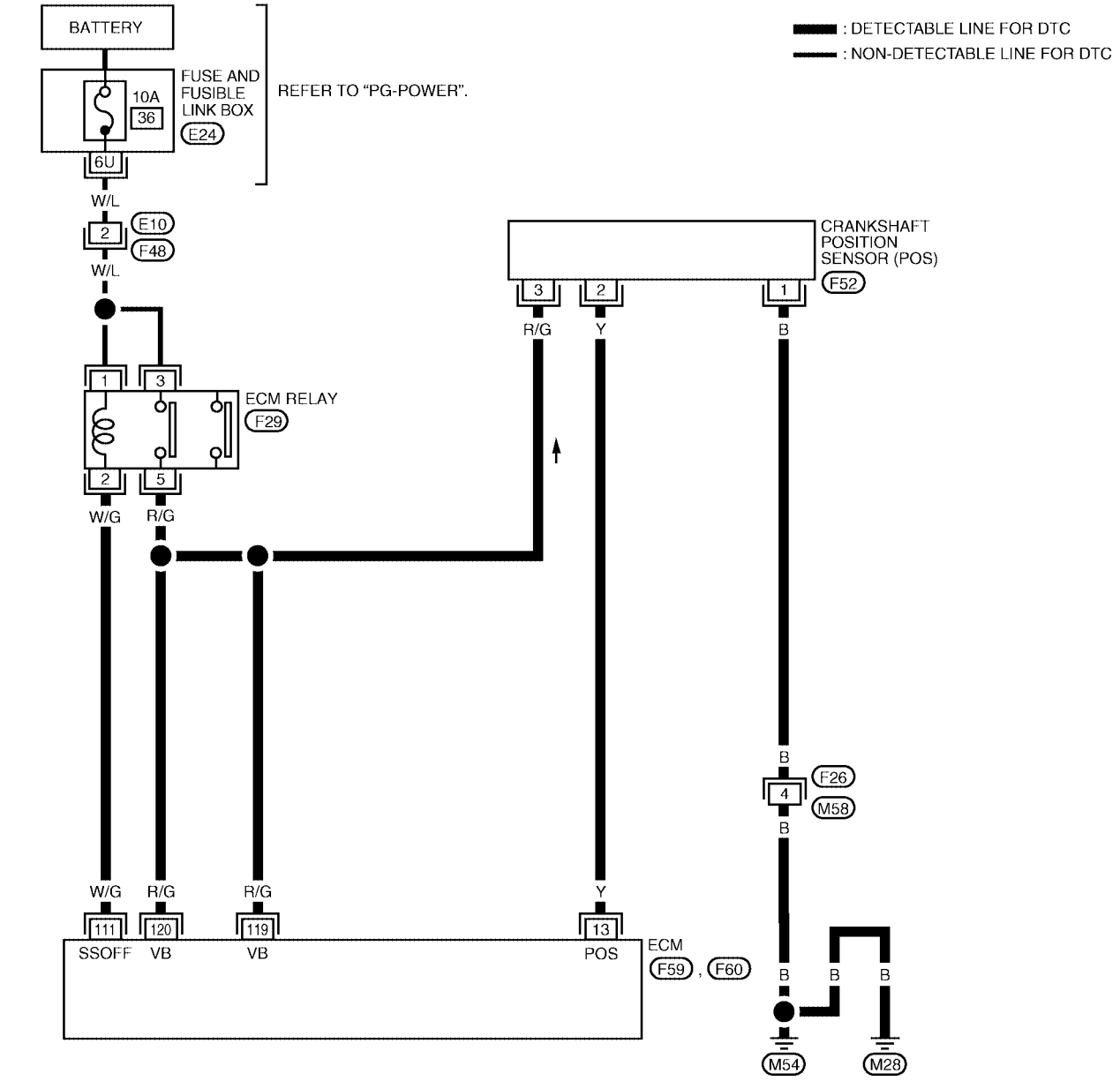
WITH GST

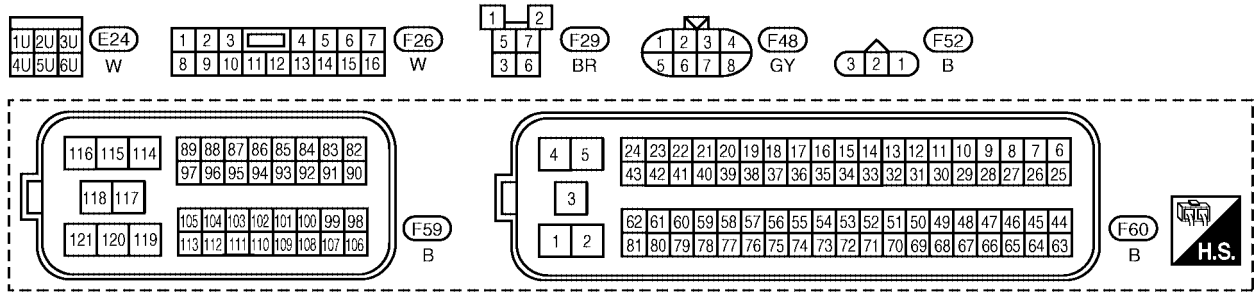
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00B7C

EC-POS-01



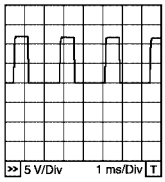
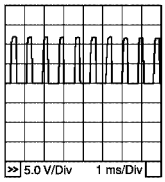


BBWA1429E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	Y	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	Approximately 3.0V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E

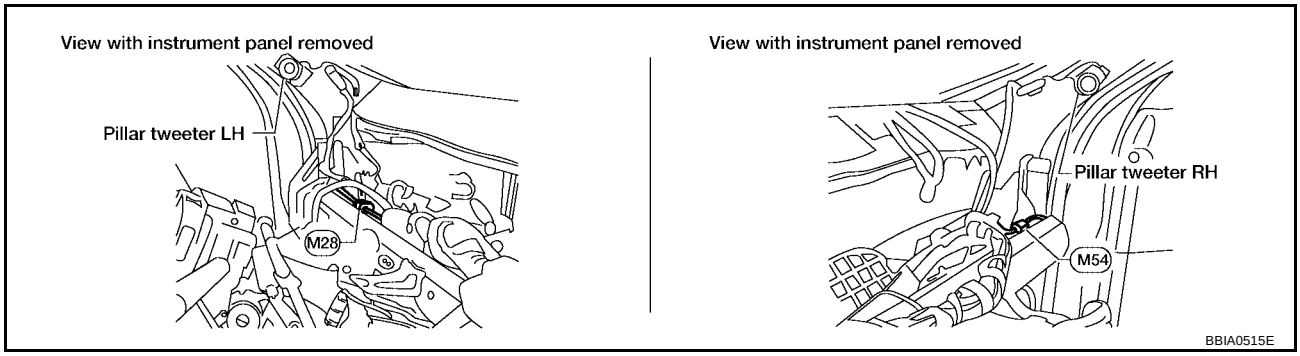
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00B7D

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .

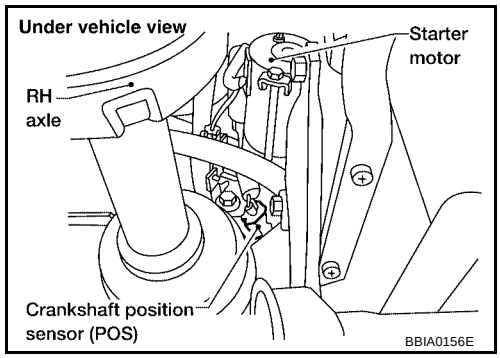


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK CKP SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.



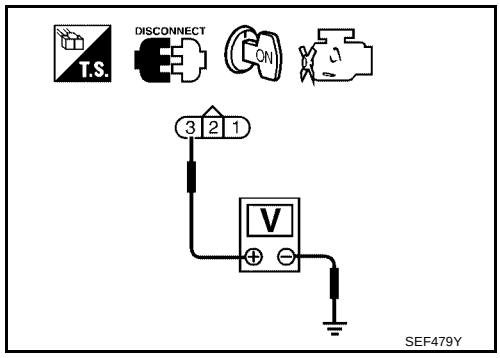
3. Check voltage between CKP sensor (POS) harness connector terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CKP sensor (POS) terminal 1 and ground. Refer to the wiring diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F26, M58
- Harness for open or short between crankshaft position sensor (POS) and ground

>> Repair open circuit or short to power in harness or connectors.

6. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 and CKP sensor (POS) terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-288, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace crankshaft position sensor (POS).

8. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 9.
NG >> Replace the signal plate.

9. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

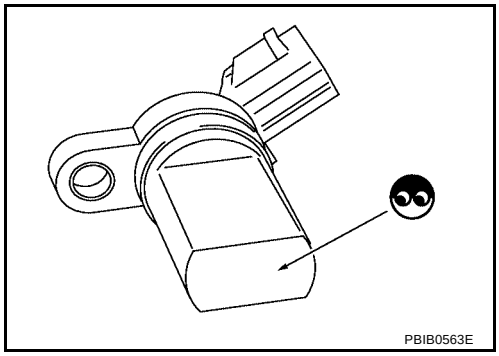
>> **INSPECTION END**

Component Inspection

UBS00B7E

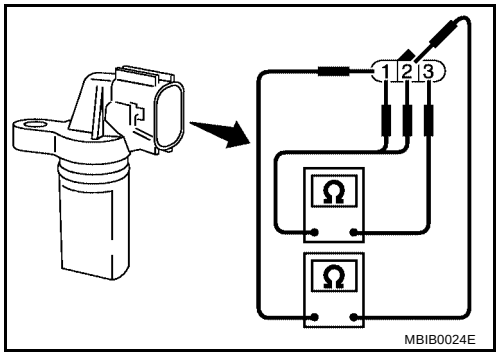
CRANKSHAFT POSITION SENSOR (POS)

1. Disconnect crankshaft position sensor (POS) harness connector.
2. Loosen the fixing bolt of the sensor.
3. Remove the sensor.
4. Visually check the sensor for chipping.


PBIB0563E

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (–)	Except 0 or ∞
3 (+) - 2 (–)	
2 (+) - 1 (–)	



MBIB0024E

If NG, replace crankshaft position sensor (POS).

Removal and Installation

UBS00B7F

CRANKSHAFT POSITION SENSOR (POS)

Refer to EM-69, "CYLINDER BLOCK" .

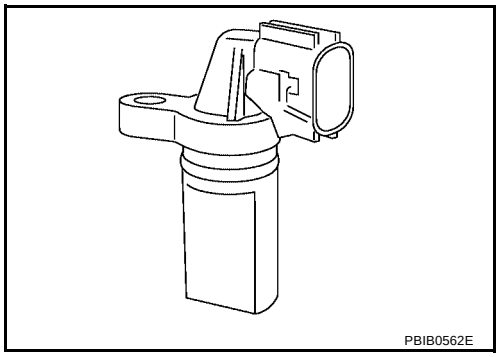
DTC P0340 CMP SENSOR (PHASE)

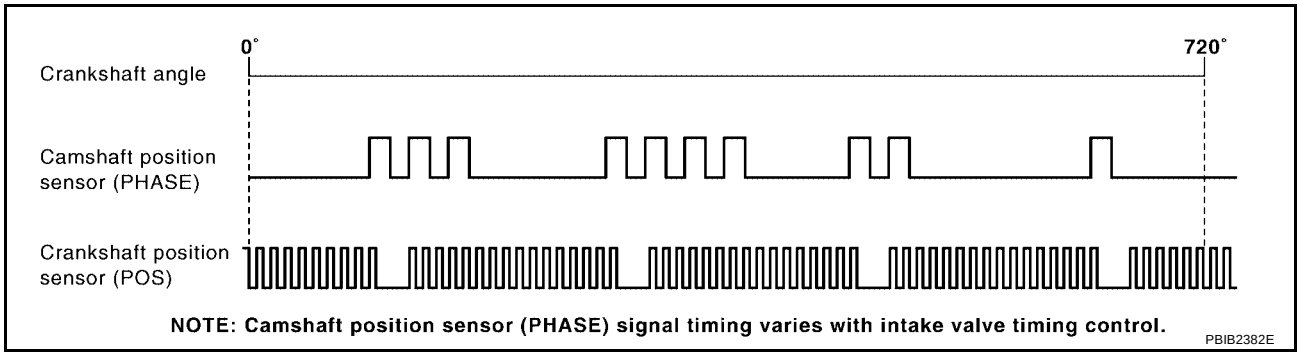
PFP:23731

Component Description

UBS00B7G

The camshaft position sensor (PHASE) senses the retraction of intake valve camshaft to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
ECM receives the signals as shown in the figure.


PBIB0562E



NOTE: Camshaft position sensor (PHASE) signal timing varies with intake valve timing control.
PBIB2382E

On Board Diagnosis Logic

UBS00B7H

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	Camshaft position sensor (PHASE) circuit	● The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. ● The cylinder No. signal is not sent to ECM during engine running. ● The cylinder No. signal is not in the normal pattern during engine running.	● Harness or connectors (The sensor circuit is open or shorted) ● Camshaft position sensor (PHASE) ● Camshaft (Intake) ● Starter motor (Refer to SC-9 .) ● Starting system circuit (Refer to SC-9 .) ● Dead (Weak) battery

DTC Confirmation Procedure

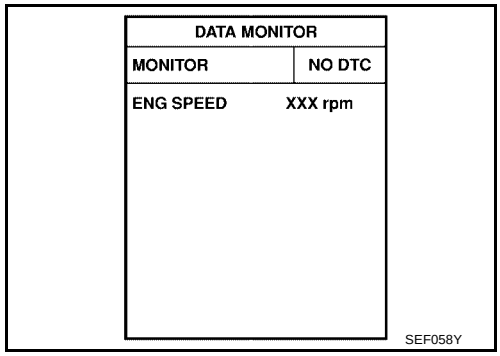
UBS00B7I

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
4. If 1st trip DTC is detected, go to EC-293, "Diagnostic Procedure".
   If 1st trip DTC is not detected, go to next step.
5. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
6. If 1st trip DTC is detected, go to EC-293, "Diagnostic Procedure".



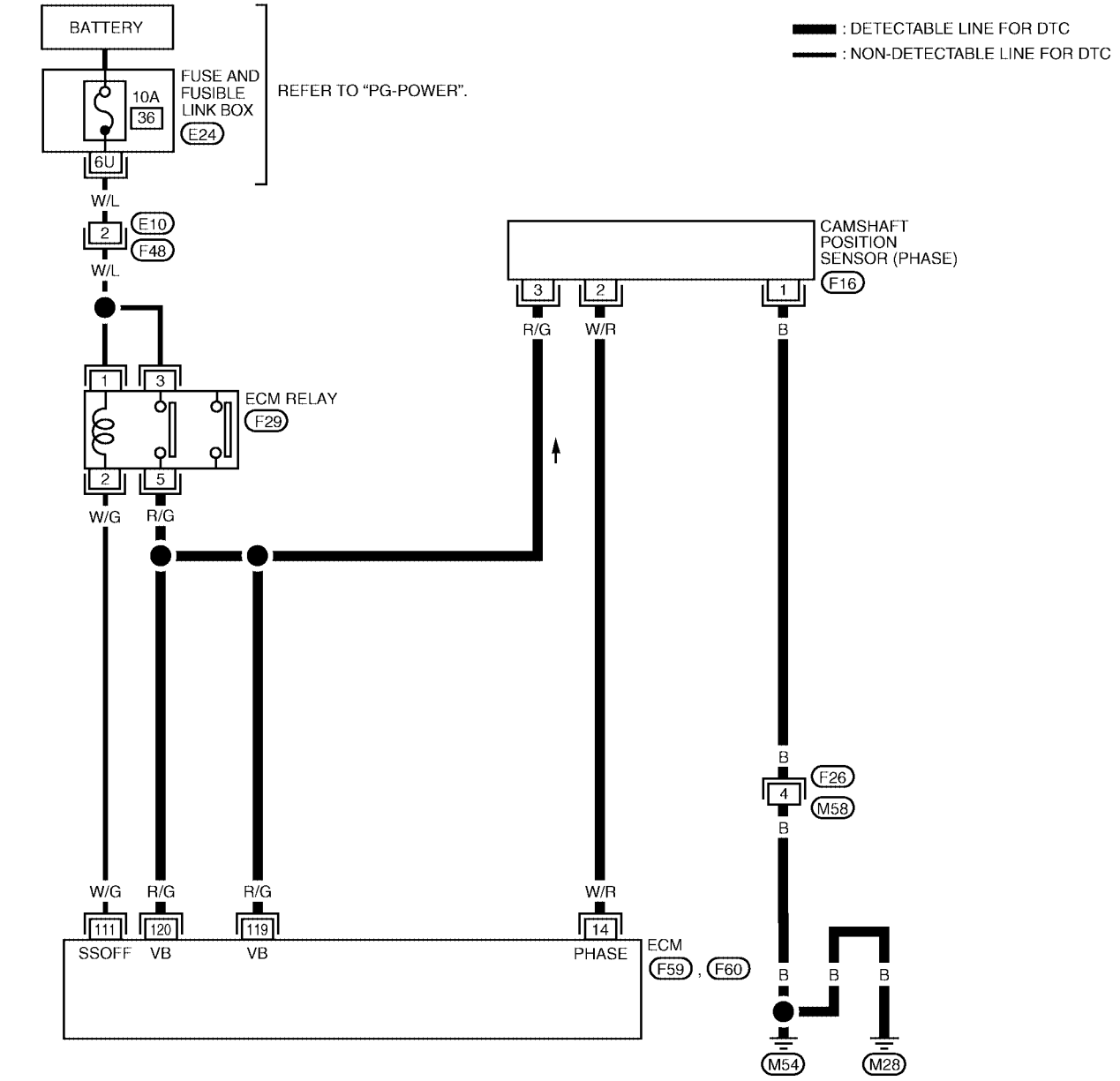
WITH GST

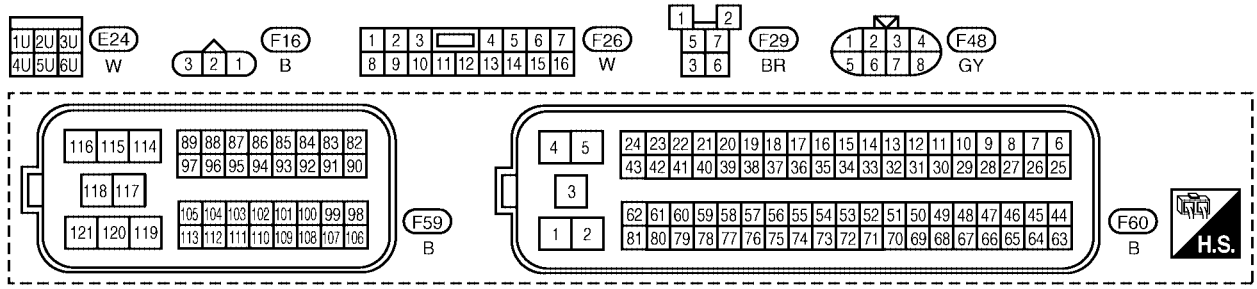
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00B7J

EC-PHASE-01

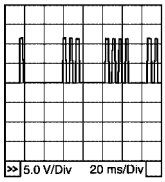
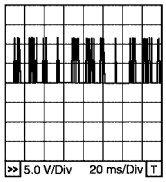




BBWA1430E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	W/R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0526E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00B7K

1. CHECK STARTING SYSTEM

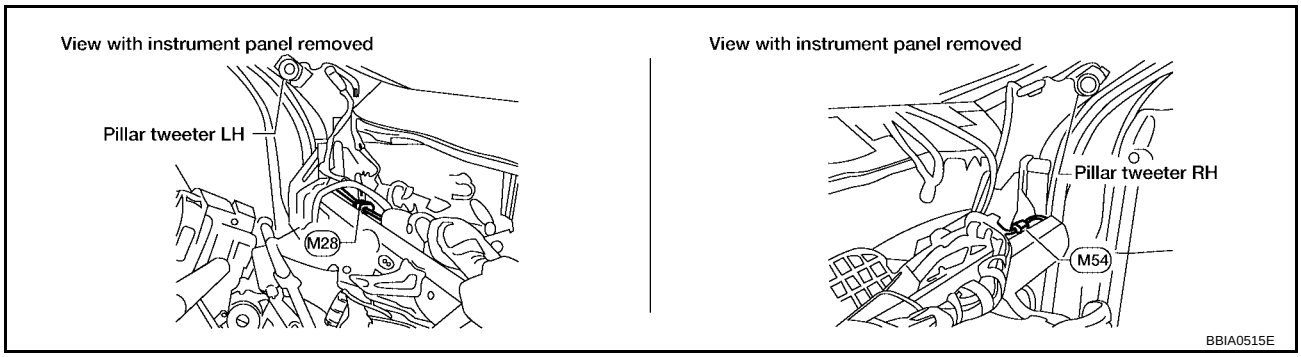
Turn ignition switch to START position.
Does the engine turn over?
Does the starter motor operate?

Yes or No

Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-9, "STARTING SYSTEM" .)

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170 .

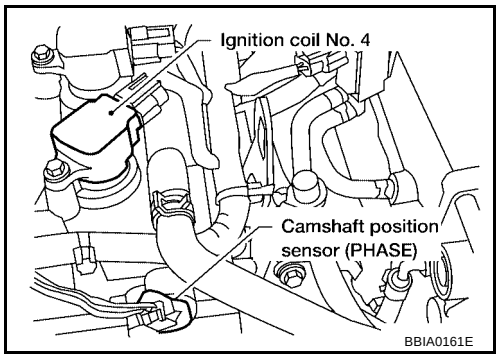


OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

3. CHECK CMP SENSOR (PHASE) POWER SUPPLY CIRCUIT

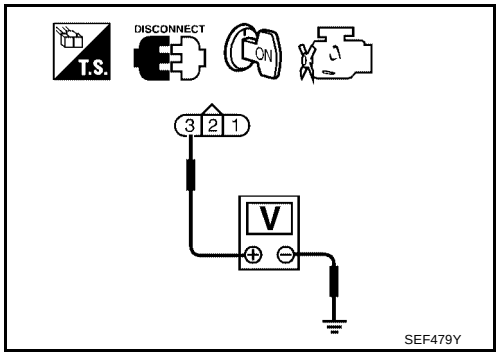
1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.



3. Check voltage between camshaft position sensor (PHASE) terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between camshaft position sensor (PHASE) and ECM
- Harness for open or short between camshaft position sensor (PHASE) and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between camshaft position sensor (PHASE) terminal 1 and ground. Refer to the wiring diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F26, M58
- Harness for open or short between camshaft position sensor (PHASE) and ground

>> Repair open circuit or short to power in harness or connectors.

7. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between CMP sensor (PHASE) terminal 2 and ECM terminal 14. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-296, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace camshaft position sensor (PHASE).

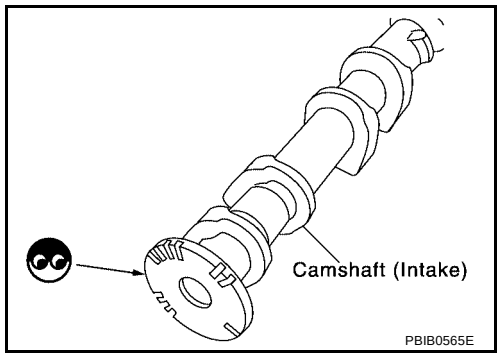
9. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 10.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



10. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

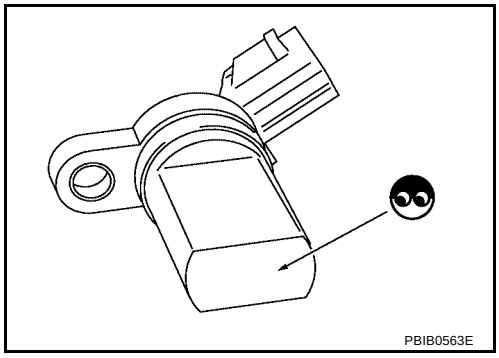
>> **INSPECTION END**

Component Inspection

UBS00B7L

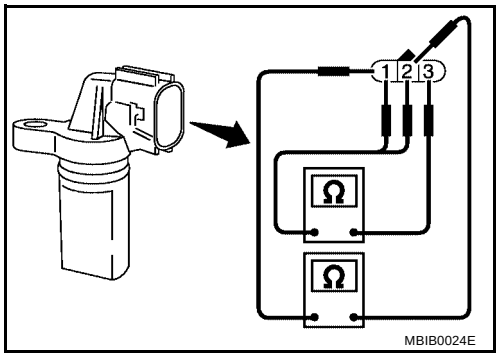
CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
3 (+) - 2 (-)	
2 (+) - 1 (-)	



Removal and Installation

UBS00B7M

CAMSHAFT POSITION SENSOR (PHASE)

Refer to EM-42, "TIMING CHAIN" .

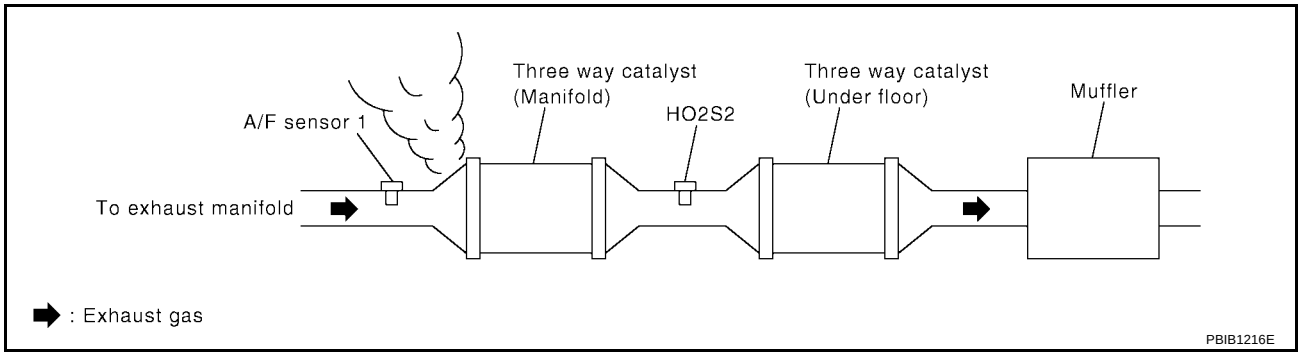
DTC P0420 THREE WAY CATALYST FUNCTION

PFP:20905

On Board Diagnosis Logic

UBS00B7N

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.



A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420 0420	Catalyst system efficiency below threshold	● Three way catalyst (manifold) does not operate properly. ● Three way catalyst (manifold) does not have enough oxygen storage capacity.	● Three way catalyst (manifold) ● Exhaust tube ● Intake air leaks ● Fuel injectors ● Fuel injector leaks ● Spark plug ● Improper ignition timing

DTC Confirmation Procedure

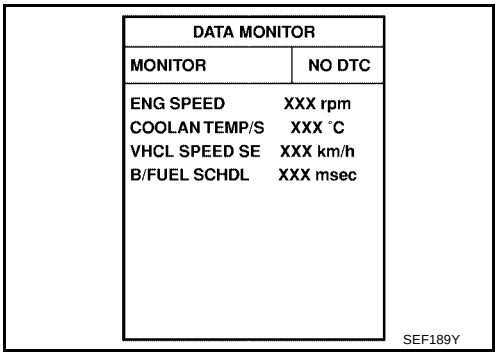
UBS00B7O

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

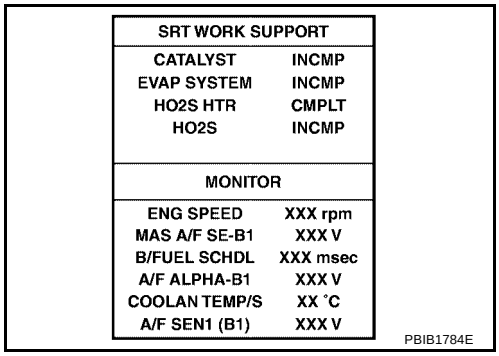
WITH CONSULT-II

TESTING CONDITION:
Do not hold engine speed for more than the specified minutes below.

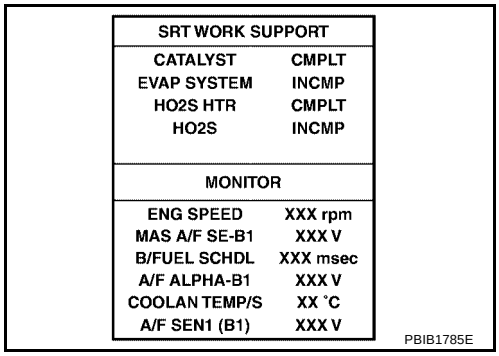
1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
7. Open engine hood.



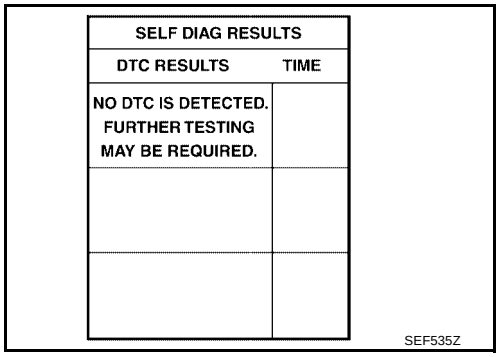
8. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
9. Rev engine up to 2,500 to 3,500 rpm and hold it for 3 consecutive minutes, then release the accelerator pedal completely.
   If “INCMP” of “CATALYST” changed to “CMPLT”, GO TO STEP 12.
10. Wait 5 seconds at idle.



11. Rev engine up to 2,000 to 3,000 rpm and maintain it until “IMCMP” of “CATALYST” changes to “CMPLT” (it will take approximately 5 minutes).
    If not “CMPLT”, stop engine and cool it down to less than 70°C (158°F) and then retest step 1.



12. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
13. Confirm that the 1st trip DTC is not detected.
    If the 1st trip DTC is detected, go to EC-299, "Diagnostic Procedure" .



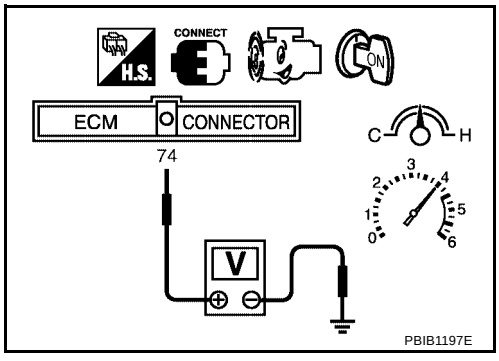
Overall Function Check

UBS00B7P

Use this procedure to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Set voltmeter probe between ECM terminal 74 and ground.
7. Keep engine speed at 2,500 rpm constant under no load.
8. Make sure that the voltage does not vary for more than 5 seconds.
   If the voltage fluctuation cycle takes less than 5 seconds, go to EC-299, "Diagnostic Procedure" .
   - 1 cycle: 0.6 - 1.0 V → 0 - 0.3 V → 0.6 - 1.0 V



Diagnostic Procedure

UBS00B7Q

1. CHECK EXHAUST SYSTEM

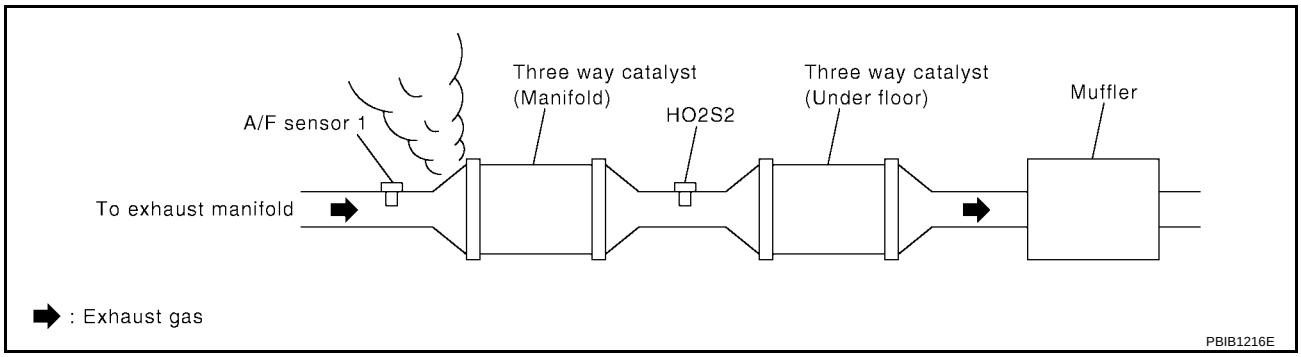
Visually check exhaust tubes and muffler for dent.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK IGNITION TIMING

Check for ignition timing. Refer to EC-74, "Basic Inspection" .

Items	Specifications	
Target idle speed	A/T	800 ± 50 rpm (in P or N position)
	M/T	650 ± 50 rpm
Ignition timing	A/T	18 ± 5°BTDC (in P or N position)
	M/T	7 ± 5°BTDC

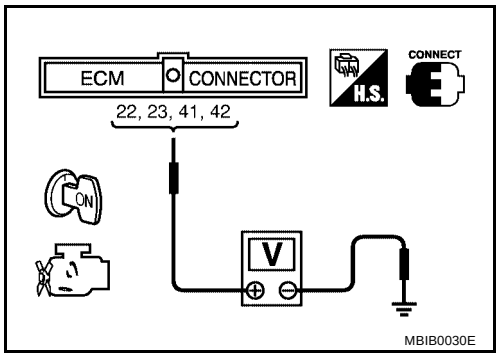
OK or NG

OK >> GO TO 5.
NG >> Follow the EC-74, "Basic Inspection" .

5. CHECK INJECTORS

1. Refer to Wiring Diagram for Injectors, EC-615 .
2. Stop engine and then turn ignition switch ON.
3. Check voltage between ECM terminals 22, 23, 41, 42 and ground with CONSULT-II or tester.

: Battery voltage should exist.



OK or NG

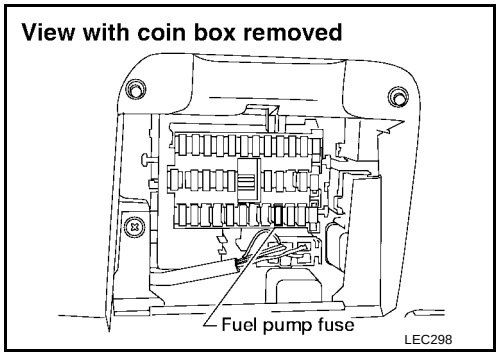
OK >> GO TO 6.
NG >> Perform Diagnostic Procedure INJECTOR, EC-615 .

6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustibles.

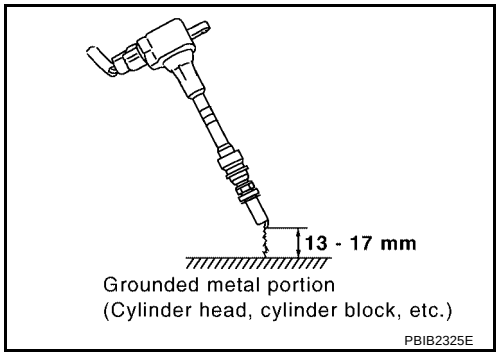
1. Turn ignition switch OFF.
2. Remove fuel pump fuse in IPDM E/R to release fuel pressure.

NOTE:
Do not use CONSULT-II to release fuel pressure, or fuel pressure applies again during the following procedure.



3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for five seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.



CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of 17 mm or more is taken.**

NOTE:
When the gap is 13 mm or less, the spark might be generated even if the coil is malfunctioning.

OK or NG

OK >> GO TO 9.
NG >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

OK or NG

OK >> GO TO 8.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-601 .

8. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about three seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

OK or NG

OK >> **INSPECTION END**
NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-21 .

9. CHECK INJECTOR

1. Turn ignition switch OFF.
2. Remove injector assembly. Refer to EM-21, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
3. Reconnect all injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Turn ignition switch ON.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip)>>GO TO 10.
NG (Drips)>>Replace the injector(s) from which fuel is dripping.

10. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Trouble is fixed>>**INSPECTION END**
Trouble is not fixed>>Replace three way catalyst (manifold).

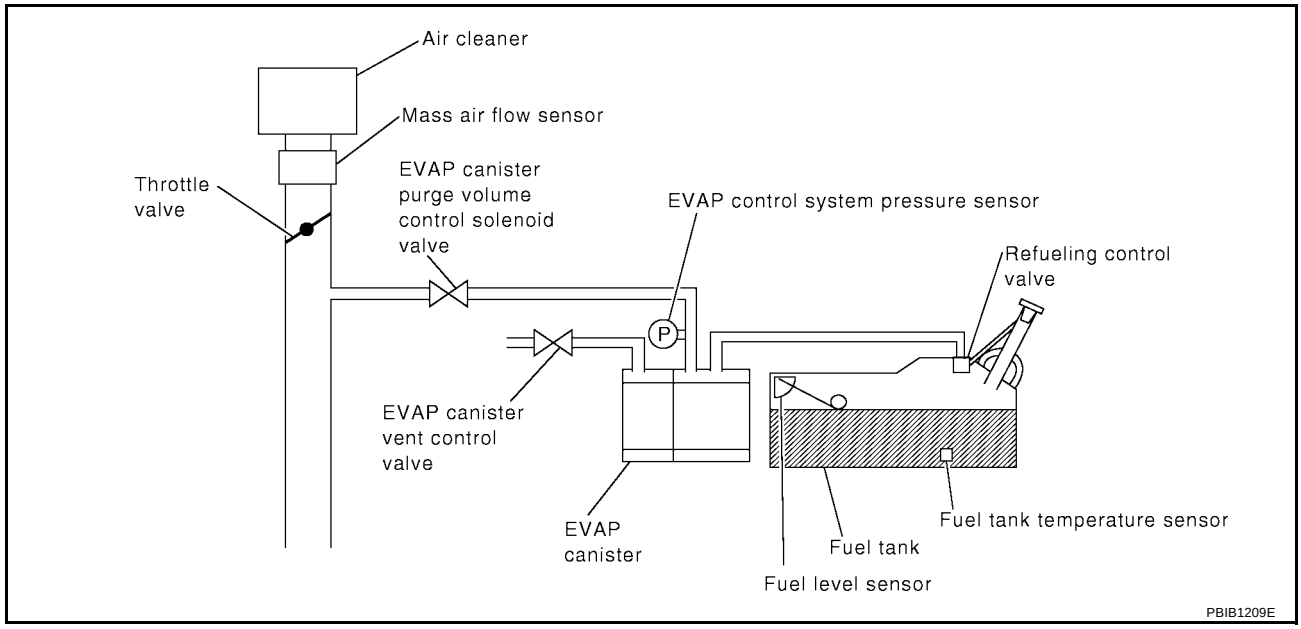
DTC P0441 EVAP CONTROL SYSTEM

PFP:14950

System Description

UBS00B7R

NOTE:
If DTC P0441 is displayed with other DTC such as P2122, P2123 P2127, P2128, P2138, first perform trouble diagnosis for other DTC.



In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

UBS00B7S

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441 0441	EVAP control system incorrect purge flow	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	● EVAP canister purge volume control solenoid valve stuck closed ● EVAP control system pressure sensor and the circuit ● Loose, disconnected or improper connection of rubber tube ● Blocked rubber tube ● Cracked EVAP canister ● EVAP canister purge volume control solenoid valve circuit ● Accelerator pedal position sensor ● Blocked purge port ● EVAP canister vent control valve

DTC Confirmation Procedure

UBS00B7T

CAUTION:
Always drive vehicle at a safe speed.

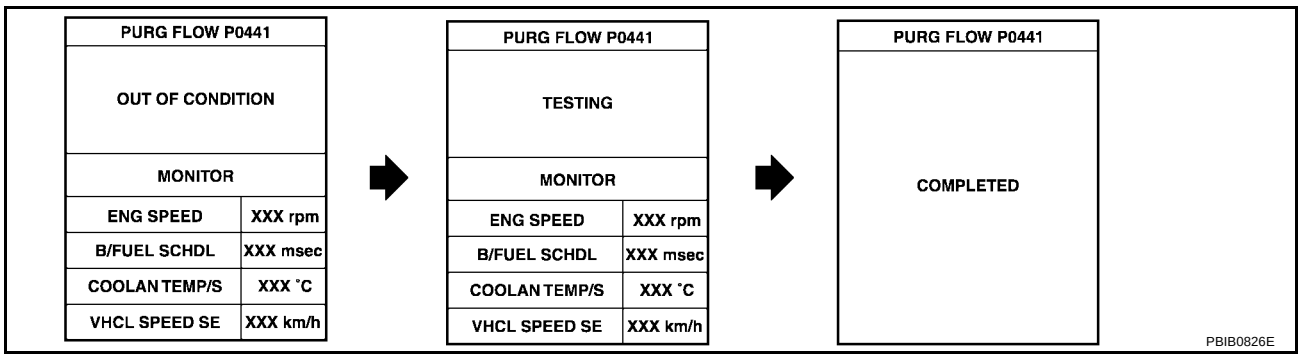
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 0°C (32°F) or more.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 70 seconds.
4. Select “PURG FLOW P0441” of “EVAPORATIVE SYSTEM” in “DTC CONFIRMATION” mode with CONSULT-II.
5. Touch “START”.
   If “COMPLETED” is displayed, go to step 7.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 35 seconds.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,800 rpm
B/FUEL SCHDL	1.0 - 8.2 msec
Engine coolant temperature	More than 0°C (32°F)



If “TESTING” is not changed for a long time, retry from step 2.

7. Make sure that OK is displayed after touching “SELF-DIAG RESULTS”. If NG is displayed, refer to EC-304, "Diagnostic Procedure" .

Overall Function Check

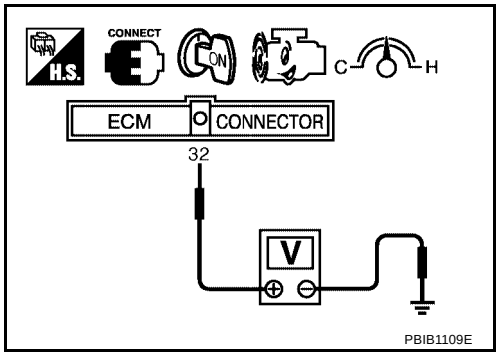
UBS00B7U

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF, wait at least 10 seconds.
4. Start engine and wait at least 70 seconds.

5. Set voltmeter probes to ECM terminals 32 (EVAP control system pressure sensor signal) and ground.
6. Check EVAP control system pressure sensor value at idle speed and note it.
7. Establish and maintain the following conditions for at least 1 minute.



Air conditioner switch	ON
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Gear position	Any position other than P, N or R

8. Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
9. If NG, go to EC-304, "Diagnostic Procedure" .

Diagnostic Procedure

UBS00B7V

1. CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

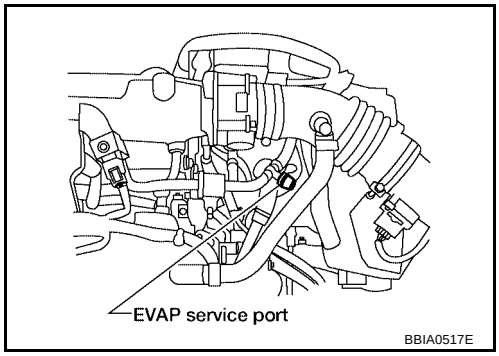
OK or NG

OK (With CONSULT-II) >>GO TO 2.
OK (Without CONSULT-II) >>GO TO 3.
NG >> Replace EVAP canister.

2. CHECK PURGE FLOW

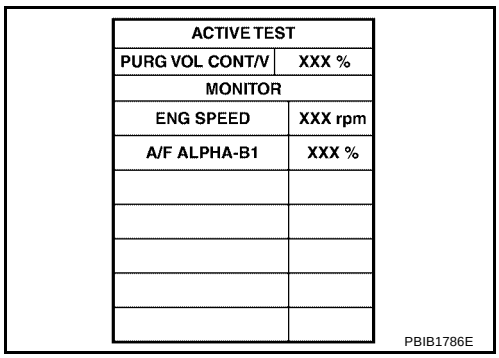
With CONSULT-II

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.
2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
4. Rev engine up to 2,000 rpm.



5. Touch “Qd” and “Qu” on CONSULT-II screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

PURG VOL CONT/V	VACUUM
100%	Should exist.
0%	should not exist.



OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

3. CHECK PURGE FLOW

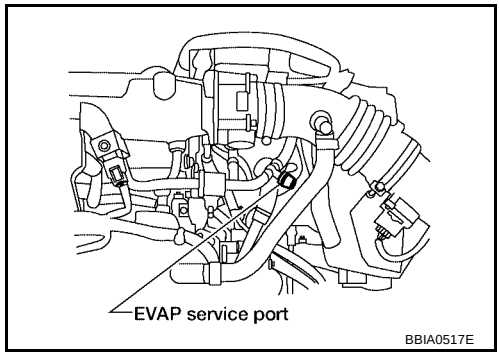
Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.
4. Start engine and let it idle.
   Do not depress accelerator pedal even slightly.
5. Check vacuum gauge indication before 60 seconds passed after starting engine.

   Vacuum should not exist.

6. Revving engine up to 2,000 rpm after 100 seconds passed after starting engine.

   Vacuum should exist.



OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

4. CHECK EVAP PURGE LINE

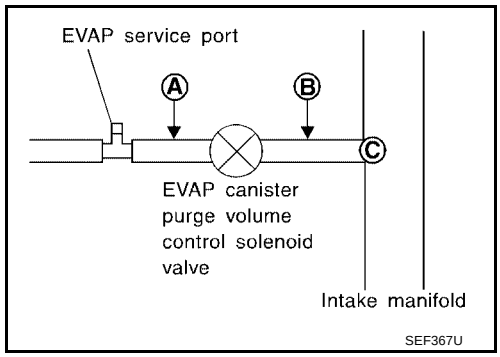
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection.
   Refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 5.
NG >> Repair it.

5. CHECK EVAP PURGE HOSE AND PURGE PORT

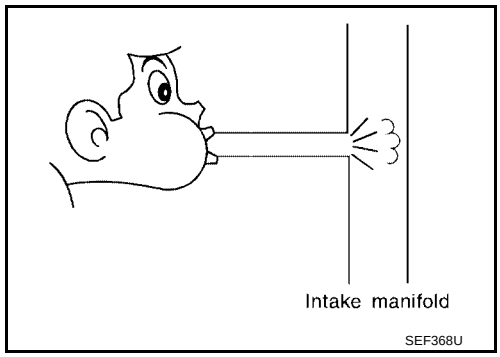
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B** .
2. Blow air into each hose and EVAP purge port **C** .



3. Check that air flows freely.

OK or NG

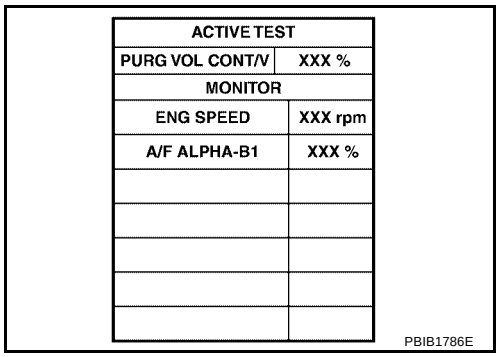
OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-329, "Component Inspection" .

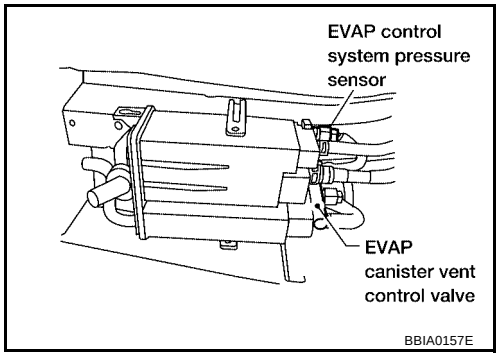
OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.



OK or NG

OK >> GO TO 9.
NG >> Replace EVAP control system pressure sensor.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to DTC Confirmation Procedure for DTC P0452, EC-334 P0453, EC-340 .

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 11.
NG >> Clean the rubber tube using an air blower.

11. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-329, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP canister vent control valve.

12. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 13.
NG >> Replace it.

13. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 14.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

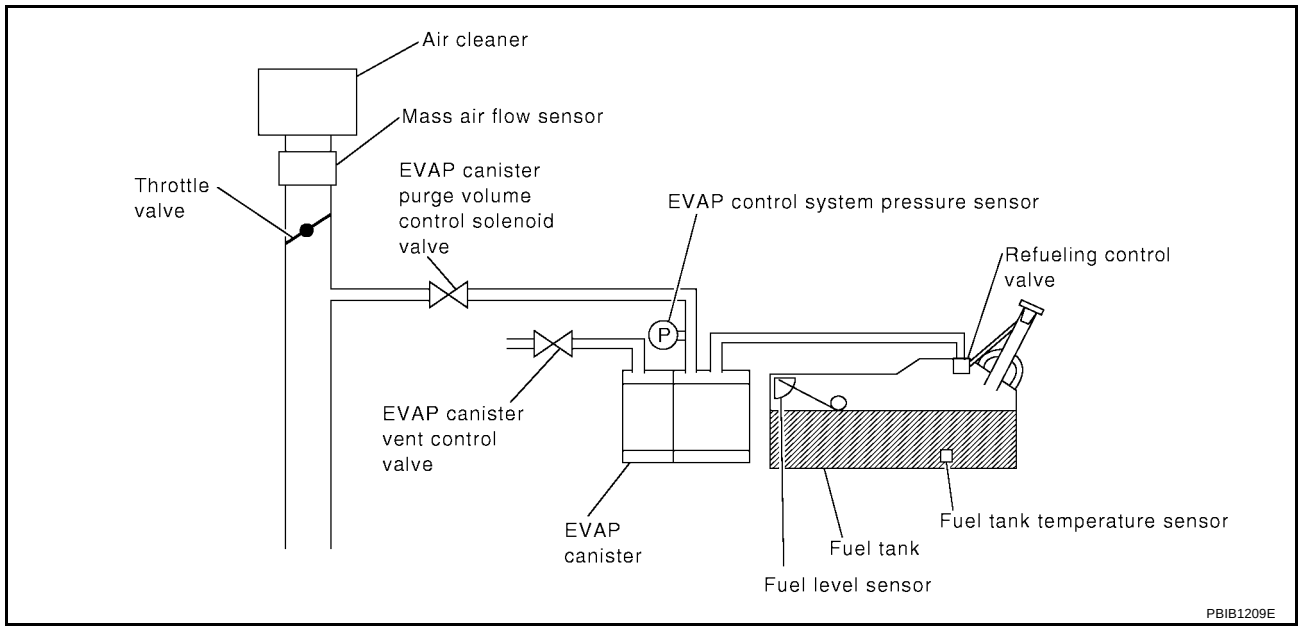
DTC P0442 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS00B7W

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following “Vacuum test” conditions.
The EVAP canister vent control valve is closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve will then be opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442 0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	● Incorrect fuel tank vacuum relief valve ● Incorrect fuel filler cap used ● Fuel filler cap remains open or fails to close. ● Foreign matter caught in fuel filler cap. ● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. ● Foreign matter caught in EVAP canister vent control valve. ● EVAP canister or fuel tank leaks ● EVAP purge line (pipe and rubber tube) leaks ● EVAP purge line rubber tube bent ● Loose or disconnected rubber tube ● EVAP canister vent control valve and the circuit ● EVAP canister purge volume control solenoid valve and the circuit ● Fuel tank temperature sensor ● O-ring of EVAP canister vent control valve is missing or damaged ● EVAP canister is saturated with water ● EVAP control system pressure sensor ● Fuel level sensor and the circuit ● Refueling control valve ● ORVR system leaks

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

UBS00B7X

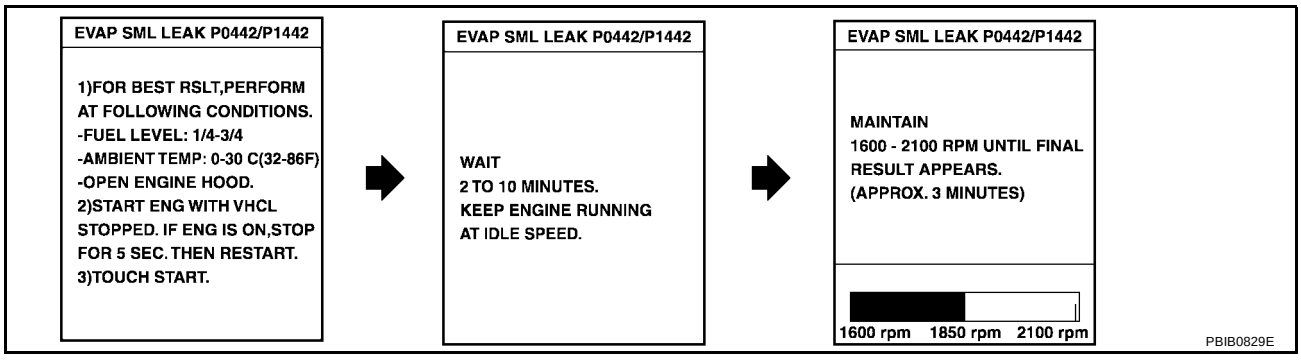
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**
- **Open engine hood before conducting following procedure.**

WITH CONSULT-II

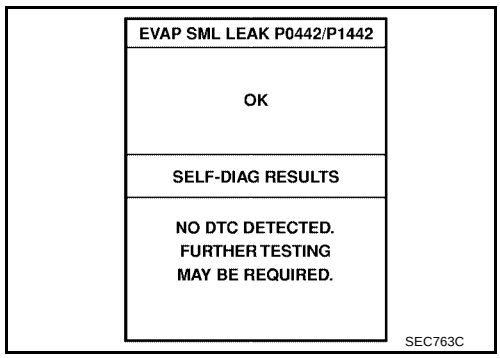
1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
4. Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)
5. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.



NOTE:
If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-74, "Basic Inspection" .

6. Make sure that OK is displayed.
   If NG is displayed, refer to EC-310, "Diagnostic Procedure" .

   NOTE:
   Make sure that EVAP hoses are connected to the EVAP canister purge volume control solenoid valve properly.



WITH GST

NOTE:
Be sure to read the explanation of Driving Pattern on EC-60 before driving vehicle.

1. Start engine.

2. Drive vehicle according to EC-61, "Driving Pattern" .
3. Stop vehicle.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Select Service $07 with GST.

- If P0442 is displayed on the screen, go to EC-310, "Diagnostic Procedure" .
- If P0441 is displayed on the screen, go to Diagnostic Procedure for DTC P0441, EC-304 .

Diagnostic Procedure

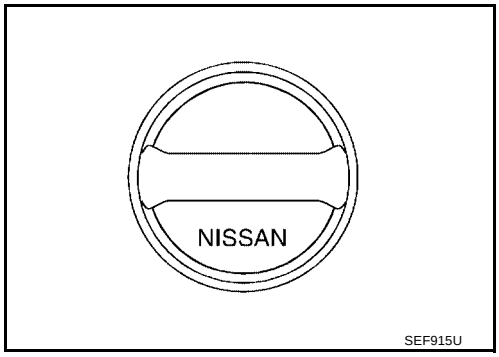
UBS00B7Y

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

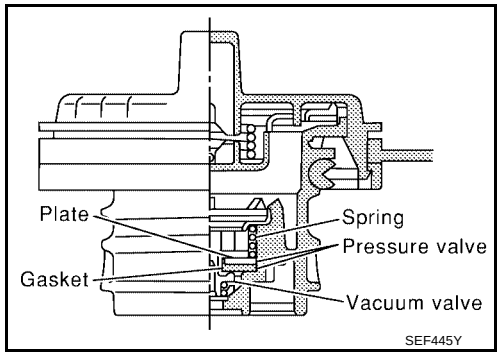
1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.

Pressure:

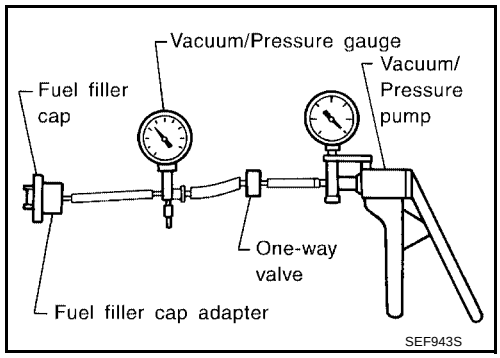
15.3 - 20.0 kPa (0.156 - 0.204 kg/cm^2 , 2.22 - 2.90 psi)

Vacuum:

−6.0 to −3.3 kPa (−0.061 to −0.034 kg/cm^2 , −0.87 to −0.48 psi)



CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.



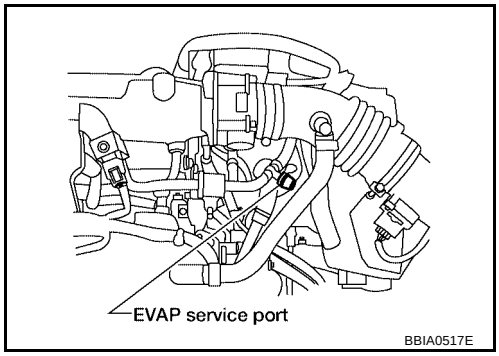
OK or NG

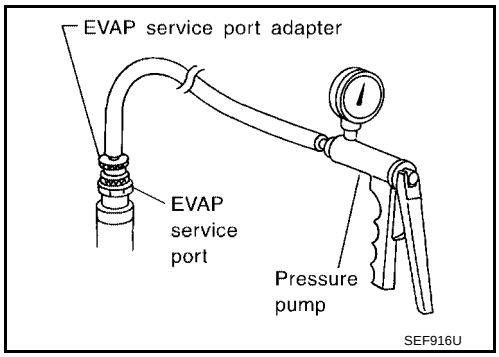
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.
For the location of EVAP service port, refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





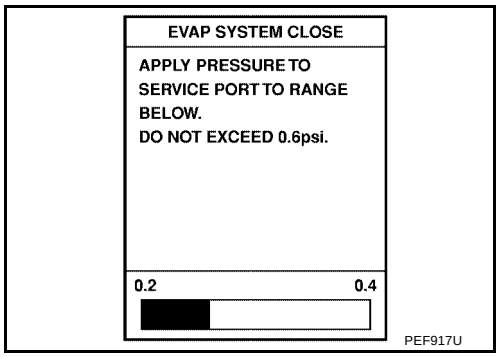
Models with CONSULT-II>>GO TO 6.
Models without CONSULT-II >>GO TO 7.

6. CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

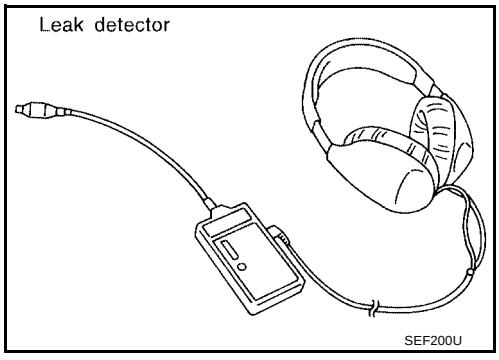
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

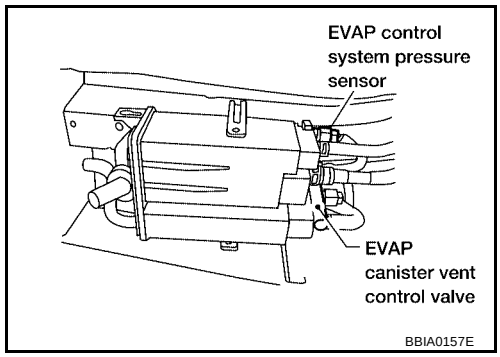


7. CHECK FOR EVAP LEAK

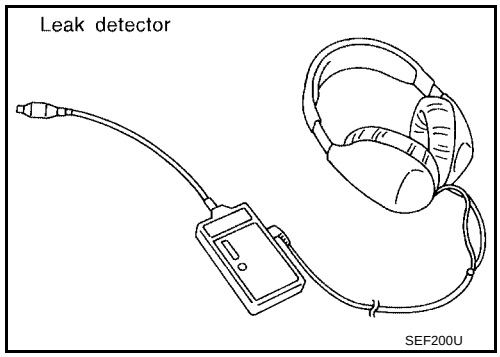
Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly.
  Refer to EC-40, "EVAP CANISTER VENT CONTROL VALVE" .
- EVAP canister vent control valve.
  Refer to EC-329, "Component Inspection" .

OK or NG

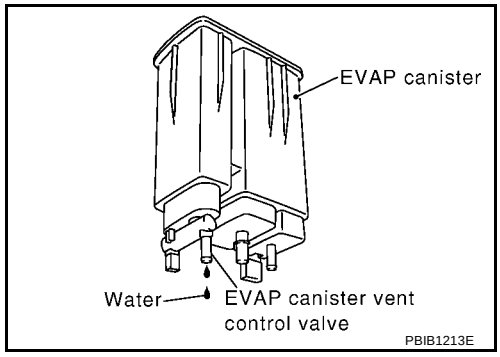
OK >> GO TO 10.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

9. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 10.
No (With CONSULT-II)>>GO TO 12.
No (Without CONSULT-II)>>GO TO 13.



10. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK (With CONSULT-II)>>GO TO 12.
OK (Without CONSULT-II)>>GO TO 13.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose connected to EVAP canister for clogging or poor connection

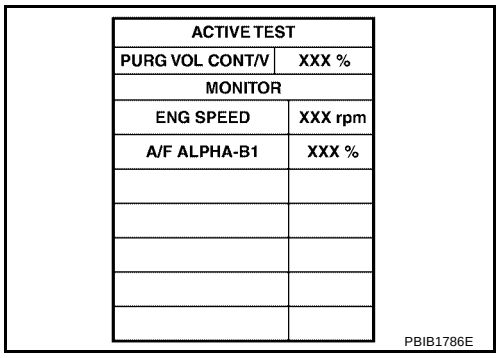
>> Repair hose or replace EVAP canister.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.



OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 16.
NG >> GO TO 14.

14. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 15.
NG >> Repair or reconnect the hose.

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-322, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.

16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-263, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace fuel level sensor unit.

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-333, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 19.
NG >> Repair or reconnect the hose.

19. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 20.

20. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-43, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 21.
NG >> Repair or replace hoses and tubes.

21. CHECK SIGNAL LINE AND RECIRCULATION LINE

Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 22.
NG >> Repair or replace hoses, tubes or filler neck tube.

22. CHECK REFUELING CONTROL VALVE

Refer to EC-47, "Component Inspection" .

OK or NG

OK >> GO TO 23.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

23. CHECK FUEL LEVEL SENSOR

Refer to DI-6 .

OK or NG

OK >> GO TO 24.
NG >> Replace fuel level sensor unit.

24. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

UBS00B7Z

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Vehicle speed signal*1	Vehicle speed		

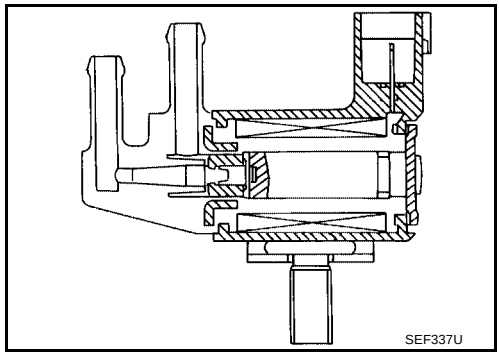
*1: This signal is sent to the ECM through CAN communication line.

*2: The ECM determines the start signal status by the signal of engine speed and battery voltage.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



CONSULT-II Reference Value in Data Monitor Mode

UBS00B80

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch OFF ● Shift lever: N (A/T), Neutral (M/T) ● No-load	Idle (Accelerator is not depressed even slightly, after engine starting)	0%
		2,000 rpm	—

On Board Diagnosis Logic

UBS00B81

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444 0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	● Harness or connectors (The solenoid valve circuit is open or shorted.) ● EVAP canister purge volume control solenoid valve
P0445 0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	● Harness or connectors (The solenoid valve circuit is shorted.) ● EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

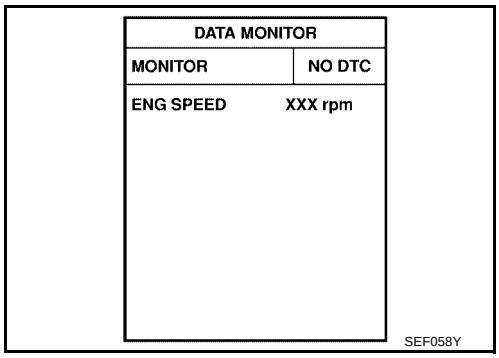
UBS00B82

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 13 seconds.
4. If 1st trip DTC is detected, go to EC-321, "Diagnostic Procedure"
.



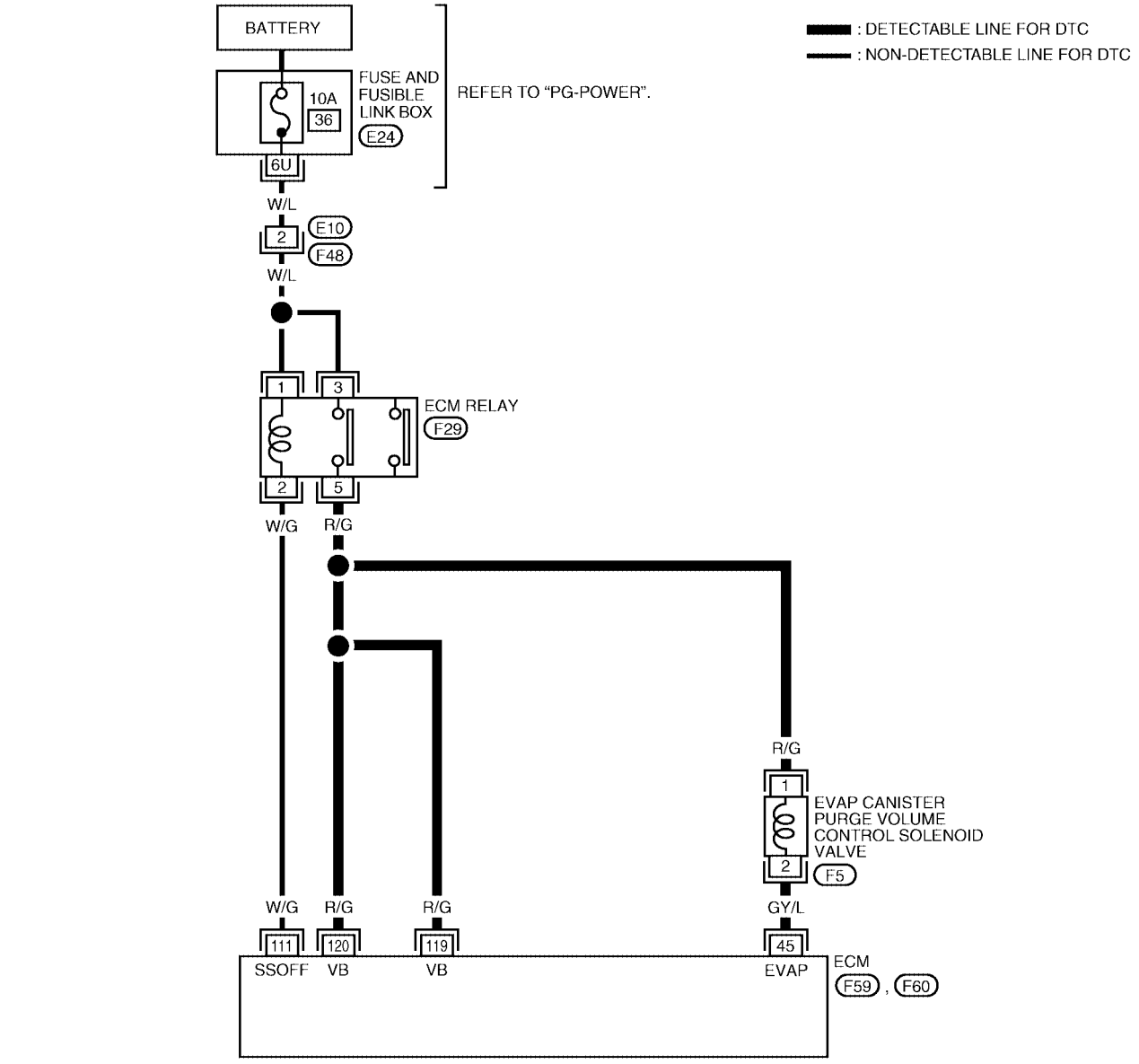
WITH GST

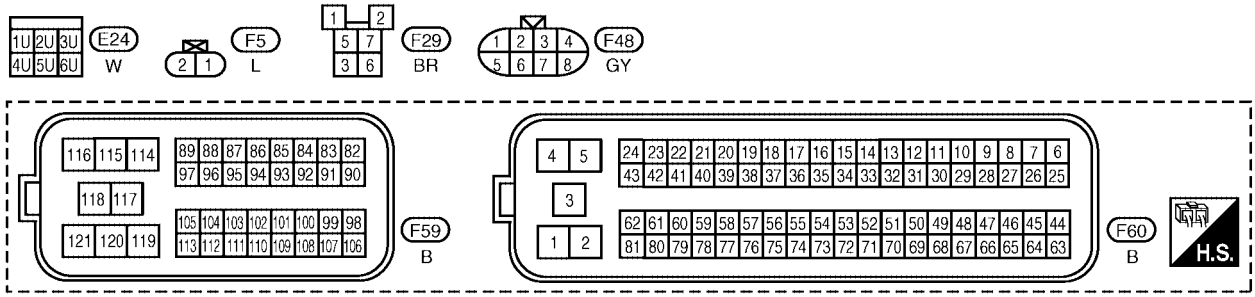
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00B83

EC-PGC/V-01



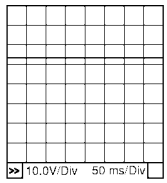
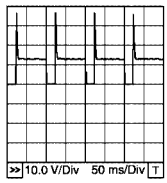


BBWA1431E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed ● Accelerator pedal is not depressed even slightly, after engine starting.	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

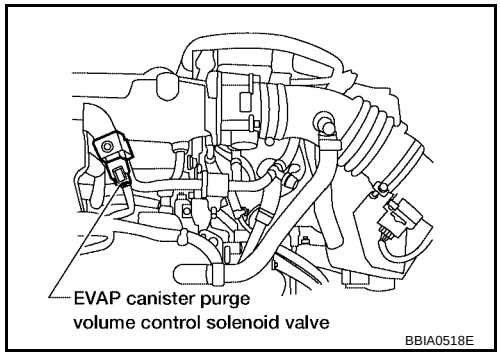
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00B84

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.

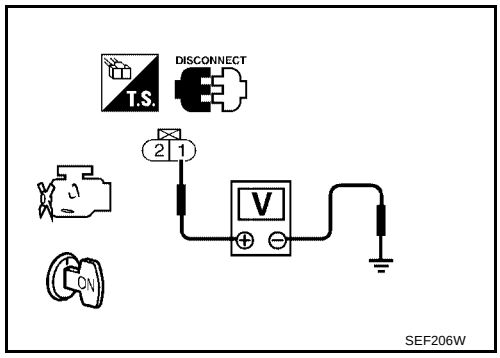


4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay.

>> Repair harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

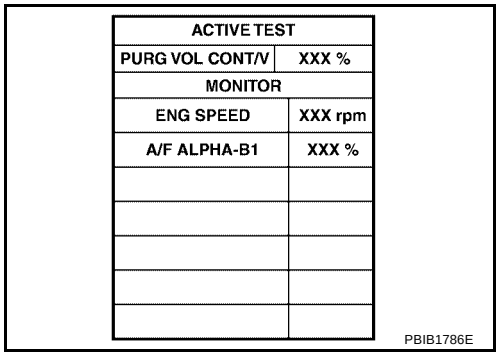
OK or NG

OK (With CONSULT-II)>>GO TO 4.
OK (Without CONSULT-II)>>GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-322, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace EVAP canister purge volume control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

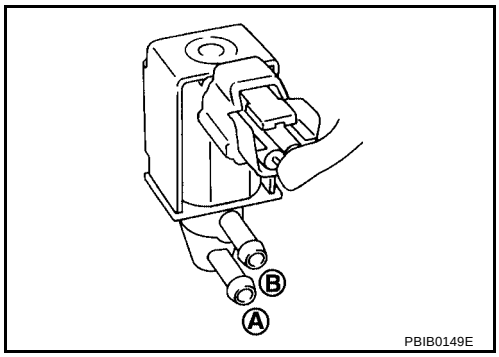
UBS00B85

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

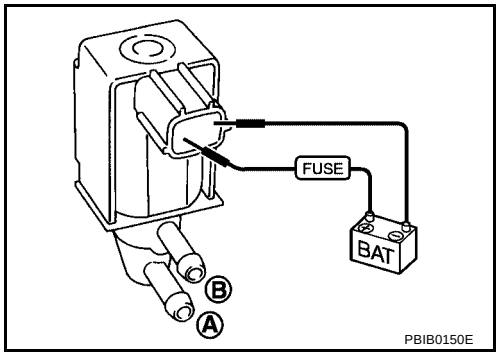
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

UBS00B86

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-15, "OUTER COMPONENT PARTS" .

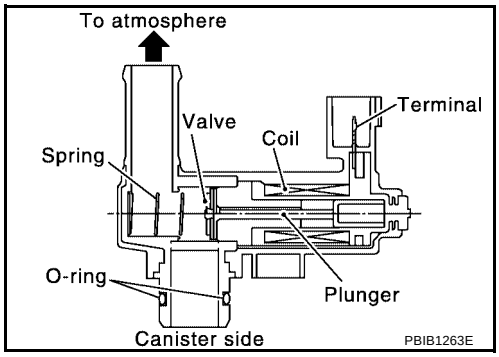
DTC P0447 EVAP CANISTER VENT CONTROL VALVE

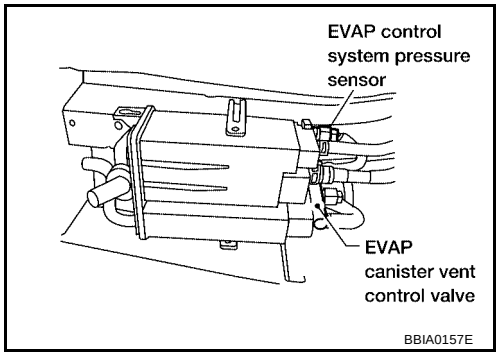
PFP:14935

Component Description

UBS00B87

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnoses.





CONSULT-II Reference Value in Data Monitor Mode

UBS00B88

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00B89

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447 0447	EVAP canister vent control valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	● Harness or connectors (The valve circuit is open or shorted.) ● EVAP canister vent control valve

DTC Confirmation Procedure

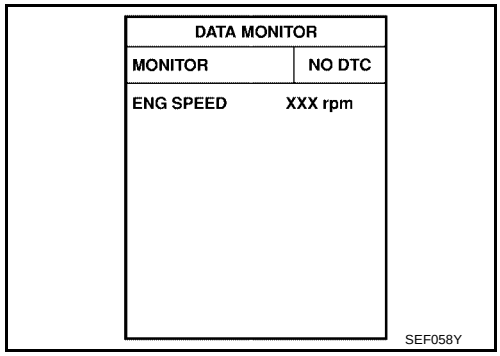
UBS00B8A

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 8 seconds.
4. If 1st trip DTC is detected, go to EC-327, "Diagnostic Procedure"
.



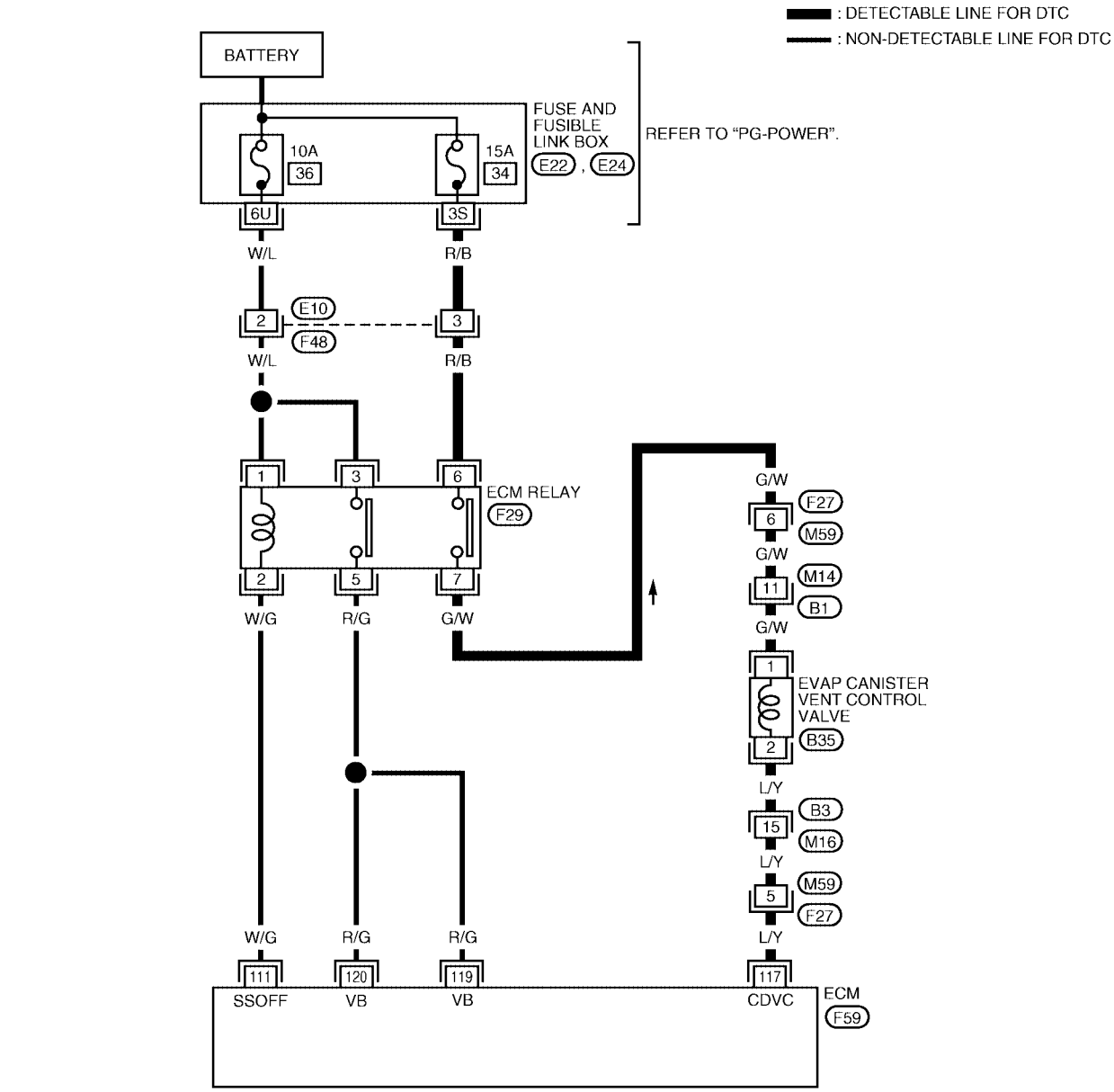
WITH GST

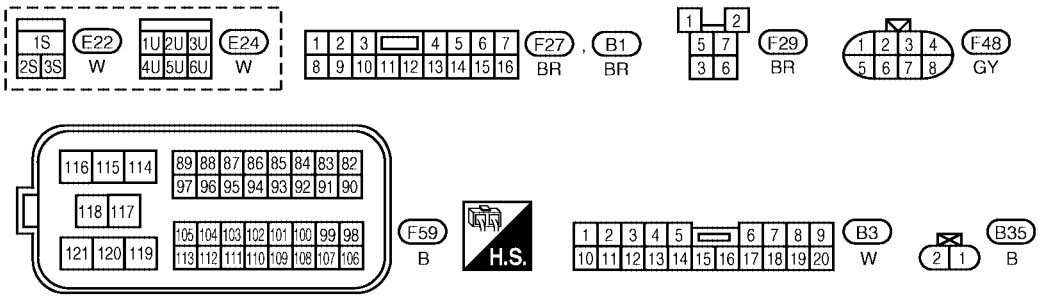
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00B8B

EC-VENT/V-01





BBWA1432E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
117	L/Y	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00B8C

1. INSPECTION START

1. Do you have CONSULT-II?

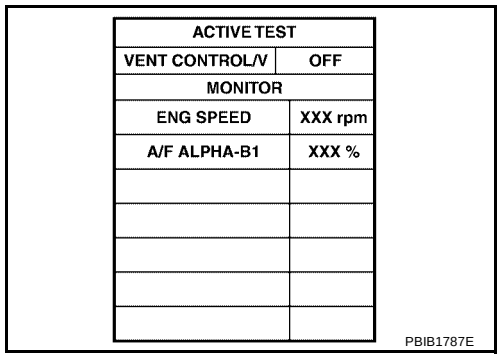
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch OFF and then turn ON.
2. Select “VENT CONTROL/V” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON/OFF” on CONSULT-II screen.
4. Check for operating sound of the valve.
   Clicking noise should be heard.

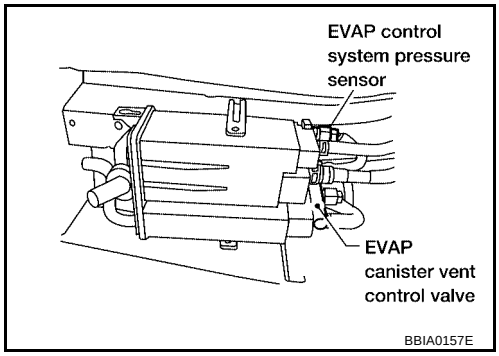


OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

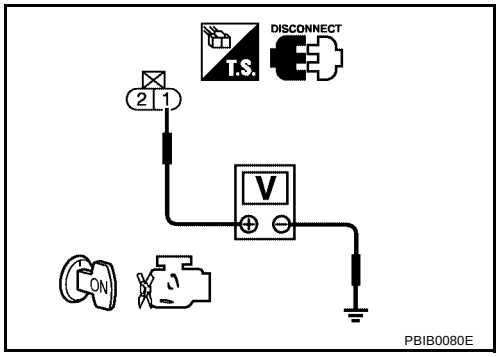
3. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F27, M59
- Harness connectors B1, M14
- Harness for open or short between EVAP canister vent control valve and ECM relay

>> Repair harness or connectors.

5. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 117 and EVAP canister vent control valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B3, M16
- Harness connectors M59, F27
- Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 8.
NG >> Clean the rubber tube using an air blower.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-329, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP canister vent control valve.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

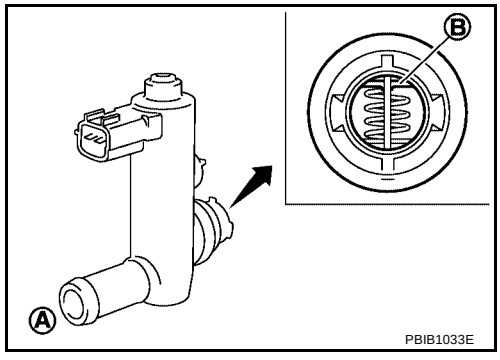
Component Inspection

UBS00B8D

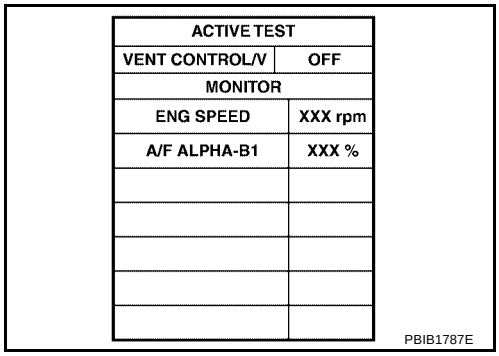
EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
   If NG, replace EVAP canister vent control valve.
   If OK, go to next step.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch ON.



5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
6. Check air passage continuity and operation delay time.
   Make sure new O-ring is installed properly.



Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

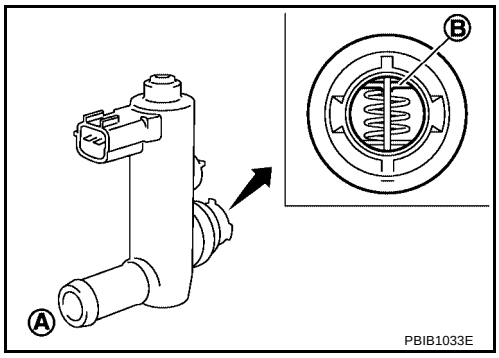
Operation takes less than 1 second.

If NG, replace EVAP canister vent control valve.
If OK, go to next step.

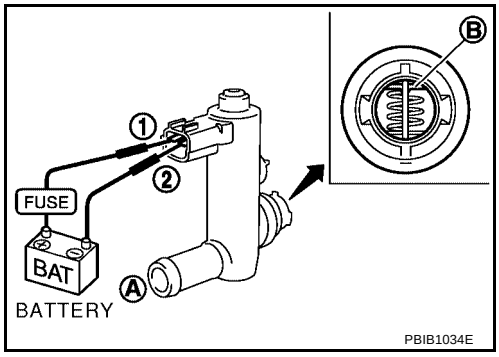
7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform step 6 again.

Without CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



3. Check air passage continuity and operation delay time under the following conditions.
   Make sure new O-ring is installed properly.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

If NG, replace EVAP canister vent control valve.
If OK, go to next step.

4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.

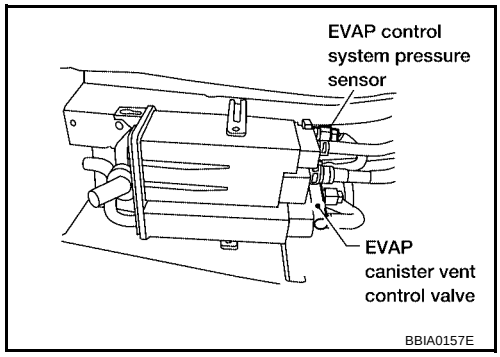
DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

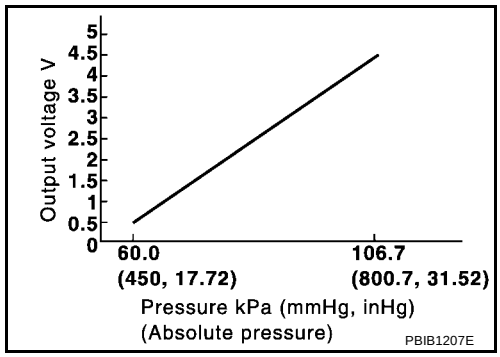
PFP:22365

Component Description

UBS00ISB

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.





CONSULT-II Reference Value in Data Monitor Mode

UBS00ISC

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

UBS00ISD

NOTE:
If DTC P0451 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-473

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0451 0451	EVAP control system pressure sensor performance	ECM detects a sloshing signal from the EVAP control system pressure sensor	● Harness or connectors ● EVAP control system pressure sensor

DTC Confirmation Procedure

UBS00ISE

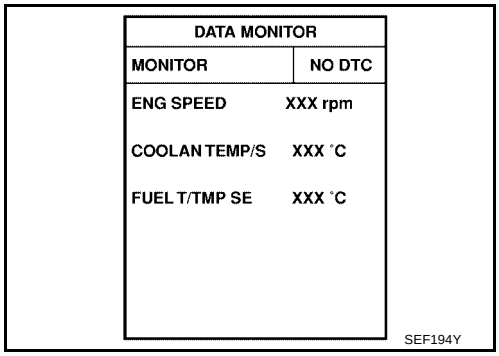
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch OFF and wait at least 10 seconds.

2. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 40 seconds.

NOTE:
Do not depress accelerator pedal even slightly.
If 1st trip DTC is detected, go to EC-332, "Diagnostic Procedure" .



WITH GST

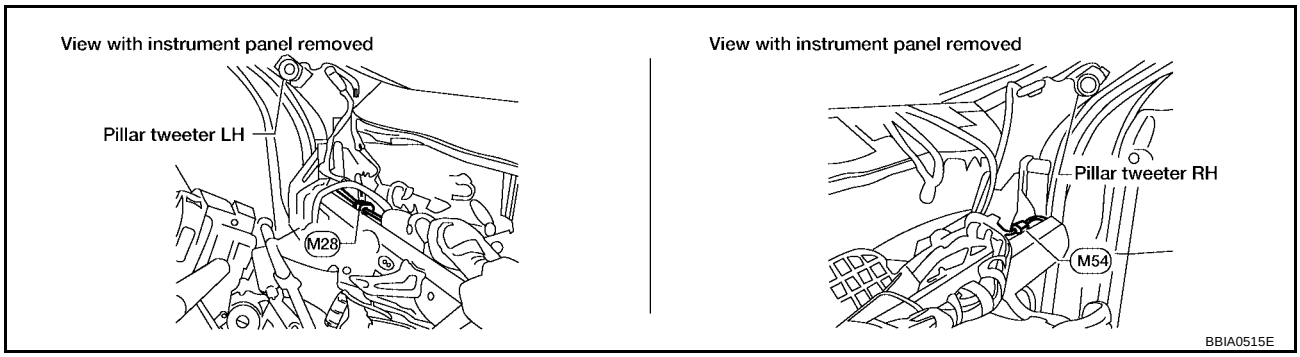
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00ISF

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

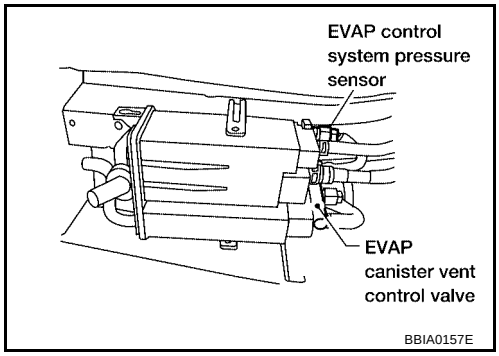
2. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness connector.



3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-333, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace EVAP control system pressure sensor.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For wiring diagram, refer to EC-336 .

>> **INSPECTION END**

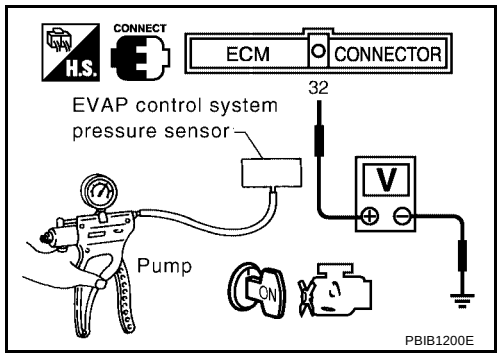
Component Inspection

UBS00ISG

EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Do not reuse the O-ring, replace it with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value



CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

4. If NG, replace EVAP control system pressure sensor.

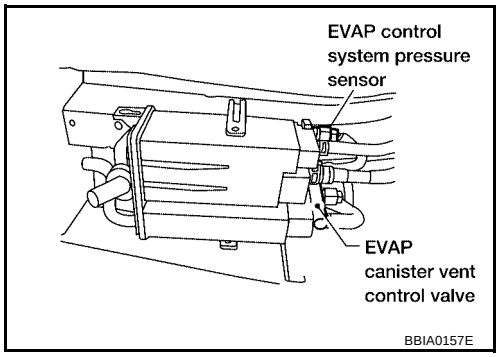
DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

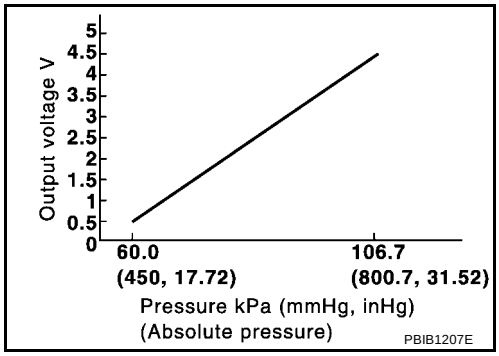
PFP:25085

Component Description

UBS00B8E

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.





CONSULT-II Reference Value in Data Monitor Mode

UBS00B8F

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

UBS00B8G

NOTE:
If DTC P0452 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-473 .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452 0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● EVAP control system pressure sensor

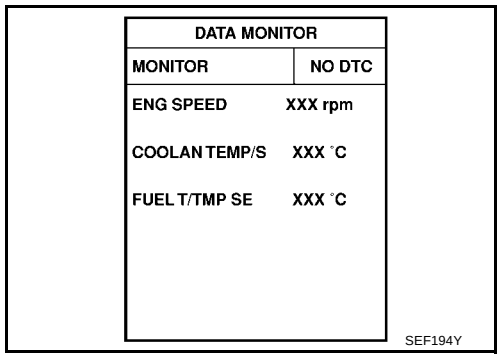
DTC Confirmation Procedure

UBS00B8H

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always perform test at a temperature of 0°C (32°F) or more.

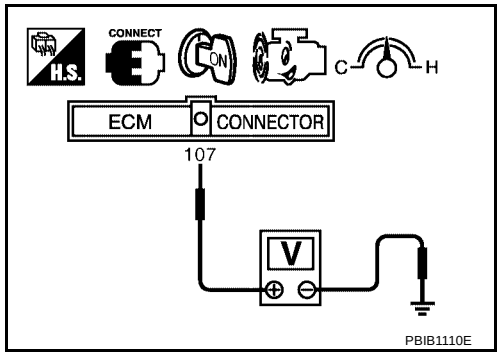
WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “FUEL T/TMP SE” is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
7. If 1st trip DTC is detected, go to EC-337, "Diagnostic Procedure"
.



WITH GST

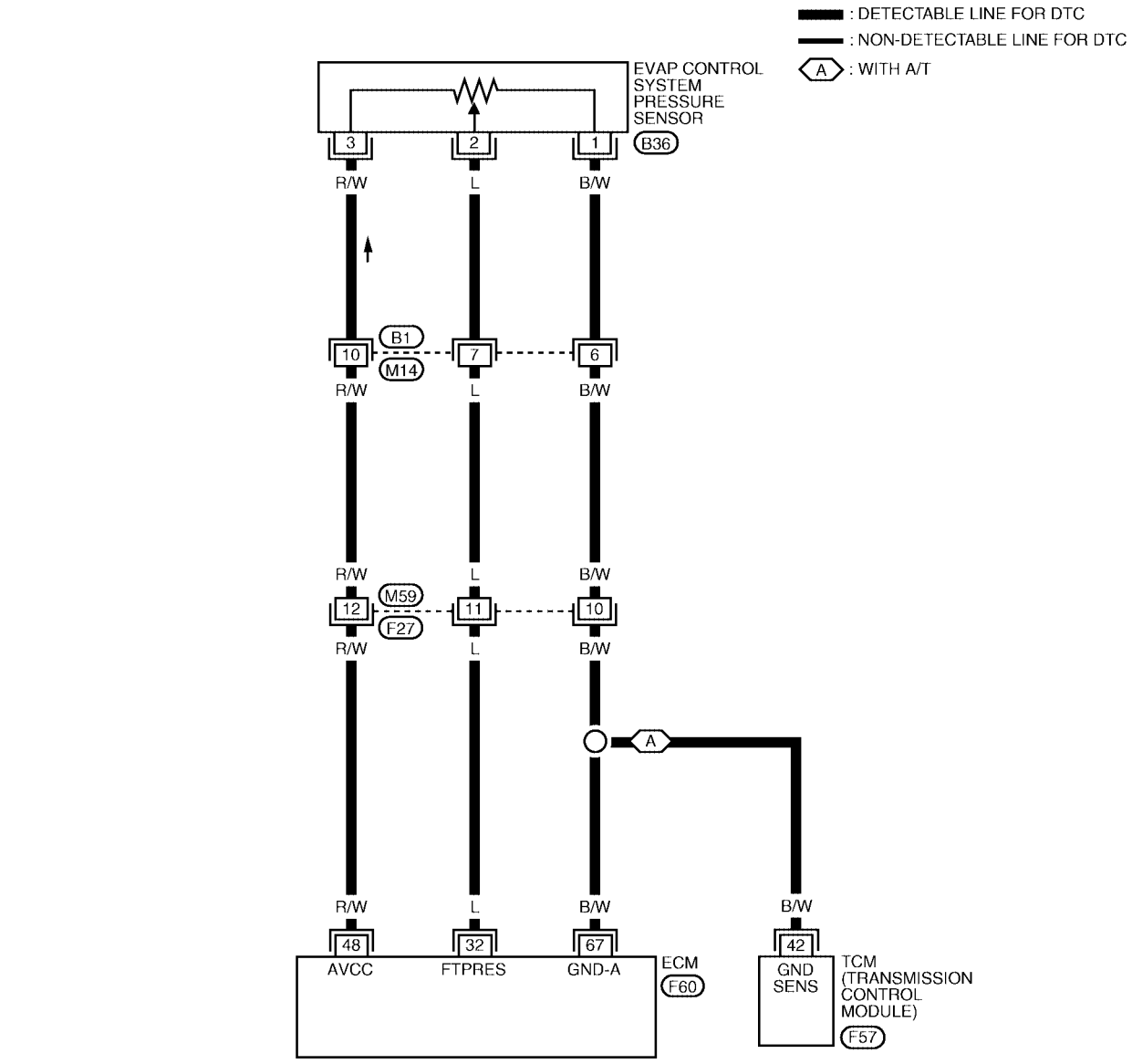
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 107 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select Service $07 with GST.
6. If 1st trip DTC is detected, go to EC-337, "Diagnostic Procedure"
.

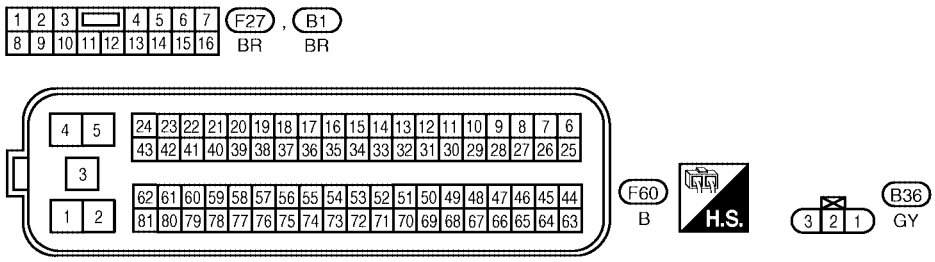


Wiring Diagram

UBS00B8I

EC-PRE/SE-01





REFER TO THE FOLLOWING.
F57 - ELECTRICAL UNITS

BBWA1433E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

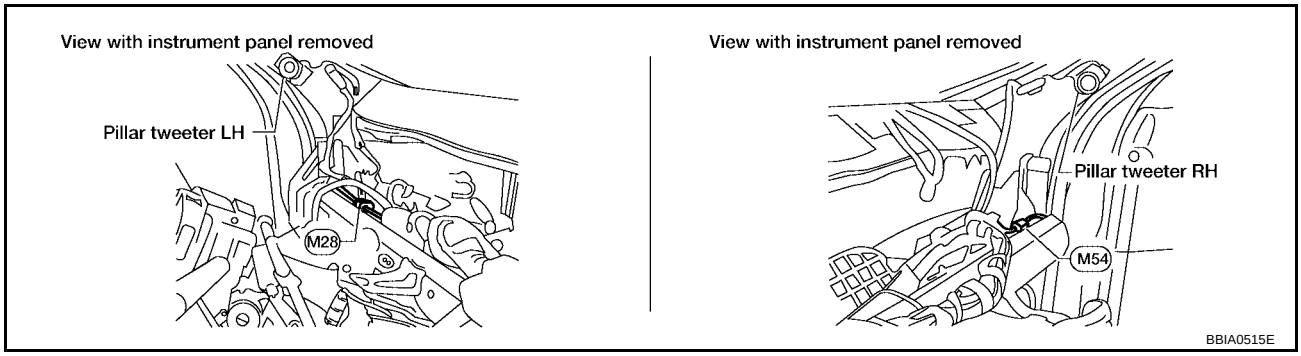
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	L	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V
48	R/W	Sensor power supply (EVAP control system pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00B8J

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .



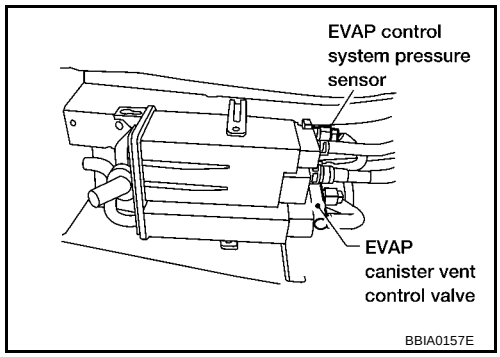
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.



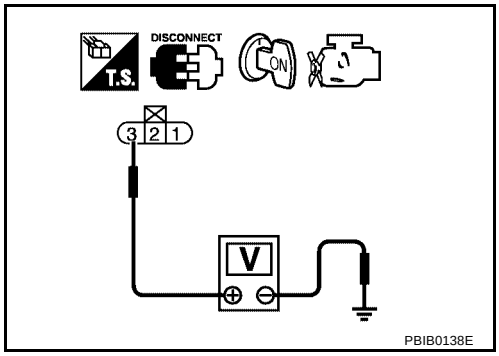
OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness connector.

3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M59, F27
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector.
4. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 67, TCM terminal 42.
   Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M59, F27
- Harness for open or short between EVAP control system pressure sensor and TCM
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 32 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M59, F27
- Harness for open or short between ECM and EVAP control system pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-339, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

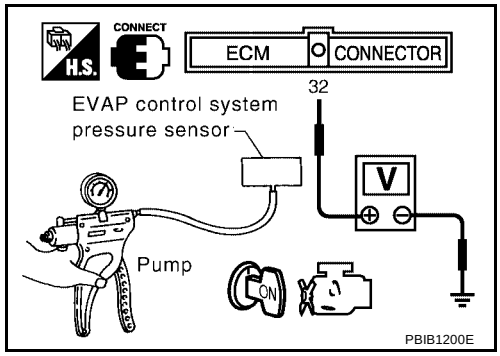
Component Inspection

UBS00B8K

EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.
   Do not reuse the O-ring, replace it with a new one.
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value



CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

4. If NG, replace EVAP control system pressure sensor.

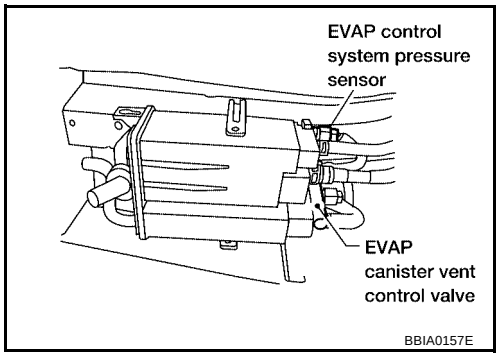
DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

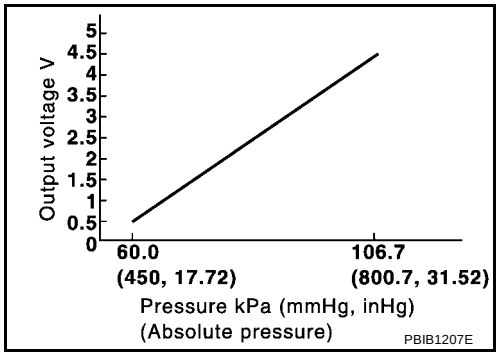
PFP:25085

Component Description

UBS00B8L

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.





CONSULT-II Reference Value in Data Monitor Mode

UBS00B8M

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

UBS00B8N

NOTE:
If DTC P0453 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-473 .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453 0453	EVAP control system pressure sensor high input	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● EVAP control system pressure sensor ● EVAP canister vent control valve ● EVAP canister ● Rubber hose to EVAP canister vent control valve

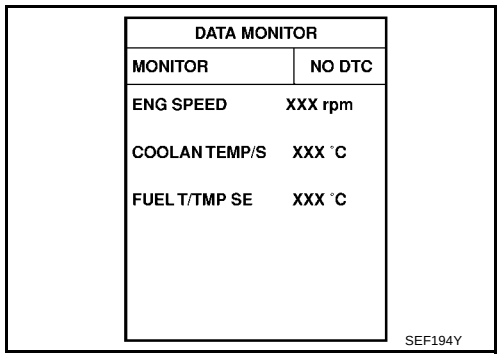
DTC Confirmation Procedure

UBS00B8O

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always perform test at a temperature of 0°C (32°F) or more.

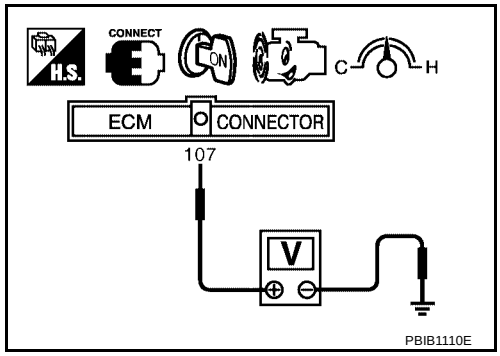
WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “FUEL T/TMP SE” is more than 0°C (32°F).
6. Wait at least 10 seconds.
7. If 1st trip DTC is detected, go to EC-343, "Diagnostic Procedure"
.



WITH GST

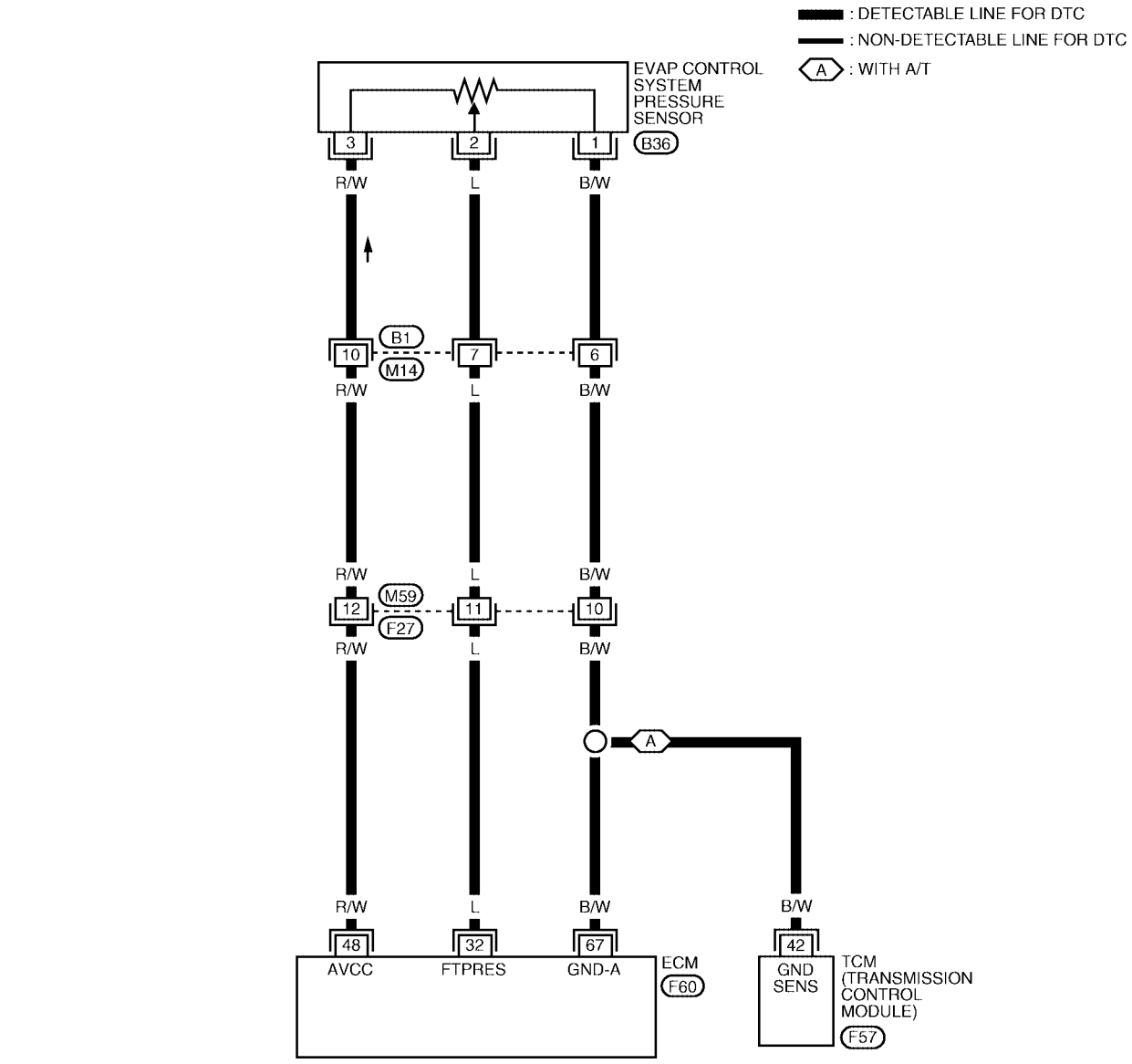
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 107 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Wait at least 10 seconds.
5. Select Service $07 with GST.
6. If 1st trip DTC is detected, go to EC-343, "Diagnostic Procedure"
.

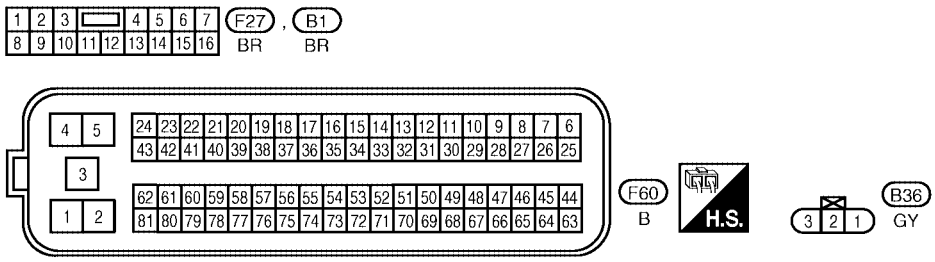


Wiring Diagram

UBS00B8P

EC-PRE/SE-01





REFER TO THE FOLLOWING.
F57 - ELECTRICAL UNITS

BBWA1433E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

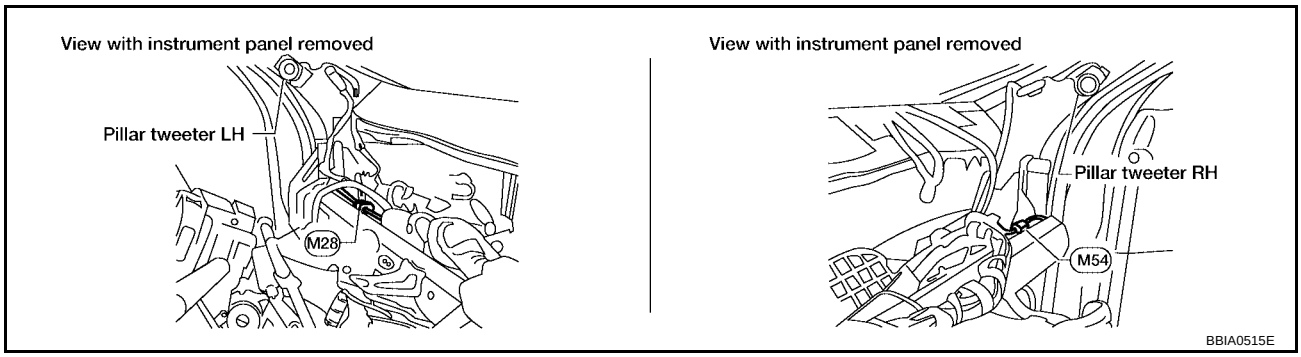
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	L	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V
48	R/W	Sensor power supply (EVAP control system pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00B8Q

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

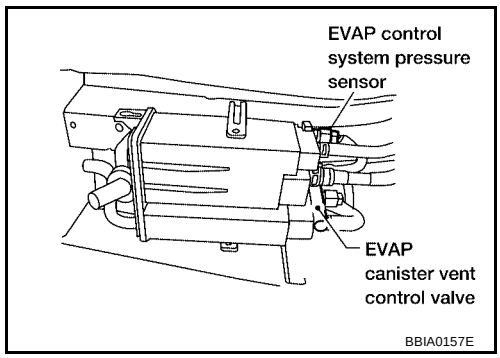
2. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check sensor harness connector for water.

Water should not exist.

OK or NG

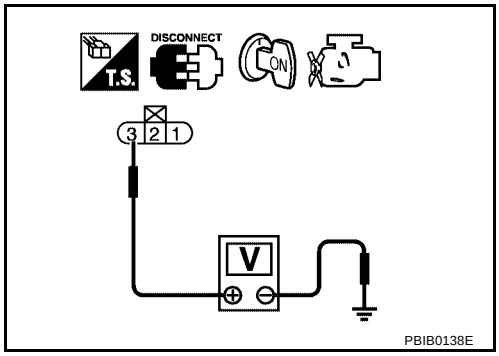
OK >> GO TO 3.
NG >> Repair or replace harness connector.



3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M59, F27
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector.
4. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 67, TCM terminal 42.
   Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M58, F26
- Harness for open or short between EVAP control system pressure sensor and TCM
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 32 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M58, F26
- Harness for open or short between ECM and EVAP control system pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging, vent and kinked.

OK or NG

OK >> GO TO 10.
NG >> Clean the rubber tube using an air blower, repair or replace rubber tube.

10. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-329, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP canister vent control valve.

11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

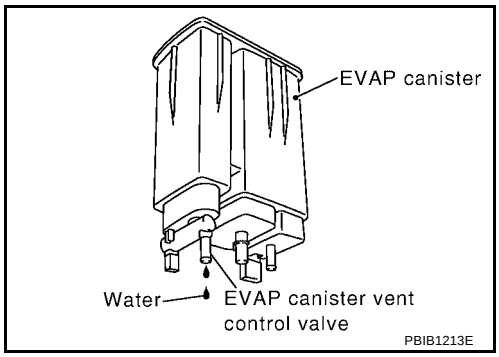
Refer to EC-346, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP control system pressure sensor.

12. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.



Yes or No

Yes >> GO TO 13.
No >> GO TO 15.

13. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.
The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose connected to EVAP canister for clogging or poor connection

>> Repair hose or replace EVAP canister.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

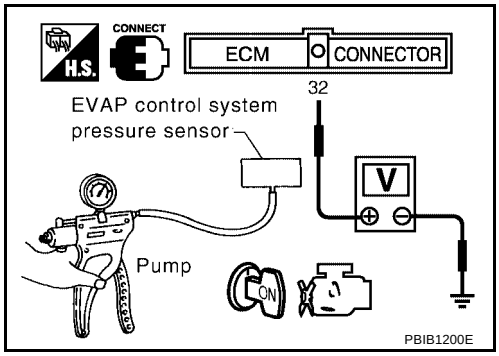
>> **INSPECTION END**

Component Inspection

UBS00B8R

EVAP CONTROL PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Do not reuse the O-ring, replace it with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

4. If NG, replace EVAP control system pressure sensor.

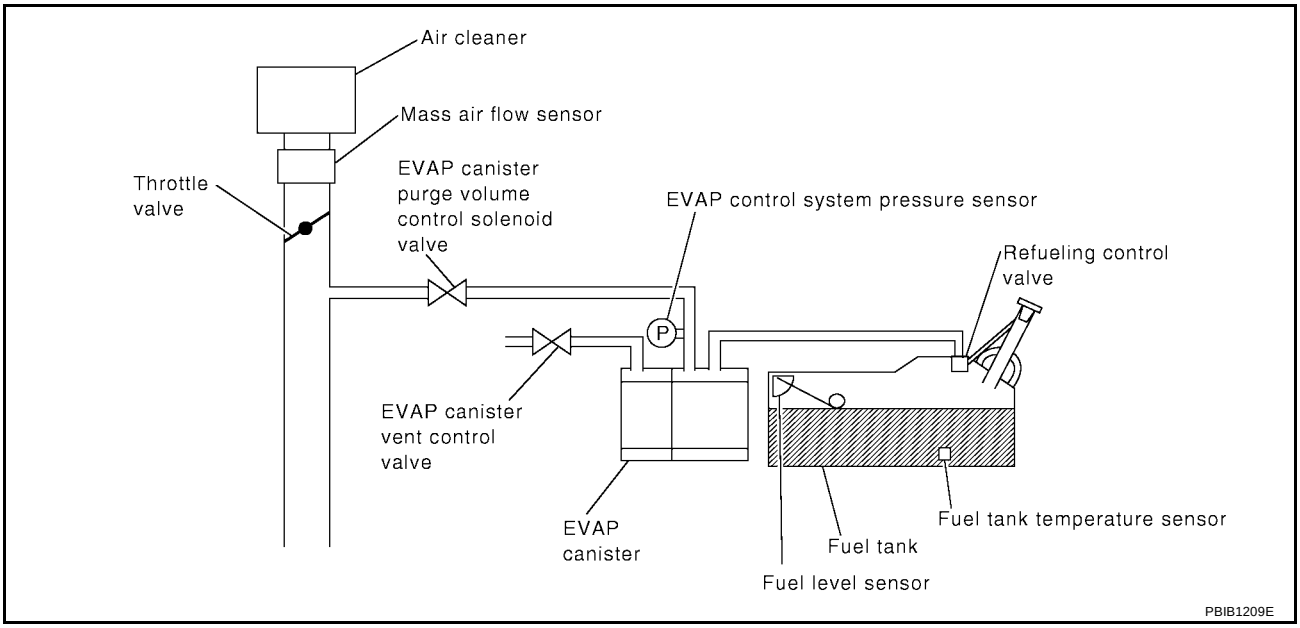
DTC P0455 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS00B8S

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0455 0455	EVAP control system gross leak detected	EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.	● Fuel filler cap remains open or fails to close. ● Incorrect fuel tank vacuum relief valve ● Incorrect fuel filler cap used ● Foreign matter caught in fuel filler cap. ● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. ● Foreign matter caught in EVAP canister vent control valve. ● EVAP canister or fuel tank leaks ● EVAP purge line (pipe and rubber tube) leaks ● EVAP purge line rubber tube bent. ● Loose or disconnected rubber tube ● EVAP canister vent control valve and the circuit ● EVAP canister purge volume control solenoid valve and the circuit ● Fuel tank temperature sensor ● O-ring of EVAP canister vent control valve is missing or damaged. ● EVAP control system pressure sensor ● Refueling control valve ● ORVR system leaks

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

UBS00B8T

CAUTION:

Never remove fuel filler cap during the DTC Confirmation Procedure.

NOTE:

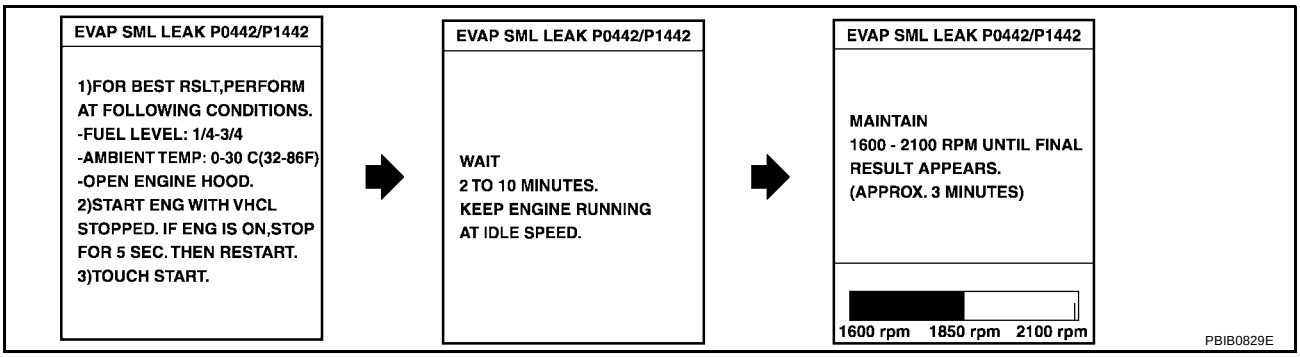
- **Make sure that EVAP hose are connected to EVAP canister purge volume control solenoid valve properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 to 3/4 full, and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedure.**

WITH CONSULT-II

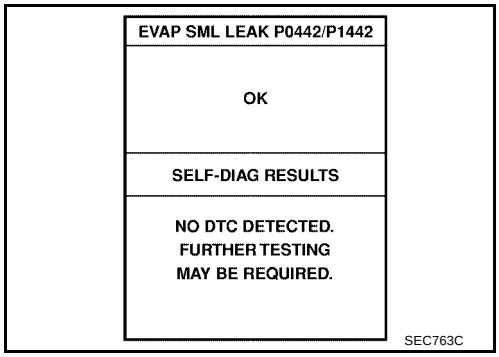
1. Tighten fuel filler cap securely until ratcheting sound is heard.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
5. Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)
6. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.



NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-74, "Basic Inspection" .

7. Make sure that OK is displayed.
   If NG is displayed, select "SELF-DIAG RESULTS" mode with CONSULT-II and make sure that "EVAP GROSS LEAK [P0455]" is displayed. If it is displayed, refer to EC-349, "Diagnostic Procedure" .
   If P0442 is displayed, perform Diagnostic Procedure for DTC P0442, EC-310 .



WITH GST

NOTE:

Be sure to read the explanation of Driving Pattern on EC-61 before driving vehicle.

1. Start engine.
2. Drive vehicle according to EC-61, "Driving Pattern" .
3. Stop vehicle.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Select Service $07 with GST.
   - If P0455 is displayed on the screen, go to EC-349, "Diagnostic Procedure" .
   - If P0442 is displayed on the screen, go to Diagnostic Procedure, for DTC P0442, EC-310 .
   - If P0441 is displayed on the screen, go to Diagnostic Procedure for DTC P0441, EC-304 .

Diagnostic Procedure

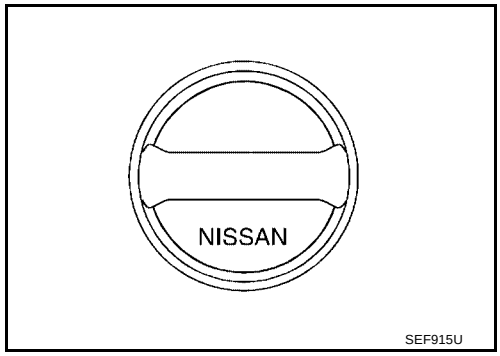
UBS00B8U

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

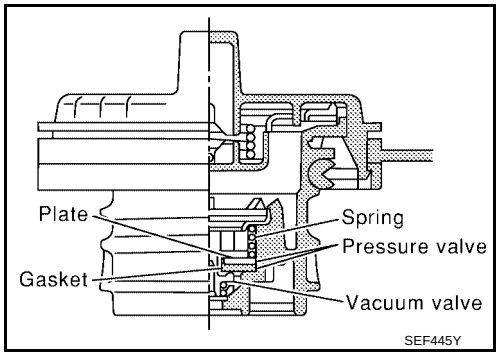
OK >> GO TO 5.
NG >> GO TO 4.

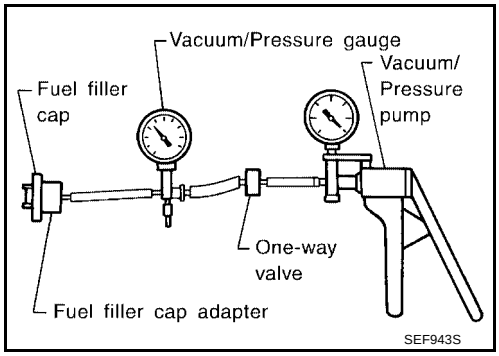
4. CHECK FUEL TANK VACUUM RELIEF VALVE

1. Wipe clean valve housing.
2. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa
(0.156 - 0.204 kg/cm^2 , 2.22 - 2.90 psi)
Vacuum: –6.0 to –3.3 kPa
(–0.061 to –0.034 kg/cm^2 , –0.87 to –0.48 psi)

CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.





OK or NG
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.
Refer to EC-36, "EVAPORATIVE EMISSION SYSTEM" .

OK or NG
OK >> GO TO 6.
NG >> Repair or reconnect the hose.

6. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 7.

7. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

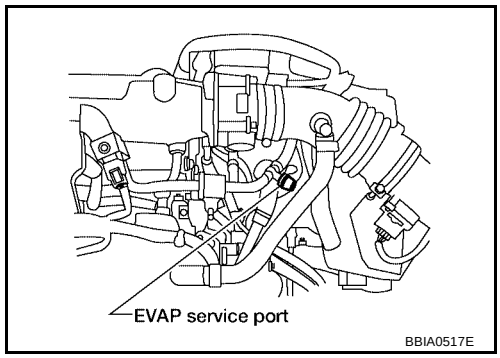
- EVAP canister vent control is installed properly.
  Refer to EC-40, "EVAP CANISTER VENT CONTROL VALVE"
- EVAP canister vent control valve.
  Refer to EC-329, "Component Inspection"

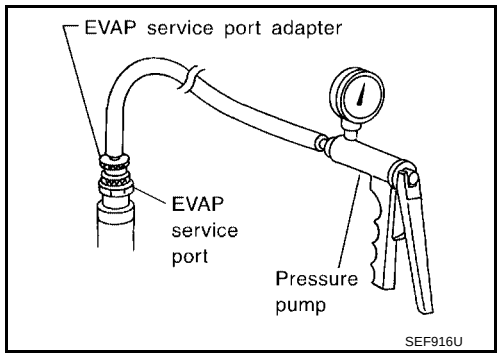
OK or NG
OK >> GO TO 8.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

8. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





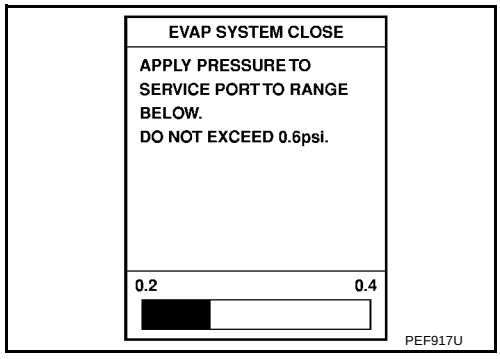
Models with CONSULT-II>>GO TO 9.
Models without CONSULT-II>>GO TO 10.

9. CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

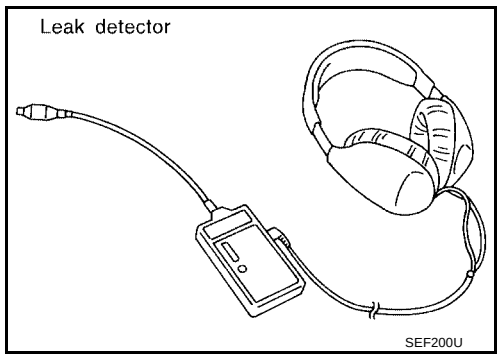
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

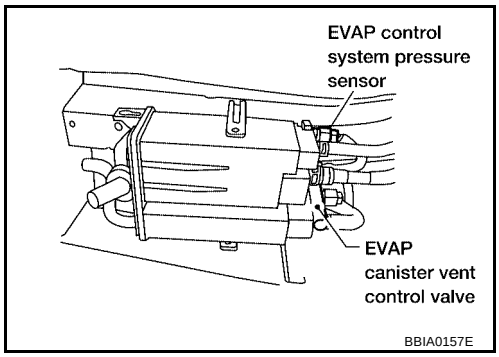


10. CHECK FOR EVAP LEAK

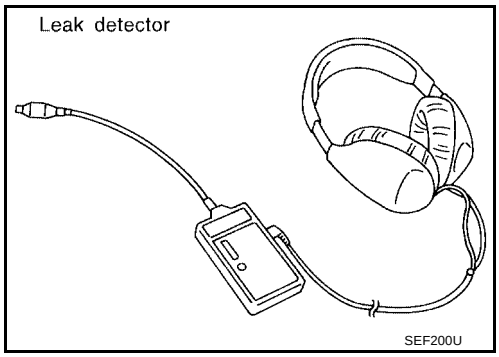
Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

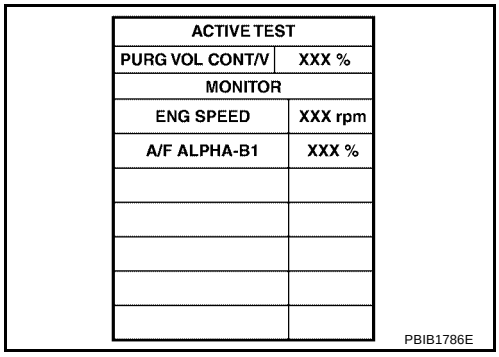
OK >> GO TO 12.
NG >> Repair or replace.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

   Vacuum should exist.



OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 15.
NG >> GO TO 13.

13. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .

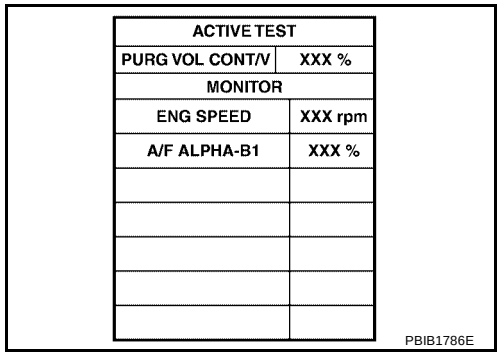
OK or NG

OK (With CONSULT-II) >>GO TO 14.
OK (Without CONSULT-II) >>GO TO 15.
NG >> Repair or reconnect the hose.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-322, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.

16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-263, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace fuel level sensor unit.

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-333, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. CHECK EVAP/ORVR VAPOR LINE

Check refueling EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-43, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 19.
>> Repair or replace hoses and tubes.

19. CHECK SIGNAL LINE AND RECIRCULATION LINE

Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 20.
>> Repair or replace hoses, tubes or filler neck tube.

20. CHECK REFUELING CONTROL VALVE

Refer to EC-48, "REFUELING CONTROL VALVE" .

OK or NG

OK >> GO TO 21.
>> Replace refueling control valve with fuel tank.

21. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

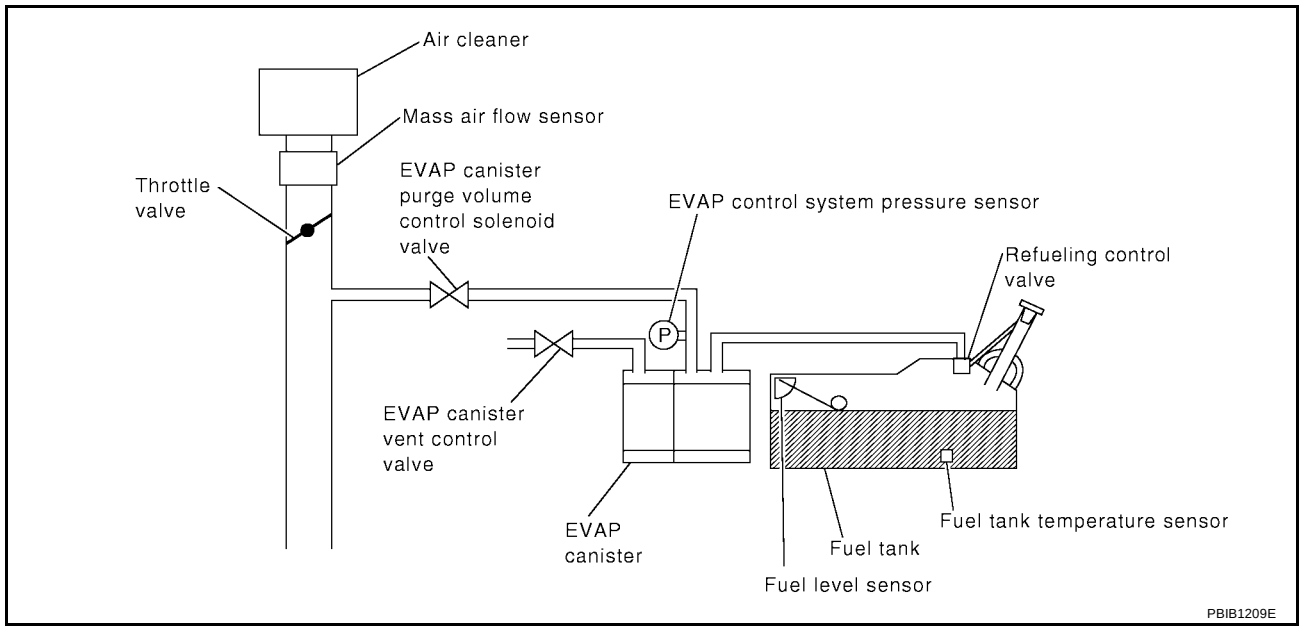
DTC P0456 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS00B8V

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.
If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected.
If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.
If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456 0456	Evaporative emission control system very small leak (negative pressure check)	● EVAP system has a very small leak. ● EVAP system does not operate properly.	● Incorrect fuel tank vacuum relief valve ● Incorrect fuel filler cap used ● Fuel filler cap remains open or fails to close. ● Foreign matter caught in fuel filler cap. ● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. ● Foreign matter caught in EVAP canister vent control valve. ● EVAP canister or fuel tank leaks ● EVAP purge line (pipe and rubber tube) leaks ● EVAP purge line rubber tube bent ● Loose or disconnected rubber tube ● EVAP canister vent control valve and the circuit ● EVAP canister purge volume control solenoid valve and the circuit ● Fuel tank temperature sensor ● O-ring of EVAP canister vent control valve is missing or damaged ● EVAP canister is saturated with water ● EVAP control system pressure sensor ● Refueling control valve ● ORVR system leaks ● Fuel level sensor and the circuit ● Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

UBS00B8W

NOTE:

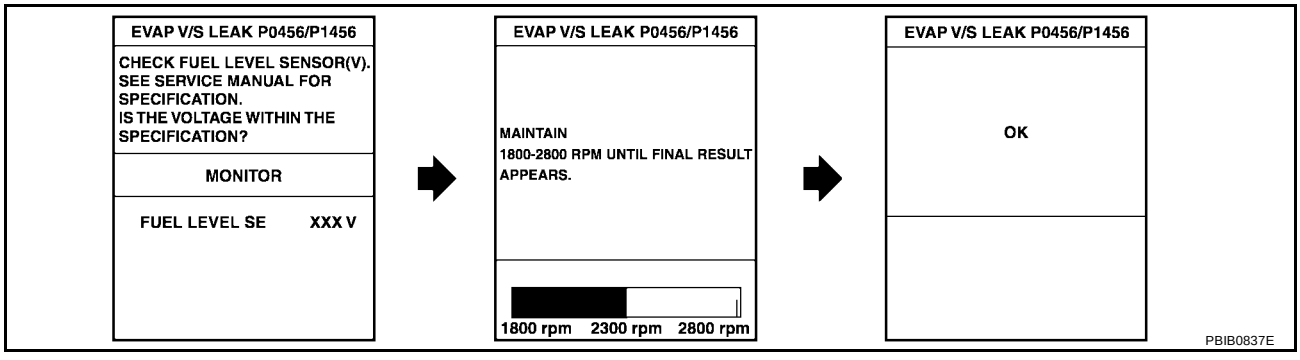
- **If DTC P0456 is displayed with P0442, perform first trouble diagnosis for DTC P0456.**
- **After repair, make sure that the hoses and clips are installed properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

- **Open engine hood before conducting following procedure.**
- **If any of following conditions are met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**
  - **Fuel filler cap is removed.**
  - **Refilled or drained the fuel.**
  - **EVAP component parts is/are removed.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Make sure the following conditions are met.
   FUEL LEVEL SE: 0.25 - 1.4V
   COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
   FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
   INT A/TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “EVAP V/S LEAK P0456/P1456” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.



6. Make sure that OK is displayed.
   If NG is displayed, refer to EC-358, "Diagnostic Procedure" .

   NOTE:
   - **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to EC-74, "Basic Inspection" .**
   - **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

Overall Function Check

UBS00B8X

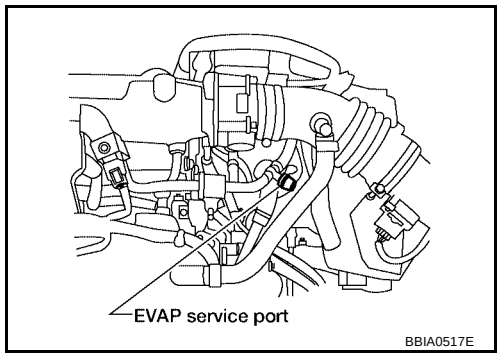
WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a DTC might not be confirmed.

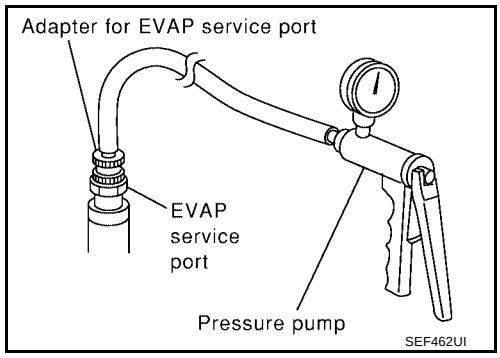
CAUTION:

- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2 , 0.6 psi).**

1. Attach the EVAP service port adapter securely to the EVAP service port.



2. Set the pressure pump and a hose.
3. Also set a vacuum gauge via 3-way connector and a hose.
4. Turn ignition switch ON.
5. Connect GST and select “Service $08”.
6. Using Service $08 control the EVAP canister vent control valve (close).
7. Apply pressure and make sure the following conditions are satisfied.
   Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)
   Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg).
   If NG, go to EC-358, "Diagnostic Procedure" .
   If OK, go to next step.



8. Disconnect GST.
9. Start engine and warm it up to normal operating temperature.
10. Turn ignition switch OFF and wait at least 10 seconds.
11. Restart engine and let it idle for 90 seconds.
12. Keep engine speed at 2,000 rpm for 30 seconds.
13. Turn ignition switch OFF.

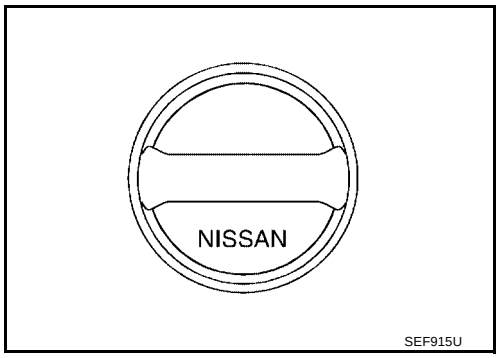
    NOTE:
    For more information, refer to GST instruction manual.

Diagnostic Procedure

UBS00B8Y

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.



OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.

2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Retighten until ratcheting sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-39, "FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)" .

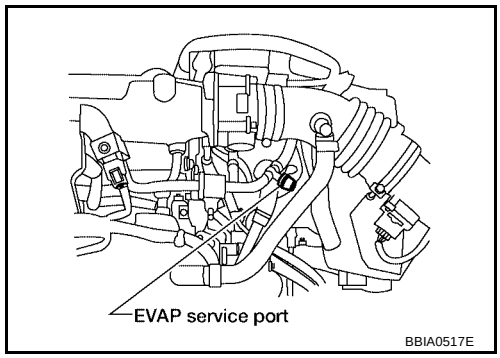
OK or NG

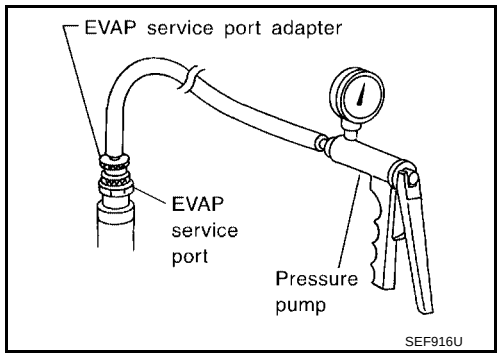
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





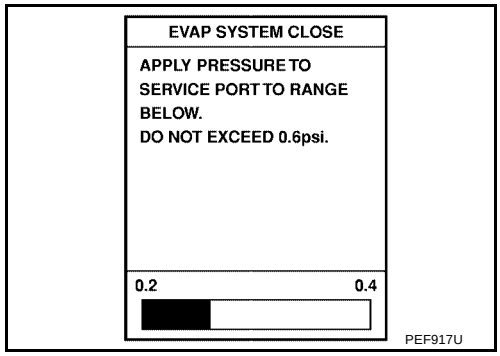
Models with CONSULT-II>>GO TO 6.
Models without CONSULT-II>>GO TO 7.

6. CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

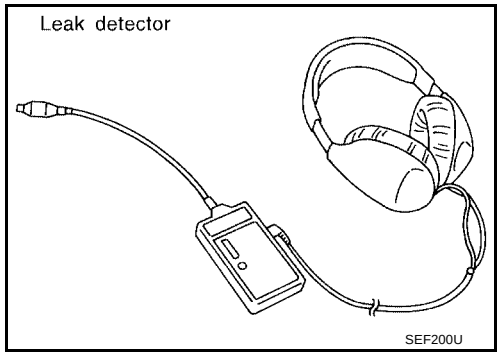
   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

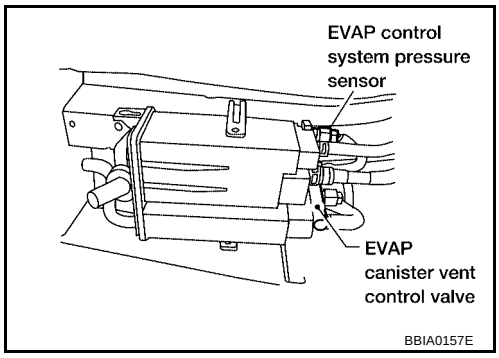


7. CHECK FOR EVAP LEAK

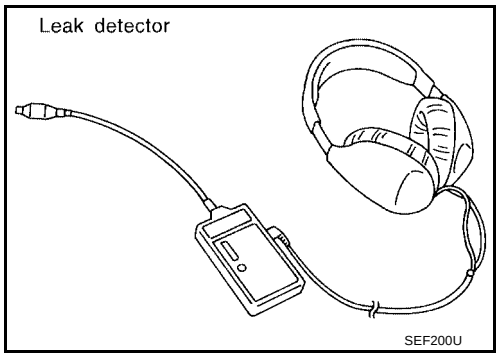
Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)
3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

   NOTE:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly. Refer to EC-40, "EVAP CANISTER VENT CONTROL VALVE"
- EVAP canister vent control valve. Refer to EC-329, "Component Inspection"

OK or NG

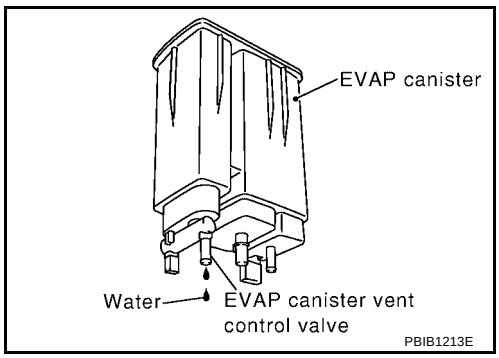
OK >> GO TO 9.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

9. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 10.
No (With CONSULT-II)>>GO TO 12.
No (Without CONSULT-II)>>GO TO 13.



10. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK (With CONSULT-II)>>GO TO 12.
OK (Without CONSULT-II)>>GO TO 13.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

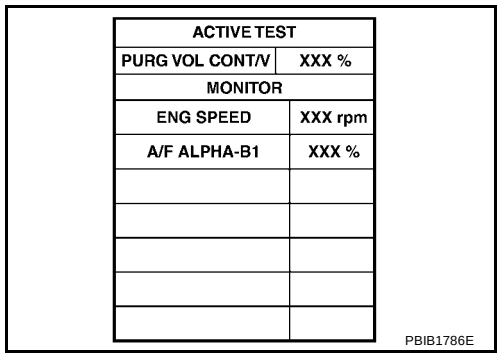
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.



OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

Vacuum should exist.

OK or NG

OK >> GO TO 16.
NG >> GO TO 14.

14. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 15.
NG >> Repair or reconnect the hose.

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-322, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.

16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-259, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace fuel level sensor unit.

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-339, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection.
Refer to EC-37, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 19.
NG >> Repair or reconnect the hose.

19. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 20.

20. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-43, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 22.
NG >> Repair or replace hoses and tubes.

21. CHECK SIGNAL LINE AND RECIRCULATION LINE

Check signal line recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 22.
NG >> Repair or replace hose, tube or filler neck tube.

22. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-47, "Component Inspection" .

OK or NG

OK >> GO TO 23.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

23. CHECK FUEL LEVEL SENSOR

Refer to DI-26, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 24.
NG >> Replace fuel level sensor unit.

24. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

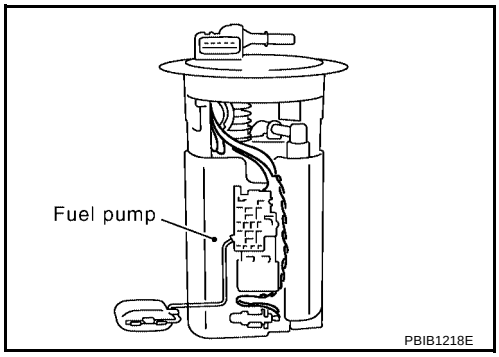
DTC P0460 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00B8Z

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnostic Logic

UBS00B90

NOTE:
If DTC P0460 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-172, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460 0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	● Harness or connectors (The CAN communication line is open or shorted) ● Harness or connectors (The sensor circuit is open or shorted) ● Combination meter ● Fuel level sensor

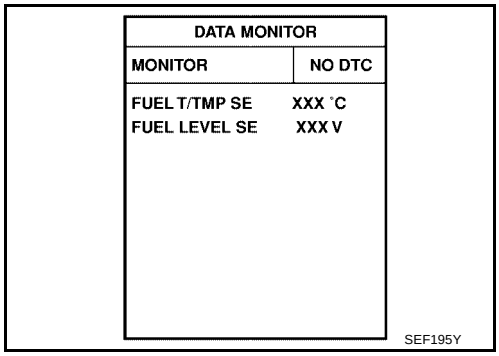
DTC Confirmation Procedure

UBS00B91

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait maximum of 2 consecutive minutes.
4. If 1st trip DTC is detected, go to EC-365, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00B92

1. CHECK COMBINATION METER

Refer to DI-4 .

OK or NG

OK >> GO TO 2.
NG >> GO TO DI-4 .

2. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00B93

FUEL LEVEL SENSOR

Refer to DI-26, "FUEL LEVEL SENSOR UNIT CHECK" .

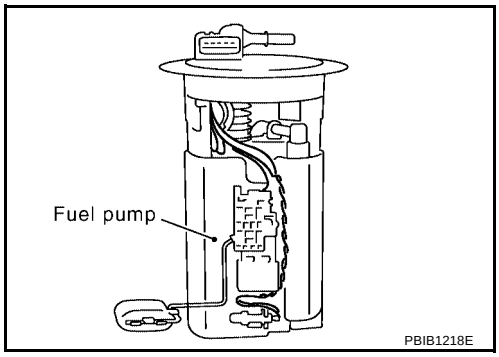
DTC P0461 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00B94

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnostic Logic

UBS00B95

NOTE:
If DTC P0461 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-172, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
Driving long distances naturally affect fuel gauge level.
This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0461 0461	Fuel level sensor circuit range/performance	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.	● Harness or connectors (The CAN communication line is open or shorted) ● Harness or connectors (The sensor circuit is open or shorted) ● Combination meter ● Fuel level sensor

Overall Function Check

UBS00B96

Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

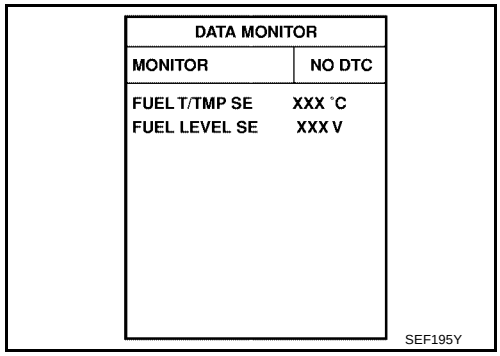
WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to FL-2, "FUEL SYSTEM" .
TESTING CONDITION:
Before starting overall function check, preparation of draining fuel and refilling fuel is required.

WITH CONSULT-II

NOTE:
Start from step 10, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-94, "FUEL PRESSURE RELEASE" .
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.

6. Select “FUEL LEVEL SE” in “DATA MONITOR” mode with CONSULT-II.
7. Check “FUEL LEVEL SE” output voltage and note it.
8. Select “FUEL PUMP” in “ACTIVE TEST” mode with CONSULT-II.
9. Touch “ON” and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Check “FUEL LEVEL SE” output voltage and note it.
11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
12. Check “FUEL LEVEL SE” output voltage and note it.
13. Confirm whether the voltage changes more than 0.03V during step 7 to 10 and 10 to 12.
If NG, go to EC-367, "Diagnostic Procedure" .



WITH GST

NOTE:
Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-94, "FUEL PRESSURE RELEASE" .
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch ON.
6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
7. Confirm that the fuel gauge indication varies.
8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
9. Confirm that the fuel gauge indication varies.
10. If NG, go to EC-367, "Diagnostic Procedure" .

Diagnostic Procedure

UBS00B97

1. CHECK COMBINATION METER

Refer to DI-7 .

OK or NG

OK >> GO TO 2.
NG >> GO TO DI-7 .

2. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00B98

FUEL LEVEL SENSOR

Refer to DI-26, "FUEL LEVEL SENSOR UNIT CHECK" .

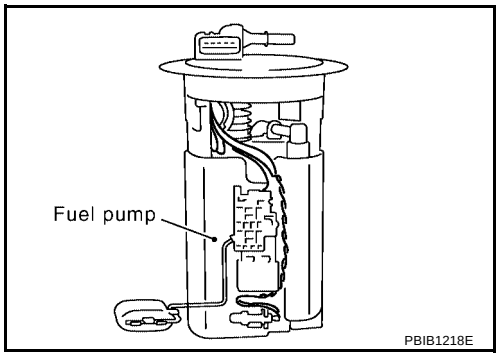
DTC P0462, P0463 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00B99

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter sends the fuel level sensor signal to the ECM through CAN communication.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnostic Logic

UBS00B9A

NOTE:
If DTC P0462 or P0463 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-172, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
This diagnosis indicates the former, to detect open or short circuit malfunction.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462 0462	Fuel level sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The CAN communication line is open or shorted) ● Harness or connectors (The sensor circuit is open or shorted) ● Combination meter ● Fuel level sensor
P0463 0463	Fuel level sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

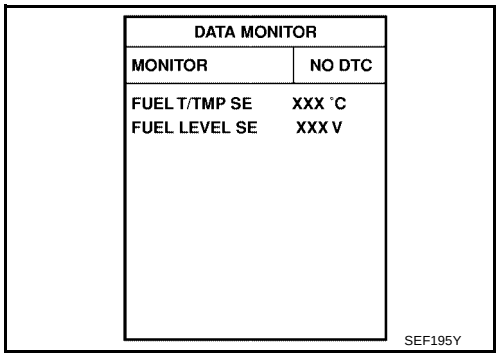
DTC Confirmation Procedure

UBS00B9B

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch ON.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-369, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00B9C

1. CHECK COMBINATION METER

Refer to DI-4

OK or NG

OK >> GO TO 2.
NG >> GO TO DI-7 .

2. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00B9D

FUEL LEVEL SENSOR

Refer toDI-26, "FUEL LEVEL SENSOR UNIT CHECK" .

DTC P0500 VSS

PFP:32702

Component Description

UBS00B9E

NOTE:
If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-172, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the combination meter. The combination meter then sends a signal to the ECM through CAN communication line.

On Board Diagnosis Logic

UBS00B9F

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500 0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	● Harness or connectors (The CAN communication line is open or shorted) ● Harness or connectors (The vehicle speed signal circuit is open or shorted) ● Vehicle speed sensor ● Combination meter

DTC Confirmation Procedure

UBS00B9G

CAUTION:
Always drive vehicle at a safe speed.

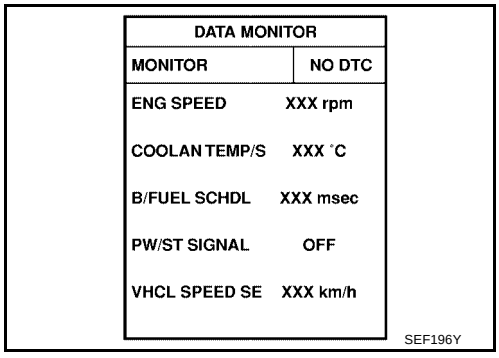
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to EC-371, "Diagnostic Procedure" .
   If OK, go to following step.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Warm engine up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,800 - 6,000 rpm (A/T) 2,200 - 6,000 rpm (M/T)
B/FUEL SCHDL	More then 4.8 msec
Selector lever	Except P or N position
PW/ST SIGNAL	OFF



6. If 1st trip DTC is detected, go to EC-371, "Diagnostic Procedure" .

Overall Function Check

UBS00B9H

Use this procedure to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine.

3. Read vehicle speed sensor signal in Service $01 with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to EC-371, "Diagnostic Procedure" .

Diagnostic Procedure

UBS00B9I

1. CHECK VEHICLE SPEED SENSOR CIRCUIT

Refer to DI-4, "METERS AND GAUGES" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK COMBINATION METER

Refer toDI-7, "Combination Meter" .

>> **INSPECTION END**

DTC P0506 ISC SYSTEM

PFP:23781

Description

UBS00B9J

NOTE:
If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.
The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

On Board Diagnosis Logic

UBS00B9K

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0506 0506	Idle speed control system RPM lower than expected	The idle speed is less than the target idle speed by 100 rpm or more.	● Electric throttle control actuator ● Intake air leak

DTC Confirmation Procedure

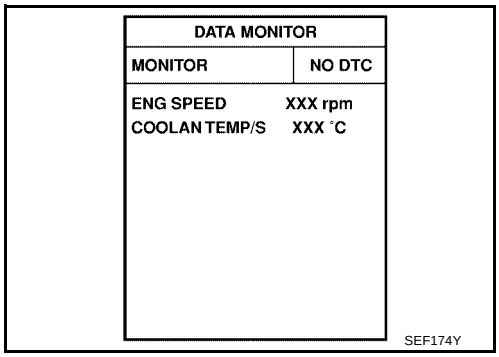
UBS00B9L

NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- **If the target idle speed is out of the specified value, perform Idle Air Volume Learning, EC-92 , before conducting DTC Confirmation Procedure. For the target idle speed, refer to EC-655, "SERVICE DATA AND SPECIFICATIONS (SDS)" .**

TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**

WITH CONSULT-II

1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
5. Start engine and run it for at least 1 minute at idle speed.
6. If 1st trip DTC is detected, go to EC-373 .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00B9M

1. CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 2.
NG >> Discover air leak location and repair.

2. REPLACE ECM

1. Stop engine.
2. Replace ECM.
3. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97 .
4. Perform EC-91, "VIN Registration" .
5. Perform EC-92, "Accelerator Pedal Released Position Learning" .
6. Perform EC-92, "Throttle Valve Closed Position Learning" .
7. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P0507 ISC SYSTEM

PFP:23781

Description

UBS00B9N

NOTE:
If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC.
The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

On Board Diagnosis Logic

UBS00B9O

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507 0507	Idle speed control system RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	● Electric throttle control actuator ● Intake air leak ● PCV system

DTC Confirmation Procedure

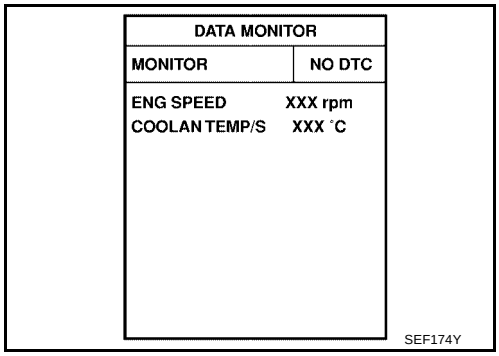
UBS00B9P

NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- **If the target idle speed is out of the specified value, perform “Idle Air Volume Learning”, EC-92 , before conducting DTC Confirmation Procedure. For the target idle speed, refer to EC-655, "SERVICE DATA AND SPECIFICATIONS (SDS)" .**

TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**

WITH CONSULT-II

1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
5. Start engine and run it for at least 1 minute at idle speed.
6. If 1st trip DTC is detected, go to EC-375, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00B9Q

1. CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 3.
NG >> Discover air leak location and repair.

3. REPLACE ECM

1. Stop engine.
2. Replace ECM.
3. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97 .
4. Perform EC-91, "VIN Registration" .
5. Perform EC-92, "Accelerator Pedal Released Position Learning" .
6. Perform EC-92, "Throttle Valve Closed Position Learning" .
7. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

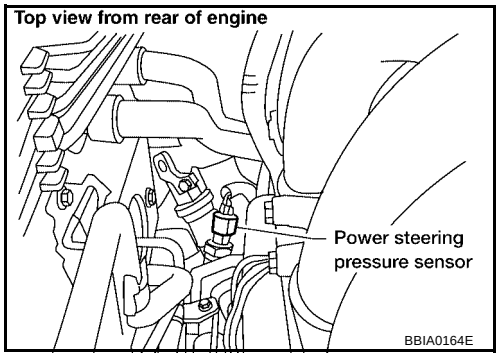
DTC P0550 PSP SENSOR

PFP:49763

Component Description

UBS00B9R

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

UBS00B9S

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is in neutral position. (Forward direction)	OFF
		Steering wheel is being turned.	ON

On Board Diagnosis Logic

UBS00B9T

The MIL will not light up for this diagnosis.

NOTE:
If DTC P0550 is displayed with DTC1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-473 .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550 0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Power steering pressure sensor

DTC Confirmation Procedure

UBS00B9U

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-378, "Diagnostic Procedure" .

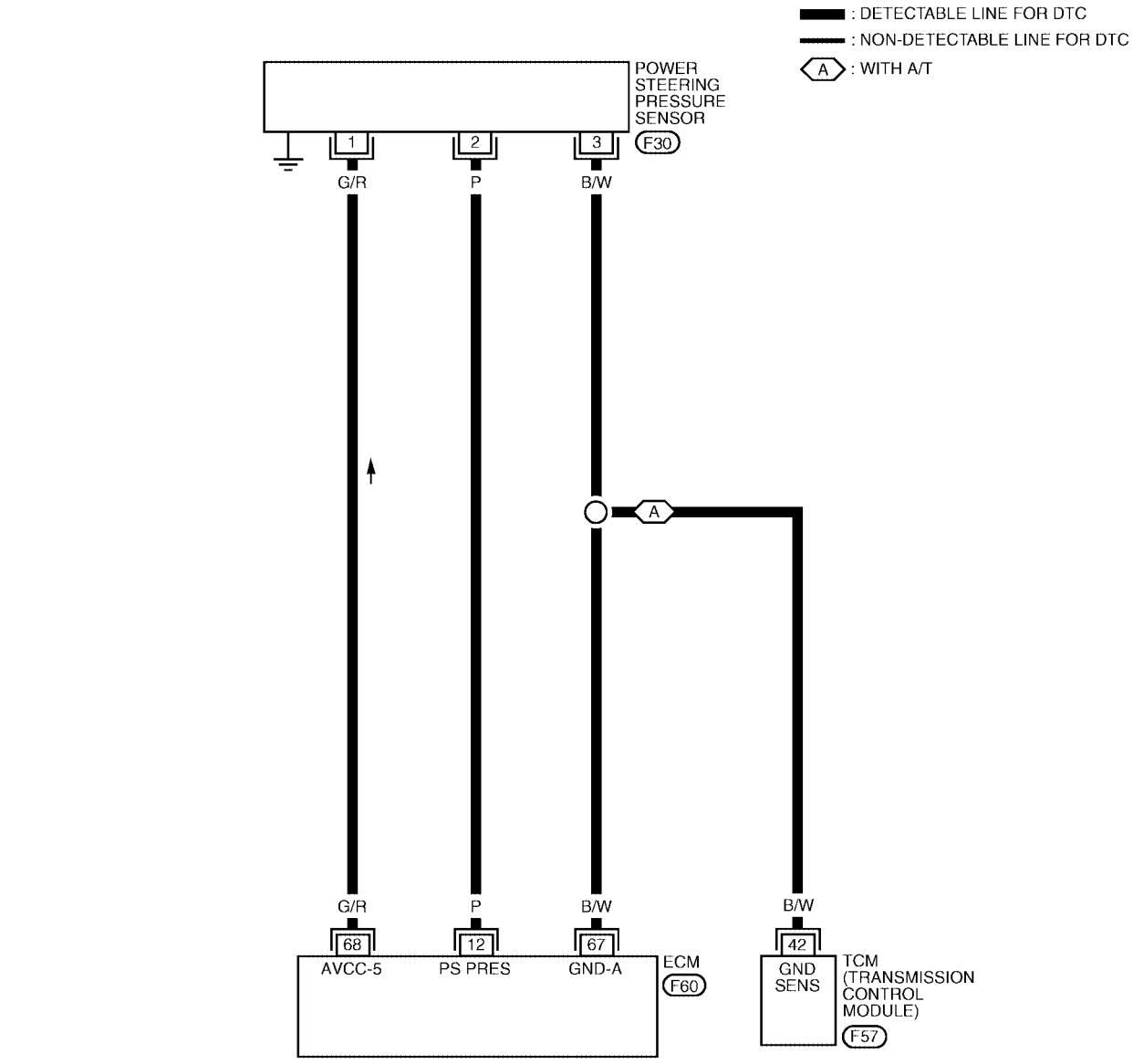
WITH GST

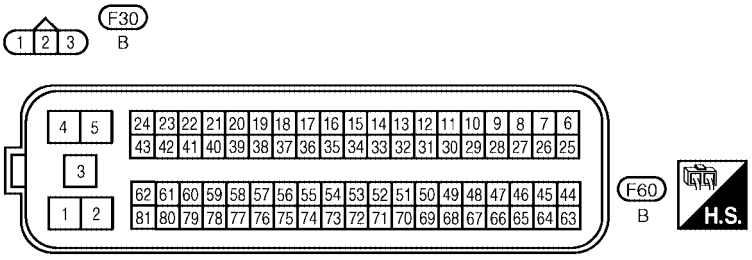
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00B9V

EC-PS/SEN-01





REFER TO THE FOLLOWING.
F57 - ELECTRICAL UNITS

BBWA1434E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

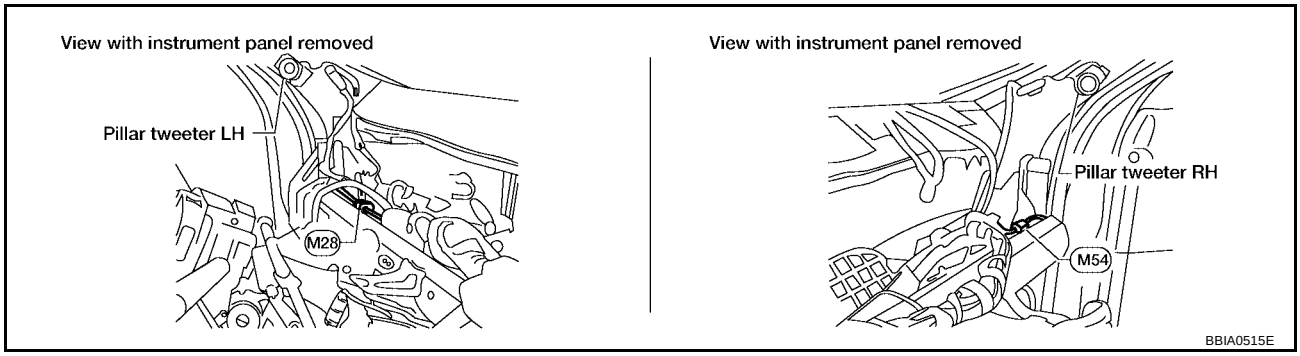
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	P	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned.	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned.	0.4 - 0.8V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	G/R	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

UBS00B9W

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .

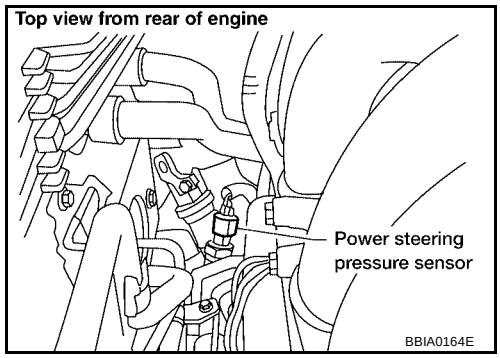


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

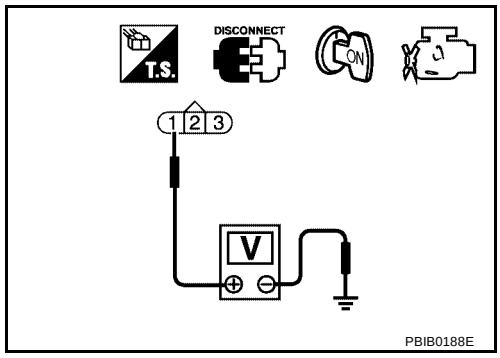
2. CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect PSP sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between PSP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector.
4. Check harness continuity between PSP sensor terminal 3 and ECM terminal 67, TCM terminal 42.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between power steering pressure sensor and ECM
- Harness for open or short between power steering pressure sensor and TCM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 12 and PSP sensor terminal 2.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK PSP SENSOR

Refer to EC-380, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace PSP sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

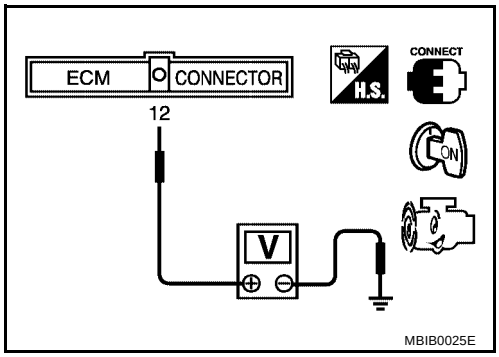
Component Inspection

UBS00B9X

POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.
3. Check voltage between ECM terminal 12 and ground under the following conditions.

Condition	Voltage
Steering wheel is being turned fully.	0.5 - 4.0V
Steering wheel is not being turned.	0.4 - 0.8V



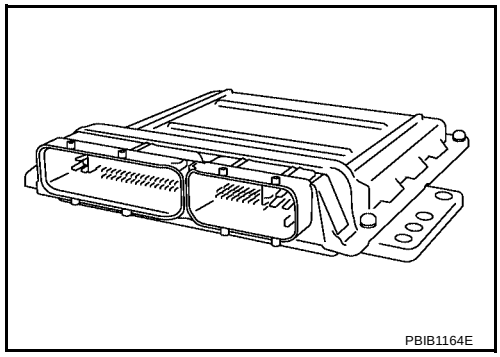
DTC P0605 ECM

PFP:23710

Component Description

UBS00B9Y

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


PBIB1164E

On Board Diagnosis Logic

UBS00B9Z

This self-diagnosis has one or two trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 0605	Engine control module	A)	ECM calculation function is malfunctioning.	● ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

FAIL-SAFE MODE

ECM enters in fail-safe mode when the malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode
Malfunction A	● ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ● ECM deactivates ASCD operation.

DTC Confirmation Procedure

UBS00BA0

Perform PROCEDURE FOR MALFUNCTION A first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. If there is no problem on PROCEDURE FOR MALFUNCTION B, perform PROCEDURE FOR MALFUNCTION C.

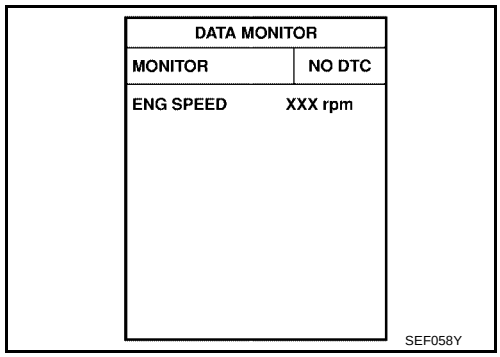
NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-382, "Diagnostic Procedure"
.



SEF058Y

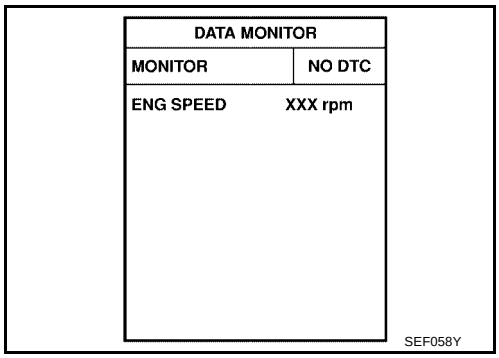
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. If 1st trip DTC is detected, go to EC-382, "Diagnostic Procedure" .



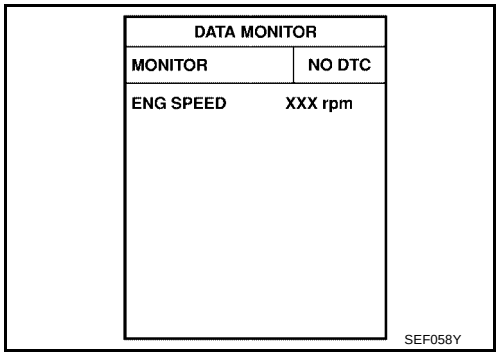
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. Repeat step 3 for 32 times.
5. If 1st trip DTC is detected, go to EC-382, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

UBS00BA1

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-381 .
5. Is the 1st trip DTC P0605 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-381 .
5. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Stop engine.
2. Replace ECM.
3. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97 .
4. Perform EC-91, "VIN Registration" .
5. Perform EC-92, "Accelerator Pedal Released Position Learning" .
6. Perform EC-92, "Throttle Valve Closed Position Learning" .
7. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1031, P1032 A/F SENSOR 1 HEATER

PFP:22693

Description

UBS00BA2

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element at the specified range.

CONSULT-II Reference Value in Data Monitor Mode

UBS00BA3

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F S1 HTR (B1)	● Engine: After warming up, idle the engine	0 - 100%

On Board Diagnosis Logic

UBS00BA4

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1031 1031 (Bank 1)	Air fuel ratio (A/F) sensor 1 heater control circuit low	The current amperage in the heated air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated air fuel ratio (A/F) sensor 1 heater.)	● Harness or connectors (The heated A/F sensor 1 heater circuit is open or shorted.) ● A/F sensor 1 heater
P1032 1032 (Bank 1)	Air fuel ratio (A/F) sensor 1 heater control circuit high	The current amperage in the heated air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated air fuel ratio (A/F) sensor 1 heater.)	● Harness or connectors (The heated A/F sensor 1 heater circuit is shorted.) ● A/F sensor 1 heater

DTC Confirmation Procedure

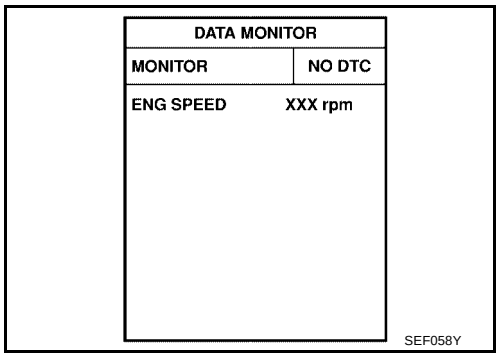
UBS00BA5

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and run it for at least 10 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-386, "Diagnostic Procedure" .

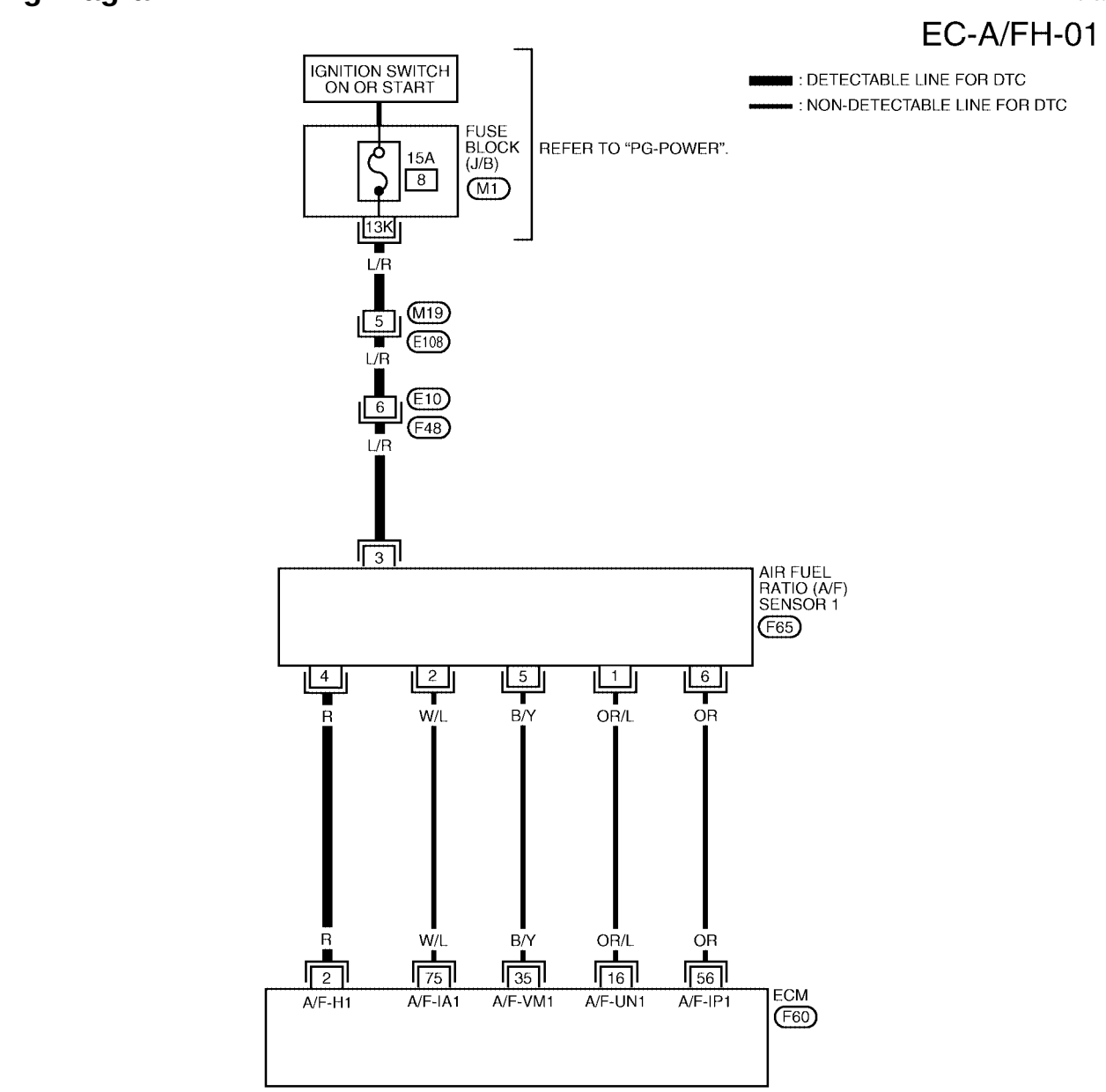


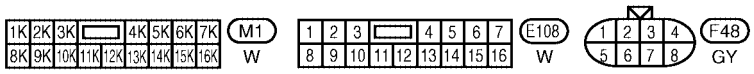
WITH GST

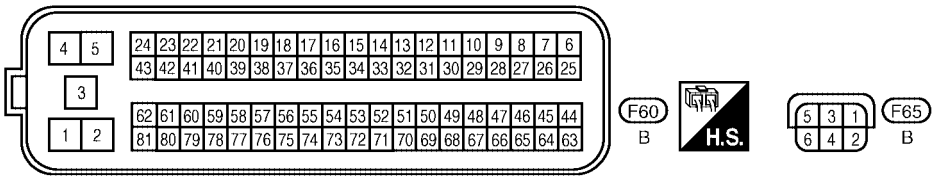
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00BA6





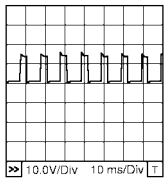


BBWA1435E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	R	A/F sensor 1 heater	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E

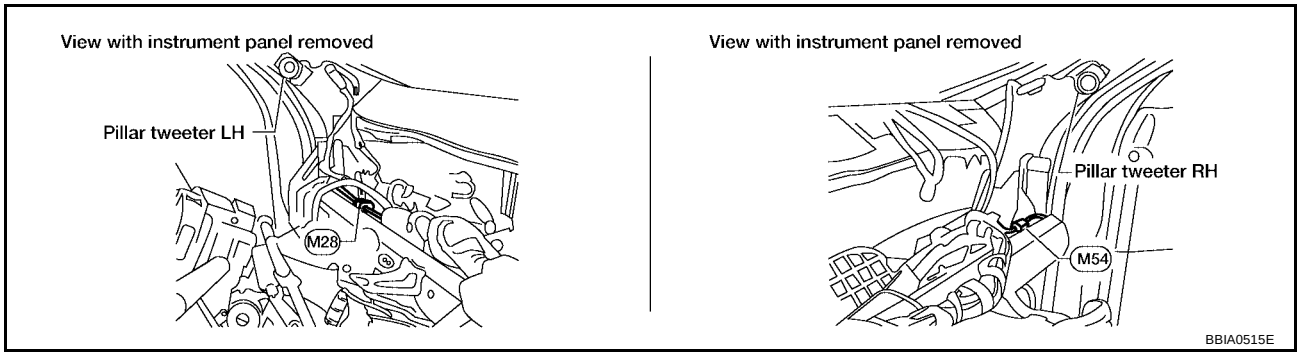
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00BA7

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .

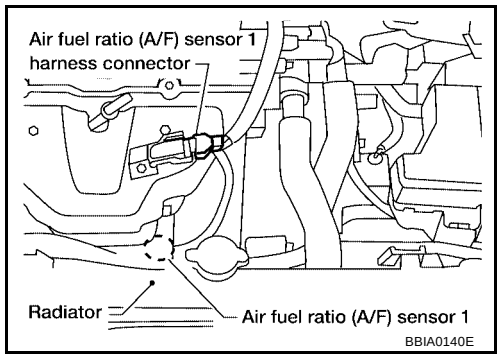


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

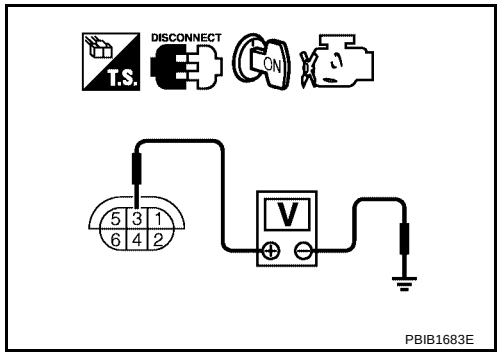
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.
2. Turn ignition switch ON.



3. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E10, F48
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 2 and A/F sensor 1 terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK A/F SENSOR 1 HEATER

Refer to EC-388, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace A/F sensor 1.

6. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Component Inspection

UBS00BA8

AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Check resistance between terminals 3 and 4.

Resistance: 2.3 - 4.3Ω at 25°C (77°F)

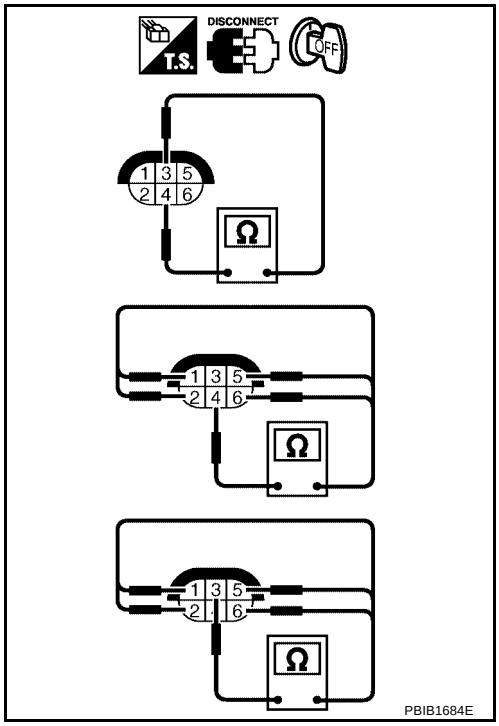
Check continuity between terminals 3 and 1, 2, 5, 6, terminals 4 and 1, 2, 5, 6.

Continuity should not exist.

If NG, replace the A/F sensor 1.

CAUTION:

- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Removal and Installation

UBS00BA9

AIR FUEL RATIO SENSOR HEATER

Refer to EM-15, "Removal and Installation" .

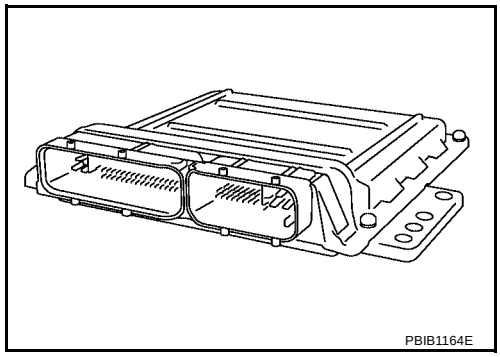
DTC P1065 ECM POWER SUPPLY

PFP:23710

Component Description

UBS00BAA

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the idle air volume learning value memory, etc.


PBIB1164E

On Board Diagnosis Logic

UBS00BAB

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065 1065	ECM power supply circuit	ECM back-up RAM system does not function properly.	● Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] ● ECM

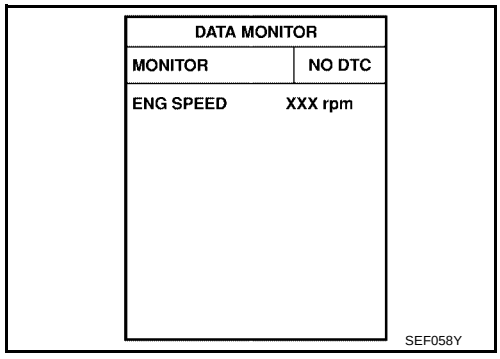
DTC Confirmation Procedure

UBS00BAC

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
5. Repeat steps 3 and 4 four times.
6. If 1st trip DTC is detected, go to EC-391, "Diagnostic Procedure".



SEF058Y

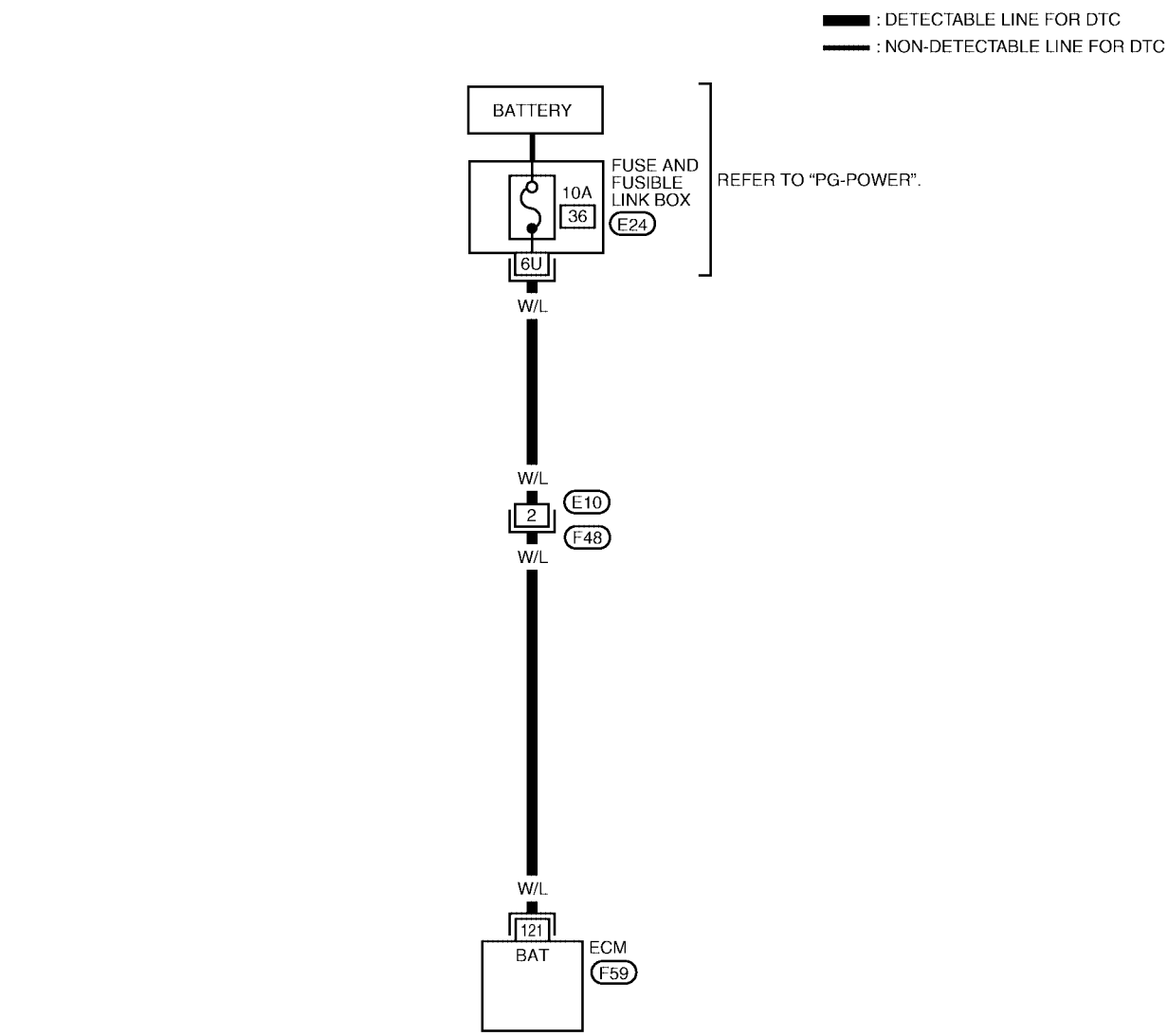
WITH GST

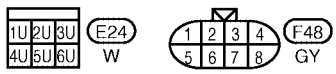
Follow the procedure “WITH CONSULT-II” above.

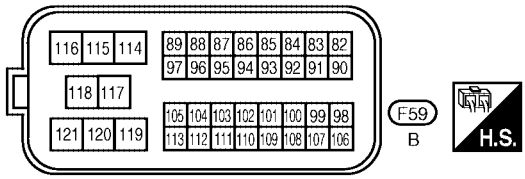
Wiring Diagram

UBS00BAD

EC-ECM/PW-01







BBWA1437E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	W/L	Power supply for ECM (Buck-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

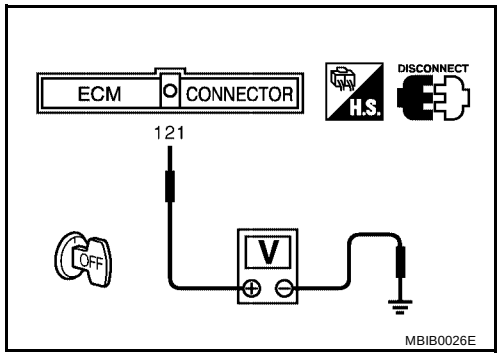
Diagnostic Procedure

UBS00BAE

1. CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- 10A fuse
- Harness for open or short between ECM and battery

>> Repair or replace harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit short to ground or short to power in harness or connectors.

4. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-389 .
5. Is the 1st trip DTC P1065 displayed again?

With GST

1. Turn ignition switch ON.
2. Select “Service $04” with GST.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-389 .
5. Is the 1st trip DTC P1065 displayed again?

Yes or No

Yes >> GO TO 5.
No >> **INSPECTION END**

5. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97 .
3. Perform EC-91, "VIN Registration" .
4. Perform EC-92, "Accelerator Pedal Released Position Learning" .
5. Perform EC-92, "Throttle Valve Closed Position Learning" .
6. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1111 IVT CONTROL SOLENOID VALVE

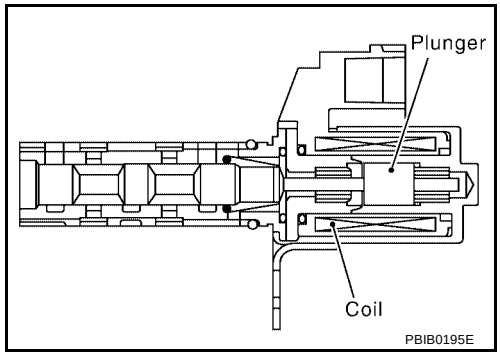
PFP:23796

Description

UBS00BAM

COMPONENT DESCRIPTION

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



CONSULT-II Reference Value in Data Monitor Mode

UBS00BAN

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		When revving engine up to 2,000 rpm quickly	Approx. 0% - 80%

On Board Diagnosis Logic

UBS00BAO

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111 1111	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	● Harness or connectors (Solenoid valve circuit is open or shorted.) ● Intake valve timing control solenoid valve

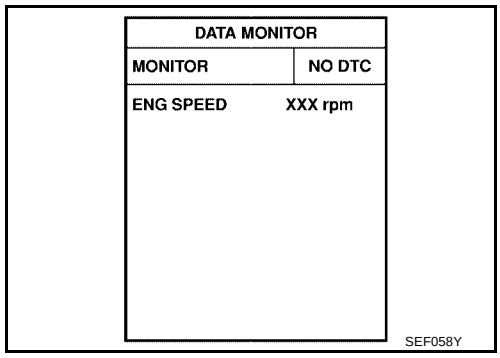
DTC Confirmation Procedure

UBS00BAP

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If 1st trip DTC is detected, go to EC-395, "Diagnostic Procedure" .



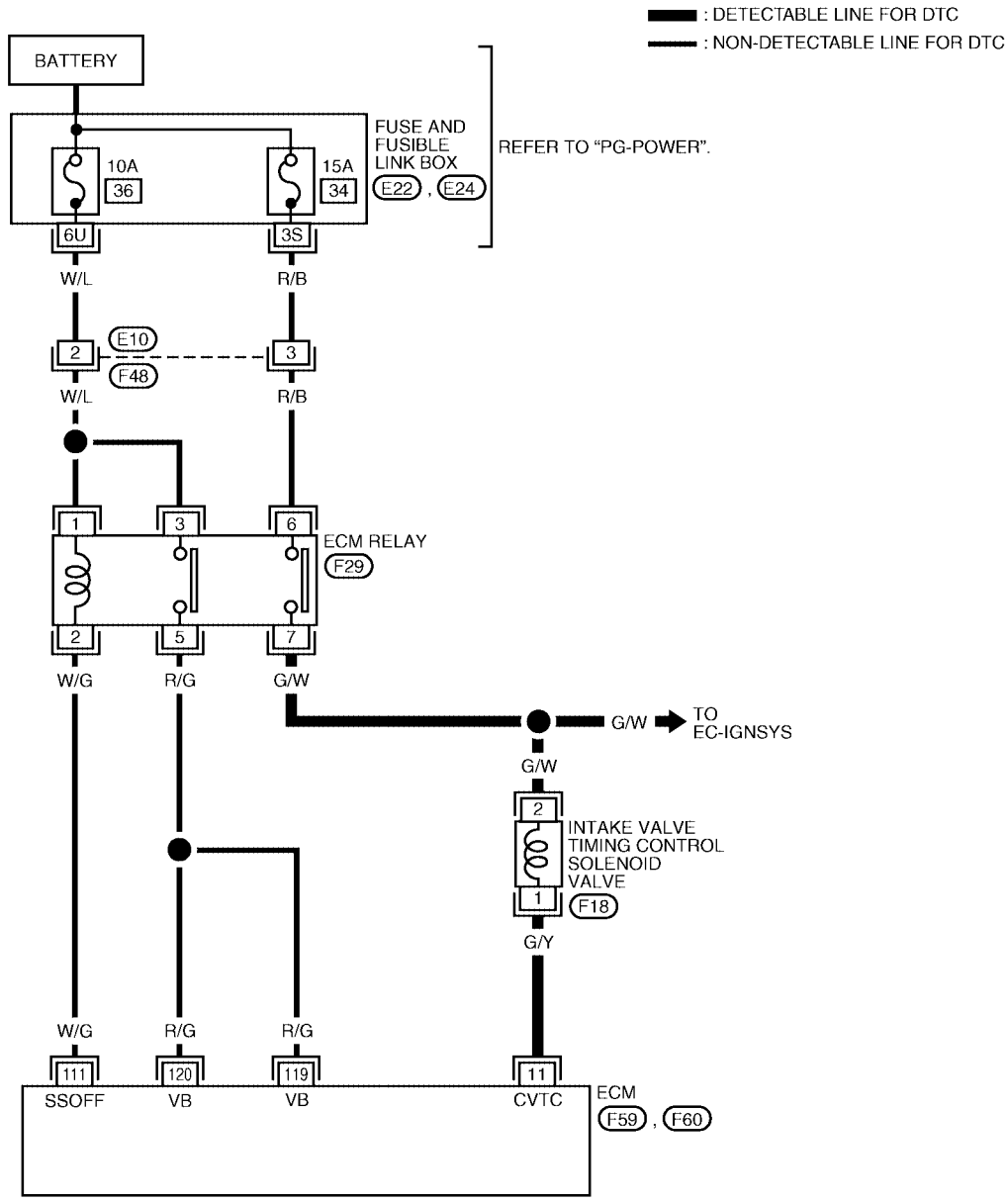
WITH GST

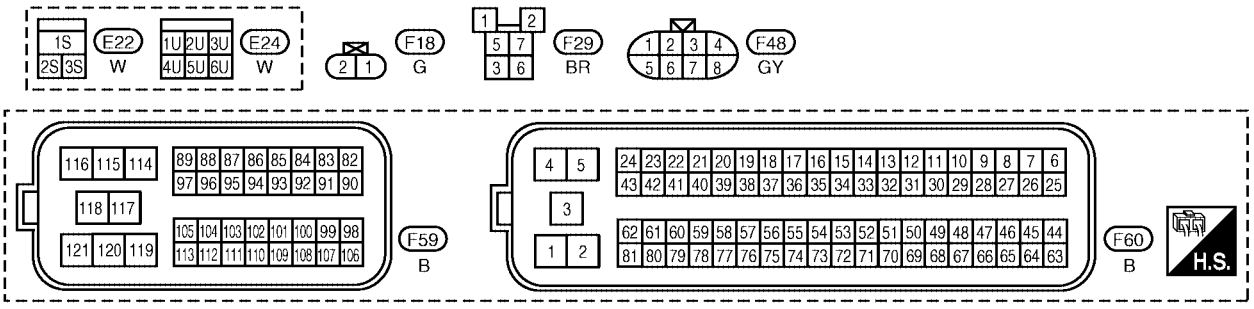
Following the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00BAQ

EC-IVC-01

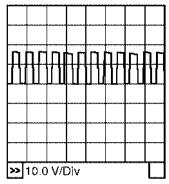




BBWA1436E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	G/Y	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● When revving engine up to 2,500 rpm quickly	7 - 10V★  PBIB1790E

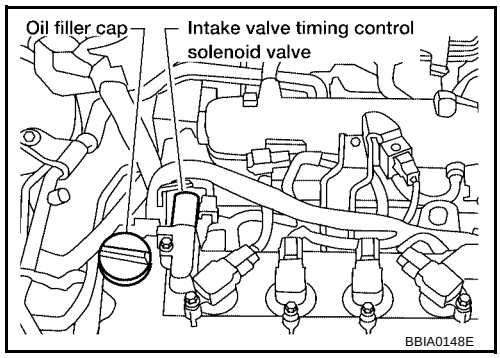
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00BAR

1. CHECK IVT CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Turn ignition switch ON.



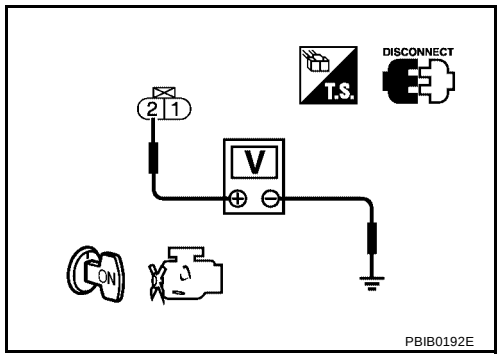
BBIA0148E

4. Check voltage between intake valve timing control solenoid valve terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



PBIB0192E

2. CHECK IVT CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 11 and intake valve timing control solenoid valve terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-396, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace intake valve timing control solenoid valve.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

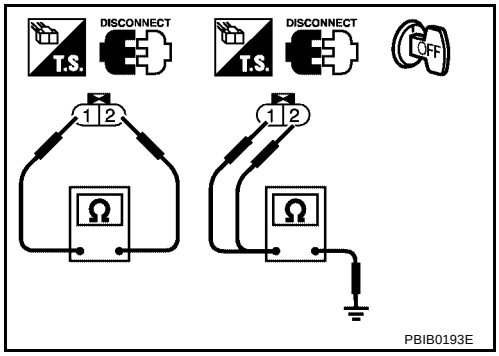
Component Inspection

UBS00BAS

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.

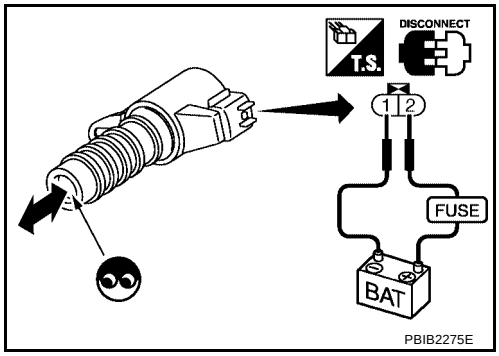
Terminal	Resistance
1 and 2	Approximately 8Ω at 20°C (68°F)
1 or 2 and ground	(Continuity should not exist.)



PBIB0193E

If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.

3. Remove intake valve timing control solenoid valve.
4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. Make sure that the plunger moves as shown in the figure.



PBIB2275E

CAUTION:
Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
If NG, replace intake valve timing control solenoid valve.

NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.

Removal and Installation

UBS00BAT

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-42, "TIMING CHAIN" .

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

PFP:16119

Component Description

UBS00BAU

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

UBS00BAV

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121 1121	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	● Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detects the throttle valve is stuck open.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	The ECM controls the electric throttle control actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position, and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

UBS00BAW

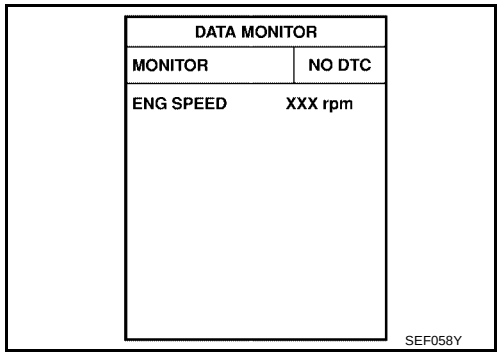
NOTE:

- **Perform PROCEDURE FOR MALFUNCTION A AND B first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION C.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A AND B

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to D position (A/T), 1st position (M/T) and wait at least 3 seconds.
4. Shift selector lever to P or N position (A/T models), Neutral position (M/T models).
5. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
6. Turn ignition switch ON and wait at least 1 second.
7. Shift selector lever to D position (A/T), 1st position (M/T), and wait at least 3 seconds.
8. Shift selector lever to P or N position (A/T models), Neutral position (M/T models).
9. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
10. If 1st trip DTC is detected, go to EC-398, "Diagnostic Procedure" .



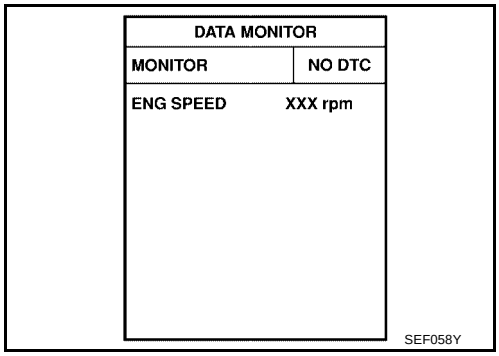
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to D position (A/T), 1st position (M/T) and wait at least 2 seconds.
4. Shift selector lever to N or P position.
5. Start engine and let it idle for 3 seconds.
6. If DTC is detected, go to EC-398, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

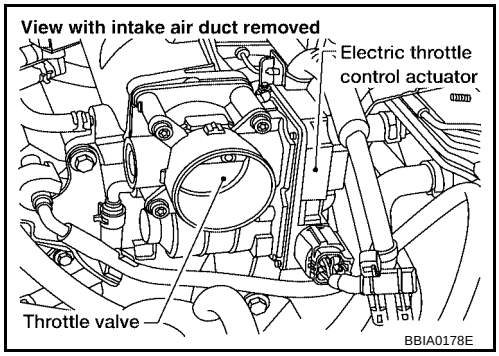
UBS00BAX

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-92, "Throttle Valve Closed Position Learning" .
3. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

PFP:16119

Description

UBS00BAY

NOTE:
If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-397 or EC-406 .
Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

UBS00BAZ

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122 1122	Electric throttle control performance problem	Electric throttle control function does not operate properly.	● Harness or connectors (Throttle control motor circuit is open or shorted) ● Electric throttle control actuator

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

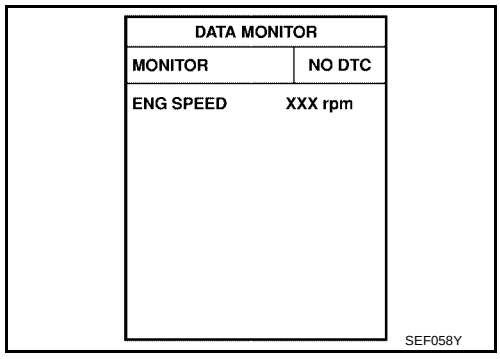
DTC Confirmation Procedure

UBS00BB0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-401, "Diagnostic Procedure" .

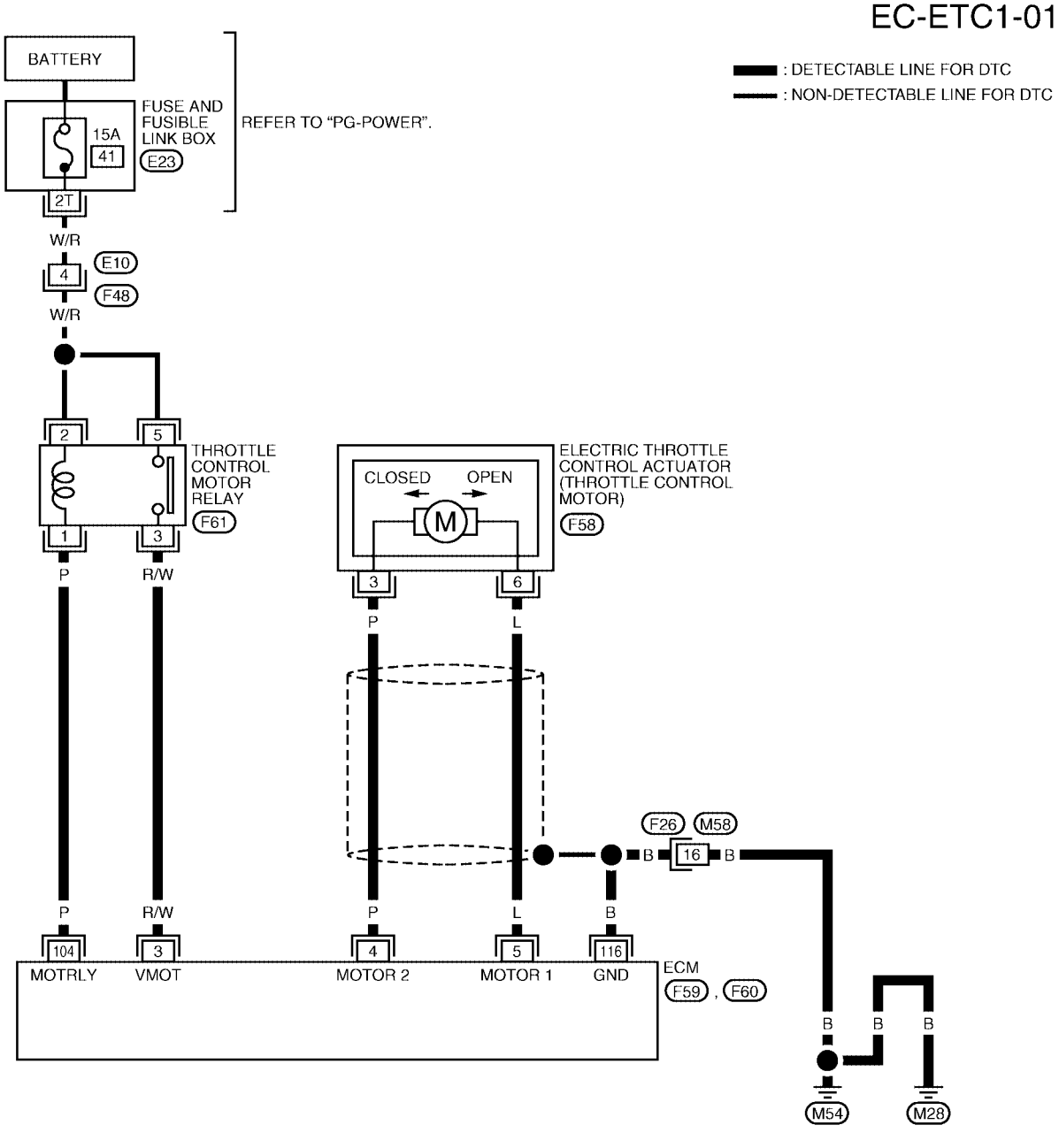


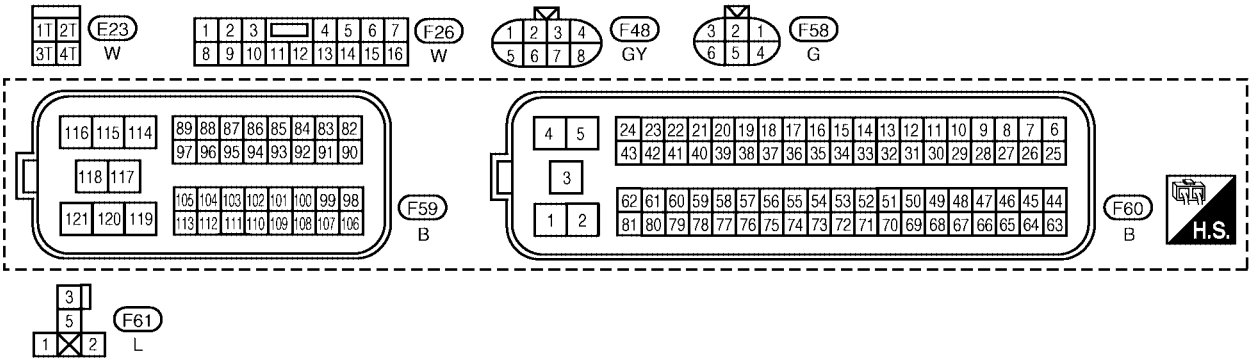
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00BB1

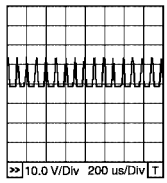
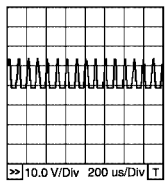




BBWA1438E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	R/W	Throttle control motor power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	P	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB0534E
5	L	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB0533E
104	P	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
116	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground

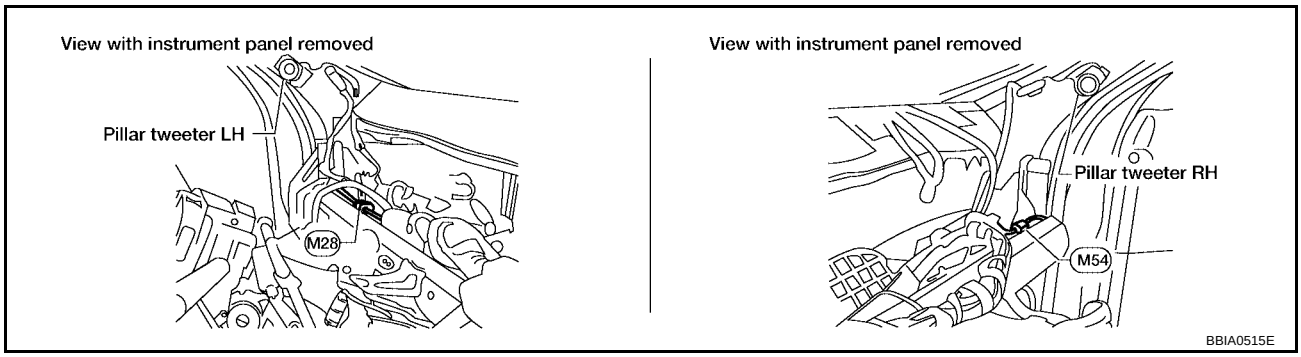
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00BB2

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.
   Refer to EC-170, "Ground Inspection" .



BBIA0515E

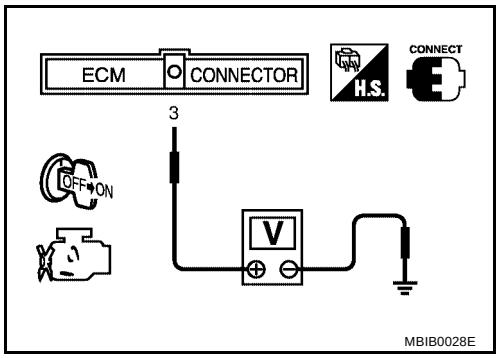
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE CONTROL MOTOR RELAY SIGNAL CIRCUIT

Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

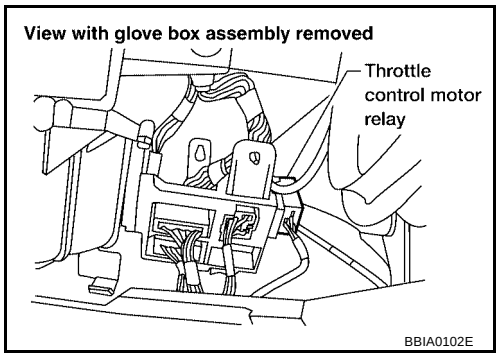


OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

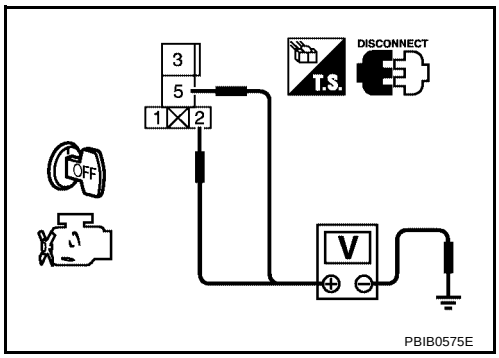
3. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect throttle control motor relay.



3. Check voltage between throttle control motor relay terminals 2, 5 and ground.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- 15A fuse
- Harness for open or short between throttle control motor relay and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 3 and throttle control motor relay terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 104 and throttle control motor relay terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK THROTTLE CONTROL MOTOR RELAY

Refer to EC-404, "Component Inspection" .

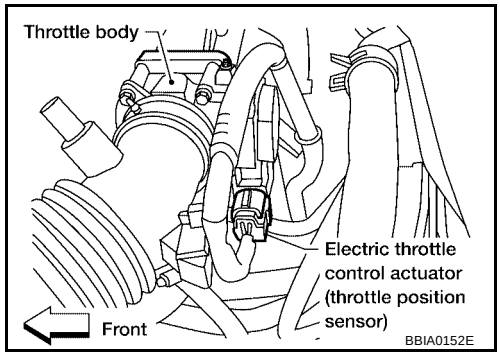
OK or NG

OK >> GO TO 11.
NG >> Replace throttle control motor relay.

8. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

Electric throttle control actuator terminal	ECM terminal	Continuity
3	4	Should exist
	5	Should not exist
6	4	Should not exist
	5	Should exist



5. Also check harness for short to ground and short to power.

OK or NG

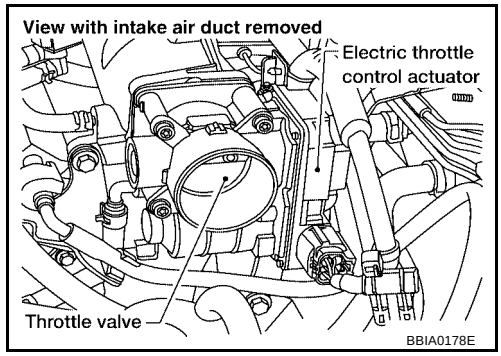
OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 10.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



10. CHECK THROTTLE CONTROL MOTOR

Refer to EC-404, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 12.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 12.
NG >> Repair or replace harness or connectors.

12. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-92, "Throttle Valve Closed Position Learning" .
3. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

Component Inspection

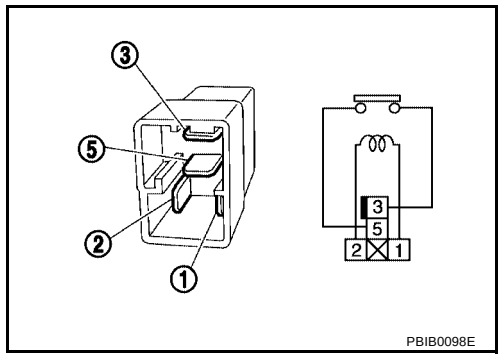
UBS00BB3

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.



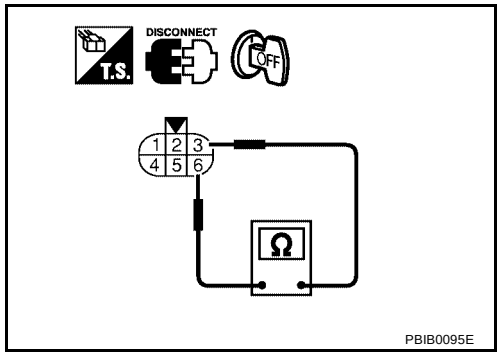
THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.

2. Check resistance between terminals 3 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-92, "Throttle Valve Closed Position Learning" .
5. PerformEC-92, "Idle Air Volume Learning" .



UBS00BB4

Removal and Installation

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

PFP:16119

Component Description

UBS00BB5

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

CONSULT-II Reference Value in Data Monitor Mode

UBS00BB6

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	● Ignition switch: ON	ON

On Board Diagnosis Logic

UBS00BB7

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124 1124	Throttle control motor relay circuit short	ECM detects the throttle control motor relay is stuck ON.	● Harness or connectors (Throttle control motor relay circuit is shorted) ● Throttle control motor relay
P1126 1126	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	● Harness or connectors (Throttle control motor relay circuit is open) ● Throttle control motor relay

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

UBS00BB8

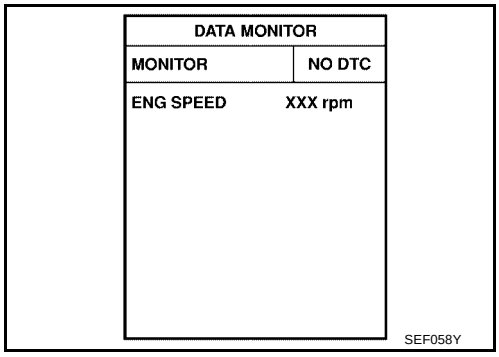
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P1124

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V.

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-409, "Diagnostic Procedure" .



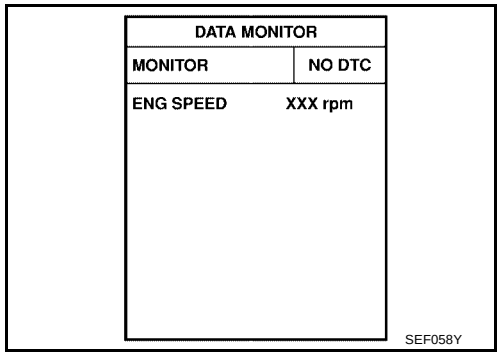
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR DTC P1126

With CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-409, "Diagnostic Procedure" .

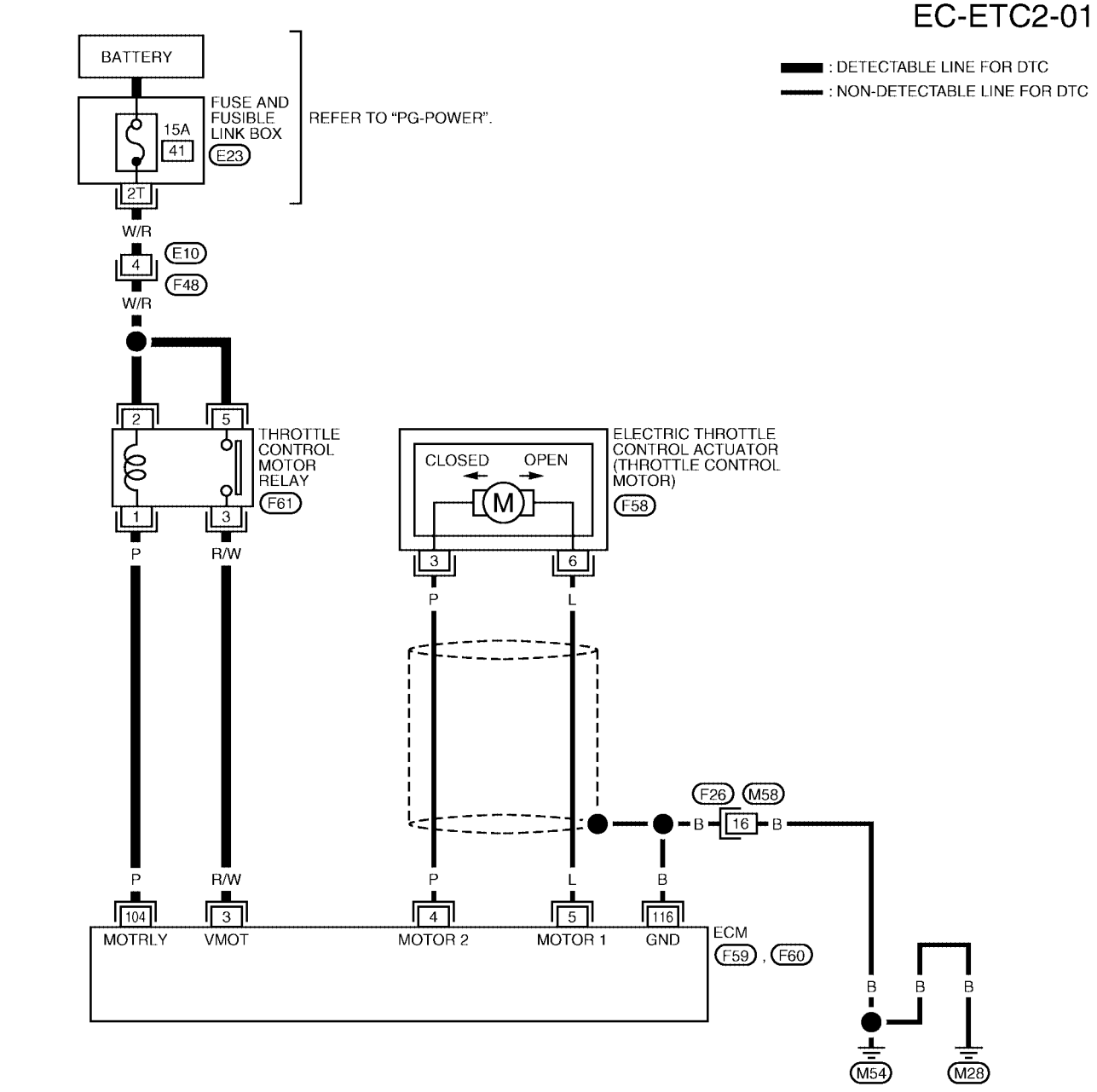


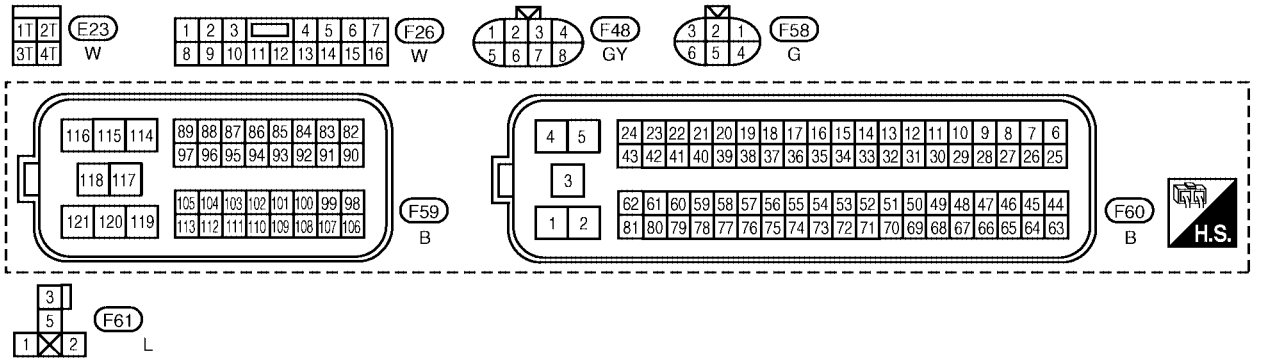
With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00BB9





BBWA1439E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

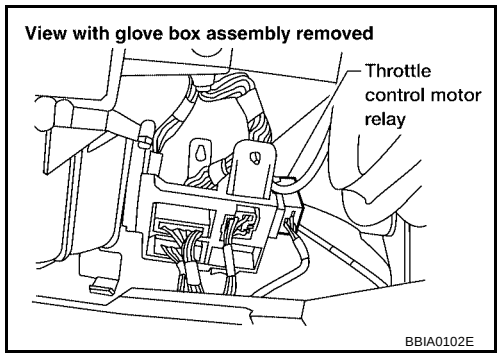
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	R/W	Throttle control motor power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
104	P	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

Diagnostic Procedure

UBS00BBA

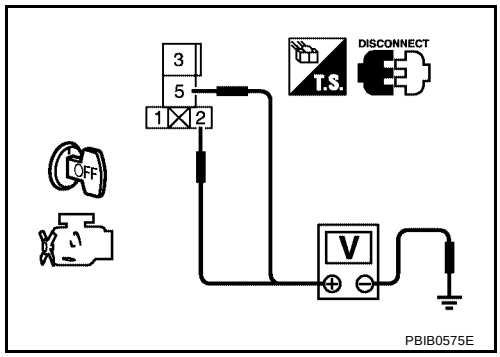
1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect throttle control motor relay harness connector.



3. Check voltage between throttle control motor relay terminal 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Fuse and fusible link connector E23
- 15A fuse
- Harness for open or short between throttle control motor relay and battery

>> Repair or replace harness or connectors.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check continuity between ECM terminal 3 and throttle control motor relay terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check continuity between ECM terminal 104 and throttle control motor relay terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE CONTROL MOTOR RELAY

Refer to EC-410, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace throttle control motor relay.

6. CHECK INTERMITTENT INCIDENT

Refer toEC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

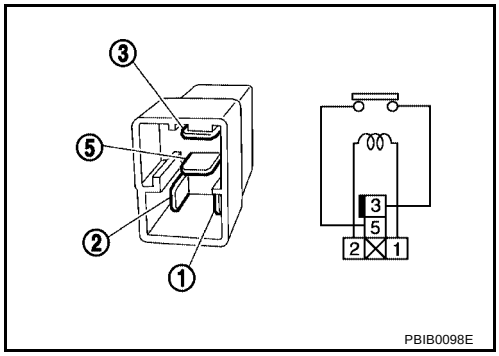
UBS00BBB

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.



DTC P1128 THROTTLE CONTROL MOTOR

PFP:16119

Component Description

UBS00BBC

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

UBS00BBD

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128 1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	● Harness or connectors (Throttle control motor circuit is shorted.) ● Electric throttle control actuator (Throttle control motor)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

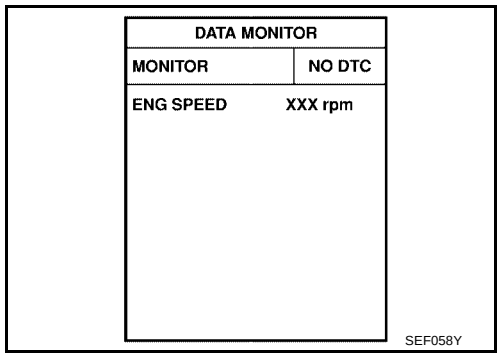
DTC Confirmation Procedure

UBS00BBE

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-413, "Diagnostic Procedure" .



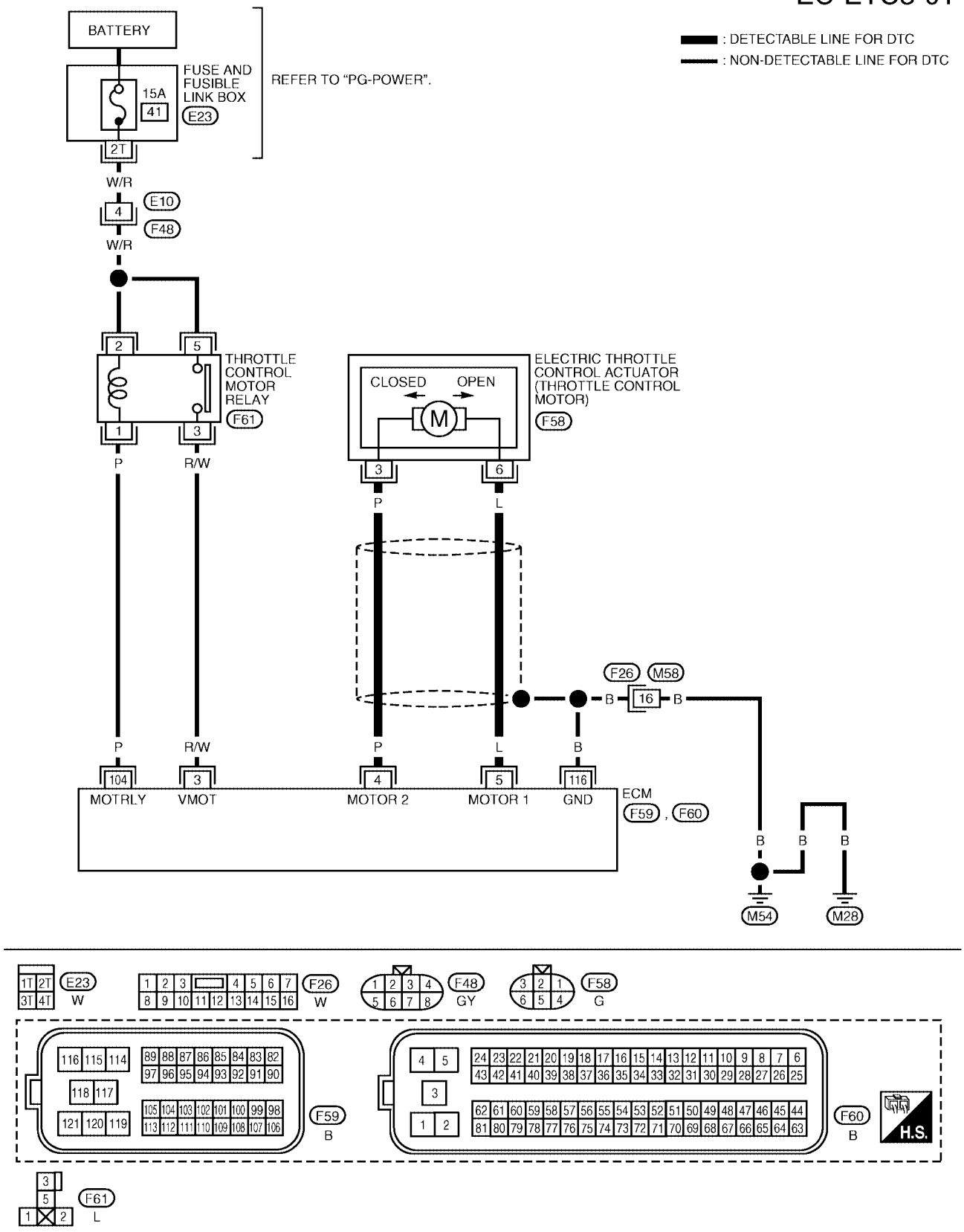
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00BBF

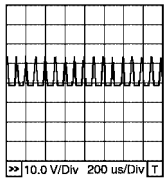
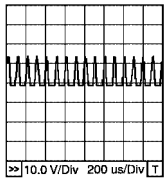
EC-ETC3-01



BBWA1440E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	P	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal is releasing	0 - 14V★  PBIB0534E
5	L	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal is depressing	0 - 14V★  PBIB0533E

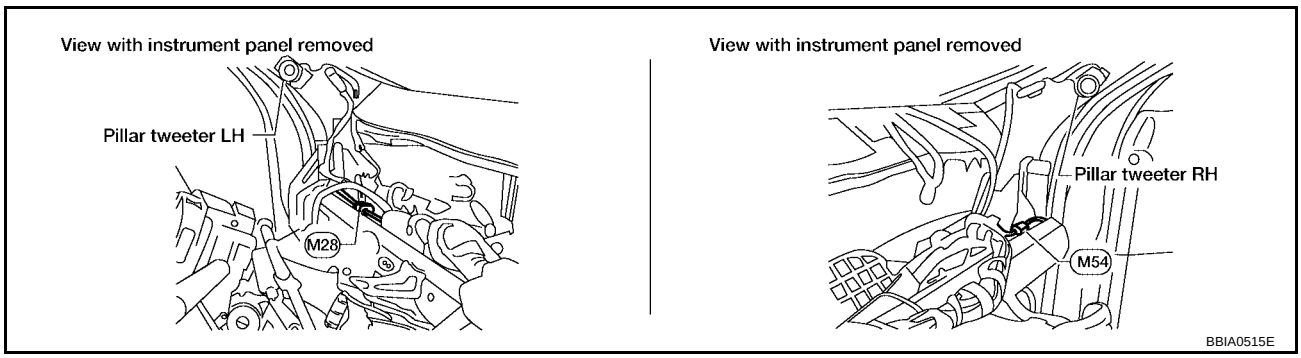
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00BBG

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.
   Refer to EC-170, "Ground Inspection" .



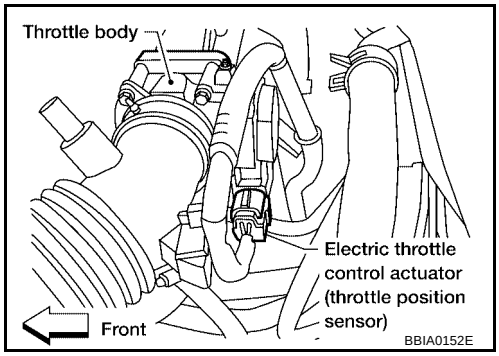
BBIA0515E

OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
3	4	Should exist
	5	Should not exist
6	4	Should not exist
	5	Should exist

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK THROTTLE CONTROL MOTOR

Refer to EC-414, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-92, "Throttle Valve Closed Position Learning" .
3. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

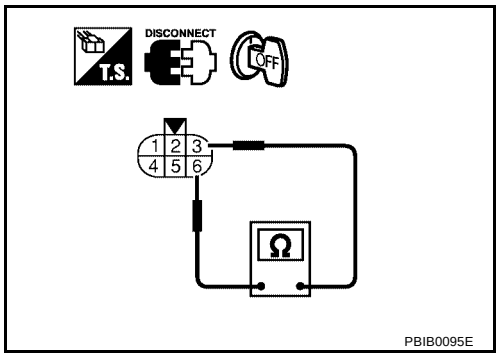
Component Inspection

UBS00BBH

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]



3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-92, "Throttle Valve Closed Position Learning" .
5. Perform EC-92, "Idle Air Volume Learning" .

Removal and Installation

UBS00BBI

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

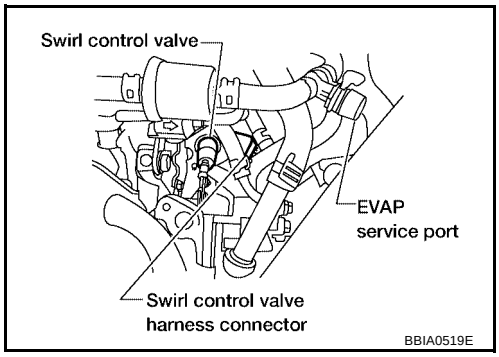
DTC P1132 SWIRL CONTROL VALVE

PFP:00000

Component Description

UBS00BBJ

Swirl control valve consists of actuator and valve. The valve is installed in the intake manifold, and the actuator is connected to the rear end of the valve shaft.
The swirl control valve uses a step motor which has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes. When no change in the control position is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.



CONSULT-II Reference Value in Data Monitor Mode

UBS00BBK

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
SWL C/V (B1)	● Engine: Idle the engine	Engine coolant temperature is below 44°C (111°F)	0 - 5 step
		Engine coolant temperature is above 45°C (113°F)	115 - 120 step
SWL/C POSI SE	● Engine: Idle the engine	Engine coolant temperature is below 44°C (111°F)	Approx. 0 deg.
		Engine coolant temperature is above 45°C (113°F)	Approx. 80 deg.

On Board Diagnosis Logic

UBS00BBL

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1132 1132	Swirl control valve circuit	An improper voltage signal is sent to ECM.	● Harness or connectors (The swirl control valve circuit is open or shorted.) ● Swirl control valve control solenoid valve

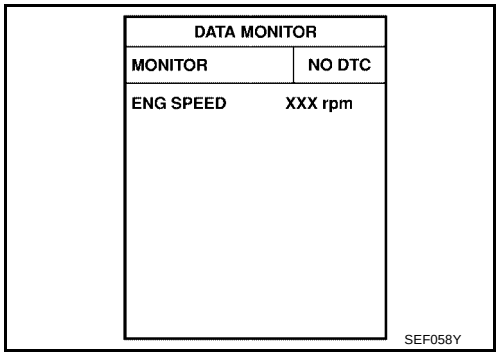
DTC Confirmation Procedure

UBS00BBM

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 10 seconds.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 2 seconds.
6. Start engine and let it idle for at least 10 seconds.
7. Maintain engine speed at about 2,000 rpm for at least 10 seconds.
8. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
   If 1st trip DTC is detected, go to EC-419, "Diagnostic Procedure".
   If 1st trip DTC is not detected, go to next step.
9. Perform step 5 through 8 three times.



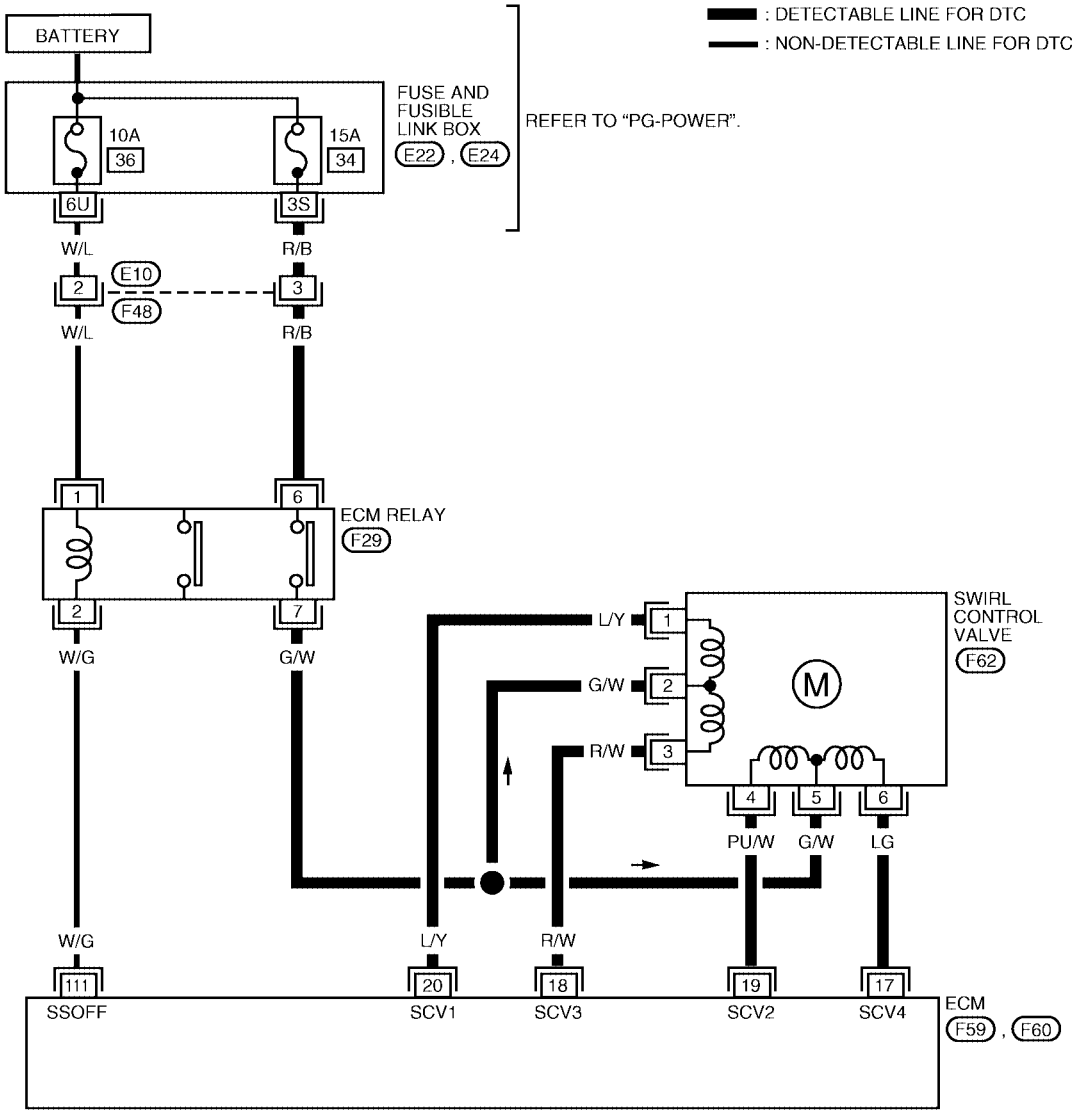
WITH GST

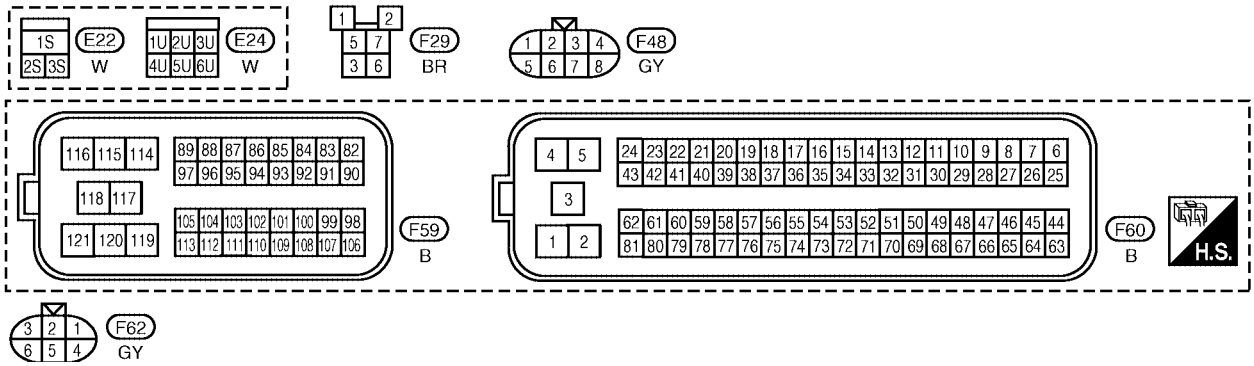
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00BBN

EC-SWL/V-01





BBWA1441E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

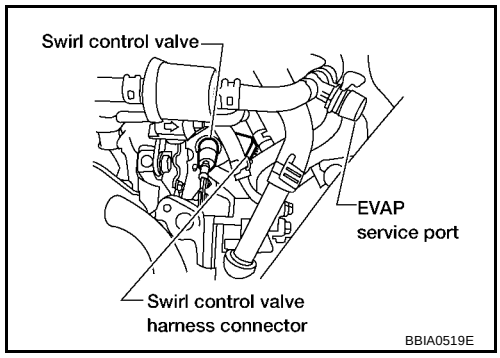
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17 18 19 20	LG R/W PU/W L/Y	Swirl control valve	**[Engine is running]** ● Idle speed	0.1 - 14V

Diagnostic Procedure

UBS00BBO

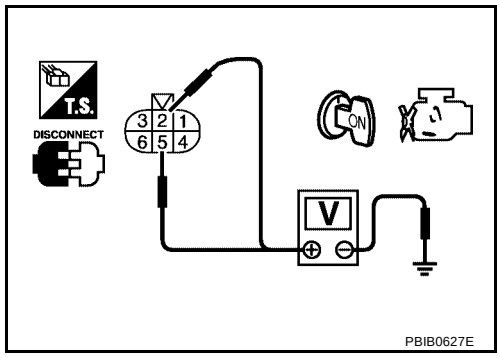
1. CHECK SWIRL CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect swirl control valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between swirl control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between swirl control valve and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK SWIRL CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and swirl control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	Swirl volume control valve
17	6
18	3
19	4
20	1

Continuity should exist.

4. Also check harness for short to ground and short to power.

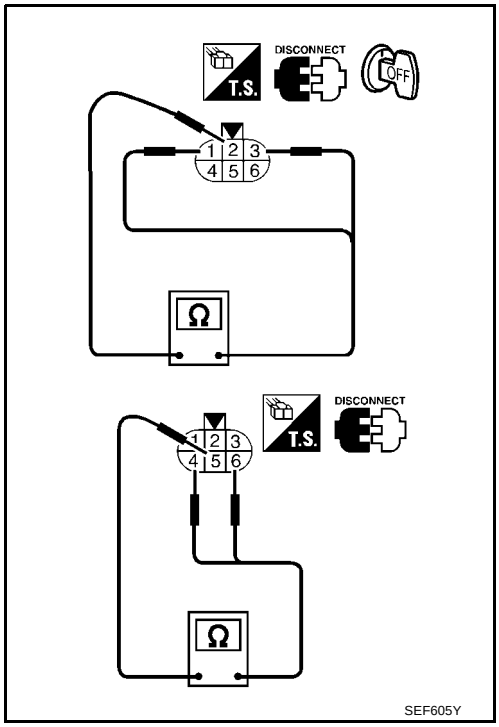
OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK SWIRL CONTROL VALVE

Check resistance between swirl control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.

Resistance: 20.5 - 23.5Ω [At 20°C (68°F)]



OK or NG

OK >> GO TO 5.
NG >> Replace intake manifold assembly.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00BBP

SWIRL CONTROL VALVE

Refer to EM-15, "Removal and Installation" .

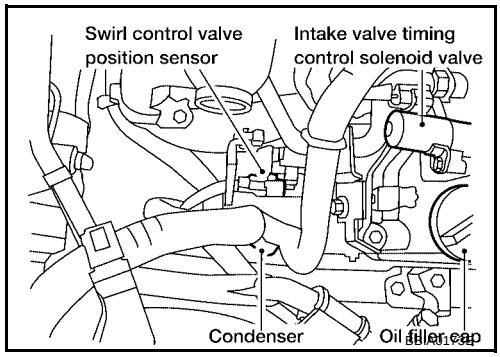
DTC P1137 SWIRL CONTROL VALVE POSITION SENSOR

PFP:23731

Component Description

UBS00BBQ

Swirl control valve position sensor is installed on the intake manifold. The sensor is connected to the front end of the valve shaft of the swirl control valve.
The sensor responds to the valve shaft movement. This sensor is a kind of potentiometer which transforms the swirl control valve position into output voltage, and emits the voltage signal to the ECM.



CONSULT-II Reference Value in Data Monitor Mode

UBS00BBR

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
SWL C/V (B1)	● Engine speed: Idle	Engine coolant temperature is below 44°C (111°F).	0 - 5 step
		Engine coolant temperature is above 45°C (113°F).	115 - 120 step
SWL/C POSI SE	● Engine: Idle the engine	Engine coolant temperature is below 44°C (111°F)	Approx. 0 deg.
		Engine coolant temperature is above 45°C (113°F)	Approx. 80 deg.

On Board Diagnosis Logic

UBS00BBS

NOTE:
If DTC P1137 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229.

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1137 1137	Swirl control valve position sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	● Harness or connectors (Swirl control valve position sensor circuit is open or shorted.) ● Swirl control valve position sensor ● Harness or connectors (Swirl control valve circuit is open or shorted.) ● Swirl control valve

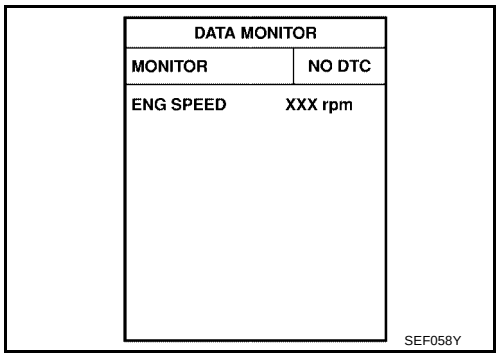
DTC Confirmation Procedure

UBS00BBT

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode with CONSULT-II and wait at least 5 seconds.
   If 1st trip DTC is detected, go to EC-425, "Diagnostic Procedure"
   .



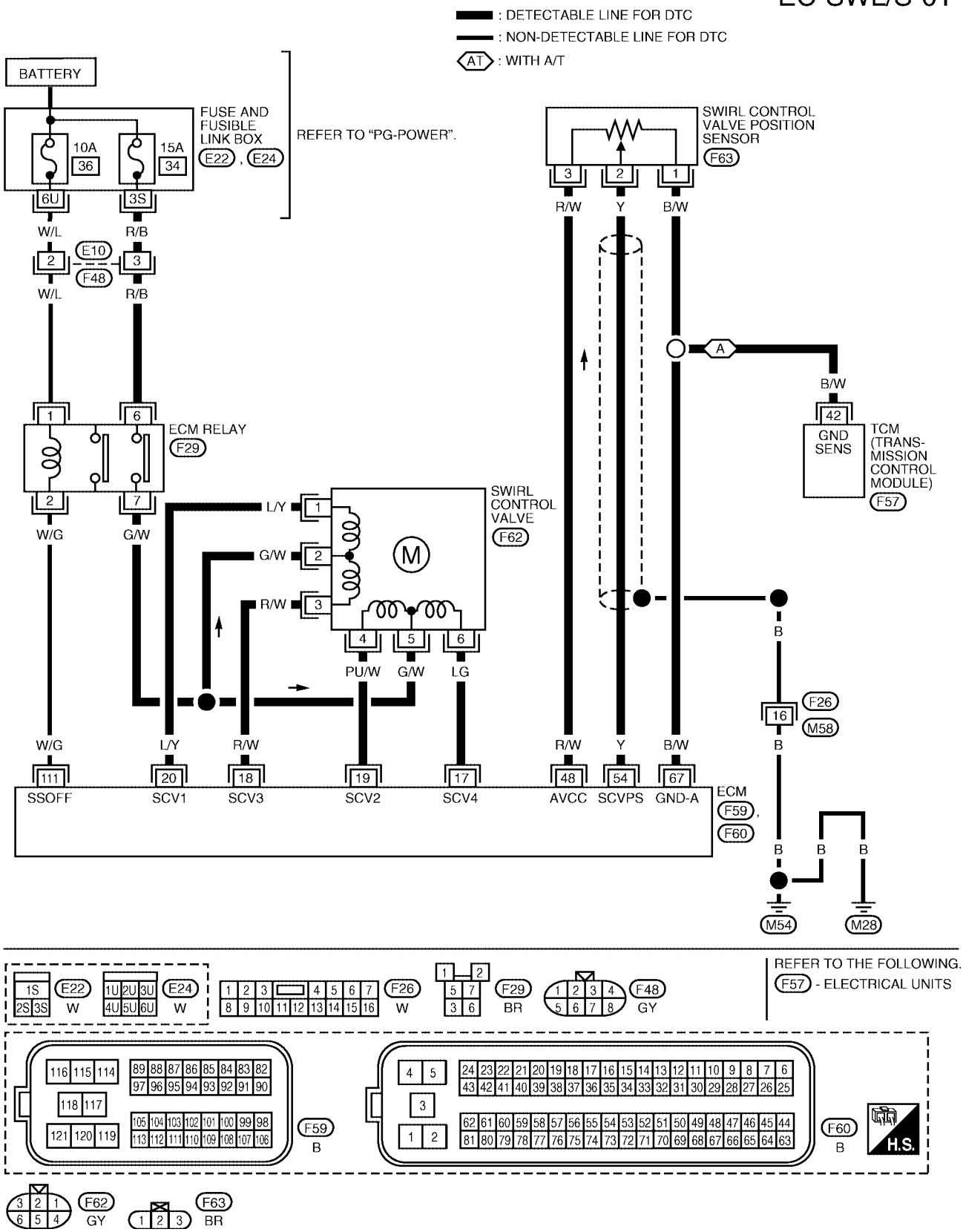
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00BBU

EC-SWL/S-01



BBWA1442E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

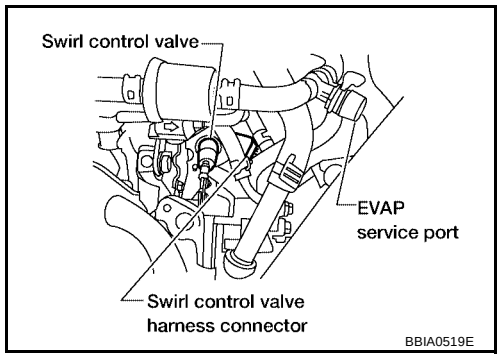
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17 18 19 20	LG R/W PU/W L/Y	Swirl control valve	**[Engine is running]** ● Idle speed	0.1 - 14V
48	R/W	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
54	Y	Swirl control valve position sensor	**[Engine is running]** ● Idle speed ● Engine coolant temperature is below 44°C (111°F).	Approximately 5V
			[Engine is running] ● **Warm-up condition** ● Idle speed ● Engine coolant temperature is above 45°C (113°F).	0 - 1.0V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00BBV

1. CHECK SWIRL CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect swirl control valve harness connector.
3. Turn ignition switch ON.

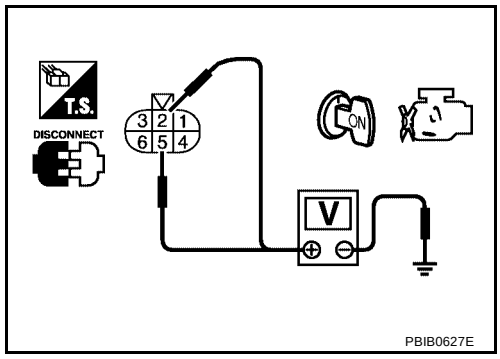


4. Check voltage between swirl control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between swirl control valve and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK SWIRL CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and swirl control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	Swirl volume control valve
17	6
18	3
19	4
20	1

Continuity should exist.

4. Also check harness for short to ground and short to power.

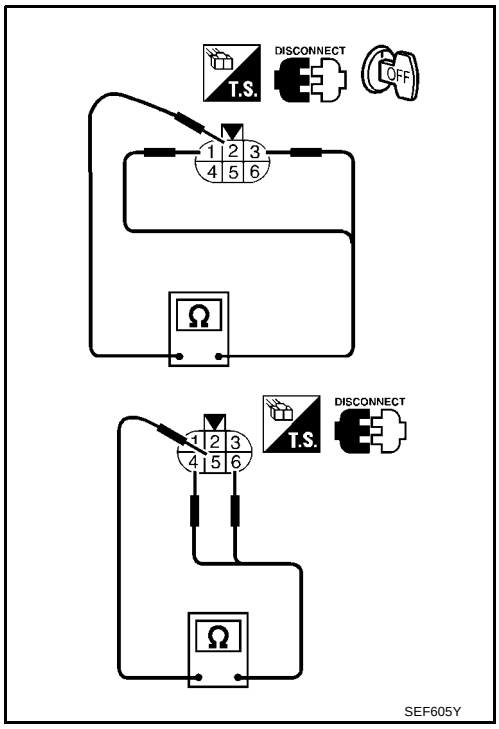
OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK SWIRL CONTROL VALVE

Check resistance between swirl control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.

Resistance: 20.5 - 23.5 Ω [at 20°C (68°F)]

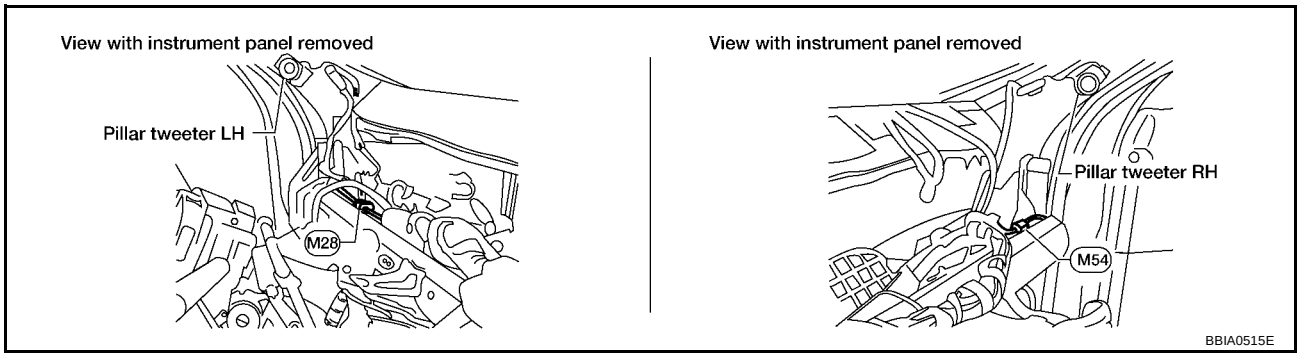


OK or NG

OK >> GO TO 5.
NG >> Replace intake manifold collector assembly.

5. CHECK GROUND CONNECTIONS

Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .

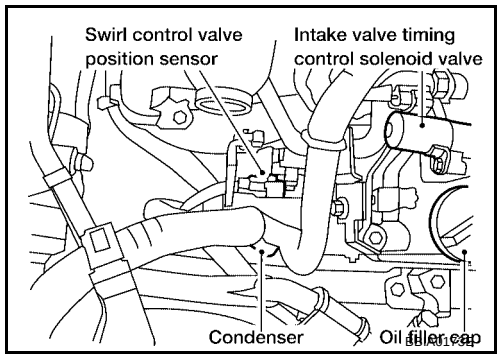


OK or NG

OK >> GO TO 6.
NG >> Repair or replace ground connections.

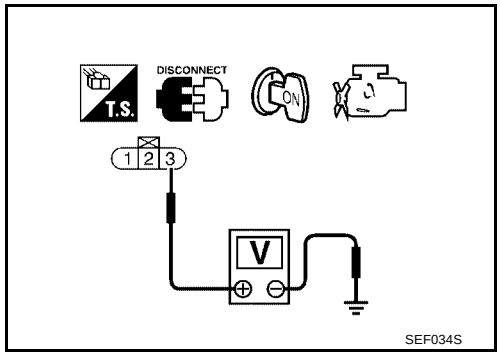
6. CHECK SWIRL CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect swirl control valve position sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between swirl control valve position sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

7. CHECK SWIRL CONTROL VALVE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector.
4. Check harness continuity between swirl control valve position sensor terminal 1 and ECM terminal 67, TCM terminal 42.
   Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between swirl control valve position sensor and TCM
- Harness for open or short between swirl control valve position sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK SWIRL CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 54 and swirl control valve position sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace intake manifold assembly.
NG >> Repair or replace.

Removal and Installation

UBS00BBW

SWIRL CONTROL VALVE CONTROL POSITION SENSOR

Refer to EM-15, "Removal and Installation" .

DTC P1138 SWIRL CONTROL VALVE

PFP:00000

Description

UBS00BBX

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Throttle position sensor	Throttle position	Swirl control valve control	Swirl control valve
Battery	Battery voltage*		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Swirl control valve position sensor	Swirl control valve position		

*: The ECM determines the start signal status by the signal of engine speed and battery voltage.

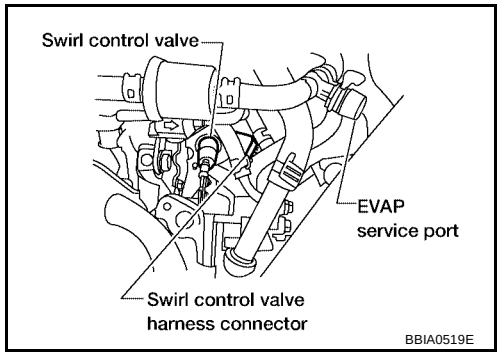
Swirl control valve has a valve portion in the intake passage of each cylinder.
While idling and during low engine coolant temperature, the swirl control valve closes, Thus the velocity of the air in the intake passage increases, promoting the vaporization of the fuel and producing a swirl in the combustion chamber.
Because of this operation, this system tends to increase the burning speed of the gas mixture, improve fuel consumption, and increase the stability in running conditions.
Also, except when idling and during low engine coolant temperature, this system opens the swirl control valve. In this condition, this system tends to increase power by improving intake efficiency via reduction of intake flow resistance, intake flow.
The swirl control valve is operated by the ECM.

Throttle position sensor (Idle position)	Engine coolant temperature	Swirl control valve
OFF	—	Open
ON	Above 45°C (113°F)	Open
	Below 44°C (111°F)	Close

COMPONENT DESCRIPTION

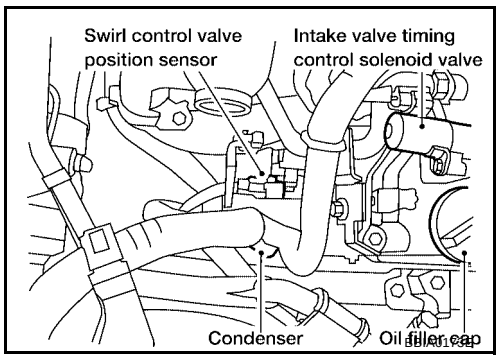
Swirl Control Valve

Swirl control valve consists of actuator and valve. The valve is installed in the intake manifold, and the actuator is connected to the rear end of the valve shaft.
The swirl control valve uses a step motor which has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes. When no change in the control position is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.



Swirl Control Valve Position Sensor

Swirl control valve position sensor is installed on the intake manifold. The sensor is connected to the front end of the valve shaft of the swirl control valve.
The sensor responds to the valve shaft movement. This sensor is a kind of potentiometer which transforms the swirl control valve position into output voltage, and emits the voltage signal to the ECM.



CONSULT-II Reference Value in Data Monitor Mode

UBS00BBY

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
SWL C/V (B1)	● Engine speed: Idle	Engine coolant temperature is below 44°C (111°F).	0 - 5 step
		Engine coolant temperature is above 45°C (113°F).	115 - 120 step

On Board Diagnosis Logic

UBS00BBZ

DTC No.	Trouble diagnosis name	DTC Detecting Condition	Possible Cause
P1138 1138	Swirl control valve control system performance	The target opening angle of swirl control valve controlled by ECM and the input signal from swirl control valve position sensor is not in the normal rang.	● Harness or connectors (Swirl control valve position sensor circuit is open or shorted.) ● Swirl control valve position sensor ● Harness or connectors (Swirl control valve circuit is open or shorted.) ● Swirl control valve

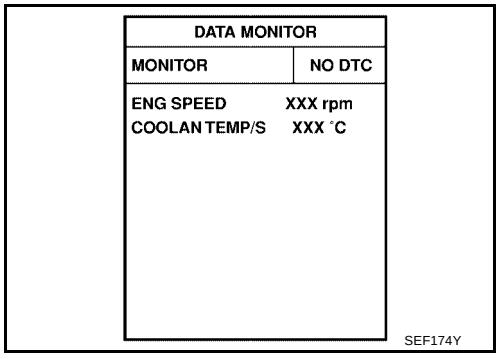
DTC Confirmation Procedure

UBS00BC0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 10 seconds.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 2 seconds.
6. Start engine and let it idle for at least 10 seconds.
7. Maintain engine speed at about 2,000 rpm for at least 10 seconds.
8. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
   If 1st trip DTC is detected, go to EC-433, "Diagnostic Procedure".
   If 1st trip DTC is not detected, go to next step.
9. Perform step 5 through 8 three times.



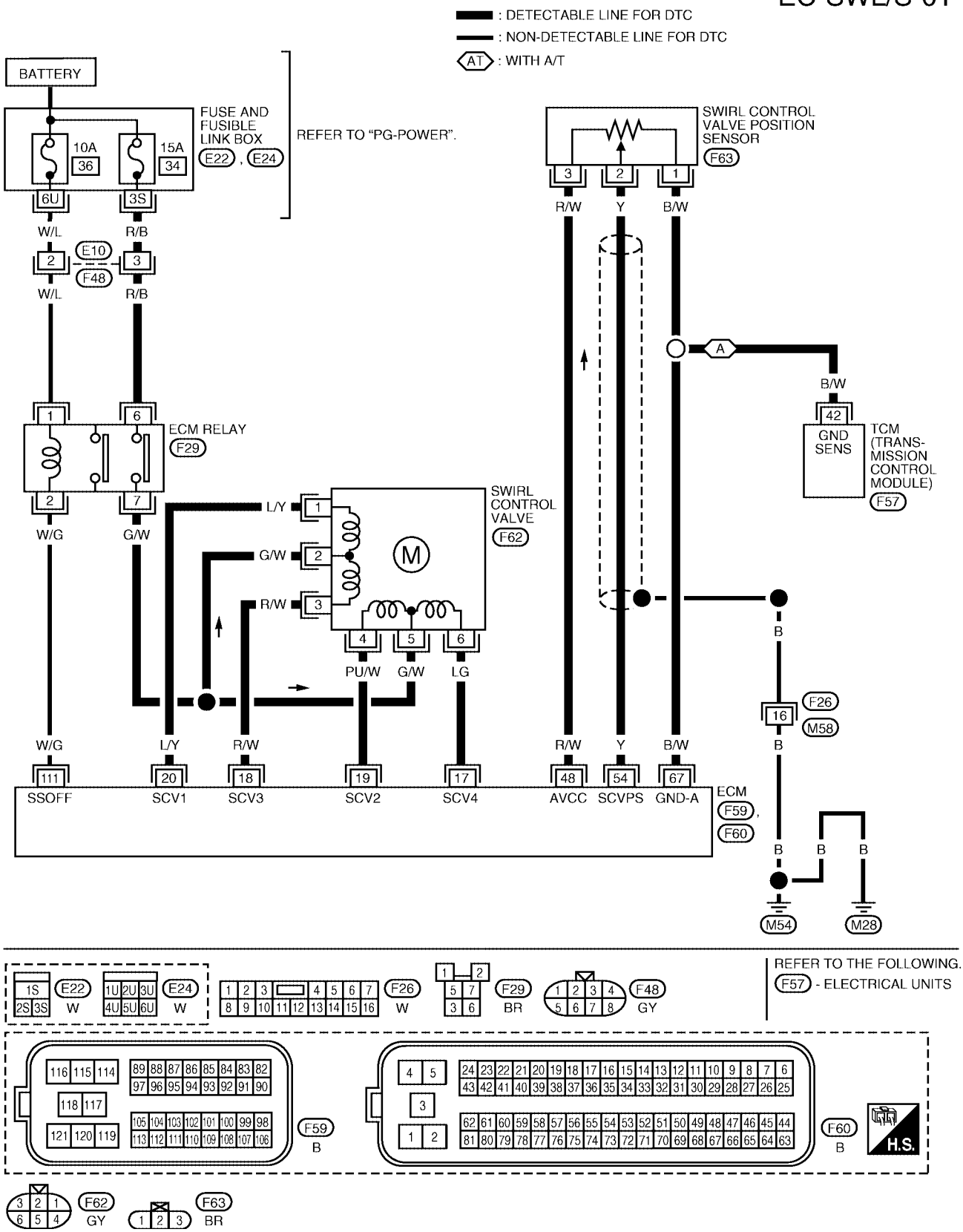
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00BC1

EC-SWL/S-01



BBWA1442E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

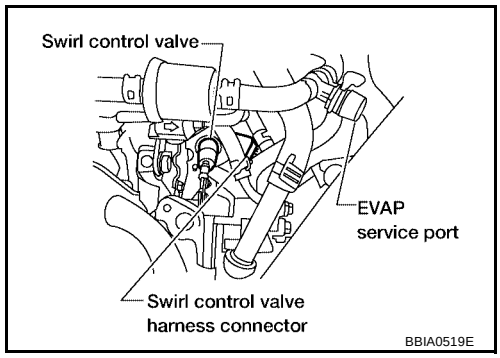
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
17 18 19 20	LG R/W PU/W L/Y	Swirl control valve	**[Engine is running]** ● Idle speed	0.1 - 14V
48	R/W	Sensor power supply (EVAP control system pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
54	Y	Swirl control valve position sensor	**[Engine is running]** ● Idle speed ● Engine coolant temperature is below 44°C (111°F).	Approximately 5V
			[Engine is running] ● **Warm-up condition** ● Idle speed ● Engine coolant temperature is above 45°C (113°F).	0 - 1.0V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds passed after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00BC2

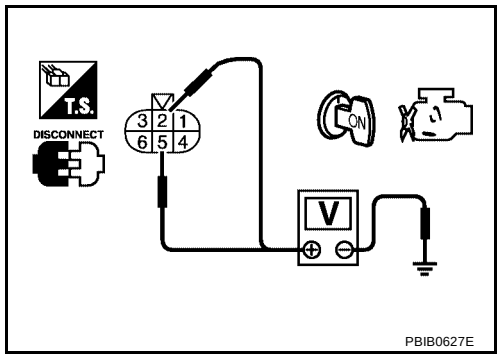
1. CHECK SWIRL CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect swirl control valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between swirl control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between swirl control valve and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK SWIRL CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and swirl control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	Swirl volume control valve
17	6
18	3
19	4
20	1

Continuity should exist.

4. Also check harness for short to ground and short to power.

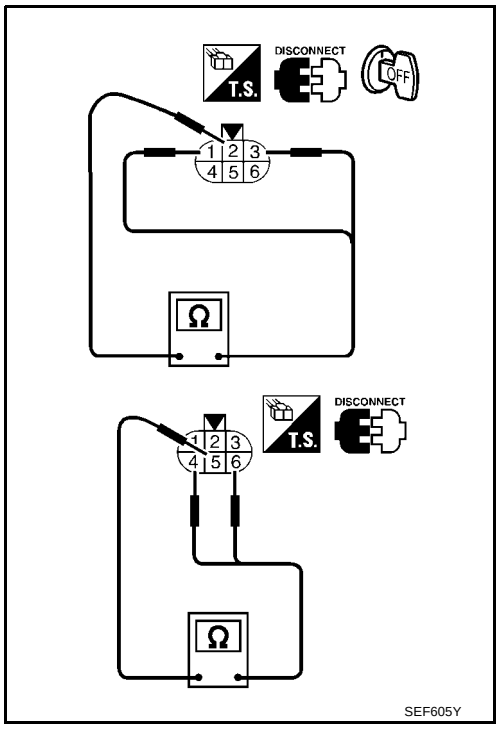
OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK SWIRL CONTROL VALVE

Check resistance between swirl control valve terminal 2 and terminals 1, 3, terminal 5 and terminals 4, 6.

Resistance: 20.5 - 23.5Ω [At 20°C (68°F)]

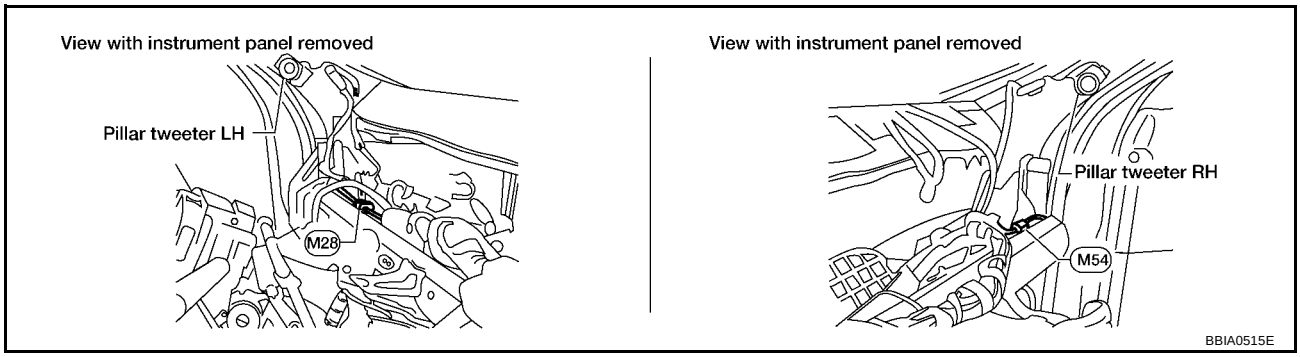


OK or NG

OK >> GO TO 5.
NG >> Replace intake manifold collector assembly.

5. CHECK GROUND CONNECTIONS

Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .

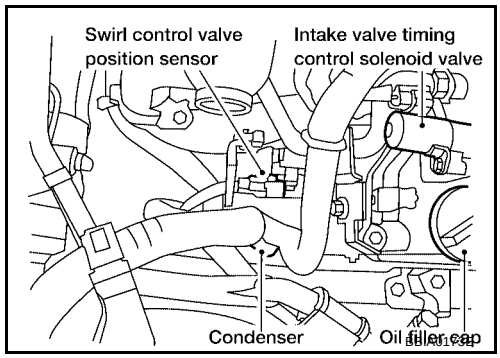


OK or NG

OK >> GO TO 6.
NG >> Repair or replace ground connections.

6. CHECK SWIRL CONTROL VALVE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect swirl control valve position sensor harness connector.
2. Turn ignition switch ON.

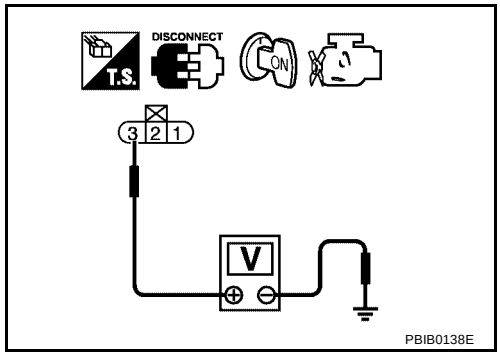


3. Check voltage between swirl control valve position sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness connectors.



7. CHECK SWIRL CONTROL VALVE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector.
4. Check harness continuity between swirl control valve position sensor terminal 1 and ECM terminal 67, TCM terminal 42.
   Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between swirl control valve position sensor and TCM
- Harness for open or short between swirl control valve position sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK SWIRL CONTROL VALVE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 54 and swirl control valve position sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK (With CONSULT-II)>>GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace intake manifold assembly.
NG >> Repair or replace.

Removal and Installation

UBS00BC3

SWIRL CONTROL VALVE

Refer to EM-15, "Removal and Installation" .

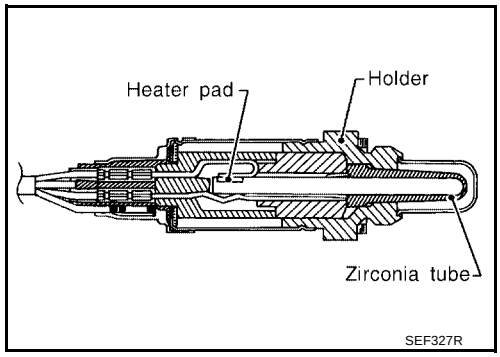
DTC P1146 HO2S2

PFP:226A0

Component Description

UBS00BC4

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00BC5

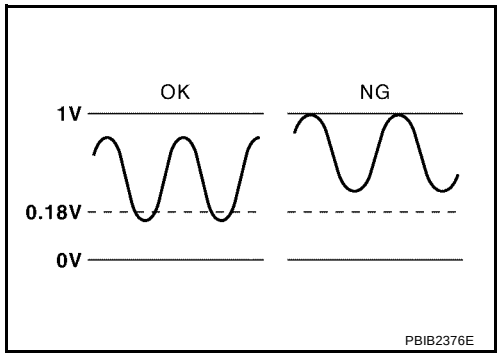
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ←→ 0.6 - 1.0V
HO2S2 MNTR (B1)	● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		LEAN ←→ RICH

On Board Diagnosis Logic

UBS00BC6

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146 1146	Heated oxygen sensor 2 minimum voltage monitoring	The minimum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injectors

DTC Confirmation Procedure

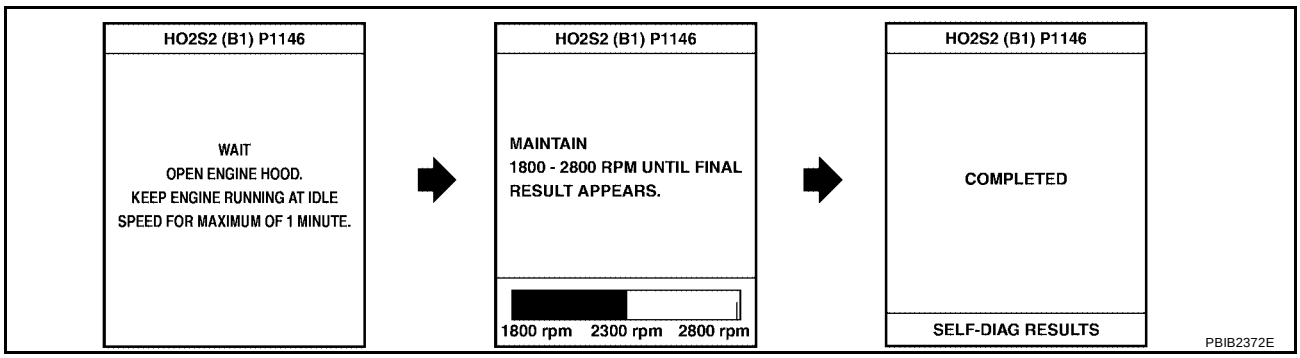
UBS00BC7

NOTE:
If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

TESTING CONDITION:
For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II and follow the instruction of CONSULT-II.



NOTE:
It will take at most 10 minutes until "COMPLETED" is displayed.

6. Make sure that OK is displayed after touching "SELF-DIAG RESULTS".
   If NG is displayed, refer to EC-441, "Diagnostic Procedure" .
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Turn ignition switch ON and select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
c. Start engine and warm it up while monitoring "COOLAN TEMP/S" indication on CONSULT-II.
d. When "COOLAN TEMP/S" indication reaches to 70°C (158°F), go to step 3.

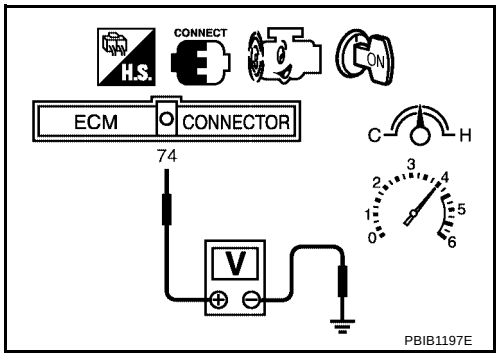
Overall Function Check

UBS00BC8

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.18V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with "OD" OFF (A/T), 4th gear position (M/T).



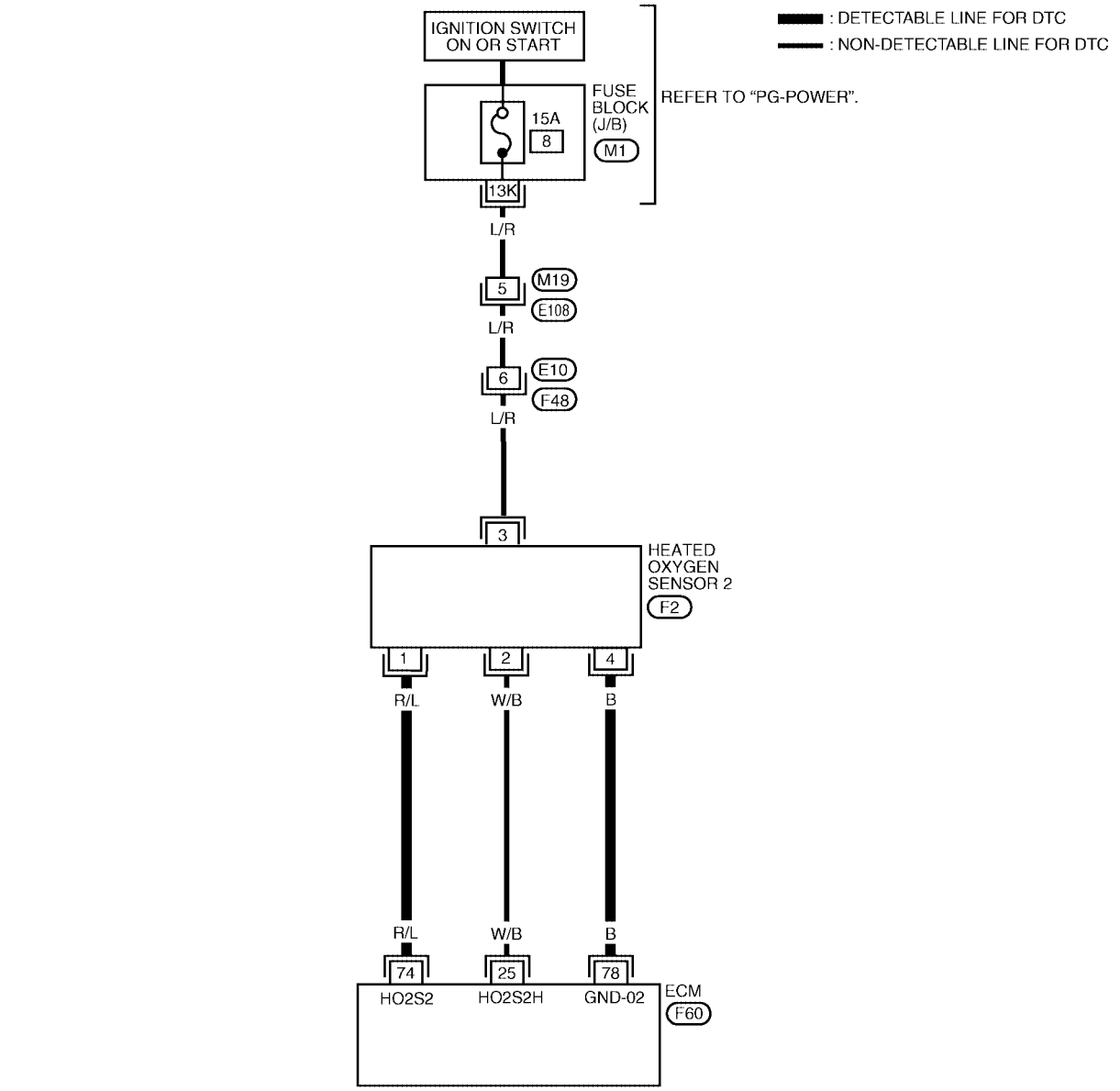
The voltage should be below 0.18V at least once during this procedure.

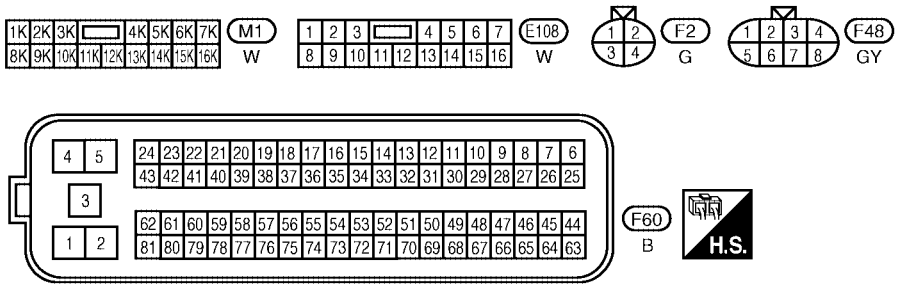
8. If NG, go to EC-441, "Diagnostic Procedure" .

Wiring Diagram

UBS00BC9

EC-HO2S2-01





BBWA1427E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

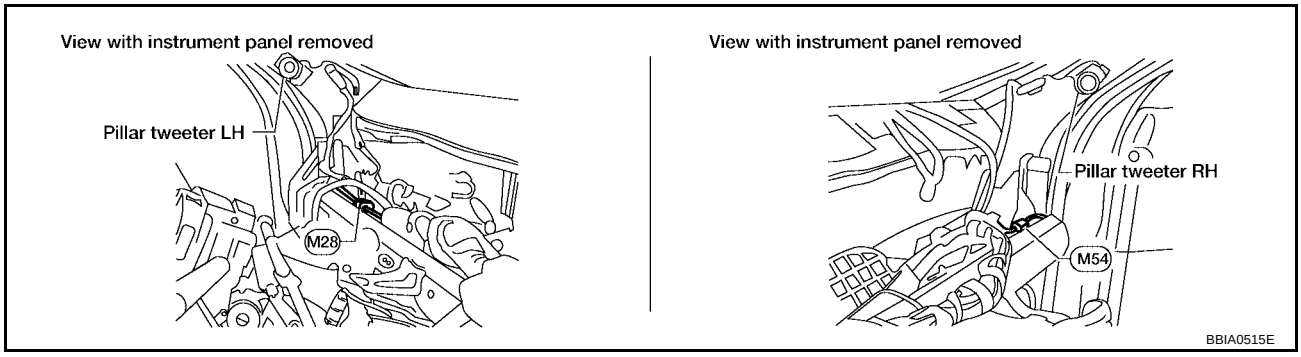
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	R/L	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00BCA

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.
   Refer to EC-170, "Ground Inspection" .



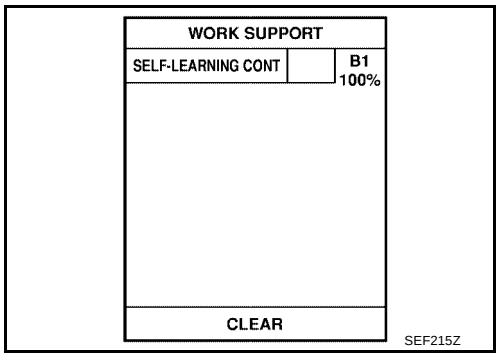
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

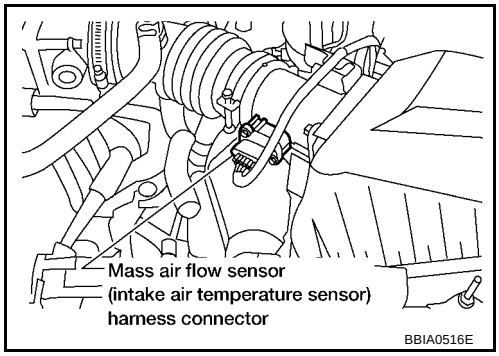
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer toEC-248 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

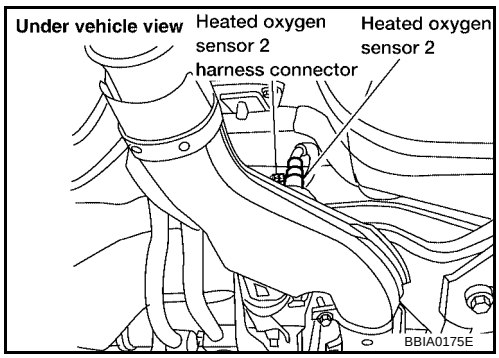
1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 78 and HO2S2 terminal 4.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 74 and HO2S2 terminal 1. Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 74 or HO2S2 terminal 1 and ground. Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer toEC-443, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

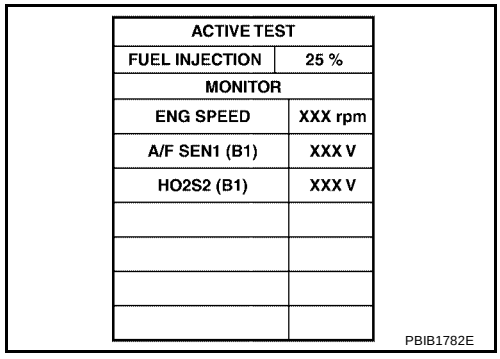
Component Inspection

UBS00BCB

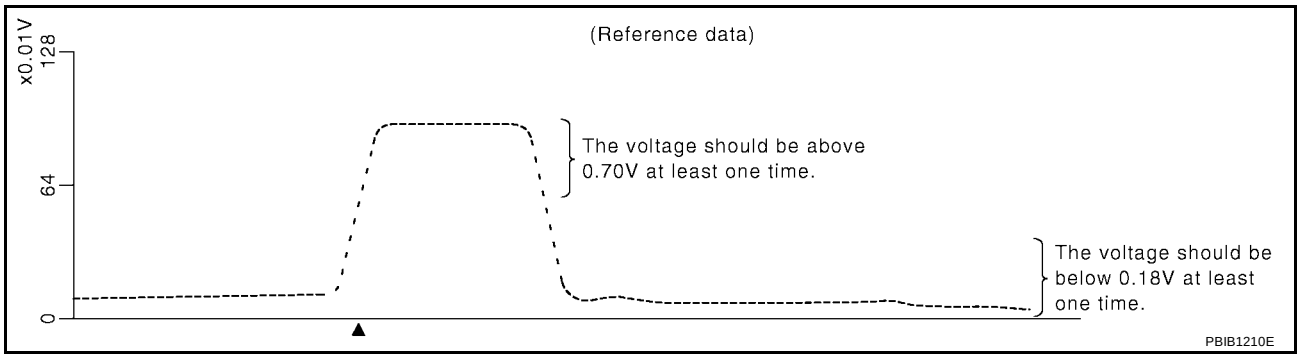
HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.



6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



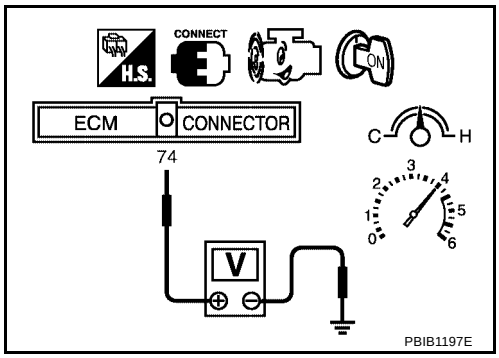
“HO2S2 (B1)” should be above 0.70V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.18V at least once when the “FUEL INJECTION” is –25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.70V at least once during this procedure.
   If the voltage is above 0.70V at step 6, step 7 is not necessary.



7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 4th gear position.
   The voltage should be below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00BCC

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

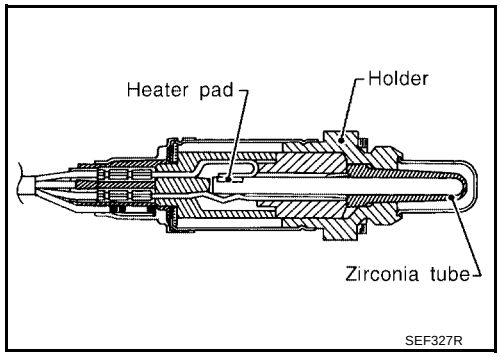
DTC P1147 HO2S2

PFP:226A0

Component Description

UBS00BCD

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the air fuel ratio (A/F) sensor 1 are shifted, the air fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00BCE

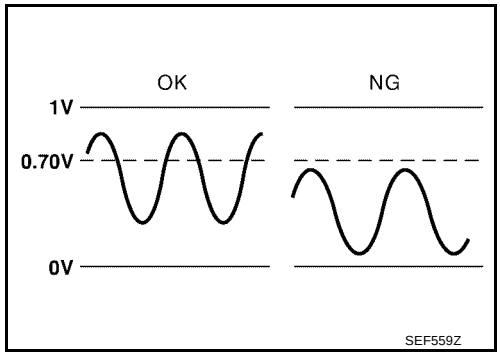
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ←→ 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS00BCF

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the air fuel ratio (A/F) sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1147 1147	Heated oxygen sensor 2 maximum voltage monitoring	The maximum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Injectors ● Intake air leaks

DTC Confirmation Procedure

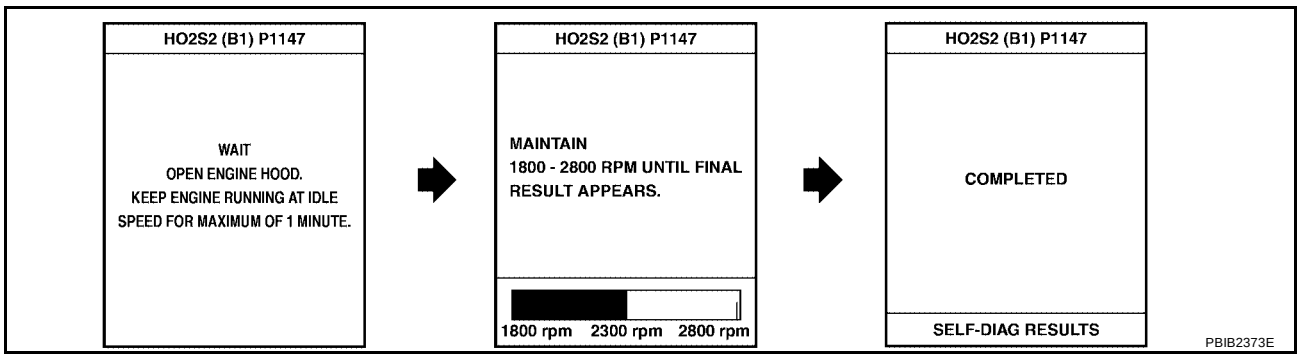
UBS00BCG

NOTE:
If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

TESTING CONDITION:
For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C (32 to 86°F).

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II and follow the instruction of CONSULT-II.



NOTE:
It will take at most 10 minutes until "COMPLETED" is displayed.

6. Make sure that OK is displayed after touching "SELF-DIAG RESULTS".
   If NG is displayed, refer to EC-449 .
   If "CAN NOT BE DIAGNOSED" is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Turn ignition switch ON and select "COOLAN TEMP/S" in "DATA MONITOR" mode with CONSULT-II.
c. Start engine and warm it up while monitoring "COOLAN TEMP/S" indication on CONSULT-II.
d. When "COOLAN TEMP/S" indication reaches to 70°C (158°F), go to step 3.

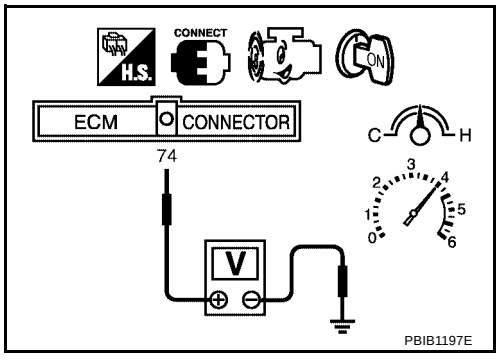
Overall Function Check

UBS00BCH

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.70V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with "OD" OFF (A/T), 4th gear position (M/T).



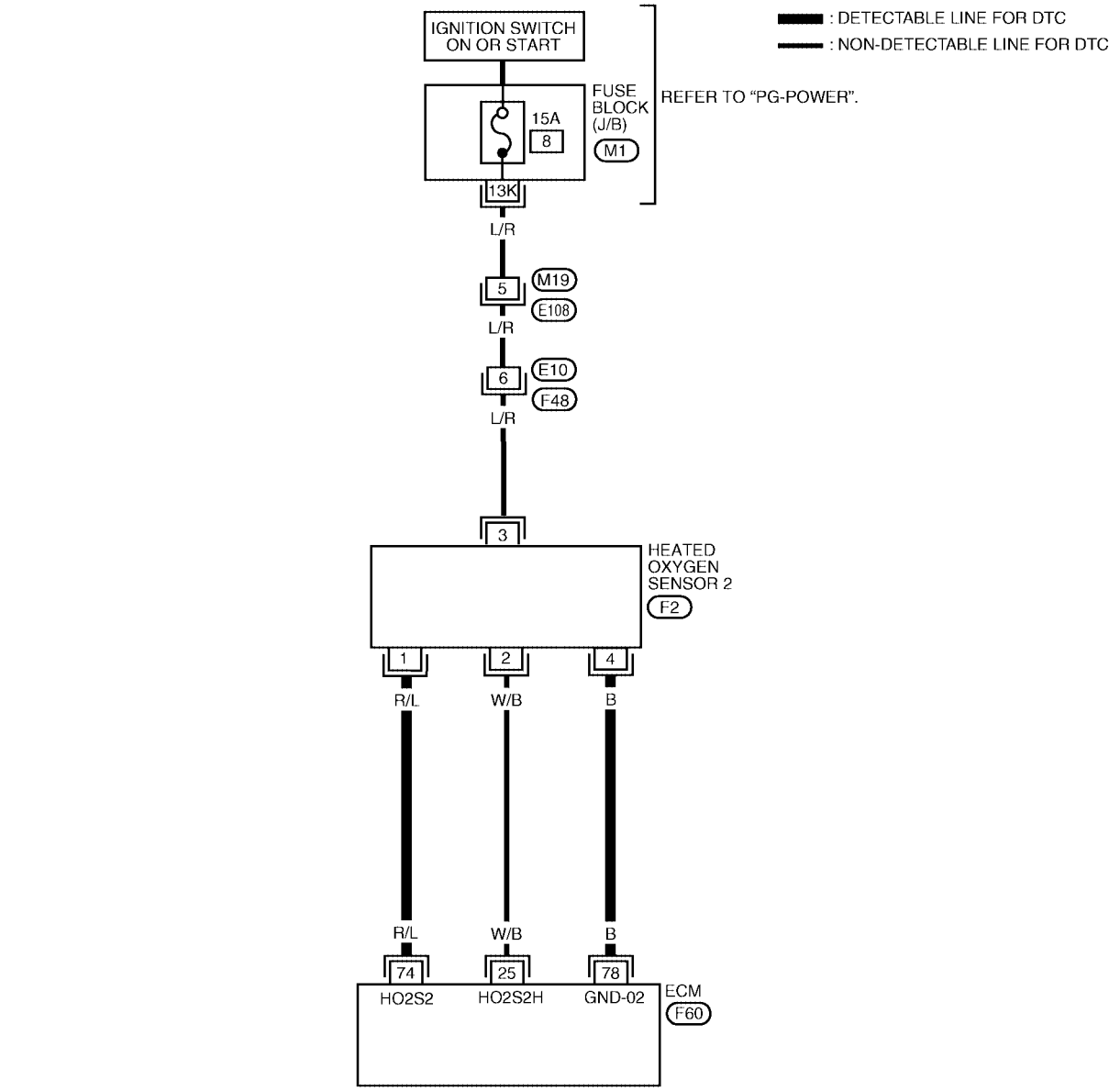
The voltage should be above 0.70V at least once during this procedure.

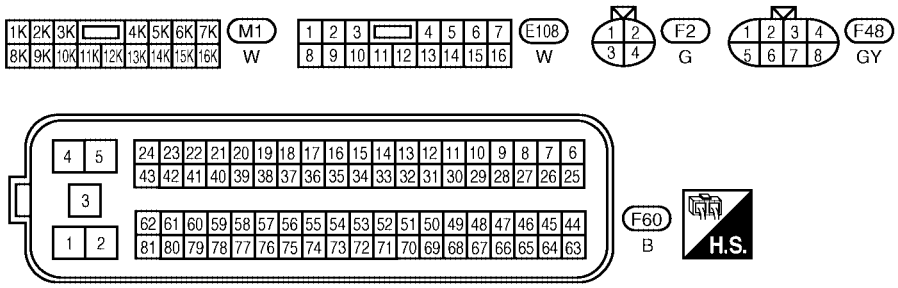
8. If NG, go to EC-449, "Diagnostic Procedure" .

Wiring Diagram

UBS00BCI

EC-HO2S2-01





BBWA1427E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

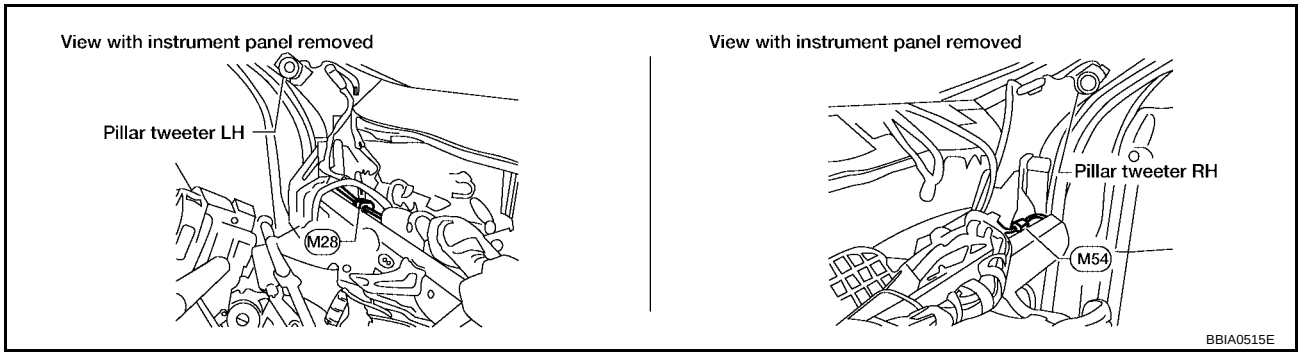
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	R/L	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00BCJ

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.
   Refer to EC-170, "Ground Inspection" .



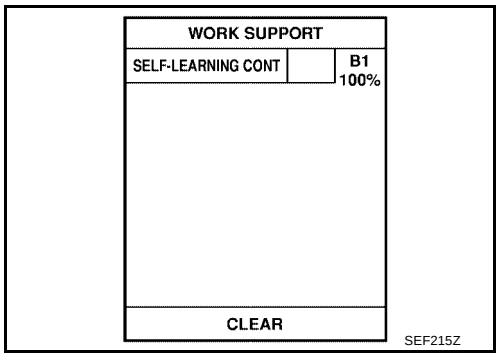
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

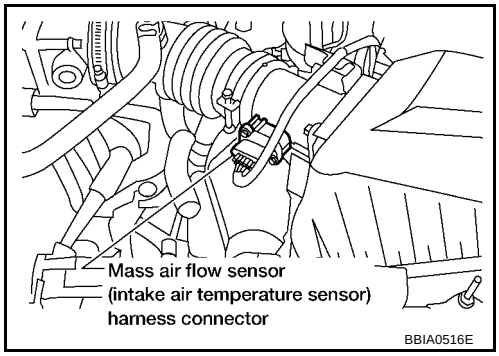
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-241 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

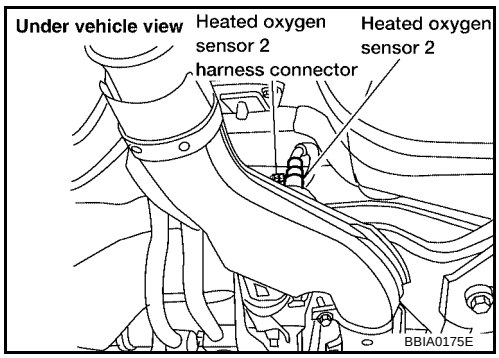
1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 78 and HO2S2 terminal 4.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 74 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 74 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-451, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00BCK

HEATED OXYGEN SENSOR 2

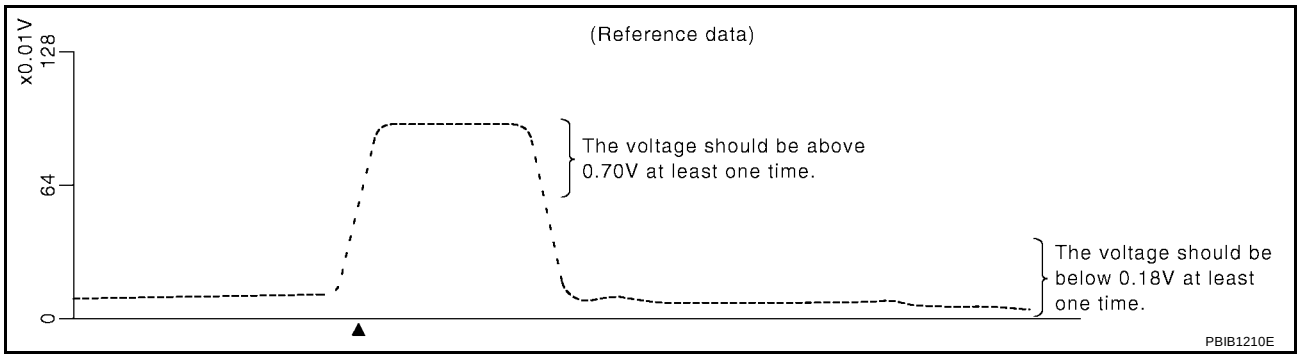
With CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
A/F SEN1 (B1)	XXX V
HO2S2 (B1)	XXX V

PBIB1782E

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



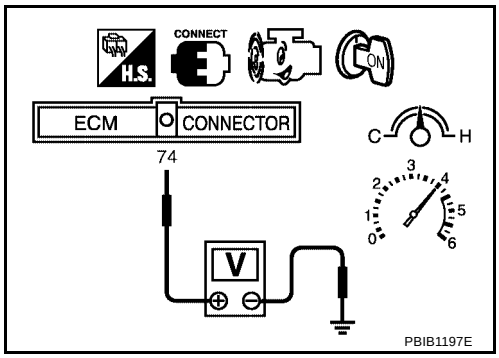
“HO2S2 (B1)” should be above 0.70V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.18V at least once when the “FUEL INJECTION” is –25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.70V at least once during this procedure.
   If the voltage is above 0.70V at step 6, step 7 is not necessary.



7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 4th position (M/T).
   The voltage should be below 0.18V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00BCL

HEATED OXYGEN SENSOR 2

Refer to EX-3, "EXHAUST SYSTEM" .

DTC P1148 CLOSED LOOP CONTROL

PFP:22690

On Board Diagnosis Logic

UBS00BCM

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148 1148	Closed loop control function	The closed loop control function for bank 1 does not operate even when vehicle is driving in the specified condition.	● The air fuel ratio (A/F) sensor 1 circuit is open or shorted. ● Air fuel ratio (A/F) sensor 1 ● Air fuel ratio (A/F) sensor 1 heater

DTC P1148 is displayed with another DTC for air fuel ratio (A/F) sensor 1. Perform the trouble diagnosis for the corresponding DTC.

DTC P1217 ENGINE OVER TEMPERATURE

PFP:00000

System Description

UBS00BCN

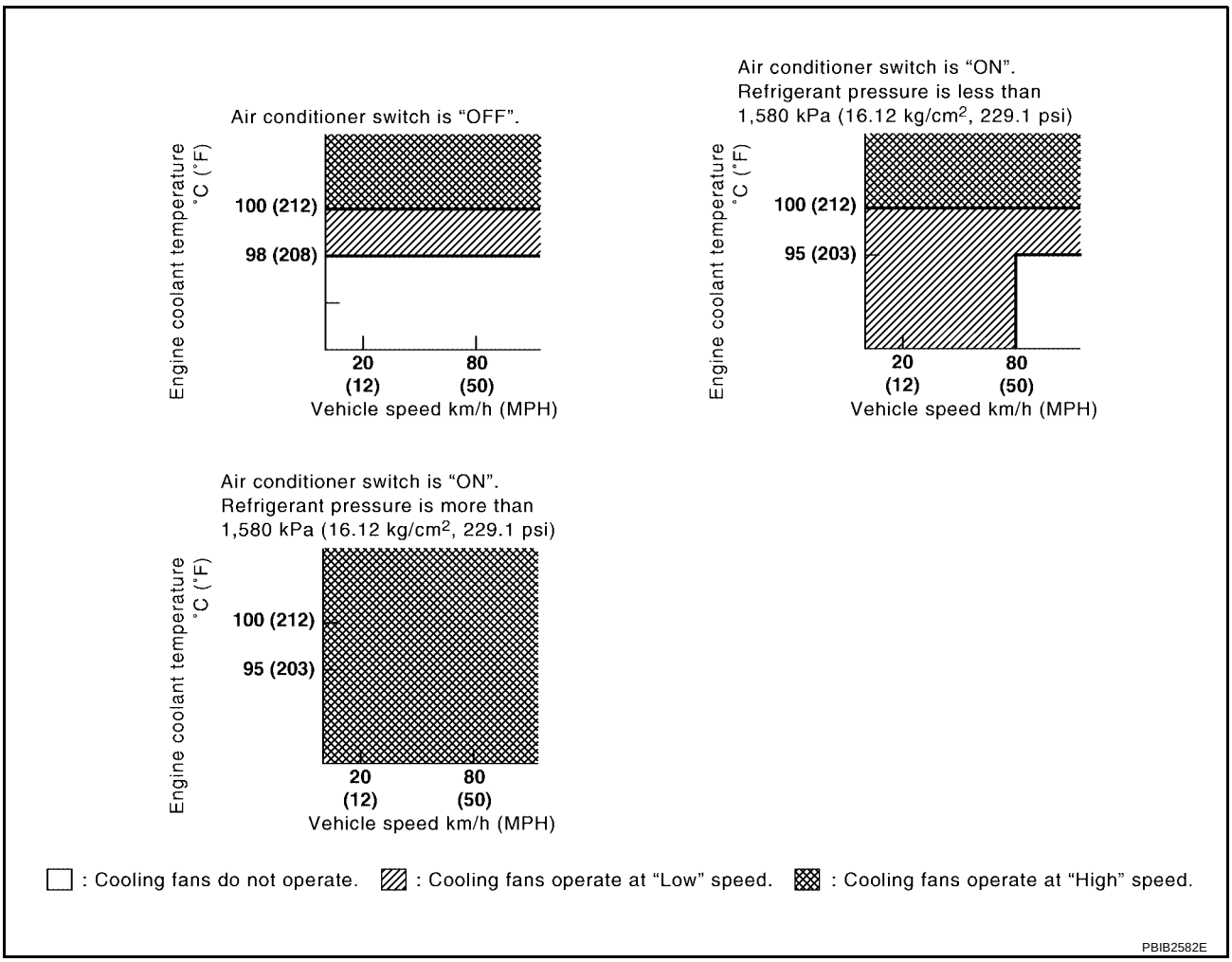
COOLING FAN CONTROL

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	Cooling fan control	Cooling fan relay(s)
Vehicle speed signal*2	Vehicle speed		
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner ON signal		
Battery	Battery voltage*1		
Refrigerant pressure sensor	Refrigerant pressure		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to the ECM through CAN communication line.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

OPERATION



CONSULT-II Reference Value in Data Monitor Mode

UBS00BCO

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	● Engine: After warming up, idle the engine	A/C switch: OFF	OFF
		A/C switch: ON (Compressor operates)	ON
COOLING FAN	● After warming up engine, idle the engine. ● Air conditioner switch: OFF	Engine coolant temperature is 97°C (207°F) or less	OFF
		Engine coolant temperature is between 98°C (208°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH

On Board Diagnosis Logic

UBS00BCP

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.
This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1217 1217	Engine over temperature (Overheat)	● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant was not added to the system using the proper filling method. ● Engine coolant level is not within the specified range.	● Harness or connectors (The cooling fan circuit is open or shorted.) ● Cooling fan ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-466, "Main 12 Causes of Overheating" .

CAUTION:
When a malfunction is indicated, be sure to replace the coolant. Refer to MA-16, "Changing Engine Coolant" . Also, replace the engine oil. Refer to MA-20, "Changing Engine Oil" .

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "Anti-freeze Coolant Mixture Ratio" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

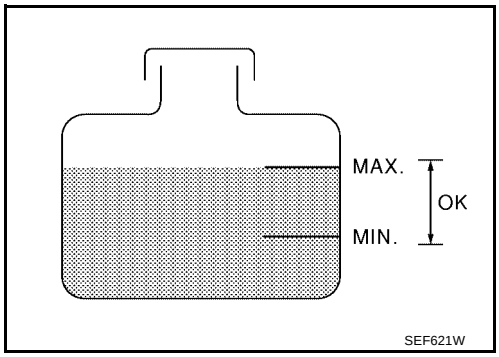
UBS00BCQ

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

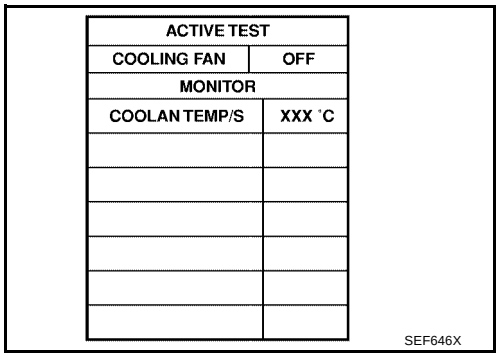
WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

WITH CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-459, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-459, "Diagnostic Procedure" .
3. Turn ignition switch ON.

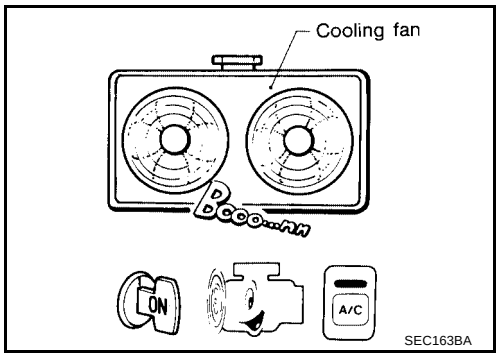


4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-459, "Diagnostic Procedure" .

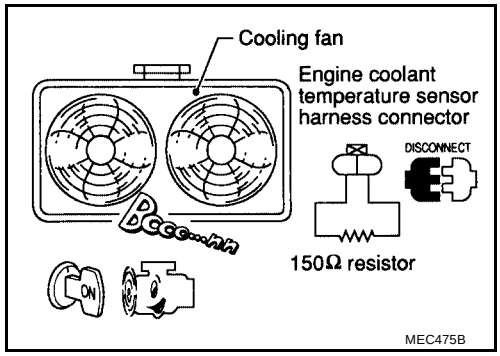


WITH GST

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-459, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-459, "Diagnostic Procedure" .
3. Start engine.
   Be careful not to overheat engine.
4. Set temperature control lever to full cold position.
5. Turn air conditioner switch ON.
6. Turn blower fan switch ON.
7. Run engine at idle for a few minutes with air conditioner operating.
   Be careful not to overheat engine.
8. Make sure that cooling fan operates at low speed.
   If NG, go to EC-459, "Diagnostic Procedure" .
   If OK, go to the following step.
9. Turn ignition switch OFF.
10. Turn air conditioner switch and blower fan switch OFF.
11. Disconnect engine coolant temperature sensor harness connector.
12. Connect 150Ω resistor to engine coolant temperature sensor harness connector.

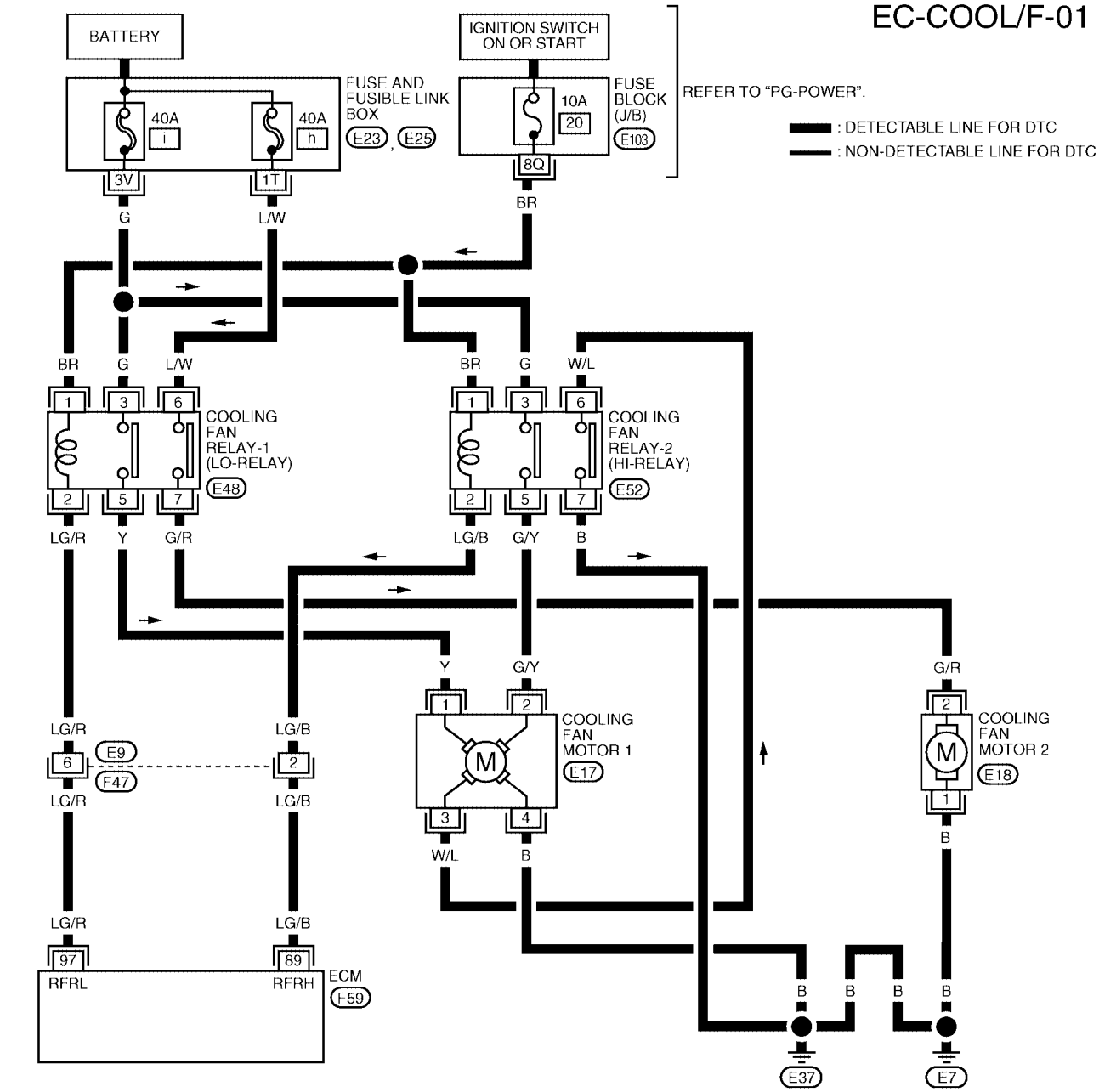


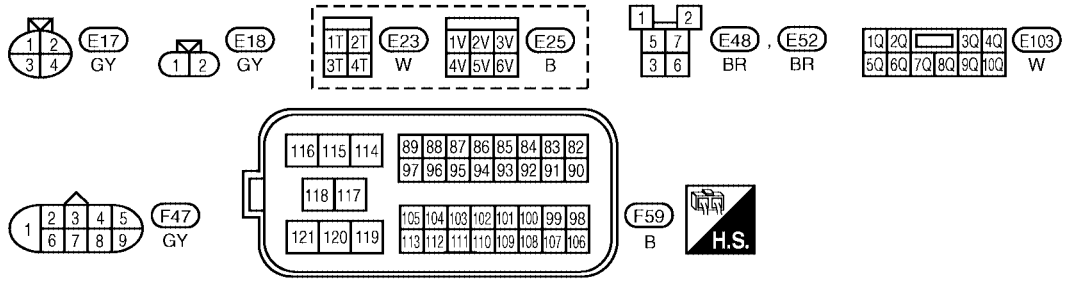
13. Restart engine and make sure that cooling fan operates at higher speed than low speed.
    Be careful not to overheat engine.
14. If NG, go to EC-459, "Diagnostic Procedure" .



Wiring Diagram

UBS00BCR





BBWA1449E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
89	LG/B	Cooling fan relay-2 (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11-14V)
			[Engine is running] ● Cooling fan is high speed operating	0 - 1.0V
97	LG/R	Cooling fan relay-1 (Low)	**[Ignition switch: ON]** ● Cooling fan is not operating	BATTERY VOLTAGE (11-14V)
			[Ignition switch: ON] ● Cooling fan is operating	0 - 1.0V

Diagnostic Procedure

UBS00BCS

1. INSPECTION START

Do you have CONSULT-II?

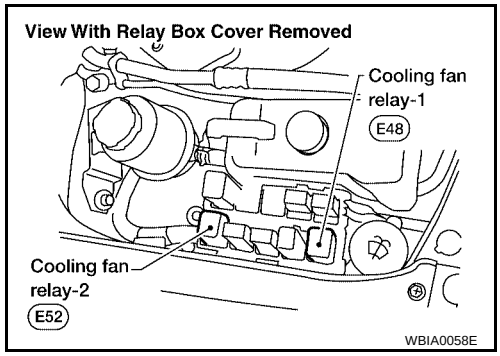
Yes or No

Yes >> GO TO 2.
No >> GO TO 4.

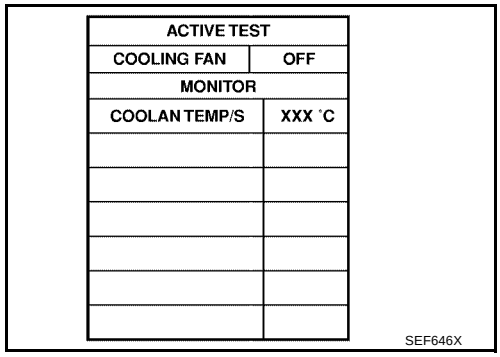
2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Disconnect cooling fan relay-2.
2. Turn ignition switch ON.



3. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
4. Make sure that cooling fans-1 and -2 operate at low speed.



OK or NG

OK >> GO TO 3.
NG >> Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-463 .)

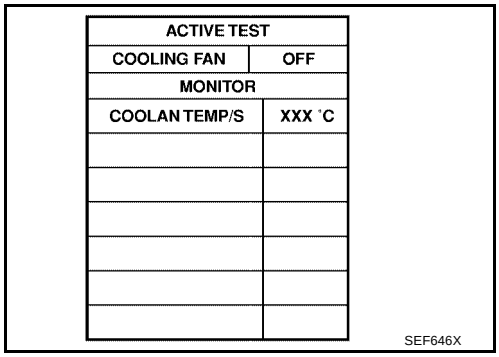
3. CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Turn ignition switch OFF.
2. Reconnect cooling fan relay-2.
3. Turn ignition switch ON.
4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. Make sure that cooling fan-1 operates at high speed.

OK or NG

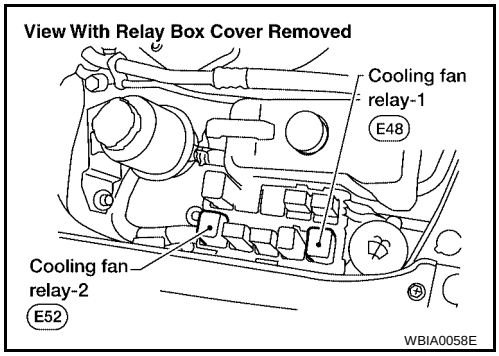
OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-465 .)



4. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-II

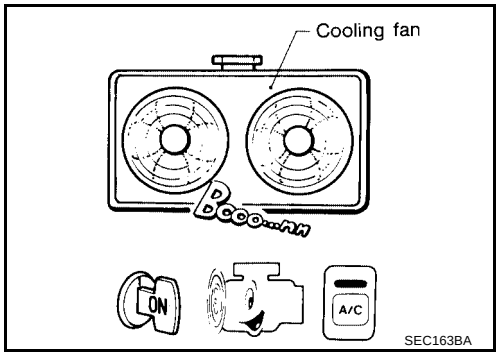
1. Disconnect cooling fan relays-2.
2. Start engine and let it idle.
3. Set temperature lever at full cold position.
4. Turn air conditioner switch ON.
5. Turn blower fan switch ON.



6. Make sure that cooling fans-1 and -2 operate at low speed.

OK or NG

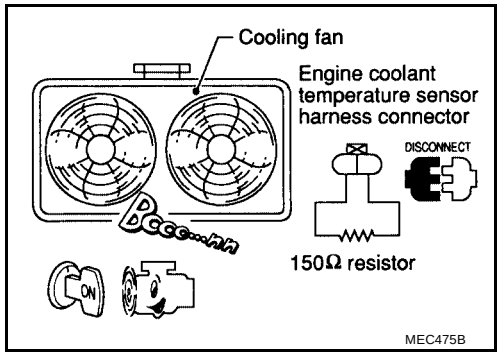
OK >> GO TO 5.
NG >> Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-463 .)



5. CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch OFF.
2. Reconnect cooling fan relay-2.
3. Turn air conditioner switch and blower fan switch OFF.
4. Disconnect engine coolant temperature sensor harness connector.
5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6. Restart engine and make sure that cooling fan-1 operates at high speed.



OK or NG

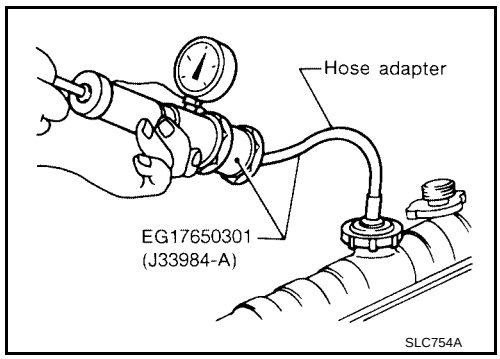
OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-465 .)

6. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.6 kg/cm^2 , 23 psi)

CAUTION:
Higher than the specified pressure may cause radiator damage.
Pressure should not drop.



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following for leak.

- Hose
- Radiator
- Water pump (Refer to CO-10, "WATER PUMP" .)

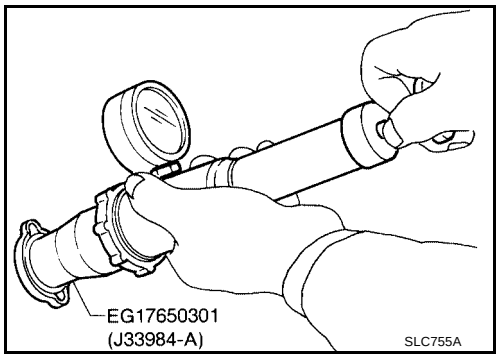
>> Repair or replace.

8. CHECK RADIATOR CAP

Apply pressure to cap with a tester.

Radiator cap relief pressure:

59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi)



OK or NG

OK >> GO TO 9.
NG >> Replace radiator cap.

9. CHECK THERMOSTAT

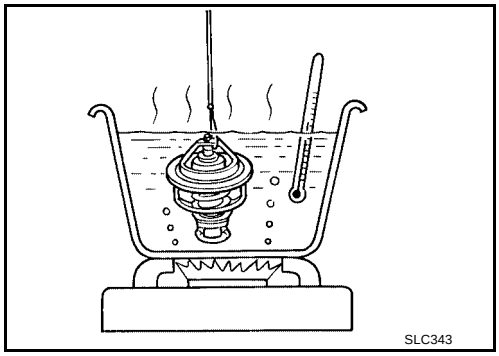
1. Check valve seating condition at normal room temperatures.
It should seat tightly.
2. Check valve opening temperature and valve lift.

Valve opening temperature:

76.5°C (170°F) [standard]

Valve lift:

More than 9 mm/90°C (0.35 in/194°F)



3. Check if valve is closed at 5°C (9°F) below valve opening temperature.

For details, refer toCO-12, "THERMOSTAT AND THERMOSTAT HOUSING" .

OK or NG

OK >> GO TO 10.
NG >> Replace thermostat.

10. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-467, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace engine coolant temperature sensor.

11. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-466, "Main 12 Causes of Overheating" .

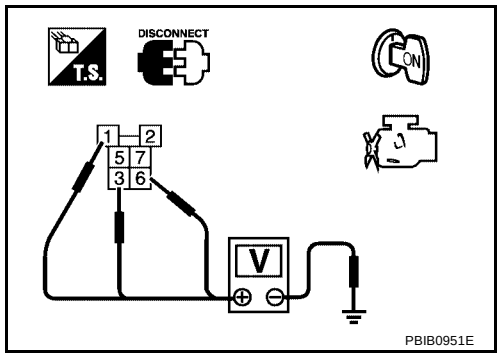
>> **INSPECTION END**

PROCEDURE A

1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch ON.
4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

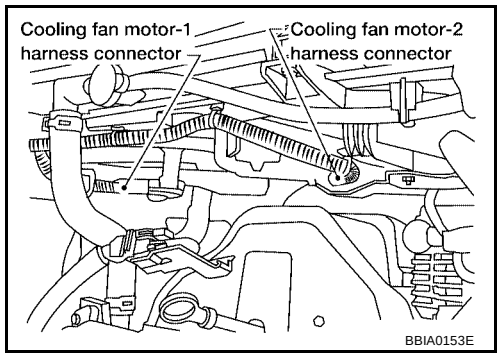
- Fuse and fusible link box connectors E23, E25
- Fuse block (J/B) connector E103
- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK COOLING FAN MOTOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 4 and ground.
   Refer to Wiring Diagram.

Continuity should exist.



4. Also check harness for short to ground and short to power.
5. Check harness continuity between cooling fan relay-1 terminal 7 and cooling fan motor-2 terminal 2, cooling fan motor-2 terminal 1 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

6. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN RELAY-1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 97 and cooling fan relay-1 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Harness for open or short between cooling fan relay-1 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-1

Refer to EC-467, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK COOLING FAN MOTORS

Refer to EC-467, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

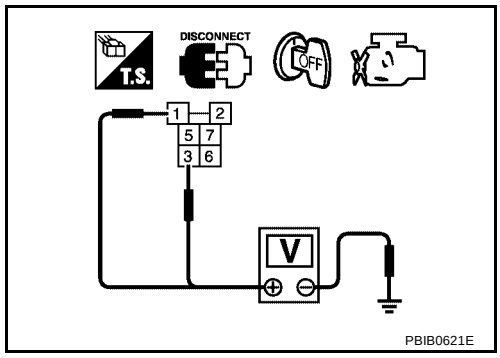
>> **INSPECTION END**

PROCEDURE B

1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-2.
3. Turn ignition switch ON.
4. Check voltage between cooling fan relay-2 terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Fuse and fusible link box connectors E23, E25
- Fuse block (J/B) connector E103
- Harness for open or short between cooling fan relay-2 and fuse
- Harness for open or short between cooling fan relay-2 and battery

>> Repair harness or connectors.

3. CHECK COOLING FAN MOTOR CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 harness connector.
3. Check harness continuity between cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 2, cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3, cooling fan relay-2 terminal 7 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN RELAY-2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 89 and cooling fan relay-2 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Harness for open or short between cooling fan relay-2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-2

Refer to EC-467, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relays.

7. CHECK COOLING FAN MOTORS

Refer to EC-467, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

UBS00BCT

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	See MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-16, "Changing Engine Coolant" .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	SeeCO-9, "CHECKING RADIATOR CAP" .
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-8, "CHECKING COOLING SYSTEM FOR LEAKS" .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-12, "THERMOSTAT AND THERMOSTAT HOUSING" and CO-14, "RADIATOR" .
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-454).
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See MA-16, "Changing Engine Coolant" .
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See MA-16, "ENGINE MAINTENANCE (QG18DE ENGINE)" .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-61, "Inspection after Disassembly" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-71, "Inspection" .

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to CO-5, "Overheating Cause Analysis" .

Component Inspection

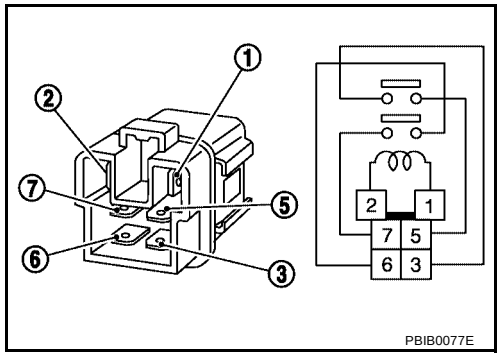
UBS00BCU

COOLING FAN RELAYS-1 AND -2

Check continuity between terminals 3 and 5, 6 and 7.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

If NG, replace relay.

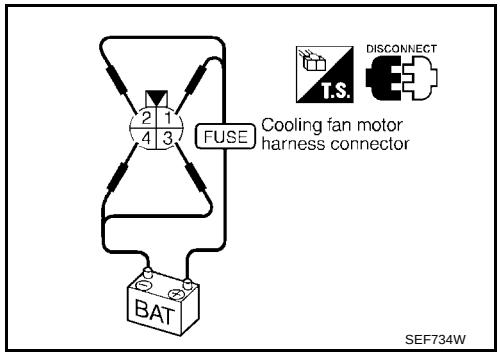


COOLING FAN MOTOR-1

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	Terminals	
		(+)	(–)
Cooling fan motor	Low	1	4
	High	1, 2	3, 4

Cooling fan motor should operate.
If NG, replace cooling fan motor.

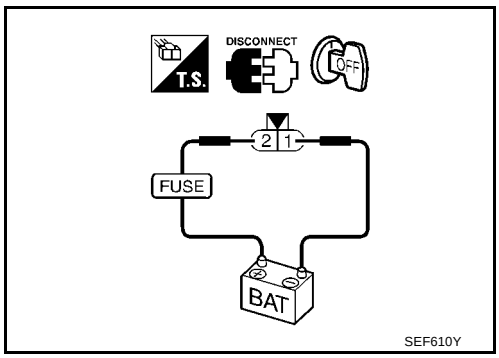


COOLING FAN MOTOR-2

1. Disconnect cooling fan motor harness connectors.

2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(–)
Cooling fan motor	2	1



Cooling fan motor should operate.
If NG, replace cooling fan motor.

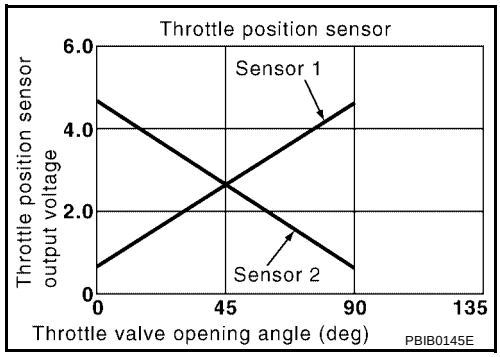
DTC P1225 TP SENSOR

PFP:16119

Component Description

UBS00BCV

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

UBS00BCW

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance problem	Closed throttle position learning value is excessively low.	● Electric throttle control actuator (TP sensor 1 and 2)

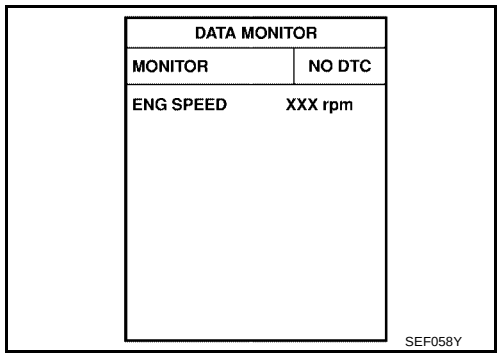
DTC Confirmation Procedure

UBS00BCX

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. If 1st trip DTC is detected, go to EC-470, "Diagnostic Procedure"
.



WITH GST

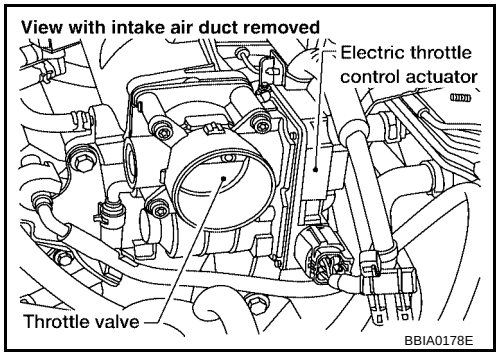
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00BCY

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-92, "Throttle Valve Closed Position Learning" .
3. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

Removal and Installation

UBS00BCZ

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer toEM-15, "OUTER COMPONENT PARTS" .

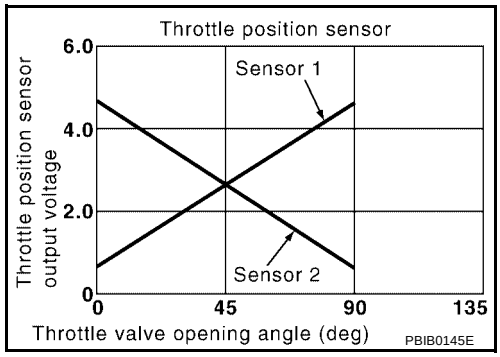
DTC P1226 TP SENSOR

PFP:16119

Component Description

UBS00BD0

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

UBS00BD1

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance problem	Closed throttle position learning is not performed successfully, repeatedly.	● Electric throttle control actuator (TP sensor 1 and 2)

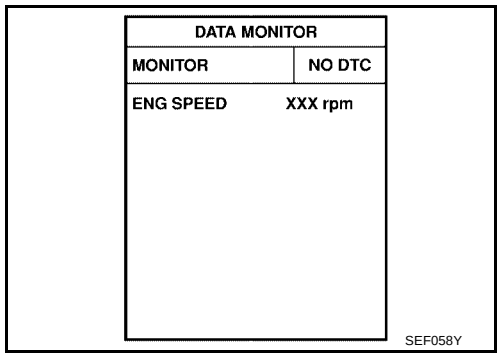
DTC Confirmation Procedure

UBS00BD2

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Repeat steps 3 and 4, 32 times.
6. If 1st trip DTC is detected, go to EC-472, "Diagnostic Procedure"
.



WITH GST

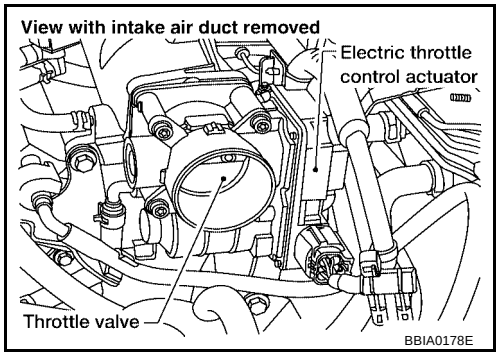
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00BD3

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-92, "Throttle Valve Closed Position Learning" .
3. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

Removal and Installation

UBS00BD4

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-15, "OUTER COMPONENT PARTS" .

DTC P1229 SENSOR POWER SUPPLY

PFP:16119

On Board Diagnosis Logic

UBS00KJV

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229 1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	● Harness or connectors (APP sensor 1 circuit is shorted.) (PSP sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) ● Swirl control valve position sensor circuit is shorted (SULEV model) ● Accelerator pedal position sensor ● Power steering pressure sensor ● Refrigerant pressure sensor ● EVAP control system pressure sensor ● Swirl control valve position sensor (SULEV model)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

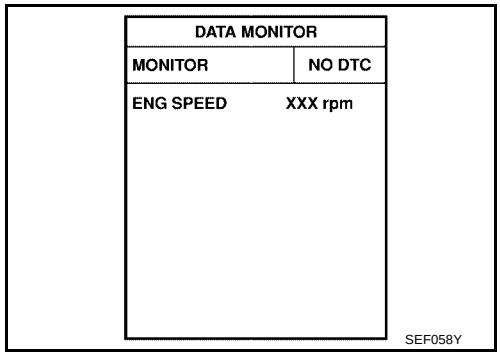
UBS00KJW

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-475, "Diagnostic Procedure" .



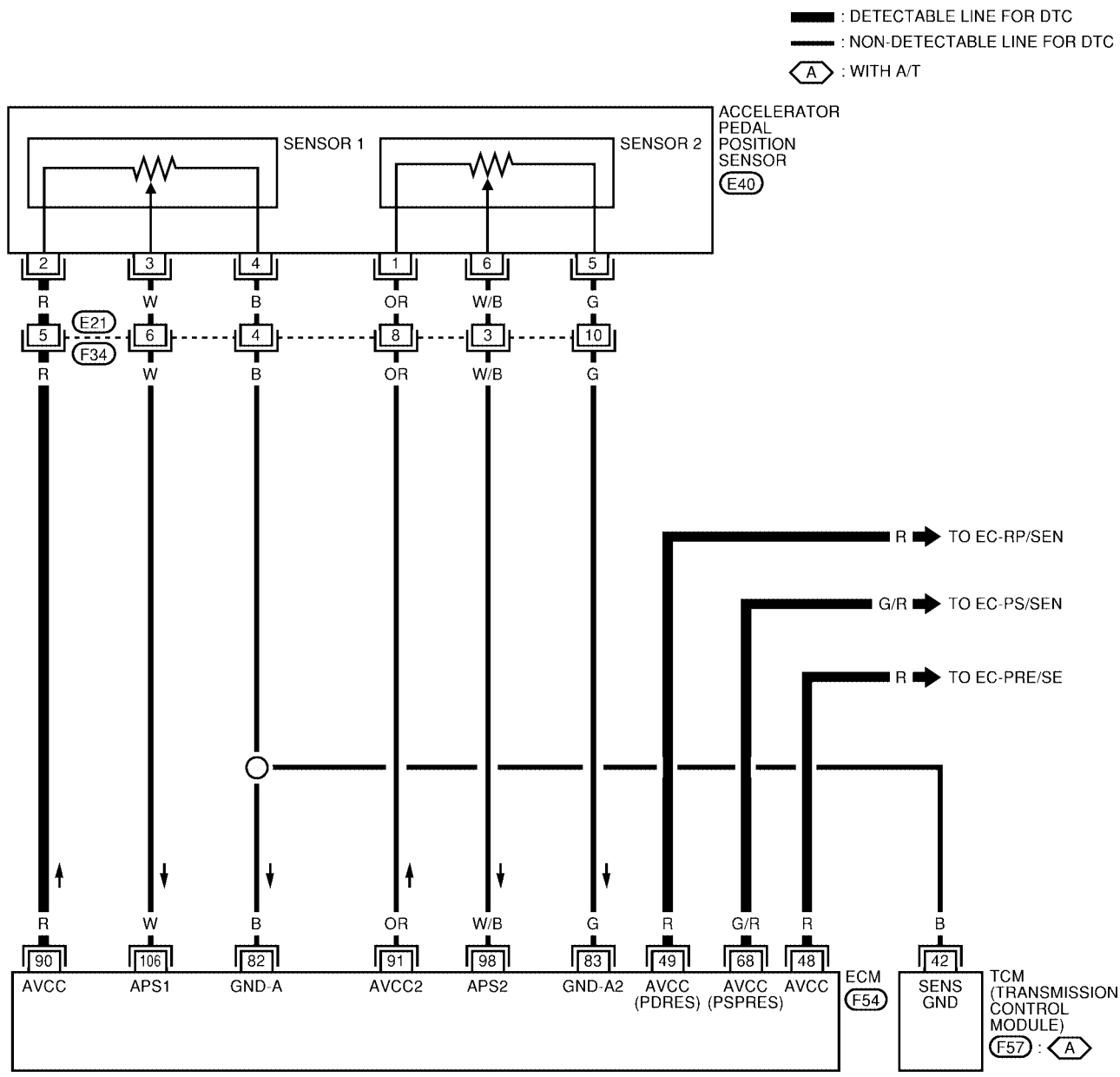
WITH GST

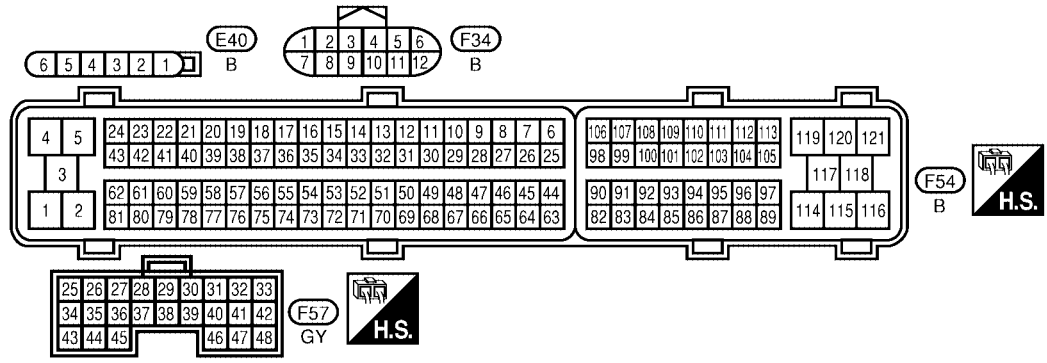
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00KJX

EC-SEN/PW-01





BBWA1241E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

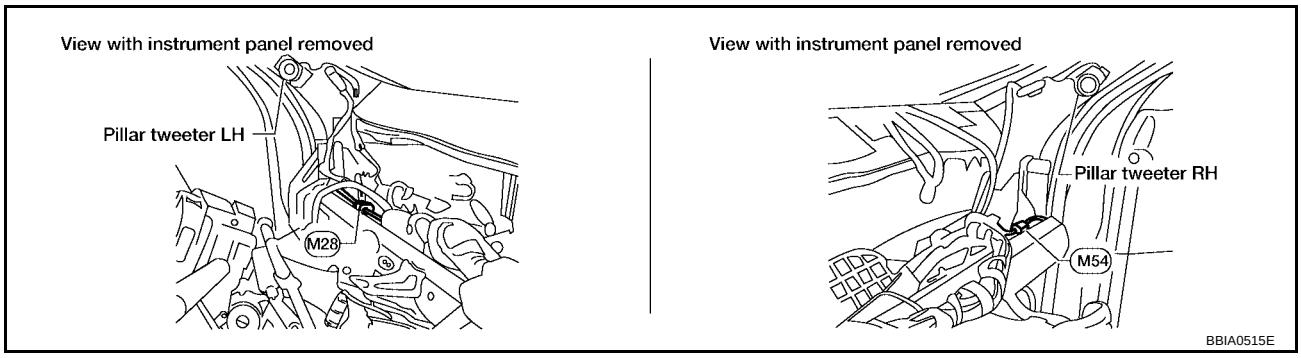
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
48	R/W	Sensor power supply	**[Ignition switch: ON]**	Approximately 5V
49	R/Y	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
68	G/R	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

UBS00KJY

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.
   Refer to EC-170, "Ground Inspection" .

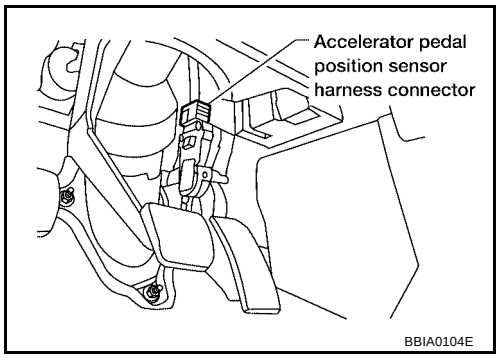


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

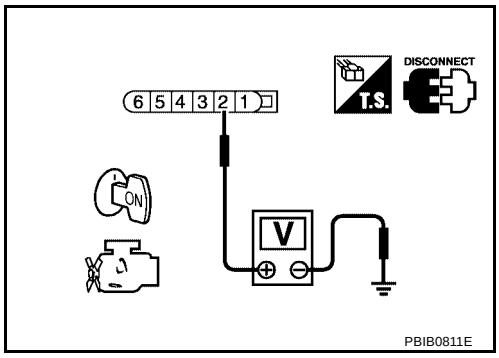
2. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 3.

3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
90	APP sensor terminal 2	EC-595
48	Swirl control valve position sensor terminal 3.	EC-423
49	Refrigerant pressure sensor terminal 1	EC-627
68	PSP sensor terminal 1	EC-377

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.

- Refrigerant pressure sensor (Refer to EC-625 .)
- Power steering pressure sensor (Refer toEC-380 .)
- EVAP control system pressure sensor (Refer to EC-346 .)
- Swirl control valve position sensor (Refer to EC-421 .)

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning component.

5. CHECK APP SENSOR

Refer to EC-600, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-92, "Accelerator Pedal Released Position Learning" .
3. Perform EC-92, "Throttle Valve Closed Position Learning" .
4. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1271 A/F SENSOR 1

PFP:22693

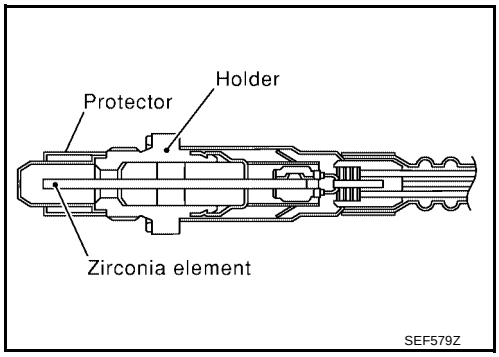
Component Description

UBS00BD9

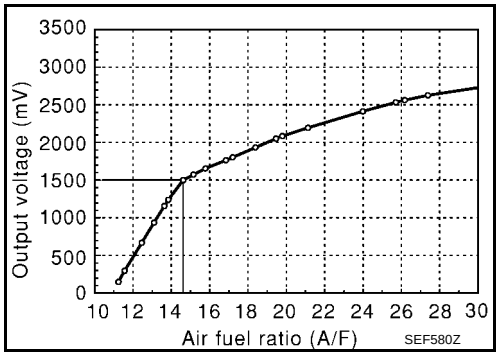
The A/F sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air-fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

UBS00BDA

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

UBS00BDB

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1271 1271	Air fuel ratio (A/F) sensor 1 circuit no activity detected	● The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0V.	● Harness or connectors (The sensor circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

UBS00BDC

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

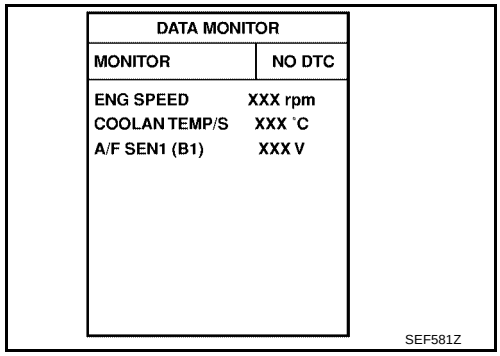
TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-II.

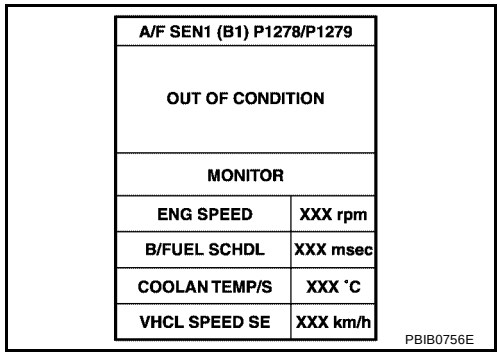
3. Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 0V, go to EC-482, "Diagnostic Procedure" .
   If the indication is not constantly approx. 0V, go to next step.
4. Select “A/F SEN1 (B1) P1278/P1279” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
5. Touch “START”.



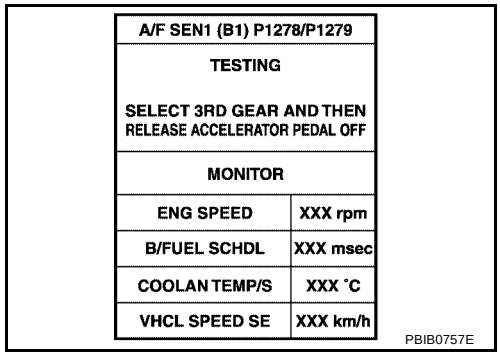
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

ENG SPEED	1,000 - 3,200 rpm
Vehicle speed	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	● D position with “OD” ON (A/T) ● 4th position (M/T)

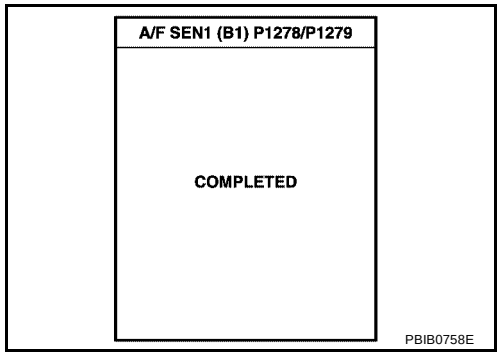
If “TESTING” is not displayed after 20 seconds, retry from step 2.



7. Following the instructions of CONSULT-II screen, set D position with “OD” OFF (A/T) or 3rd position (M/T) and release accelerator pedal fully.



8. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
9. Touch “BACK” and “MODE”, then select “SELF-DIAG RESULT” mode.
   If P1271 is displayed, go to EC-482, "Diagnostic Procedure" .
   If another DTC is displayed, go to the corresponding “Diagnostic Procedure”.



Overall Function Check

UBS00BDD

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position with “OD” OFF (A/T) or 3rd position (M/T).

NOTE:
Keep the accelerator pedal as steady as possible during the cruising.

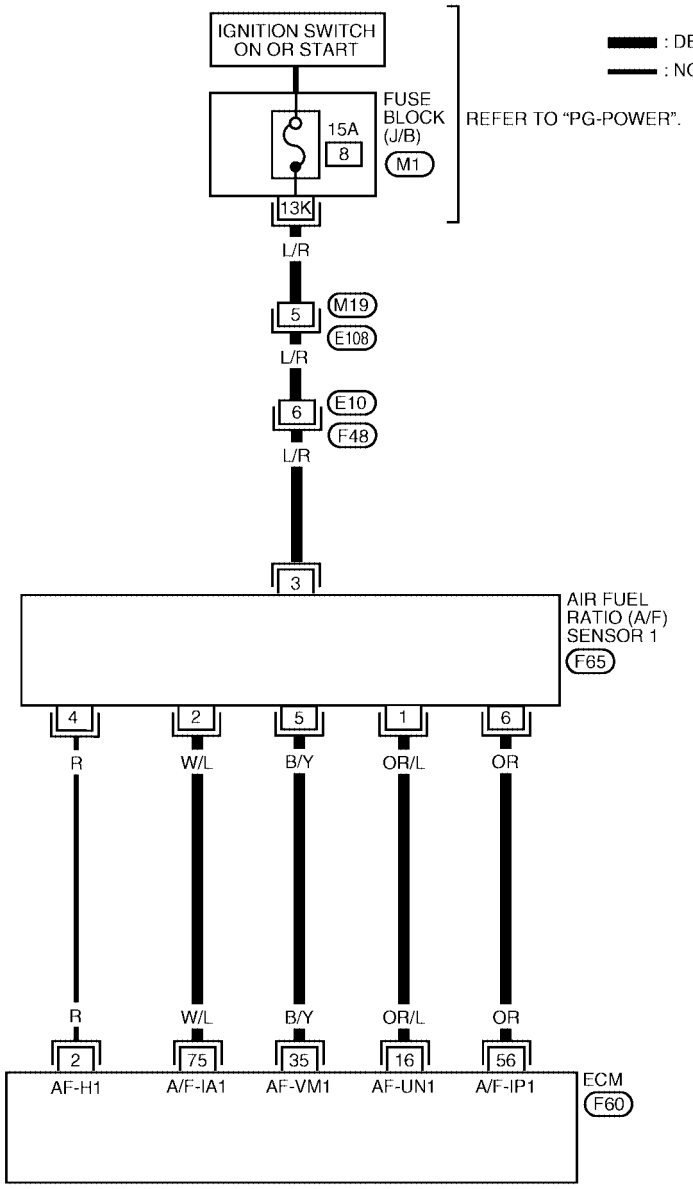
3. Set D position with “OD” ON (A/T) or 4th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

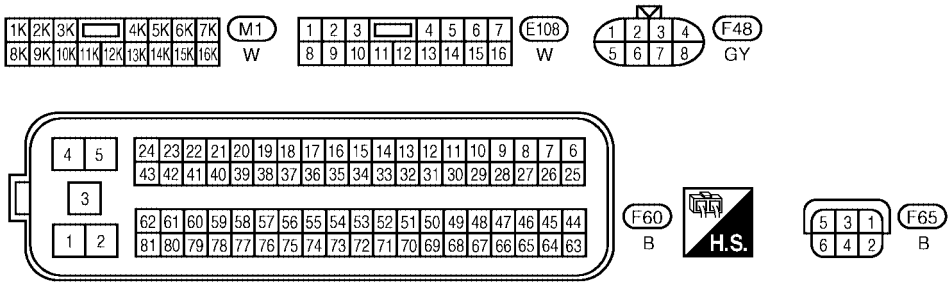
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.
   If the DTC is displayed, go to EC-482, "Diagnostic Procedure" .

Wiring Diagram

UBS00BDE

EC-A/F-01





BBWA1454E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

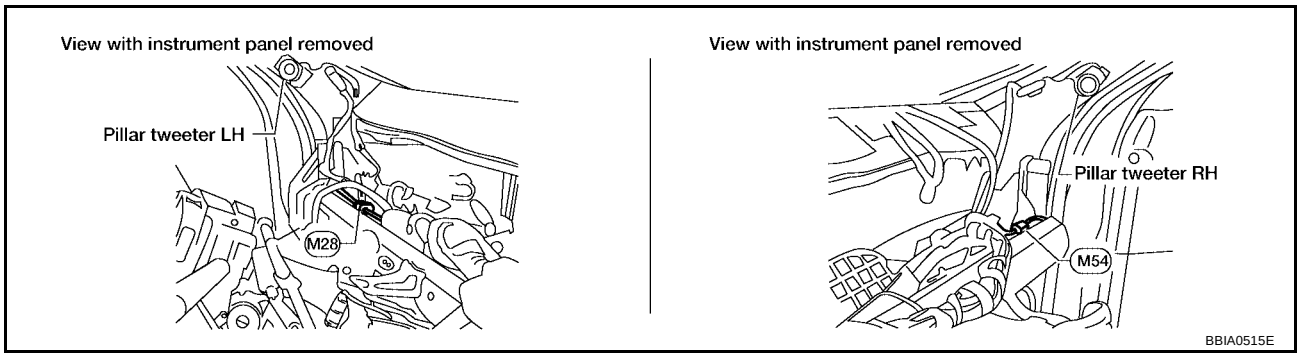
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	B/Y			Approximately 2.6V
56	OR			2 - 3V
75	W/L			2 - 3V

Diagnostic Procedure

UBS00BDF

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .



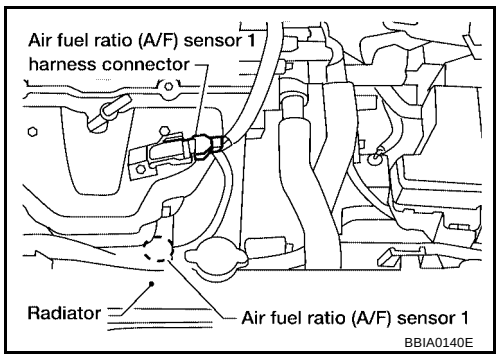
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector and A/F sensor 1 harness connector.
2. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	16
2	75
5	35
6	56



Continuity should exist.

3. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00BDG

AIR FUEL RATIO SENSOR 1

Refer to EM-15, "Removal and Installation" .

DTC P1272 A/F SENSOR 1

PFP:22693

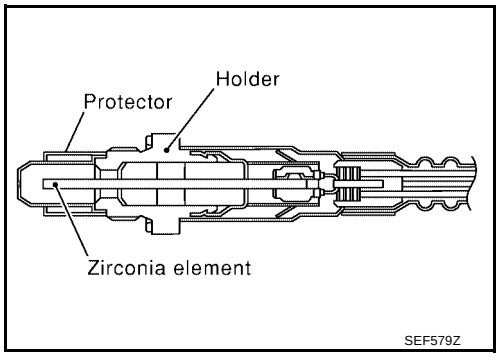
Component Description

UBS00BDH

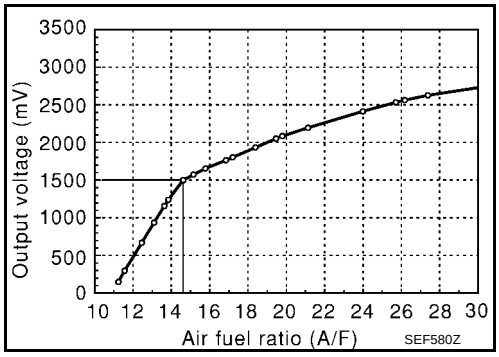
The A/F sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air-fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

UBS00BDI

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

UBS00BDJ

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1272 1272	Air fuel ratio (A/F) sensor 1 circuit no activity detected	● The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 4.5V.	● Harness or connectors (The sensor circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

UBS00BDK

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

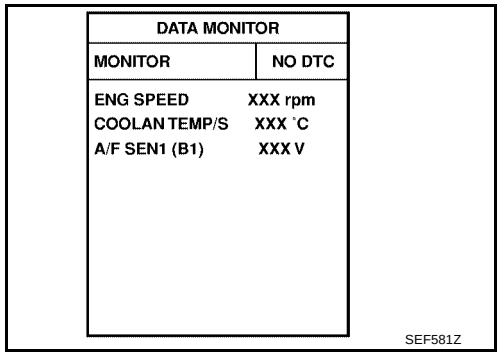
TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-II.

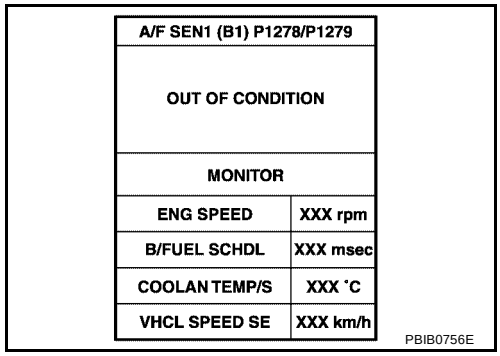
3. Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 4.5V, go to EC-488, "Diagnostic Procedure" .
   If the indication is not constantly approx. 4.5V, go to next step.
4. Select “A/F SEN1 (B1) P1278/P1279” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
5. Touch “START”.



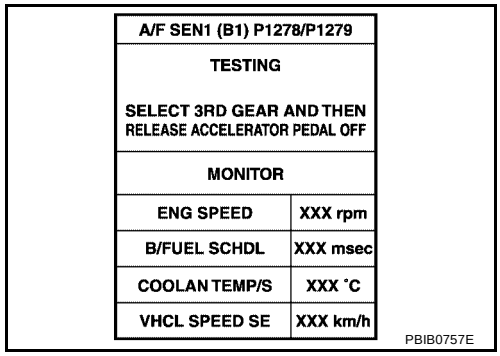
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

ENG SPEED	1,000 - 3,200 rpm
Vehicle speed	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
Selector lever	● D position with “OD” ON (A/T) ● 4th position (M/T)

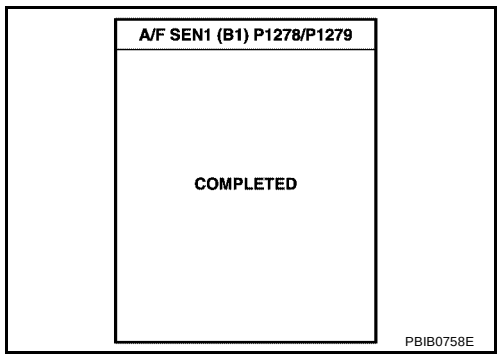
If “TESTING” is not displayed after 20 seconds, retry from step 2.



7. Following the instructions of CONSULT-II screen, set D position with “OD” OFF (A/T) or 3rd position (M/T) and release accelerator pedal fully.



8. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
9. Touch “BACK” and “MODE”, then select “SELF-DIAG RESULT” mode.
   If P1272 is displayed, go to EC-488, "Diagnostic Procedure" .
   If another DTC is displayed, go to the corresponding Diagnostic Procedure.



Overall Function Check

UBS00BDL

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position with “OD” OFF (A/T) or 3rd position (M/T).

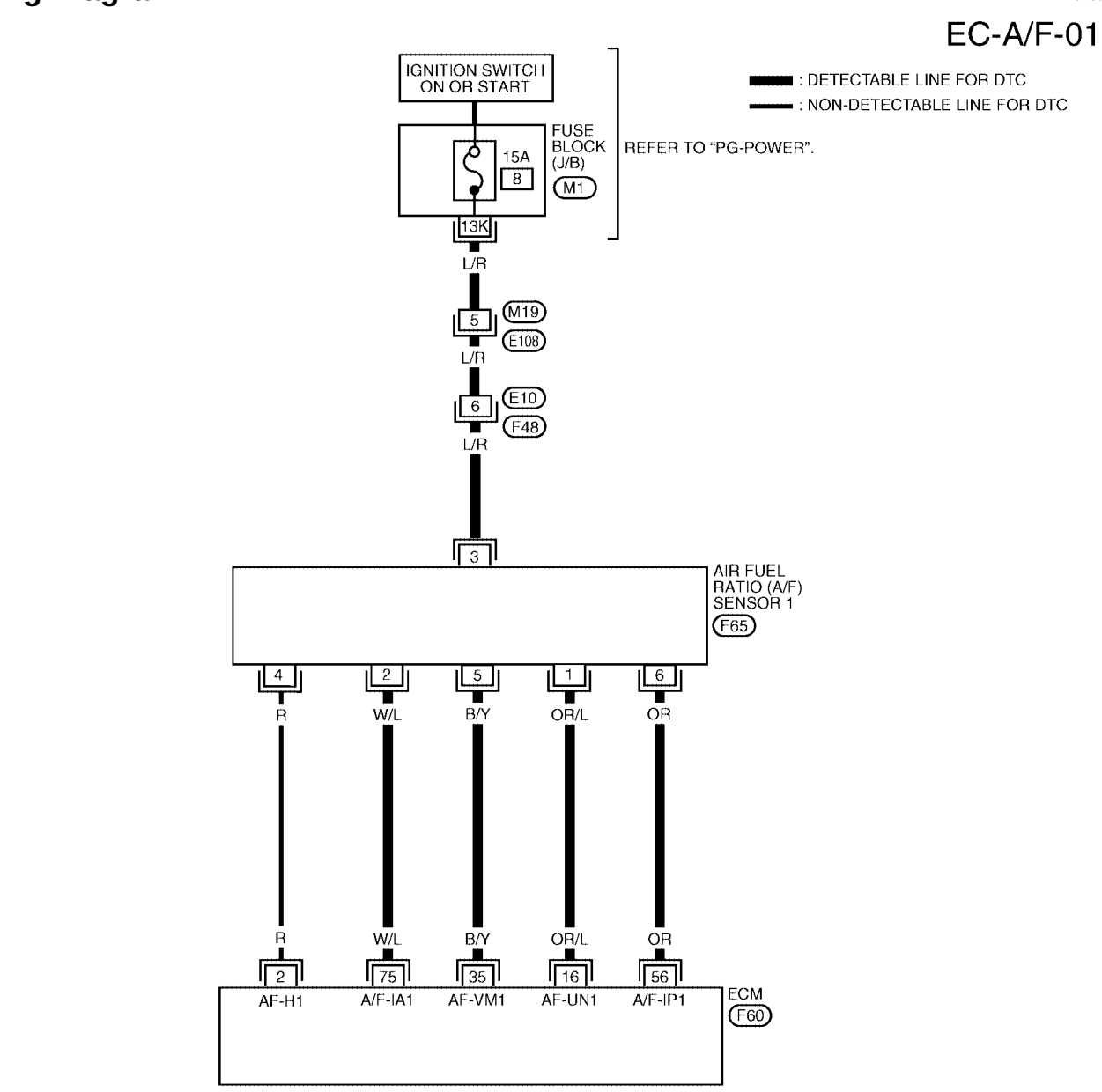
NOTE:
Keep the accelerator pedal as steady as possible during the cruising.

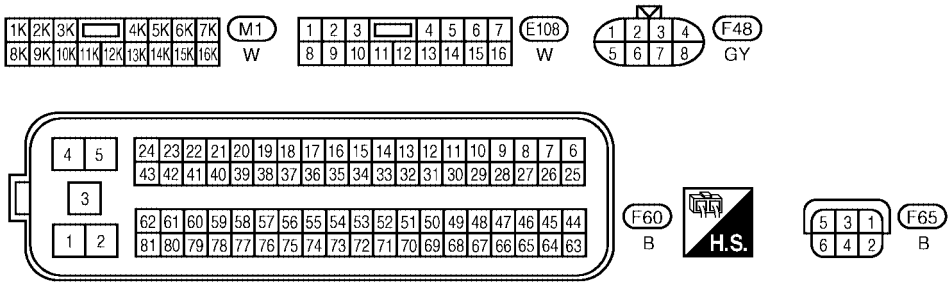
3. Set D position with “OD” ON (A/T) or 4th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.
   If the DTC is displayed, go to EC-488, "Diagnostic Procedure" .

Wiring Diagram

UBS00BDM





BBWA1454E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

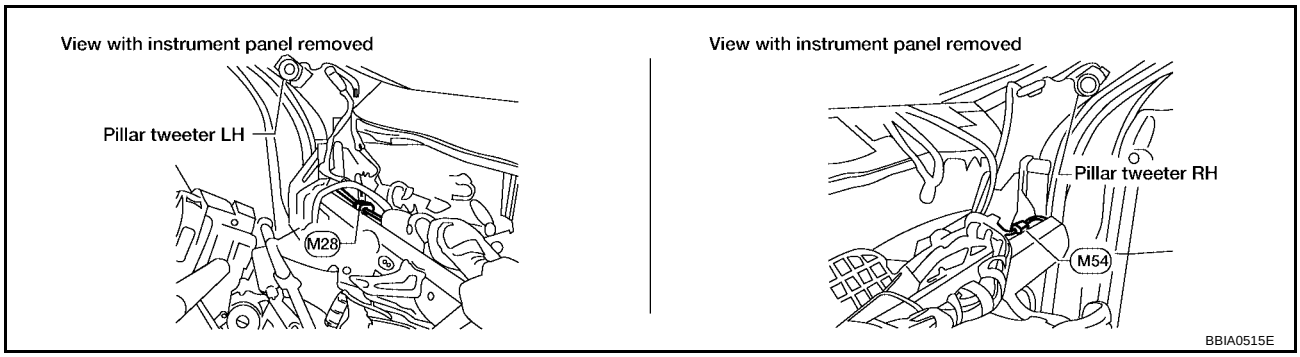
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	B/Y			Approximately 2.6V
56	OR			2 - 3V
75	W/L			2 - 3V

Diagnostic Procedure

UBS00BDN

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .



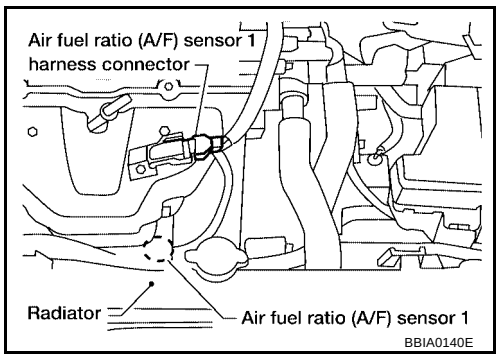
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector and A/F sensor 1 harness connector.
2. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	16
2	75
5	35
6	56



Continuity should exist.

3. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00BDO

AIR FUEL RATIO SENSOR 1

Refer to EM-15, "Removal and Installation" .

DTC P1273 A/F SENSOR 1

PFP:22693

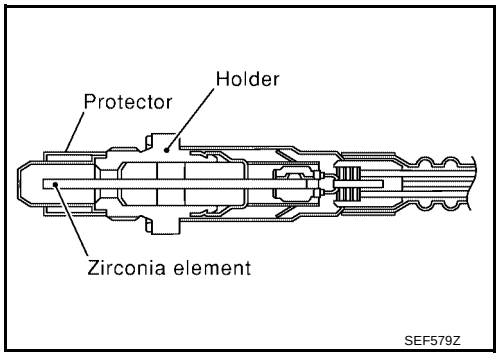
Component Description

UBS00BDP

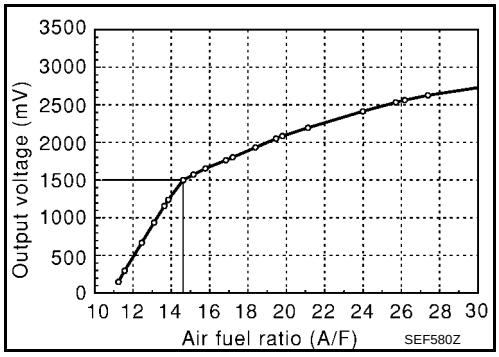
The A/F sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air-fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

UBS00BDQ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

UBS00BDR

To judge the malfunction, the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is monitored not to be shifted “lean” side or “rich” side. When the A/F signal is shifting to the lean side, the malfunction will be detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1273 1273	Air fuel ratio (A/F) sensor 1 lean shift monitoring	● The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period.	● Air fuel ratio (A/F) sensor 1 ● Air fuel ratio (A/F) sensor heater 1 ● Fuel pressure ● Fuel injectors ● Intake air leaks

DTC Confirmation Procedure

UBS00BDS

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

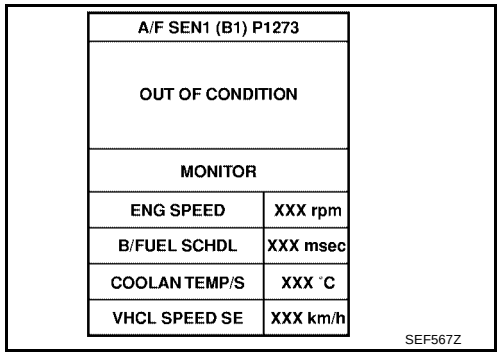
1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1) P1273” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
3. Touch “START”.

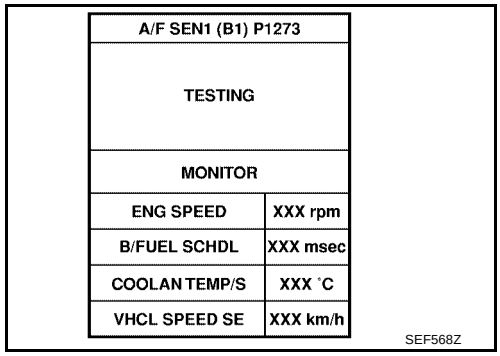
4. Maintain the following conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 400 to 800 seconds.)

   NOTE:
   Keep the accelerator pedal as steady as possible.

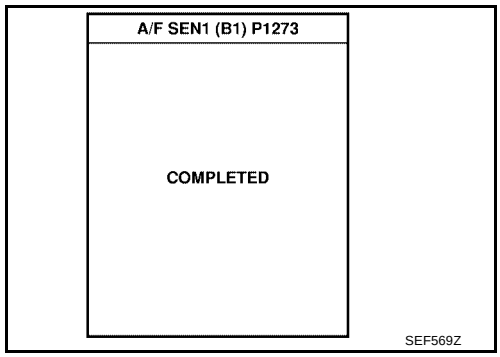
ENG SPEED	Below 3,200 rpm
B/FUEL SCHDL	Below 13.6 msec
Selector lever	P or N position

If “TESTING” is not displayed after 20 minutes, retry from step 2.





5. Make sure that OK is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, go to EC-494, "Diagnostic Procedure" .



Overall Function Check

UBS00BDT

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position with “OD” OFF (A/T) or 3rd position (M/T).

   NOTE:
   Keep accelerator pedal as steady as possible during the cruising.
3. Set D position with “OD” ON (A/T) or 4th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

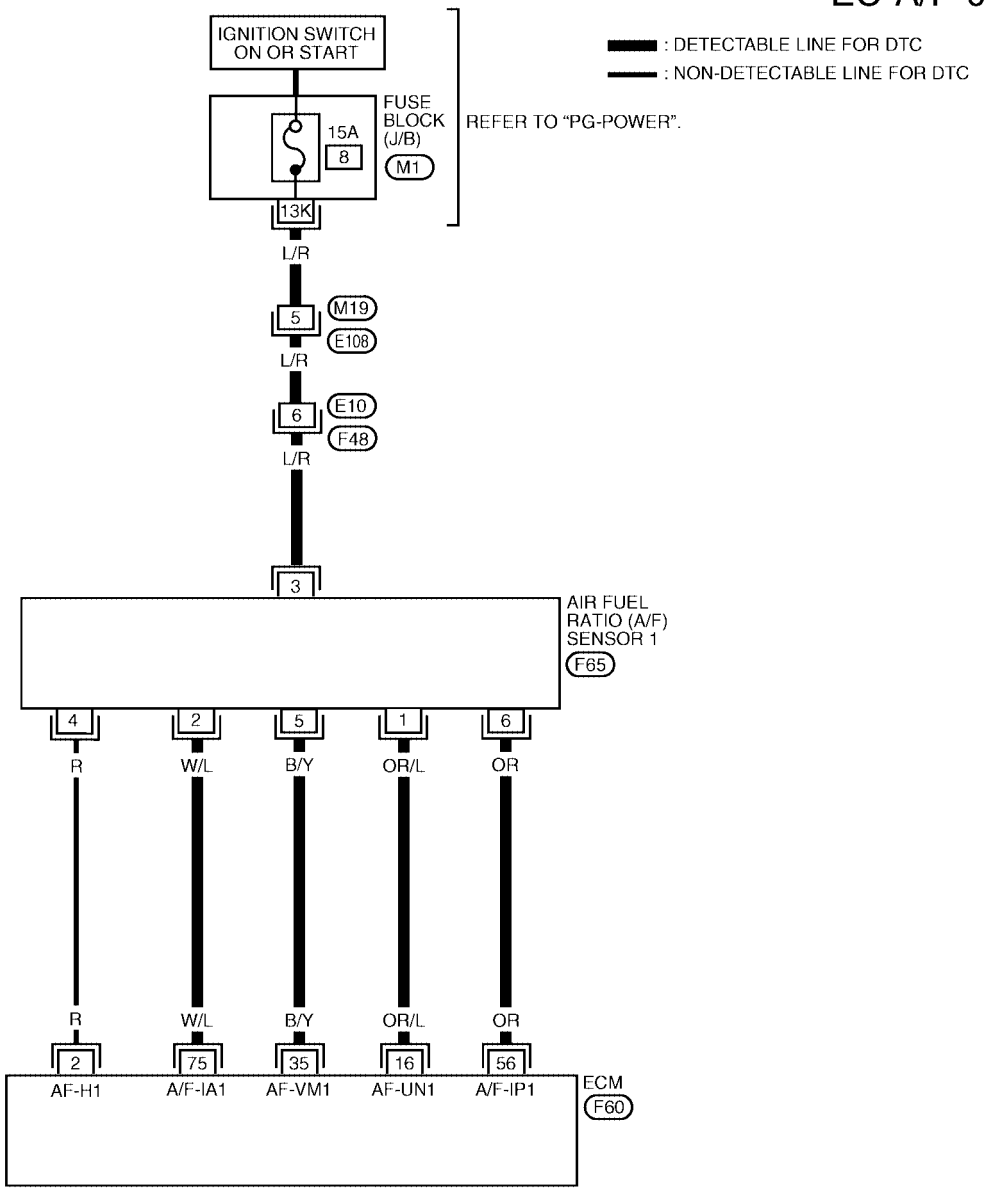
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.

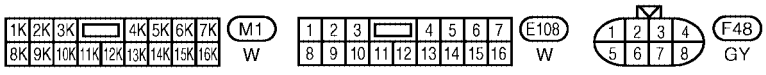
If the DTC is displayed, go to EC-494, "Diagnostic Procedure" .

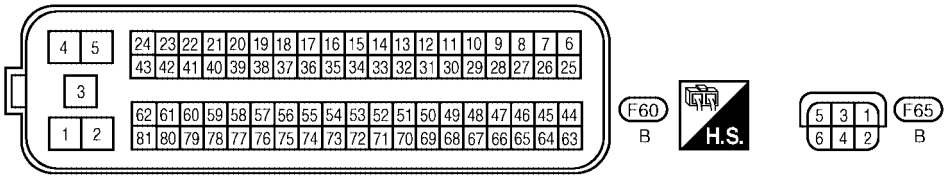
Wiring Diagram

UBS00BDU

EC-A/F-01







BBWA1454E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

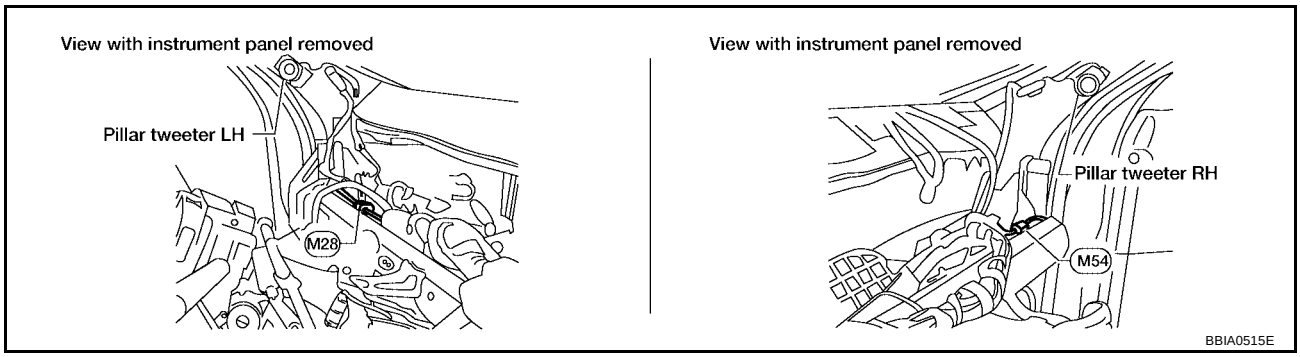
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	B/Y			Approximately 2.6V
56	OR			2 - 3V
75	W/L			2 - 3V

Diagnostic Procedure

UBS00BDV

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.

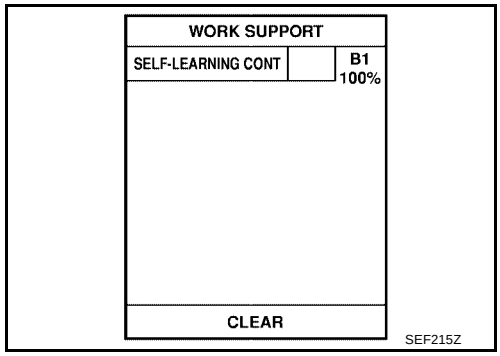
Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.

3. CLEAR THE SELF-LEARNING DATA.

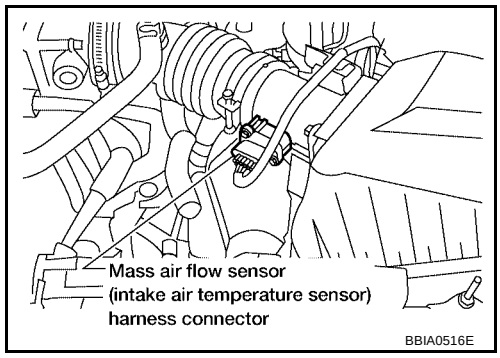
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?



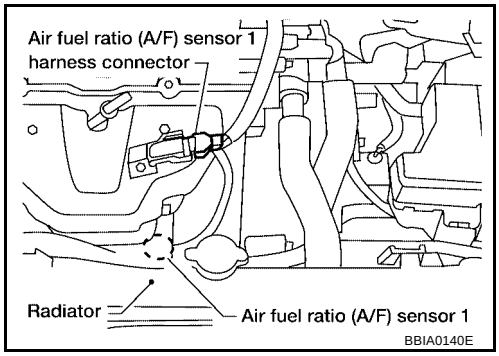
Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-241 .
No >> GO TO 4.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	16
2	75
5	35
6	56



Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK A/F SENSOR 1 HEATER

Refer to EC-388, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace A/F sensor 1.

6. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00BDW

AIR FUEL RATIO SENSOR 1

Refer to EM-15, "Removal and Installation" .

DTC P1274 A/F SENSOR 1

PFP:22693

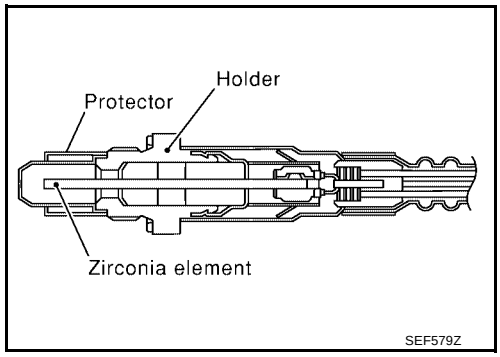
Component Description

UBS00BDX

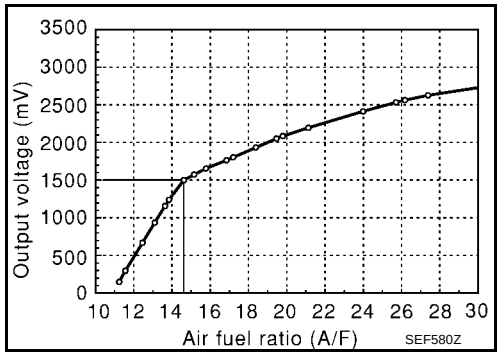
The A/F sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air-fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

UBS00BDY

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

UBS00BDZ

To judge the malfunction, the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is monitored not to be shifted to the lean side or rich side. When the A/F signal is shifting to the rich side, the malfunction will be detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1274 1274	Air fuel ratio (A/F) sensor 1 rich shift monitoring	● The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period.	● Air fuel ratio (A/F) sensor 1 ● Air fuel ratio (A/F) sensor heater 1 ● Fuel pressure ● Fuel injectors

DTC Confirmation Procedure

UBS00BE0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

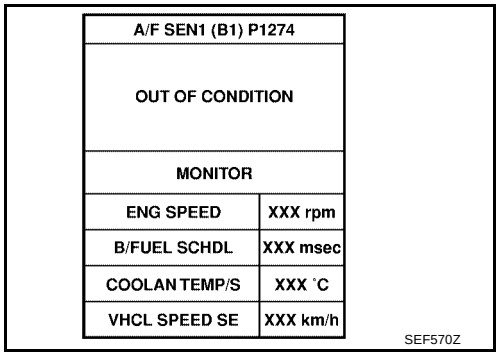
1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1) P1274” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
3. Touch “START”.

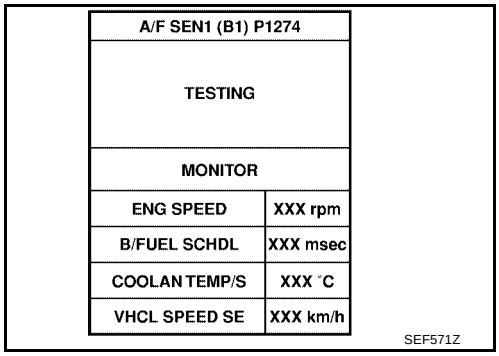
4. Maintain the following conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 400 to 800 seconds.)

   NOTE:
   Keep the accelerator pedal as steady as possible.

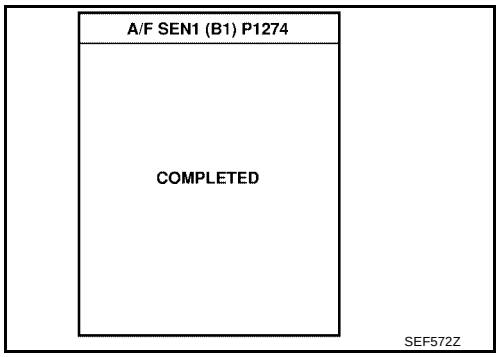
ENG SPEED	Below 3,200 rpm
B/FUEL SCHDL	Below 13.6 msec
Selector lever	P or N position

If “TESTING” is not displayed after 20 minutes, retry from step 2.





5. Make sure that OK is displayed after touching “SELF-DIAG RESULTS”.
   If NG is displayed, go to EC-501, "Diagnostic Procedure" .



Overall Function Check

UBS00BE1

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position with “OD” OFF (A/T) or 3rd position (M/T).

   NOTE:
   Keep accelerator pedal as steady as possible during the cruising.
3. Set D position with “OD” ON (A/T) or 4th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

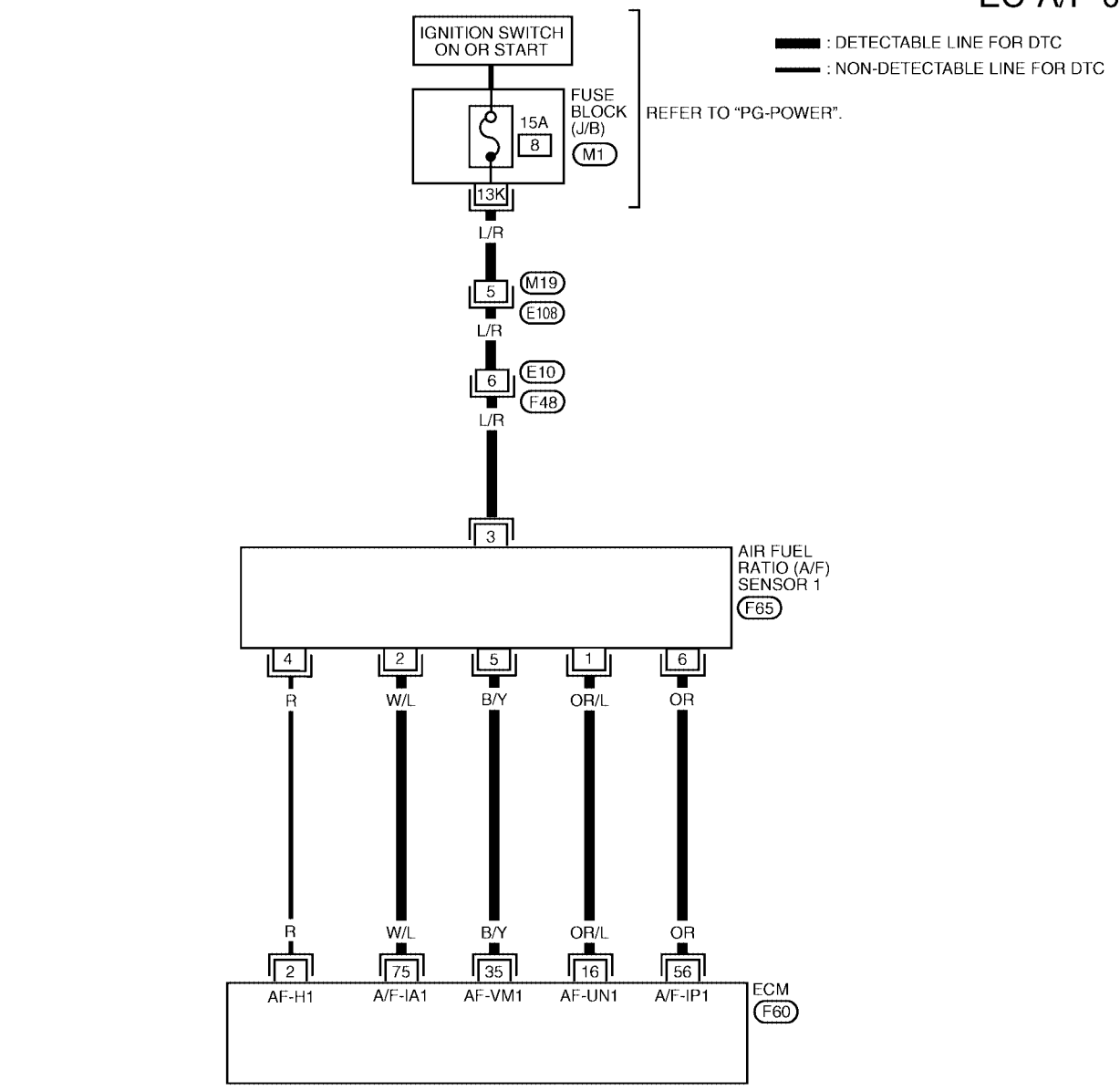
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.

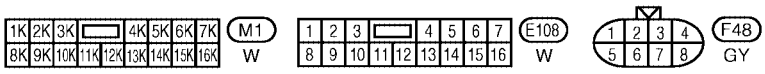
If the DTC is displayed, go to EC-501, "Diagnostic Procedure" .

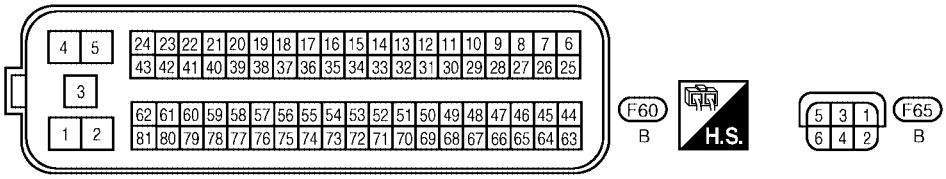
Wiring Diagram

UBS00BE2

EC-A/F-01







BBWA1454E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

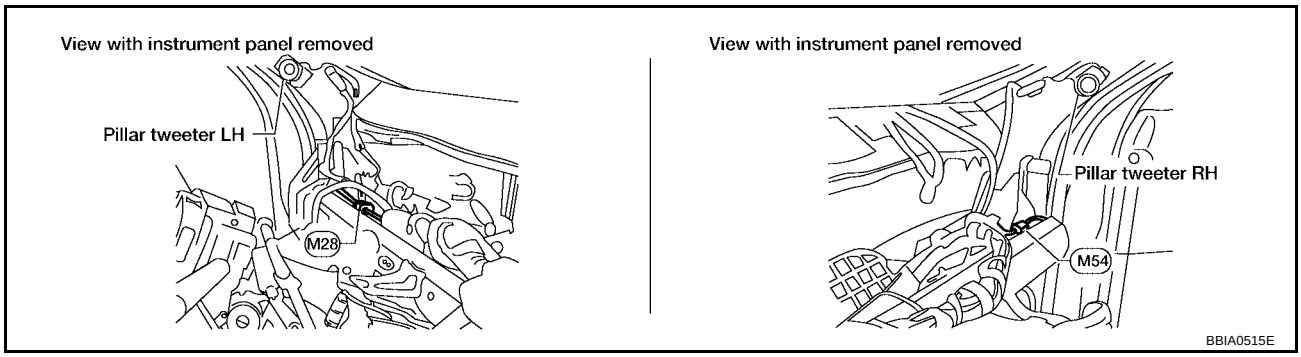
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	B/Y			Approximately 2.6V
56	OR			2 - 3V
75	W/L			2 - 3V

Diagnostic Procedure

UBS00BE3

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.

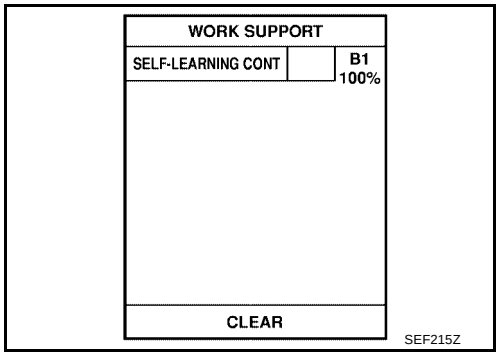
Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.

3. CLEAR THE SELF-LEARNING DATA

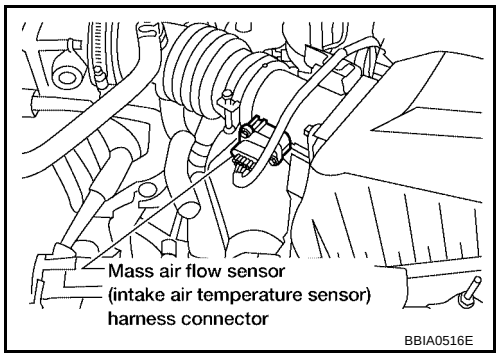
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-248 .
No >> GO TO 4.

4. CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Check harness connector for water.
   Water should not exit.

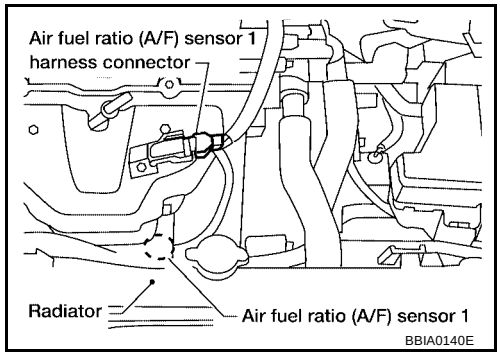
OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness connector.

5. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	16
2	75
5	35
6	56



Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK A/F SENSOR 1 HEATER

Refer to EC-388, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace A/F sensor 1.

7. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00BE4

AIR FUEL RATIO SENSOR 1

Refer to EM-15, "Removal and Installation" .

DTC P1276 A/F SENSOR 1

PFP:22693

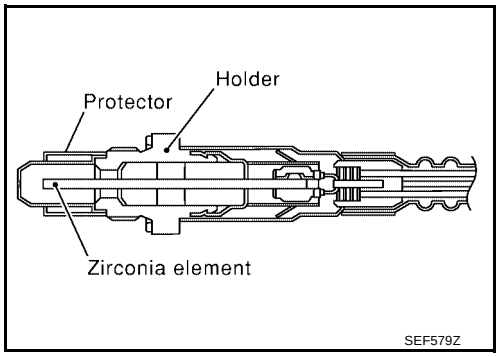
Component Description

UBS00BE5

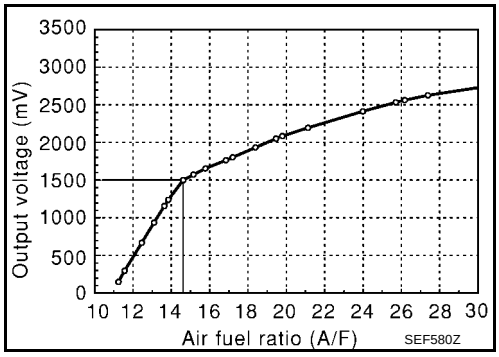
The A/F sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air-fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

UBS00BE6

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

UBS00BE7

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1276 1276	Air fuel ratio (A/F) sensor 1 circuit high voltage	● The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 1.5V.	● Harness or connectors (The sensor circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

UBS00BE8

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

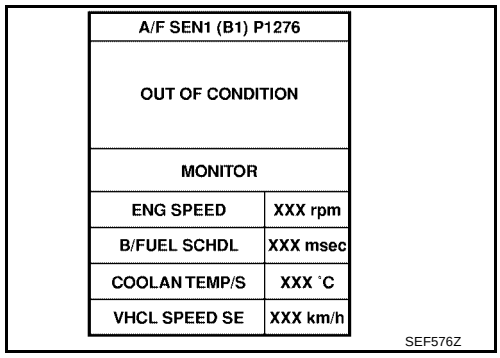
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” of “DATA MONITOR” mode with CONSULT-II.
3. Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 1.5V and does not fluctuates, go to EC-508, "Diagnostic Procedure" .
   If the indication fluctuates around 1.5V, go to next step.

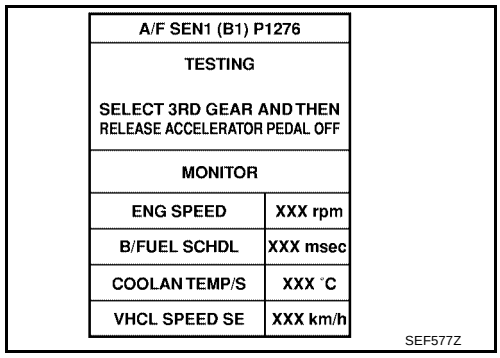
4. Select “A/F SEN1 (B1) P1276” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
5. Touch “START”.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

ENG SPEED	1,750 - 2,000 rpm (A/T) 1,750 - 2,900 rpm (M/T)
Vehicle speed	More than 65 km/h (40 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	● D position with “OD” ON (A/T) ● 4th position (M/T)

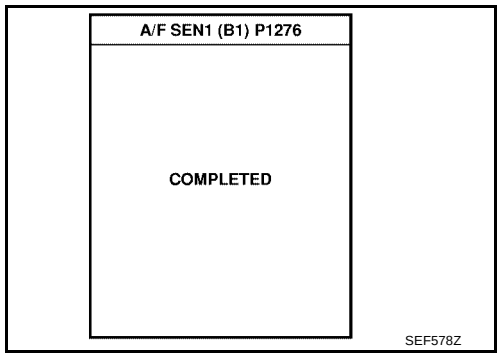


If “TESTING” is not displayed after 20 seconds, retry from step 2.

7. Following the instructions of CONSULT-II screen, set D position with “OD” OFF (A/T) or 3rd position (M/T) and release accelerator pedal fully.



8. Make sure that “TESTING” changes to “COMPLETED”.
If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
9. Make sure that OK is displayed after touching “SELF-DIAG RESULT”.
If NG is displayed, go to EC-508, "Diagnostic Procedure" .



Overall Function Check

UBS00BE9

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

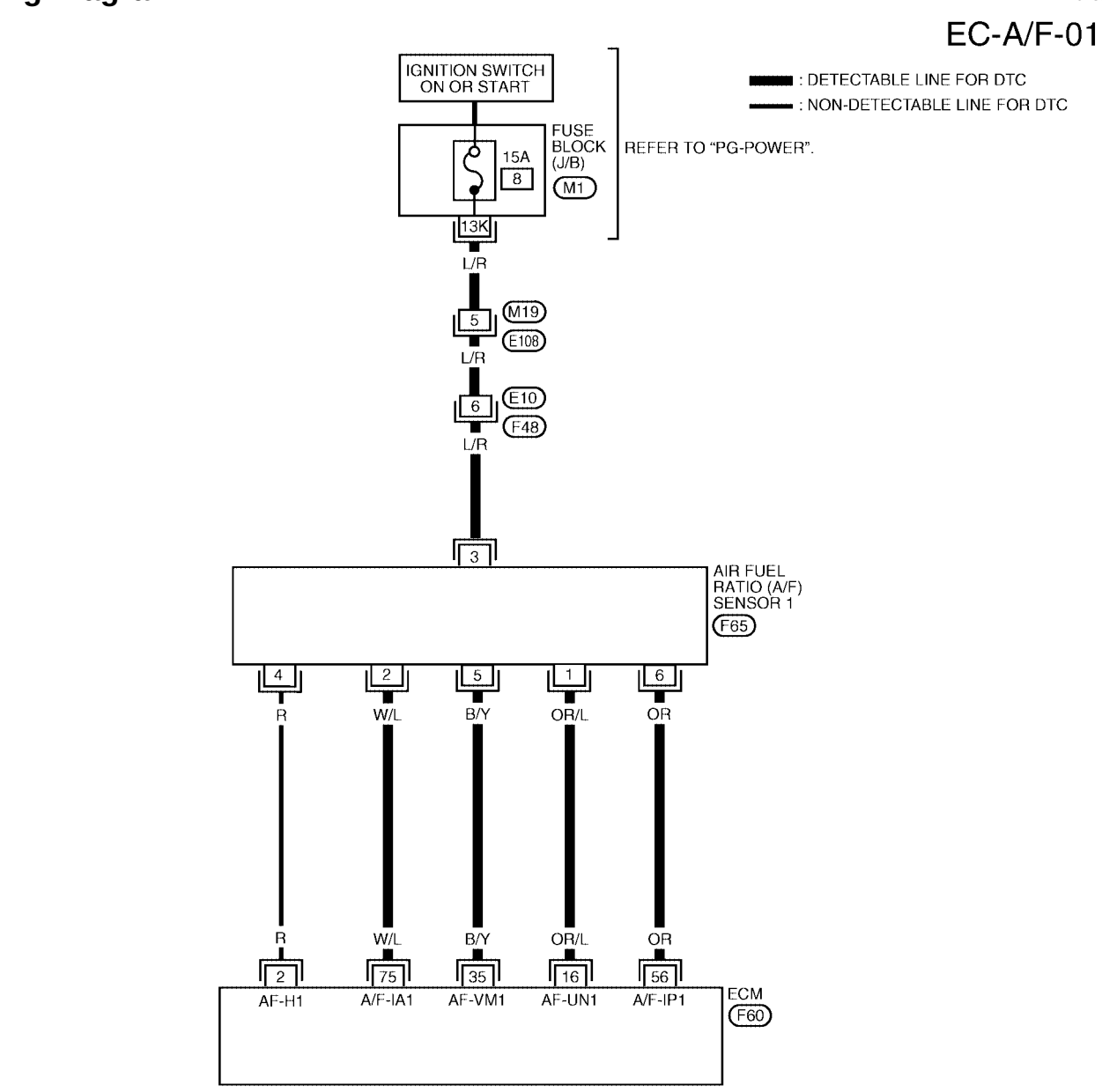
WITH GST

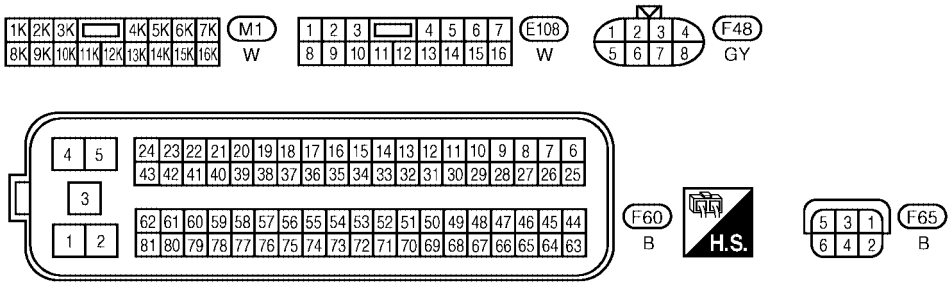
1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position with “OD” OFF (A/T) or 3rd position (M/T).
NOTE:
Keep the accelerator pedal as steady as possible during the cruising.
3. Set D position with “OD” ON (A/T) or 4th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
NOTE:
Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.

7. Repeat steps 2 to 3 five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.
   If the DTC is displayed, go to EC-508, "Diagnostic Procedure" .

Wiring Diagram

UBS00BEA





BBWA1454E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

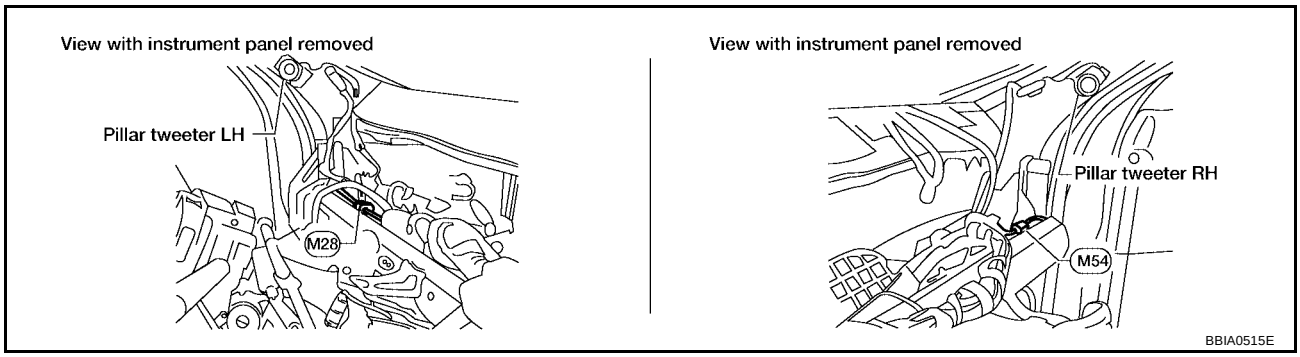
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	B/Y			Approximately 2.6V
56	OR			2 - 3V
75	W/L			2 - 3V

Diagnostic Procedure

UBS00BEB

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .



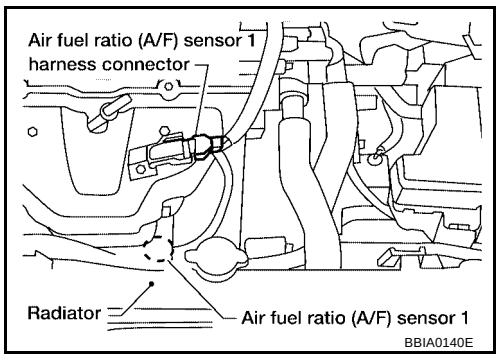
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector and A/F sensor 1 harness connector.
2. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	16
2	75
5	35
6	56



Continuity should exist.

3. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00BEC

AIR FUEL RATIO SENSOR 1

Refer to EM-15, "Removal and Installation" .

DTC P1278 A/F SENSOR 1

PFP:22693

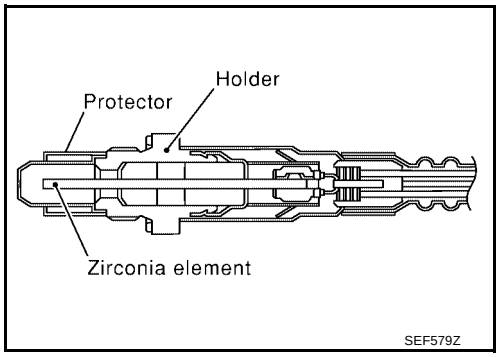
Component Description

UBS00BED

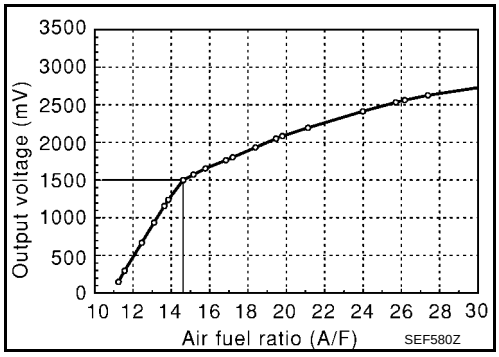
The A/F sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air/fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

UBS00BEE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

UBS00BEF

To judge the malfunction of air fuel ratio (A/F) sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the air fuel ratio (A/F) sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1278 1278	Air fuel ratio (A/F) sensor 1 circuit slow response	● The response (from RICH to LEAN) of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.	● Harness or connectors (The sensor circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1 ● Air fuel ratio (A/F) sensor heater 1 ● Fuel pressure ● Fuel injectors ● Intake air leaks ● Exhaust gas leaks ● PCV ● Mass air flow sensor

DTC Confirmation Procedure

UBS00BEG

CAUTION:
Always drive vehicle at a safe speed.

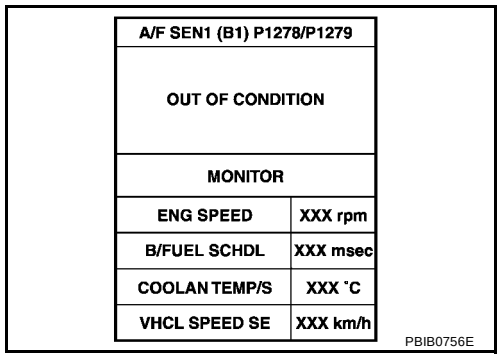
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

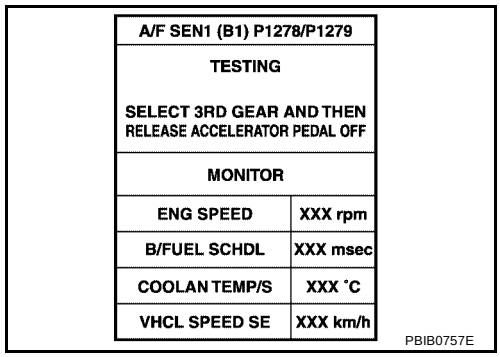
1. Perform EC-92, "Idle Air Volume Learning" . Make sure that “CMPLT” is displayed on CONSULT-II screen. If “INCMP” is displayed, follow the instruction for Idle Air Volume Learning.
2. Select “A/F SEN1 (B1) P1278/P1279” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
3. Touch “START”.
4. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

ENG SPEED	1,750 - 2,000 rpm (A/T) 1,750 - 2,900 rpm (M/T)
Vehicle speed	More than 65 km/h (40 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	● D position with “OD” ON (A/T) ● 4th position (M/T)

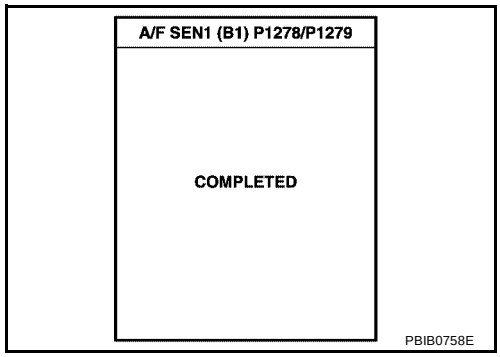


If “TESTING” is not displayed after 20 seconds, retry from step 2.

5. Following the instructions of CONSULT-II screen, set D position with “OD” OFF (A/T) or 3rd position (M/T) and release accelerator pedal fully.



6. Make sure that “TESTING” changes to “COMPLETED”.
If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
7. Make sure that OK is displayed after touching “SELF-DIAG RESULT”.
If NG is displayed, go to EC-514, "Diagnostic Procedure" .



Overall Function Check

UBS00BEH

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Perform EC-92, "Idle Air Volume Learning" . Make sure the result is OK. If NG, follow the instruction for Idle Air Volume Learning.

2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position with “OD” OFF (A/T) or 3rd position (M/T).

   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.

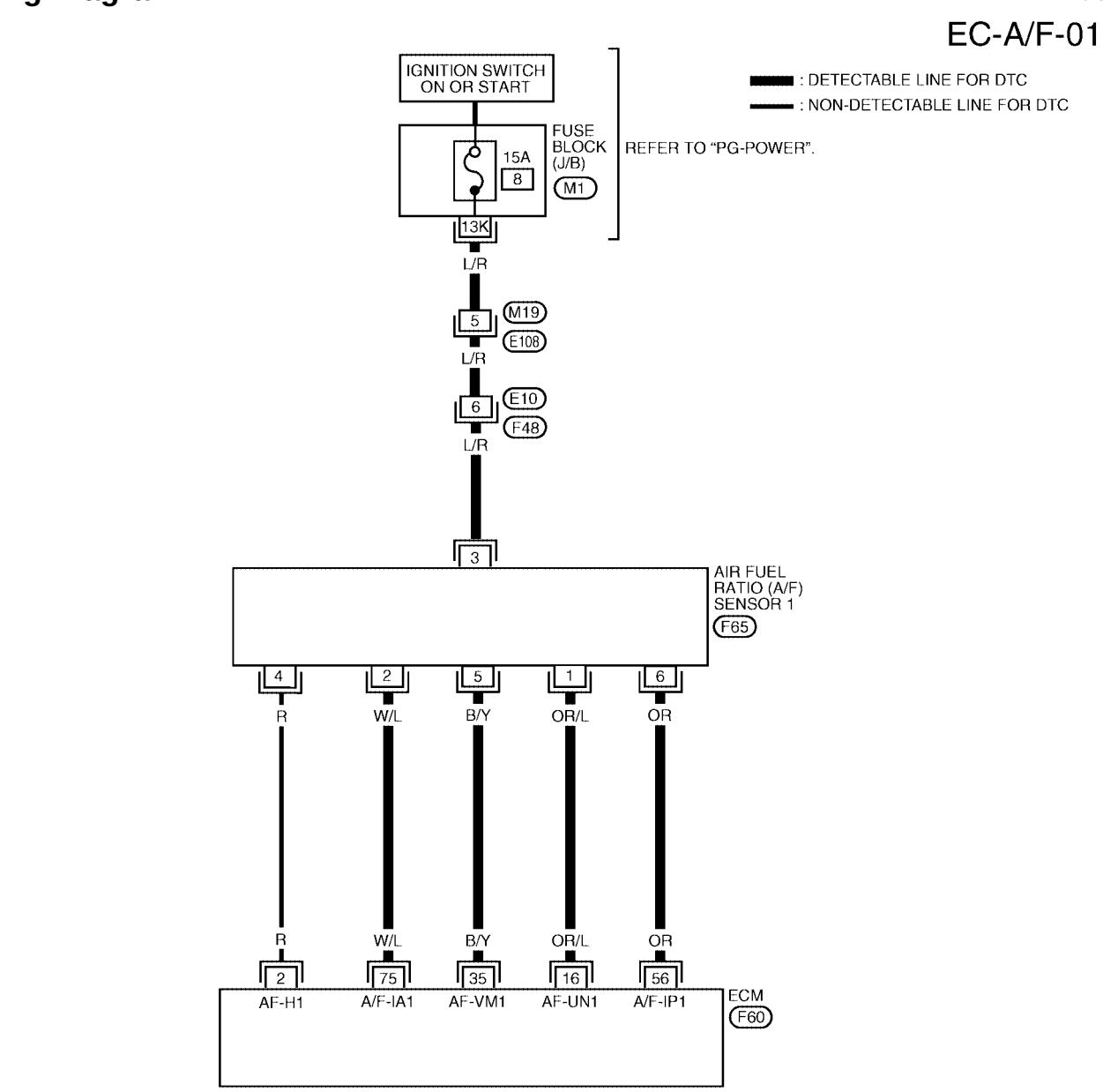
3. Set D position with “OD” ON (A/T) or 4th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

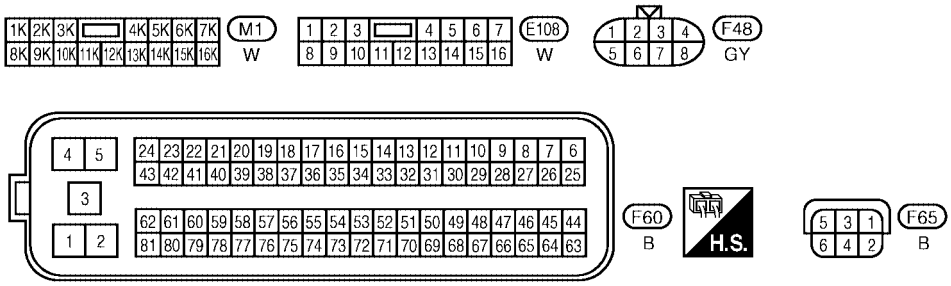
   NOTE:
   Never apply brake during releasing the accelerator pedal.

4. Repeat steps 2 to 3 five times.
5. Select Service $07 with GST.
   If 1st trip DTC is displayed, go to EC-514, "Diagnostic Procedure" .

Wiring Diagram

UBS00BEI





BBWA1454E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

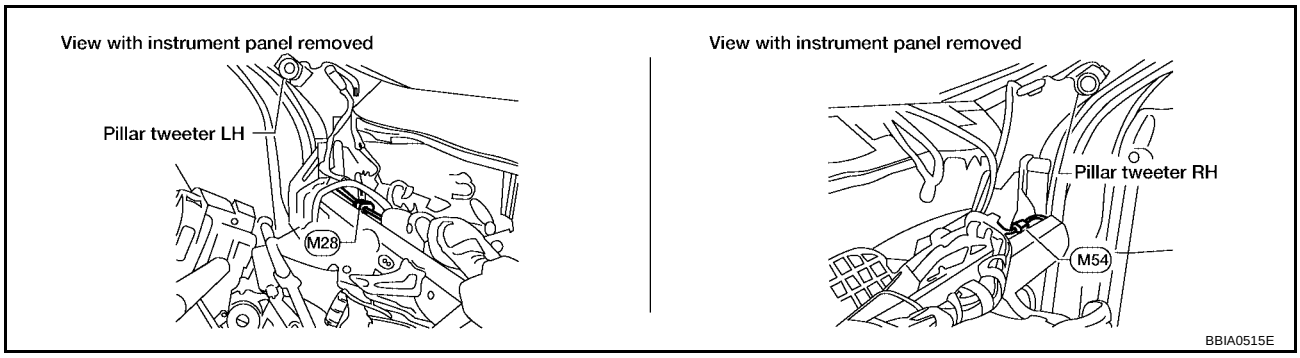
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	B/Y			Approximately 2.6V
56	OR			2 - 3V
75	W/L			2 - 3V

Diagnostic Procedure

UBS00BEJ

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.
   Refer to EC-170, "Ground Inspection" .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

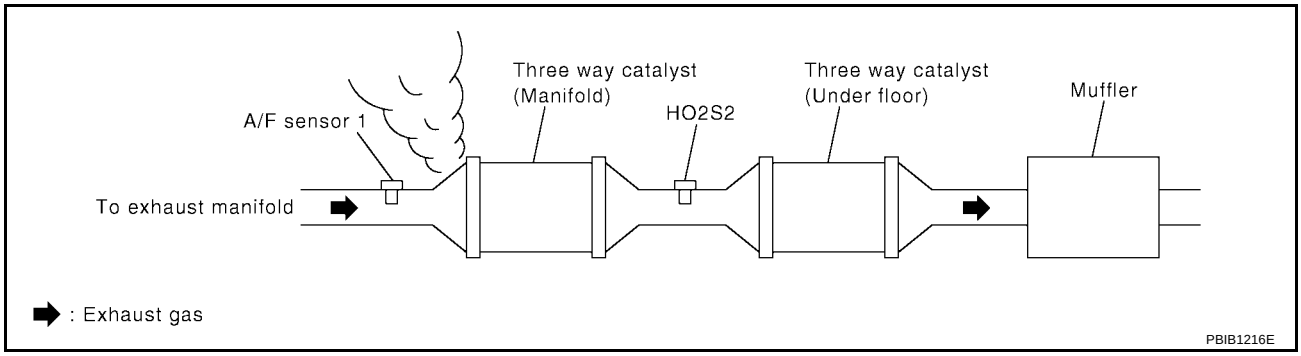
Loosen and retighten the air fuel ratio (A/F) sensor 1.

Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

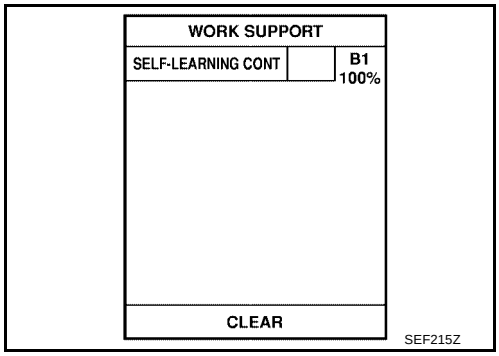
OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. CLEAR THE SELF-LEARNING DATA

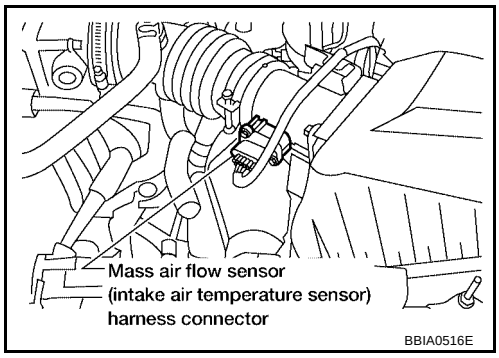
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR” or “START”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?



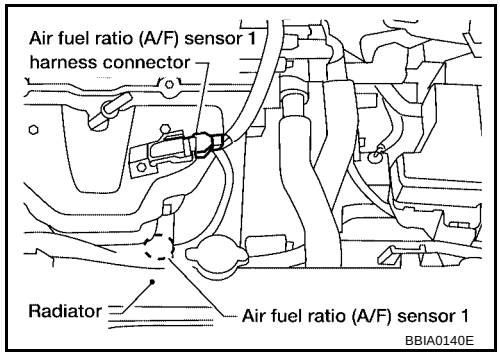
Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-241 , EC-248 .
No >> GO TO 6.

6. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	16
2	75
5	35
6	56



Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-388, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace A/F sensor 1.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-193, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK PCV VALVE

Refer toEC-49, "POSITIVE CRANKCASE VENTILATION" .

OK or NG

OK >> GO TO 10.
NG >> Repair or replace PCV valve.

10. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00BEK

AIR FUEL RATIO SENSOR 1

Refer to EM-15, "Removal and Installation" .

DTC P1279 A/F SENSOR 1

PFP:22693

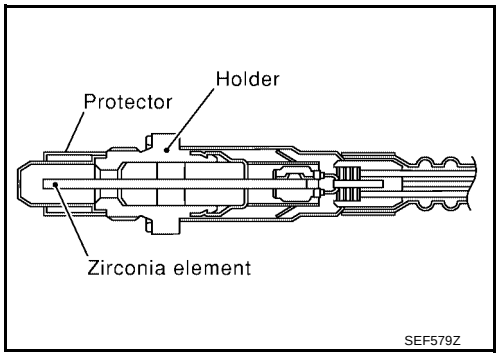
Component Description

UBS00BEL

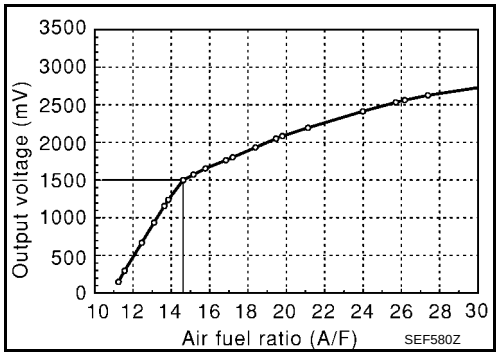
The A/F sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air-fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

UBS00BEM

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

UBS00BEN

To judge the malfunction of air fuel ratio (A/F) sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the air fuel ratio (A/F) sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1279 1279	Air fuel ratio (A/F) sensor 1 circuit slow response	● The response (from LEAN to RICH) of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.	● Harness or connectors (The sensor circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1 ● Air fuel ratio (A/F) sensor heater 1 ● Fuel pressure ● Fuel injectors ● Intake air leaks ● Exhaust gas leaks ● PCV ● Mass air flow sensor

DTC Confirmation Procedure

UBS00BEO

CAUTION:

Always drive vehicle at a safe speed.

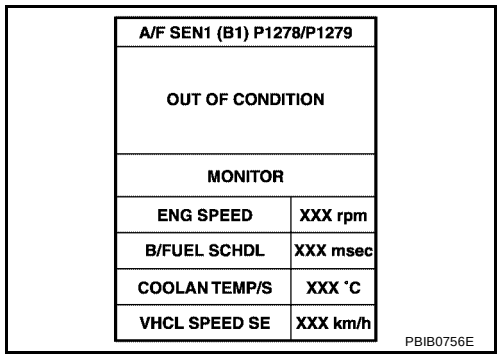
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

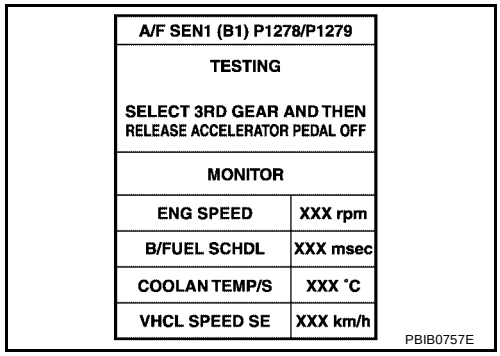
1. Perform EC-92, "Idle Air Volume Learning" . Make sure that “CMPLT” is displayed on CONSULT-II screen. If “INCMP” is displayed, follow the instruction for Idle Air Volume Learning.
2. Select “A/F SEN1 (B1) P1278/P1279” of “A/F SEN1” in “DTC WORK SUPPORT” mode.
3. Touch “START”.
4. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

ENG SPEED	1,500 - 3,000 rpm
Vehicle speed	70 - 120 km/h (43 - 75 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
Selector lever	● D position with “OD” ON (A/T) ● 4th position (M/T)

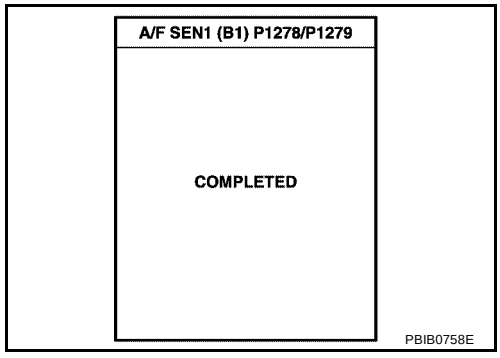


If “TESTING” is not displayed after 20 seconds, retry from step 2.

5. Following the instructions of CONSULT-II screen, set D position with “OD” OFF (A/T) or 3rd position (M/T) and release accelerator pedal fully.



6. Make sure that “TESTING” changes to “COMPLETED”.
If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
7. Make sure that OK is displayed after touching “SELF-DIAG RESULT”.
If NG is displayed, go to EC-522, "Diagnostic Procedure" .



Overall Function Check

UBS00BEP

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Perform EC-92, "Idle Air Volume Learning" . Make sure the result is OK. If NG, follow the instruction for Idle Air Volume Learning.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position with “OD” OFF (A/T) or 3rd position (M/T).

NOTE:
Keep the accelerator pedal as steady as possible during the cruising.

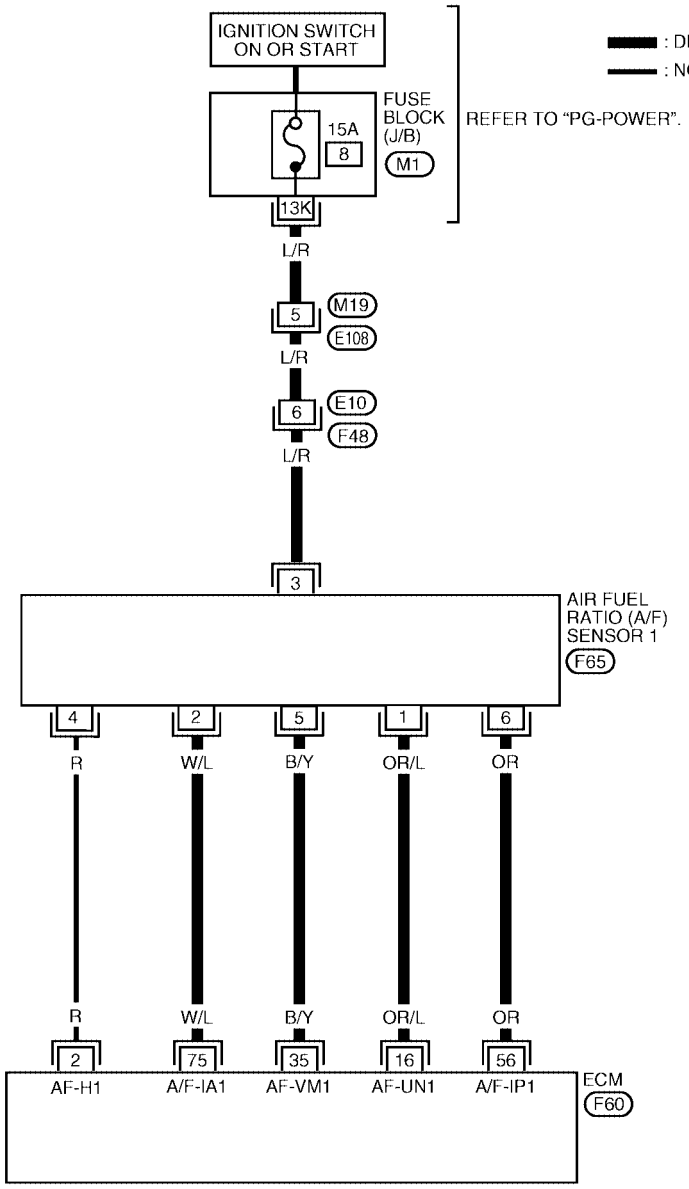
3. Set D position with “OD” ON (A/T) or 4th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

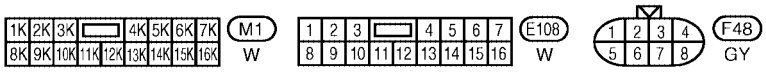
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 five times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.
7. Repeat steps 2 to 3 five times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no DTC is displayed.
   If the DTC is displayed, go to EC-522, "Diagnostic Procedure" .

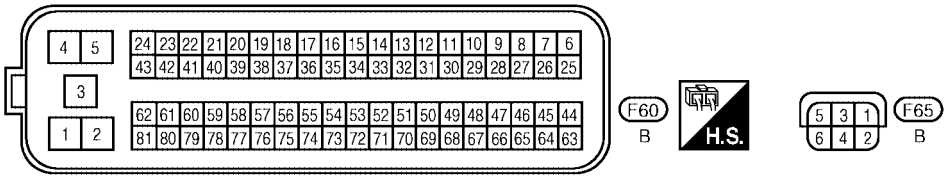
Wiring Diagram

UBS00BEQ

EC-A/F-01







BBWA1454E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

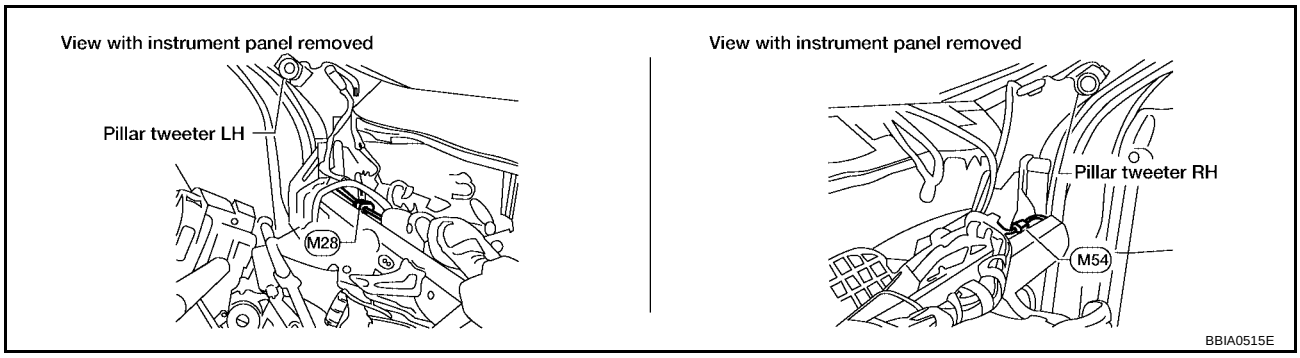
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	B/Y			Approximately 2.6V
56	OR			2 - 3V
75	W/L			2 - 3V

Diagnostic Procedure

UBS00BER

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.
   Refer to EC-170, "Ground Inspection" .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

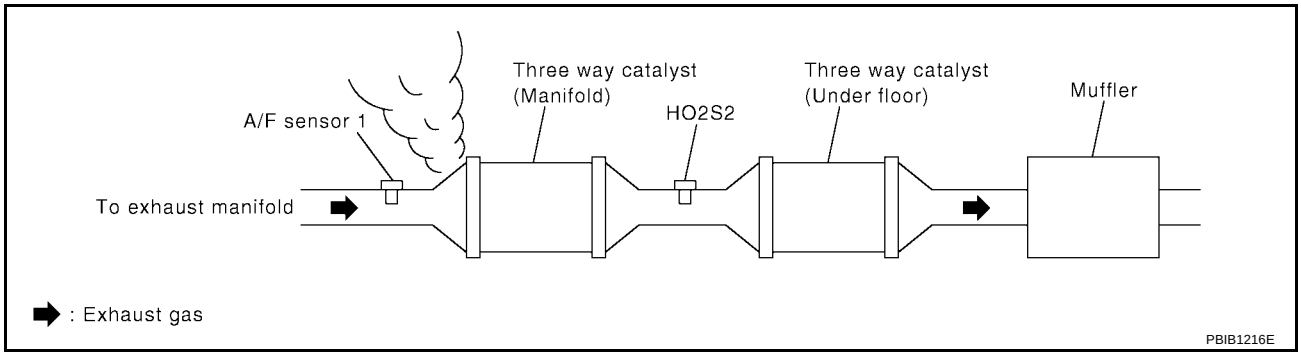
Loosen and retighten the air fuel ratio (A/F) sensor 1.

Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.

3. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

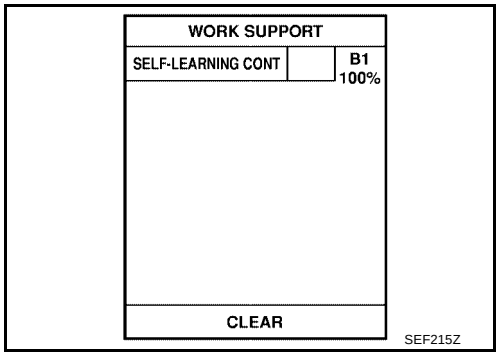
OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. CLEAR THE SELF-LEARNING DATA

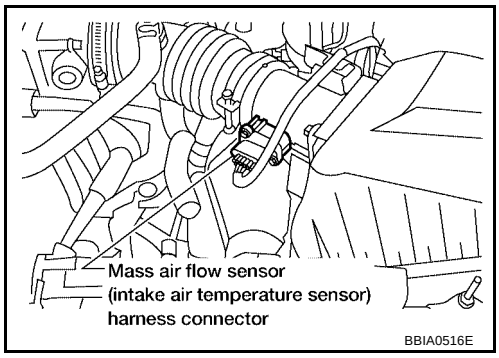
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR” or “START”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 3 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?



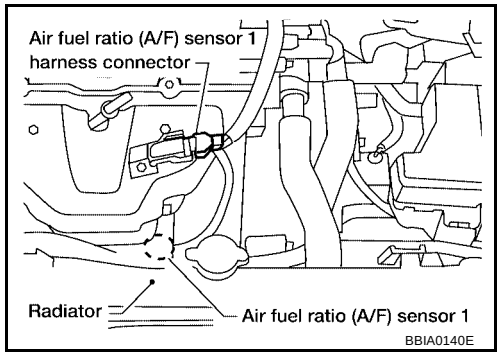
Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-241 , EC-248 .
No >> GO TO 6.

6. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	16
2	75
5	35
6	56



Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-388, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace A/F sensor 1.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-193, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK PCV VALVE

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 10.
NG >> Repair or replace PCV valve.

10. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00BES

AIR FUEL RATIO SENSOR 1

Refer to EM-15, "Removal and Installation" .

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

UBS00BET

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Air fuel ratio (A/F) sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor*2	Vehicle speed		

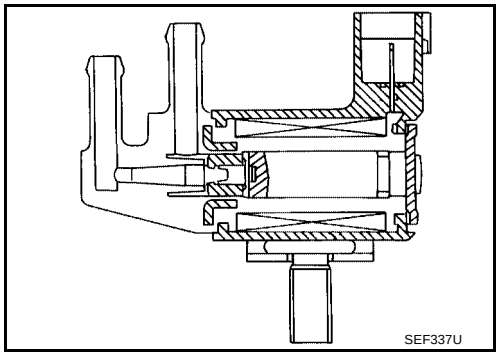
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM through CAN communication line.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



CONSULT-II Reference Value in Data Monitor Mode

UBS00BEU

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No-load	Idle (Accelerator pedal is not depressed even slightly, after engine starting.)	0%
		2,000 rpm	—

On Board Diagnosis Logic

UBS00BEV

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1444 1444	EVAP canister purge volume control solenoid valve	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	● EVAP control system pressure sensor ● EVAP canister purge volume control solenoid valve (The valve is stuck open.) ● EVAP canister vent control valve ● EVAP canister ● Hoses (Hoses are connected incorrectly or clogged.)

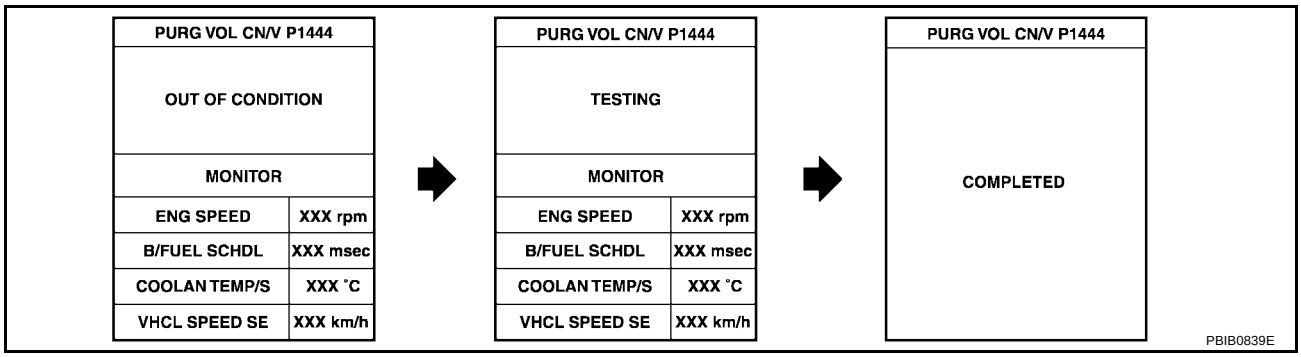
DTC Confirmation Procedure

UBS00BEW

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always perform test at a temperature of 0°C (32°F) or more.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
5. Touch “START”.



6. Start engine and let it idle until “TESTING” on CONSULT-II changes to “COMPLETED”. (It will take approximately 10 seconds.)
   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Make sure that OK is displayed after touching “SELF-DIAG RESULTS”. If NG is displayed, refer to EC-530, "Diagnostic Procedure" .

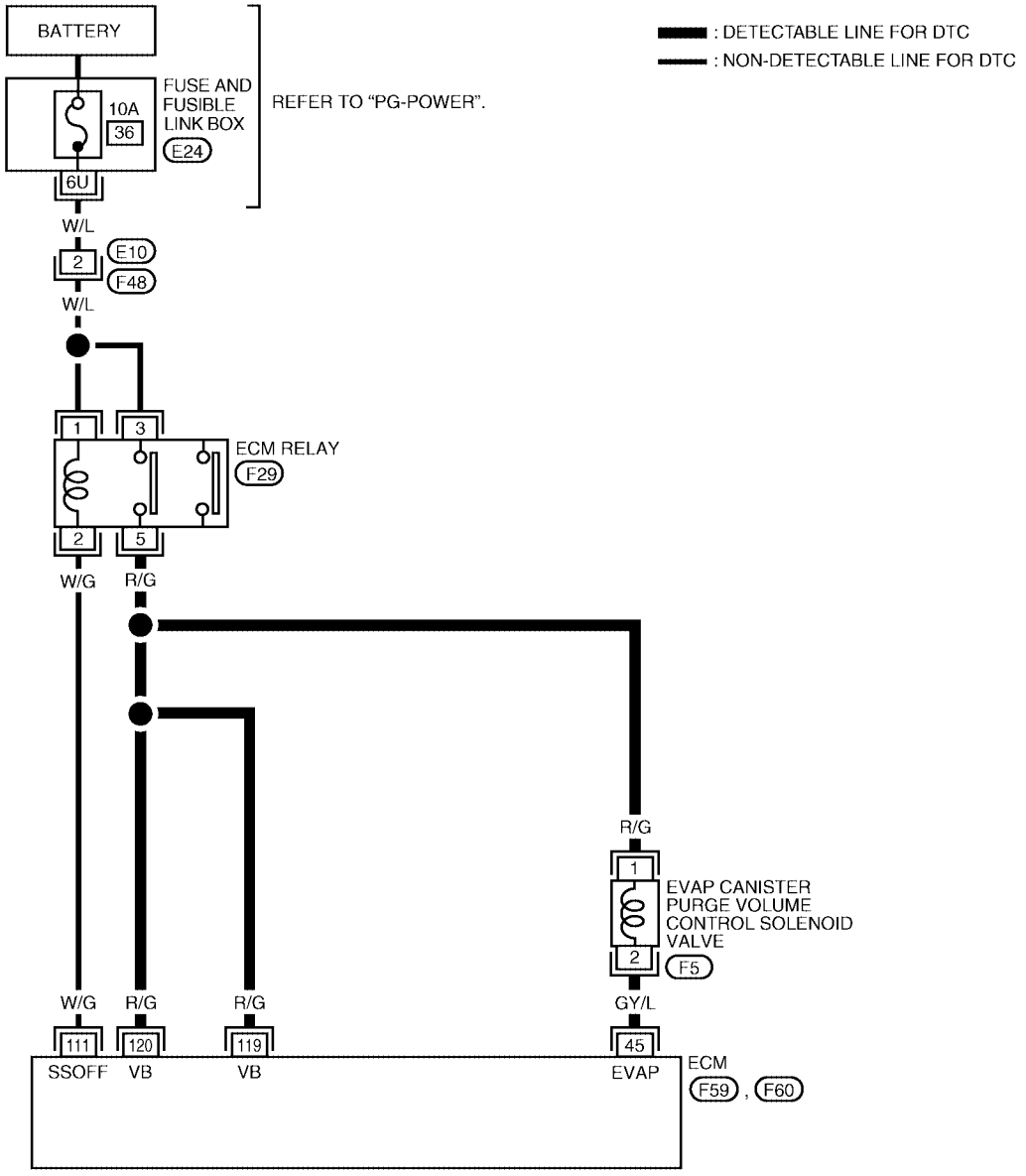
WITH GST

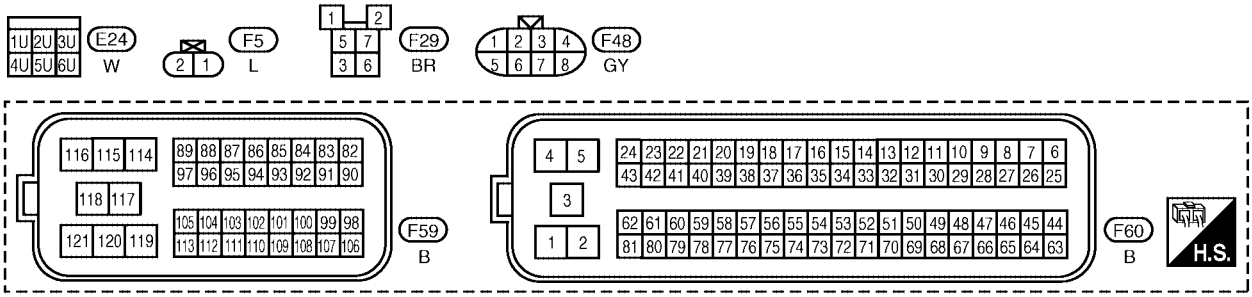
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Select Service $07 with GST.
5. If 1st trip DTC is detected, go to EC-530, "Diagnostic Procedure" .

Wiring Diagram

UBS00BEX

EC-PGC/V-01



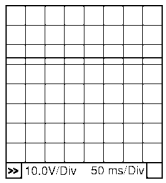
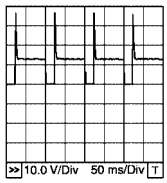


BBWA1431E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed ● Accelerator pedal is not depressed even slightly, after engine starting.	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

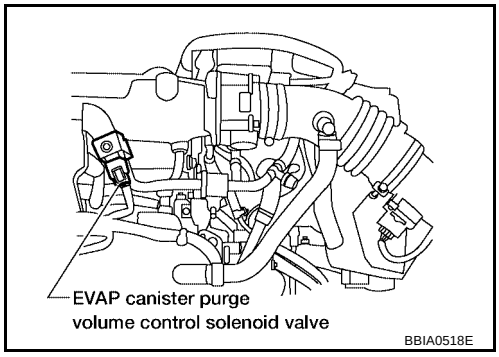
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00BEY

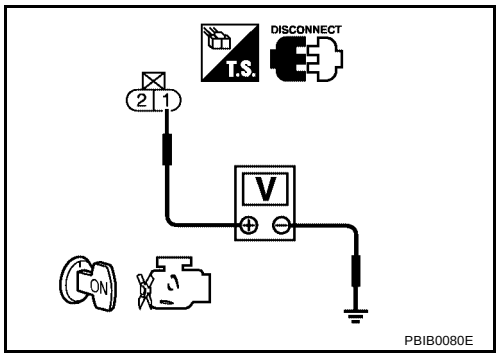
1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and engine ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

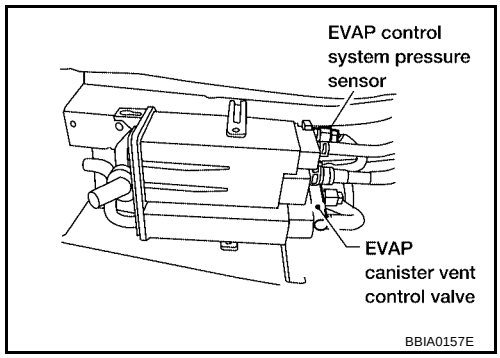
OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.



OK or NG

OK >> GO TO 5.
NG >> Replace EVAP control system pressure sensor.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-339, "Component Inspection" .

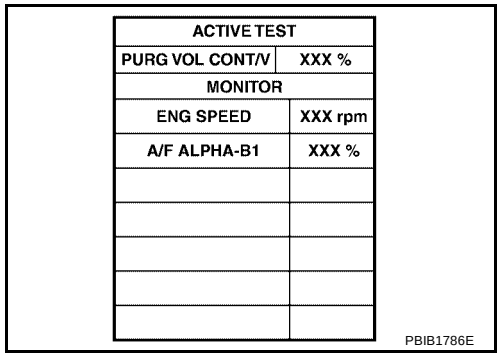
OK or NG

OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> Replace EVAP control system pressure sensor.

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Start engine.
4. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-346, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 9.
NG >> Clean the rubber tube using an air blower.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-329, "Component Inspection" .

OK or NG

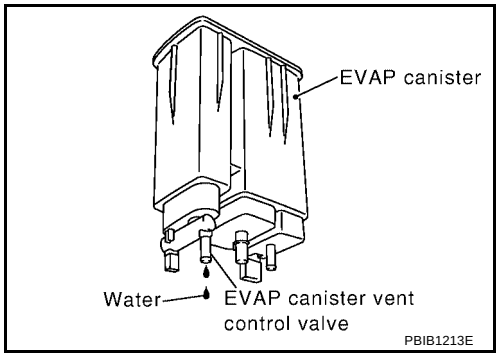
OK >> GO TO 11.
NG >> Replace EVAP canister vent control valve.

10. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.

Yes or No

Yes >> GO TO 11.
No >> GO TO 13.



11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

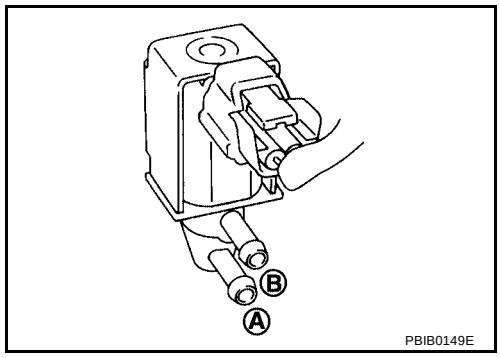
UBS00BEZ

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

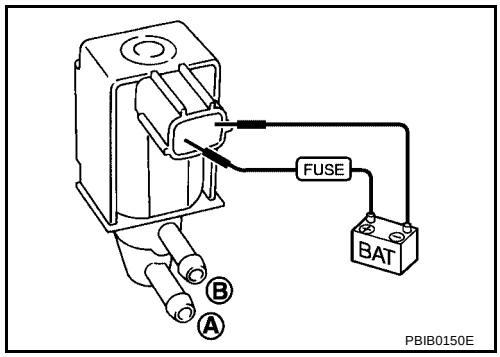
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

UBS00BJU

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-15, "Removal and Installation" .

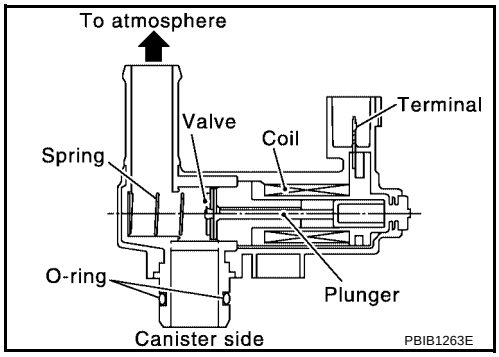
DTC P1446 EVAP CANISTER VENT CONTROL VALVE

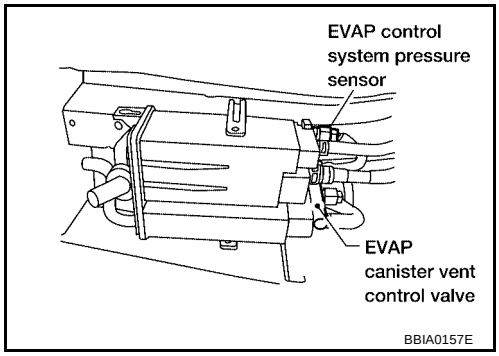
PFP:14935

Component Description

UBS00BF0

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnoses.





CONSULT-II Reference Value in Data Monitor Mode

UBS00BF1

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00BF2

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1446 1446	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	● EVAP canister vent control valve ● EVAP control system pressure sensor and the circuit ● Blocked rubber tube to EVAP canister vent control valve ● EVAP canister is saturated with water

DTC Confirmation Procedure

UBS00BF3

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and let it idle for at least 1 minute.
5. Repeat next procedures 3 times.

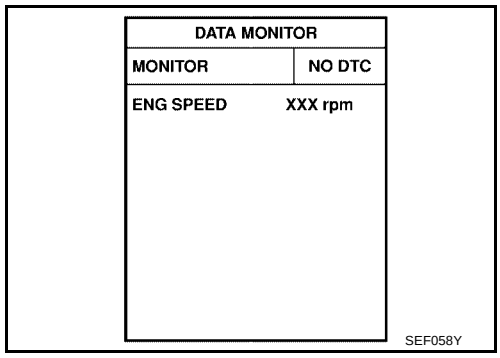
a. Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.
Never exceed 3 minutes.

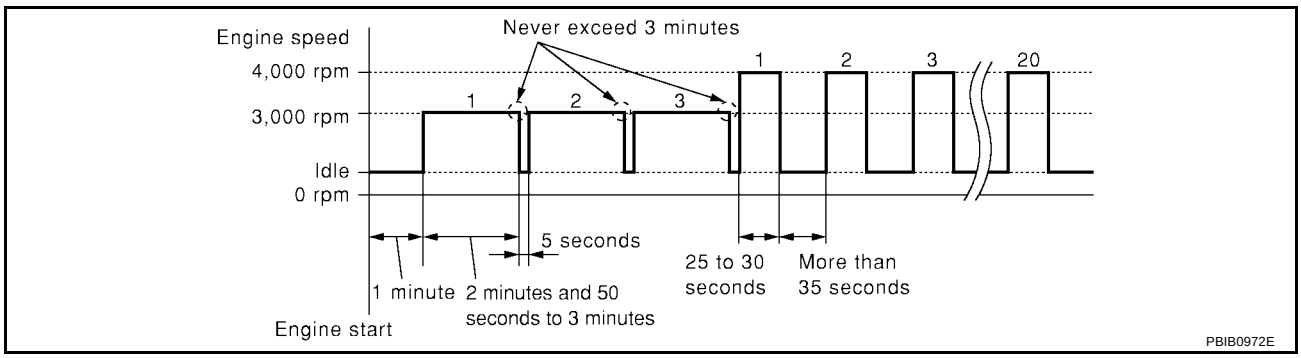
b. Fully released accelerator pedal and keep engine idle for about 5 seconds.

6. If 1st trip DTC is detected, go to EC-441, "Diagnostic Procedure" .
If 1st trip DTC is not detected, go to the next step.
7. Repeat next procedure 20 times.

a. Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.

b. Fully released accelerator pedal and keep engine idle for at least 35 seconds.





8. If 1st trip DTC is detected, go to EC-441, "Diagnostic Procedure" .

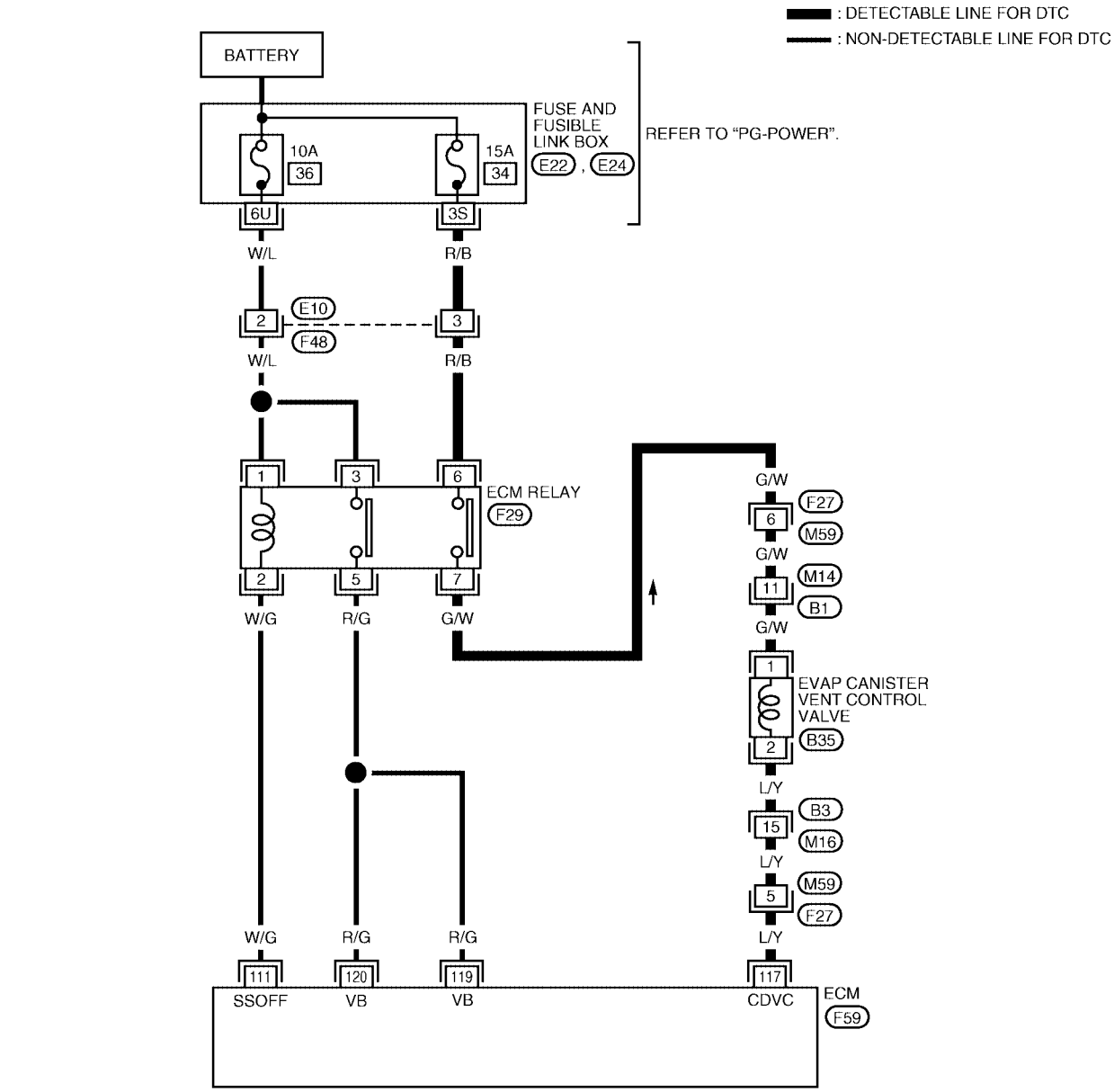
WITH GST

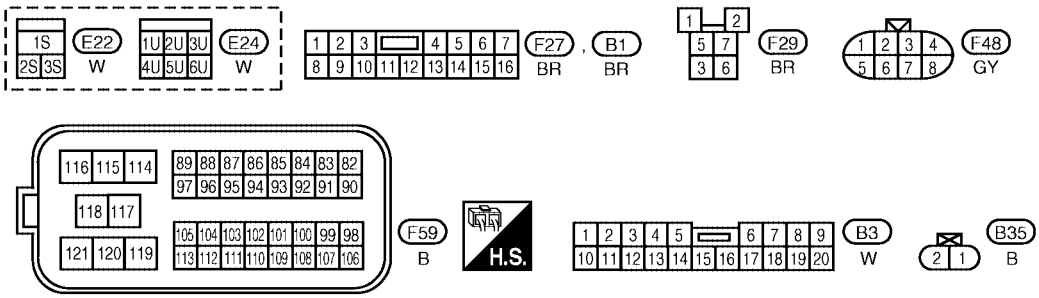
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00BF4

EC-VENT/V-01





BBWA1432E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
117	L/Y	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

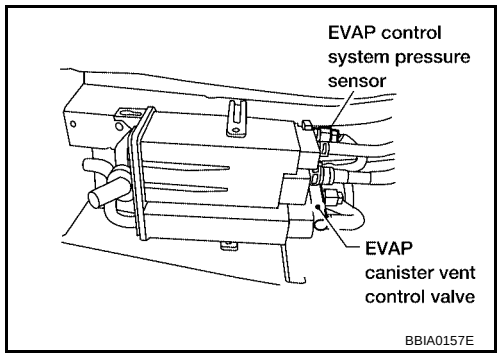
UBS00BF5

1. CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 2.
NG >> Clean rubber tube using an air blower.



2. CHECK EVAP CANISTER VENT CONTROL VALVE

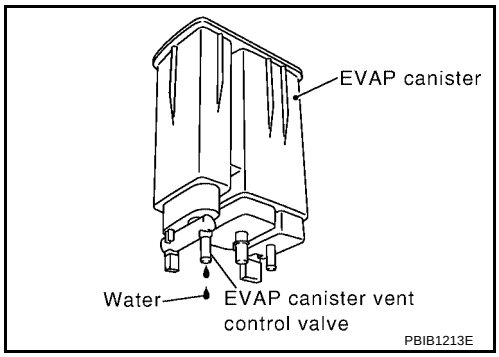
Refer to EC-443, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace EVAP canister vent control valve.

3. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.



Yes or No

Yes >> GO TO 4.
No >> GO TO 6.

4. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

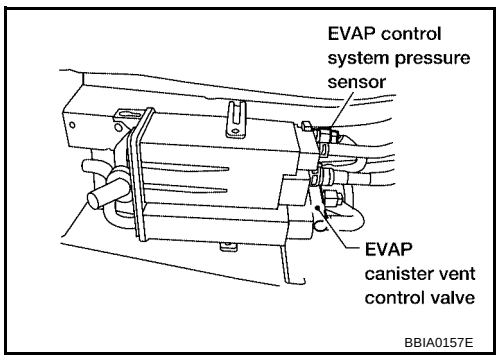
- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist.



OK or NG

OK >> GO TO 7.
NG >> Replace EVAP control system pressure sensor.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-346, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP control system pressure sensor.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

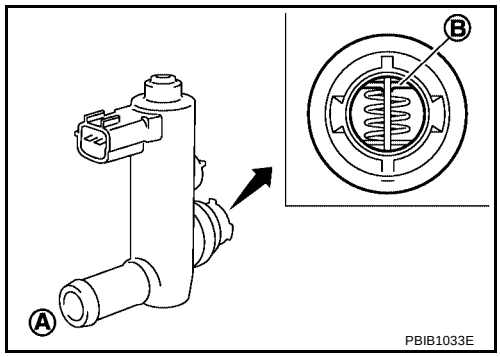
Component Inspection

UBS00BF6

EVAP CANISTER VENT CONTROL VALVE

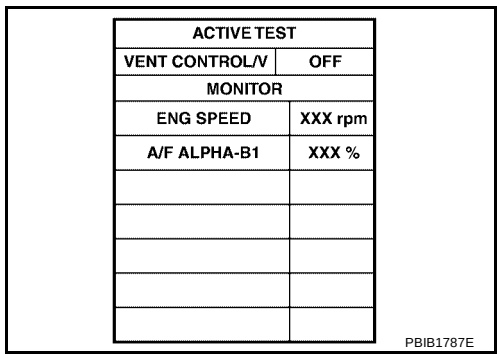
With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
   If NG, replace EVAP canister vent control valve.
   If OK, go to next step.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch ON.



5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
6. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

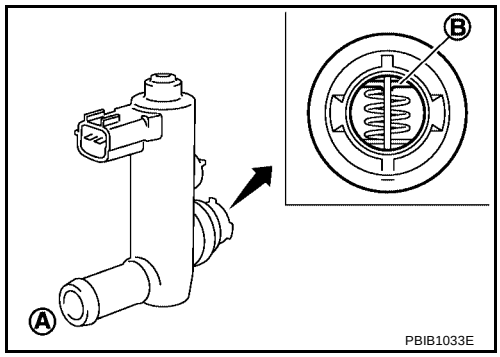


Operation takes less than 1 second.
Make sure new O-ring is installed properly.
If NG, replace EVAP canister vent control valve.
If OK, go to next step.

7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform step 5 again.

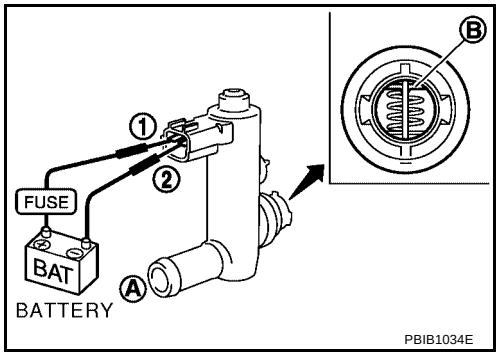
Without CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



3. Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes



Operation takes less than 1 second.
Make sure new O-ring is installed properly.
If NG, replace EVAP canister vent control valve.
If OK, go to next step.

4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.

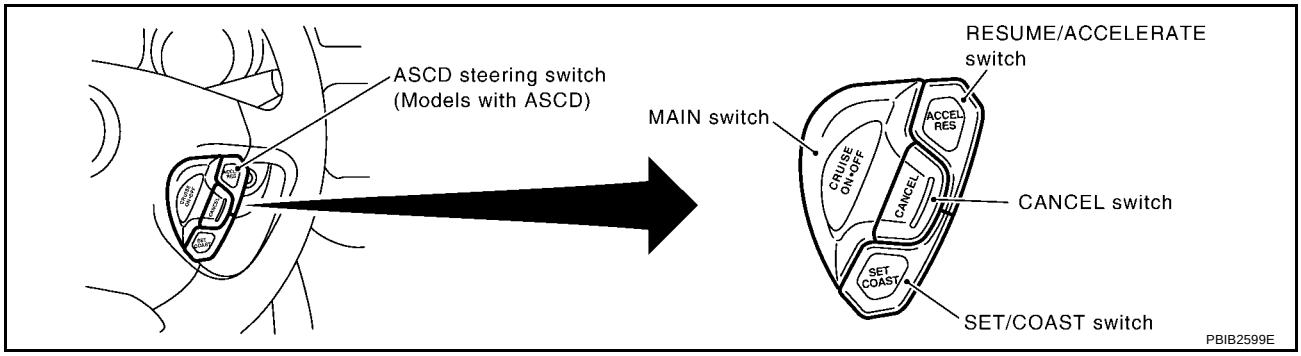
DTC P1564 ASCD STEERING SWITCH

PFP:25551

Component Description

UBS00BF7

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.



Refer to EC-33 for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

UBS00BF8

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN SW	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	● Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	● Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF

On Board Diagnosis Logic

UBS00BF9

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-381.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1564 1564	ASCD steering switch	● An excessively high voltage signal from the ASCD steering switch is sent to ECM. ● ECM detects that input signal from the ASCD steering switch is out of the specified range. ● ECM detects that the ASCD steering switch is stuck ON.	● Harness or connectors (The switch circuit is open or shorted.) ● ASCD steering switch ● ECM

DTC Confirmation Procedure

UBS00BFA

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.

4. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. If DTC is detected, go to EC-544, "Diagnostic Procedure" .

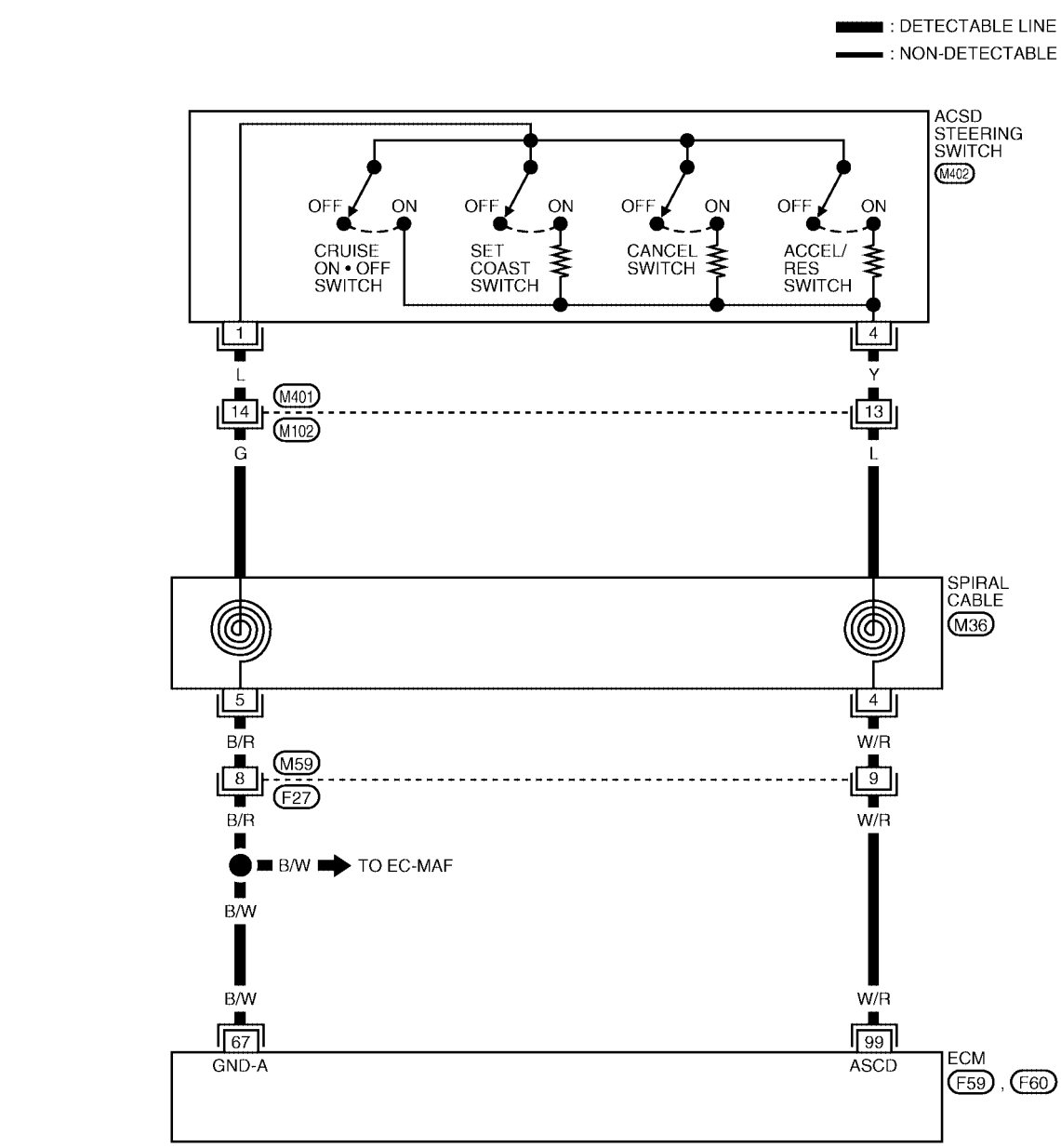
WITH GST

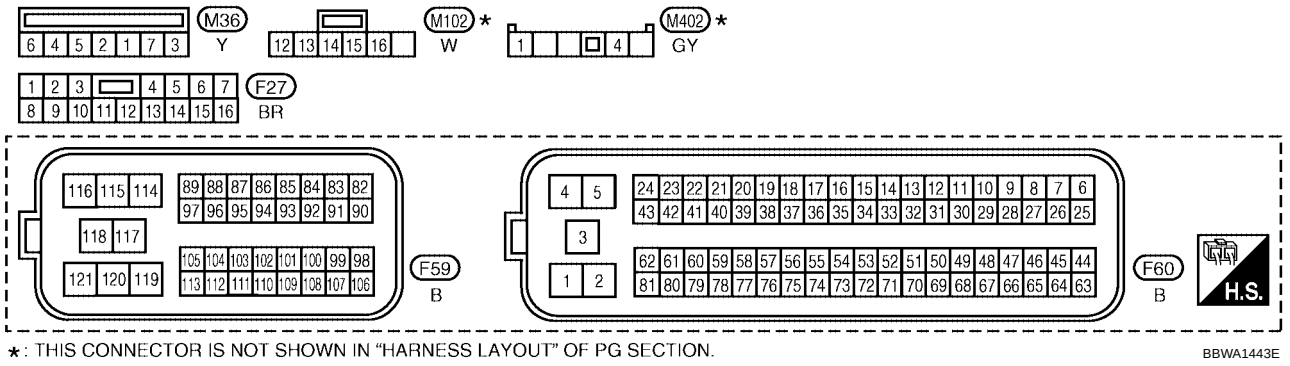
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00BFB

EC-ASC/SW-01





Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

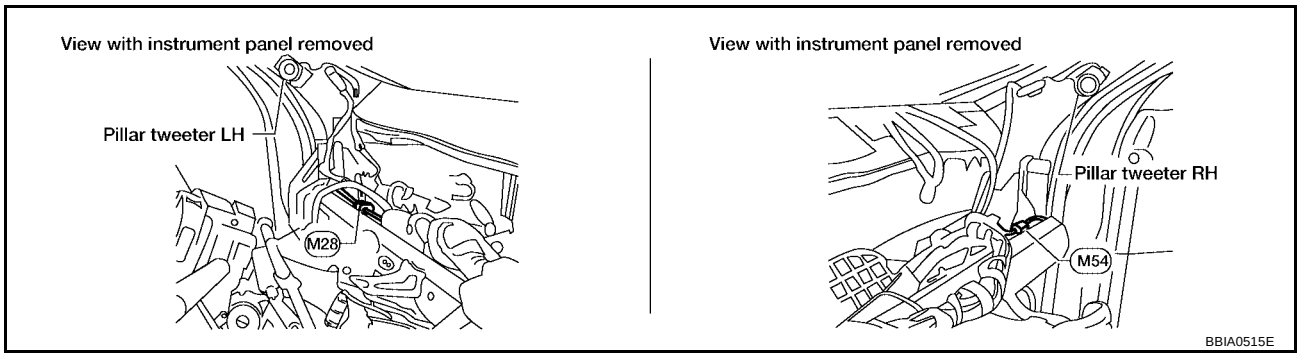
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
99	W/R	ASCD steering switch	**[Ignition switch: ON]** ● ASCD steering switch: OFF	Approximately 4V
			[Ignition switch: ON] ● MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] ● CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] ● SET/COAST switch: Pressed	Approximately 2V

Diagnostic Procedure

UBS00BFC

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.
   Refer to EC-170, "Ground Inspection" .



OK or NG

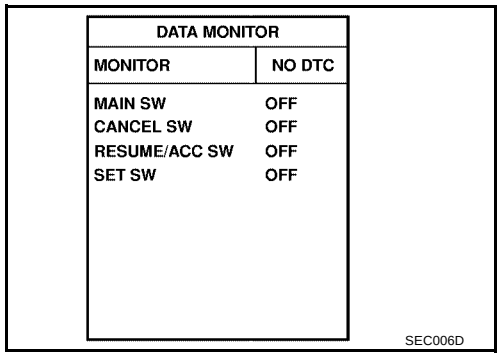
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-II

1. Turn ignition switch ON.
2. Select “MAIN SW”, “RESUME/ACC SW”, “SET SW” and “CANCEL SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check each item indication under the following conditions.

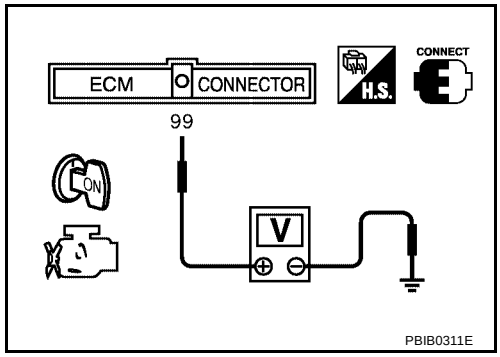
Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF
RESUME/ACCEL-ERATE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 99 and ground with pressing each button.

Switch	Condition	Voltage [V]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4
CANCEL switch	Pressed	Approx. 1
	Released	Approx. 4
RESUME/ACCELERATE switch	Pressed	Approx. 3
	Released	Approx. 4
SET/COAST switch	Pressed	Approx. 2
	Released	Approx. 4

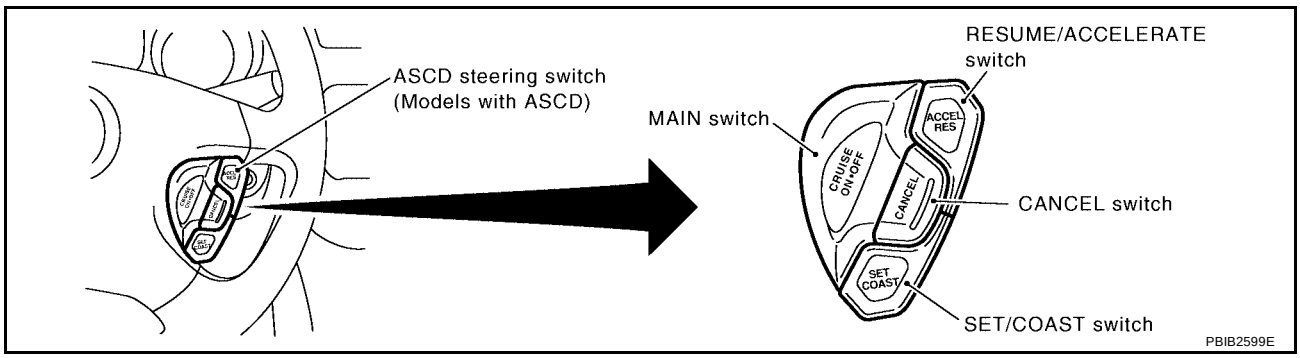


OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ASCD steering switch harness connector.



3. Disconnect ECM harness connector.
4. Disconnect TCM harness connector.
5. Check harness continuity between ASCD steering switch terminal 1 and ECM terminal 67, TCM terminal 42. Refer to Wiring Diagram.

Continuity should exist.

6. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M401, M102
- Harness connectors M59, F27
- Spiral cable
- Harness for open and short between ECM and ASCD steering switch
- Harness for open and short between TCM and ASCD steering switch

>> Repair open circuit or short to power in harness or connectors.

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 99 and ASCD steering switch terminal 4. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M401, M102
- Harness connectors M59, F27
- Spiral cable
- Harness for open and short between ECM and ASCD steering switch

>> Repair open circuit or short to ground or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-547, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

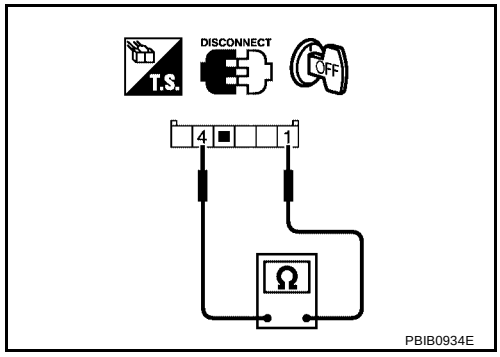
>> **INSPECTION END**

Component Inspection

UBS00BFD

ASCD STEERING SWITCH

1. Disconnect ASCD steering switch.
2. Check continuity between ASCD steering switch terminals 1 and 4 with pushing each switch.



Switch	Condition	Resistance [Ω]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE switch	Pressed	Approx. 1,480
	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000

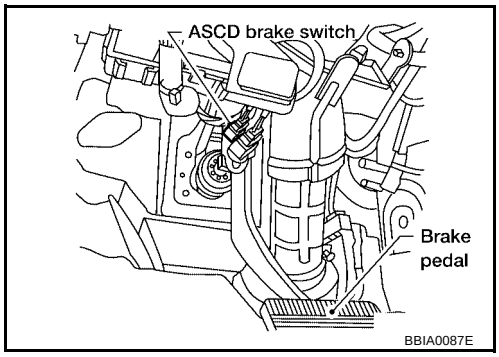
DTC P1572 ASCD BRAKE SWITCH

PFP:25320

Component Description

UBS00BFE

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-33, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

UBS00BFF

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1	● Ignition switch: ON	Clutch pedal (M/T) and brake pedal: Fully released	ON
		Clutch pedal (M/T) and/or brake pedal: Depressed	OFF
BRAKE SW2	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly Depressed	ON

On Board Diagnosis Logic

UBS00BFG

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-381**
- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition		Possible Cause
P1572 1572	ASCD brake switch	A)	● When the vehicle speed is above 30km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to ECM at the same time.	● Harness or connectors (The stop lamp switch circuit is shorted.) ● Harness or connectors (The ASCD brake switch circuit is shorted.) ● Harness or connectors (The ASCD clutch switch circuit is shorted.) (M/T models) ● Stop lamp switch ● ASCD brake switch ● ASCD clutch switch (M/T models) ● Incorrect stop lamp switch installation ● Incorrect ASCD brake switch installation ● Incorrect ASCD clutch switch installation (M/T models) ● ECM
		B)	● ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving	

DTC Confirmation Procedure

UBS00BFH

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

TESTING CONDITION:

Steps 3 and 4 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

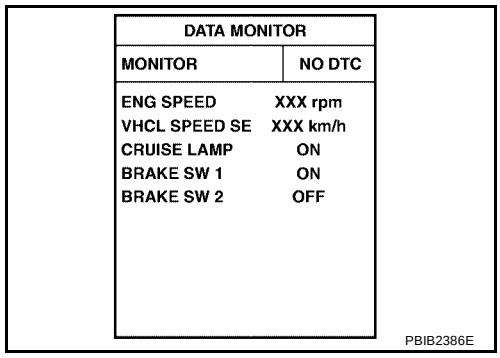
WITH CONSULT-II

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Press MAIN switch and make sure that CRUISE indicator lights up.
4. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position

If 1st trip DTC is detected, go to EC-553, "Diagnostic Procedure" .

If 1st trip DTC is not detected, go to the following step.



5. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Selector lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

6. If 1st trip DTC is detected, go to EC-553, "Diagnostic Procedure" .

Overall Function Check

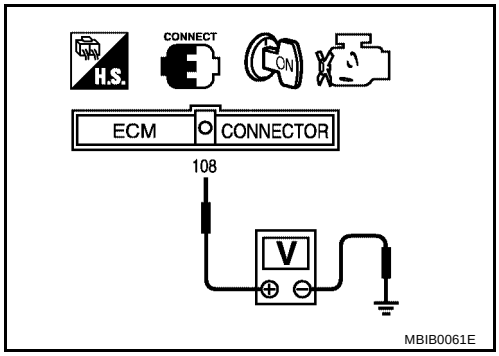
UBS00KK1

Use this procedure to check the overall function of the ASCD brake switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITHOUT CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 (ASCD brake switch signal) and ground under the following conditions.
   A/T models

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage



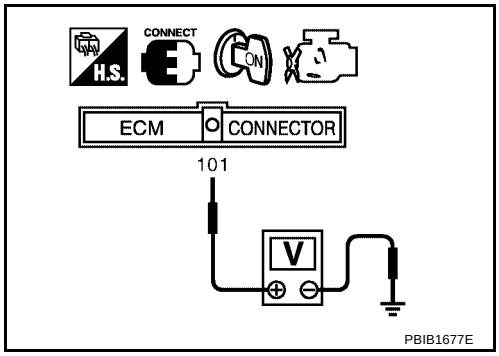
MBIB0061E

   M/T models

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage

3. If NG, go to EC-553, "Diagnostic Procedure" .
   If OK, go to next step.
4. Check voltage between ECM terminal 101 (Stop lamp switch signal) and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



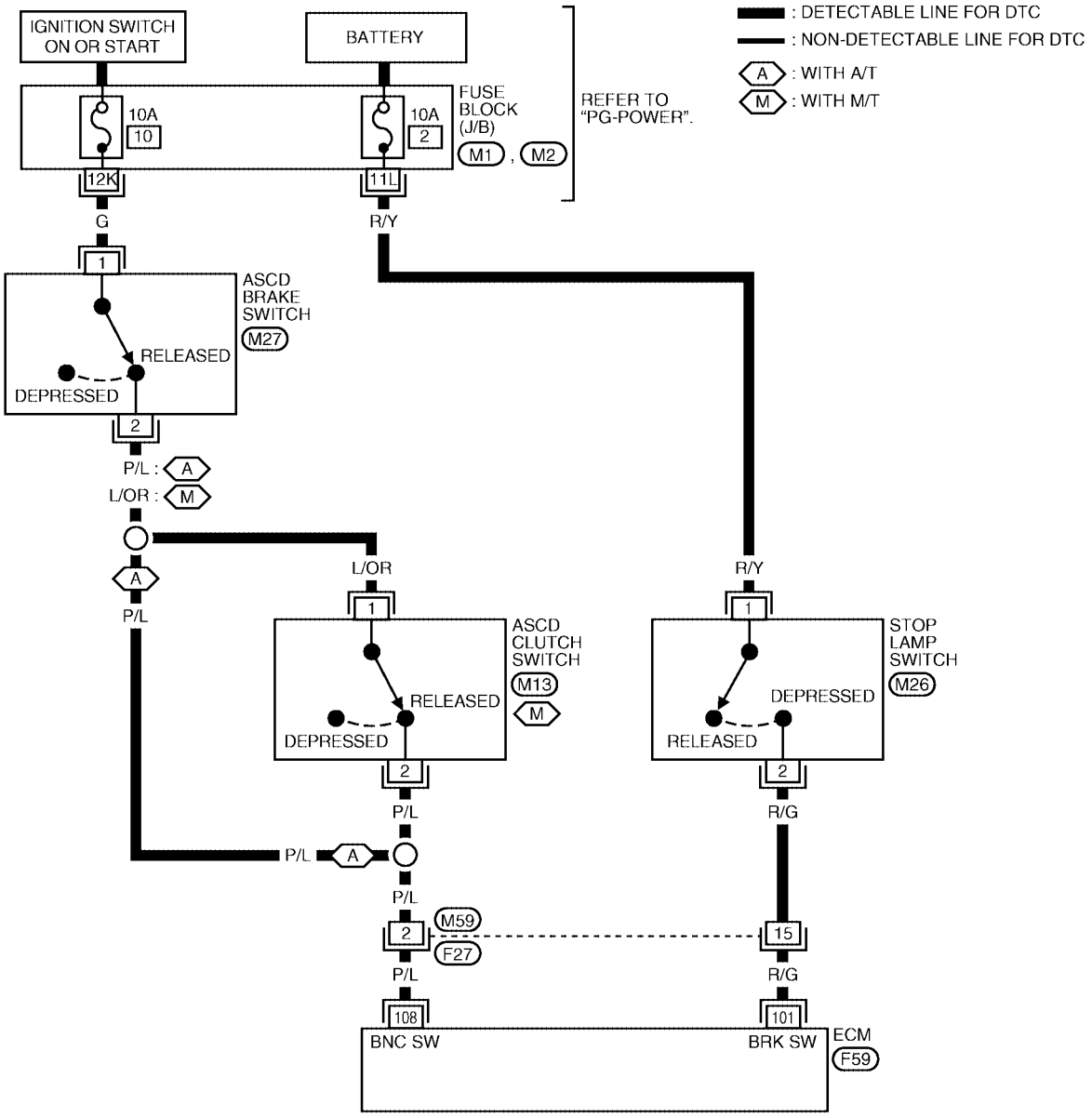
PBIB1677E

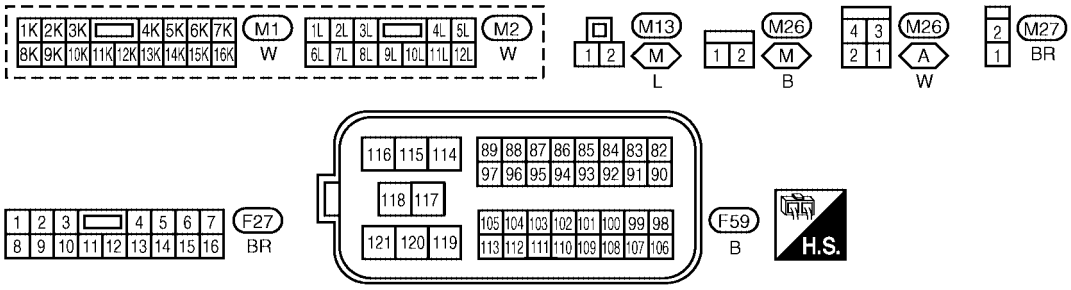
5. If NG, go to EC-553, "Diagnostic Procedure" .

Wiring Diagram

UBS00BFI

EC-ASC/BS-01





BBWA1444E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/G	Stop lamp switch	**[Ignition switch: ON]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Depressed	BATTERY VOLTAGE (11 - 14V)
108	P/L	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal: Depressed ● Clutch pedal: Depressed (M/T models)	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Fully released ● Clutch pedal: Released (M/T models)	BATTERY VOLTAGE (11 - 14V)

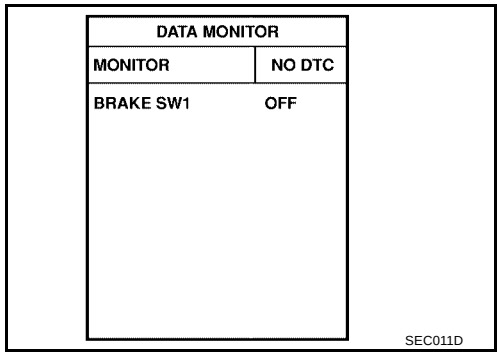
Diagnostic Procedure

UBS00BFJ

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.



A/T models

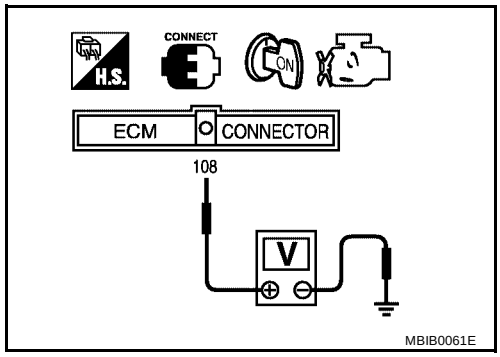
CONDITION	INDICATION
When brake pedal is depress	OFF
When brake pedal is fully released	ON

M/T models

CONDITION	INDICATION
When clutch pedal and/or brake pedal is depressed	OFF
When clutch pedal and brake pedal are fully released	ON

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.



A/T models

CONDITION	VOLTAGE
When brake pedal is depress	Approximately 0V
When brake pedal is fully released	Battery voltage

M/T models

CONDITION	VOLTAGE
When clutch pedal and/or brake pedal is depressed	Approximately 0V
When clutch pedal and brake pedal are fully released	Battery voltage

OK or NG

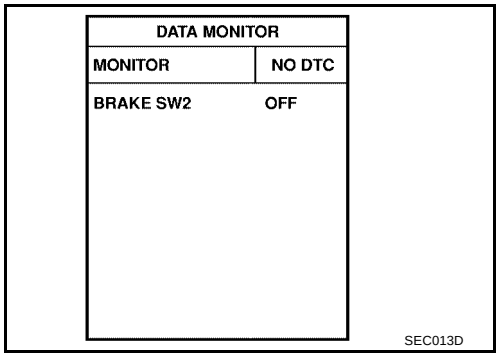
OK >> GO TO 2.
NG (M/T models) >>GO TO 3.
NG (A/T models) >>GO TO 4.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

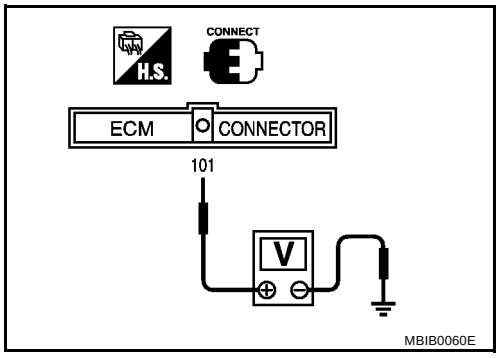
CONDITION	INDICATION
When brake pedal is released	OFF
When brake pedal is depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
When brake pedal is released	Approximately 0V
When brake pedal is depressed	Battery voltage

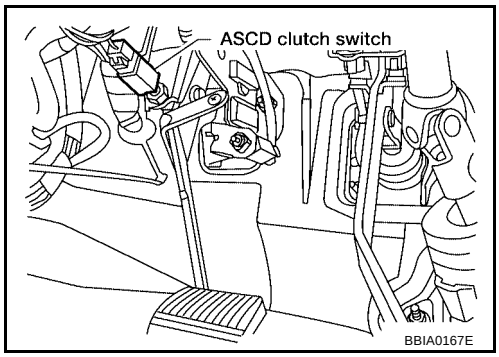


OK or NG

OK >> GO TO 18.
NG >> GO TO 13.

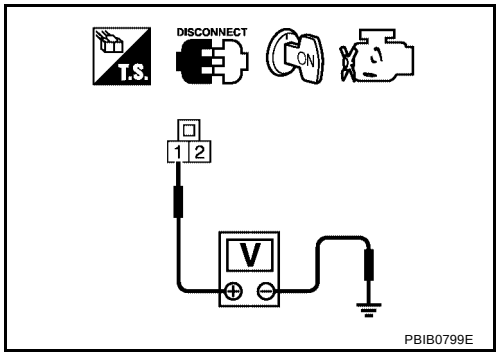
3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD clutch switch terminal 1 and ground under the following conditions with CONSULT-II or tester.

CONDITION	VOLTAGE
When brake pedal is released	Battery voltage
When brake pedal is depressed	Approx. 0V

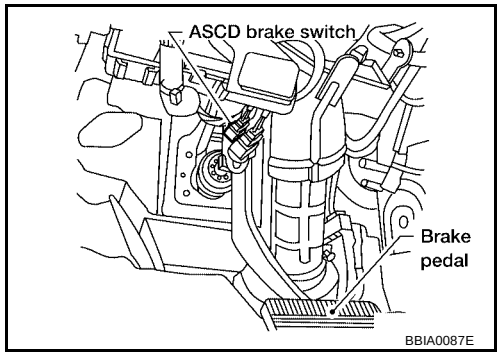


OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

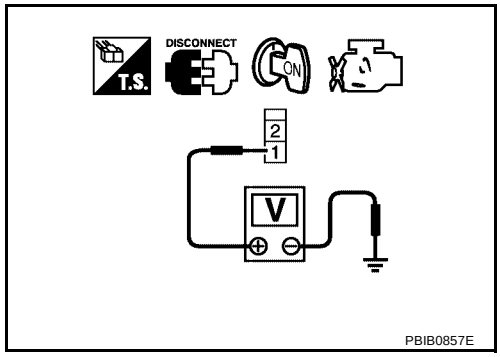
4. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK (M/T models)>>GO TO 6.
OK (A/T models)>>GO TO 7.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and ASCD brake switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ASCD BRAKE SWITCH

Refer to EC-558, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace ASCD brake switch.

10. CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and ASCD clutch switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK ASCD CLUTCH SWITCH

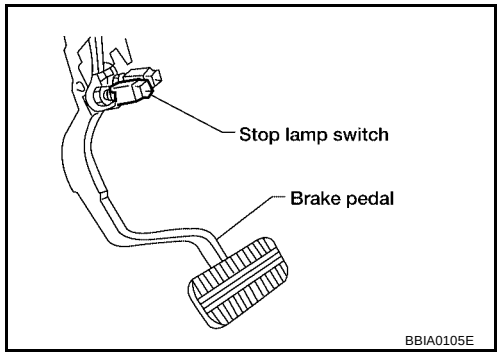
Refer to EC-558, "Component Inspection" .

OK or NG

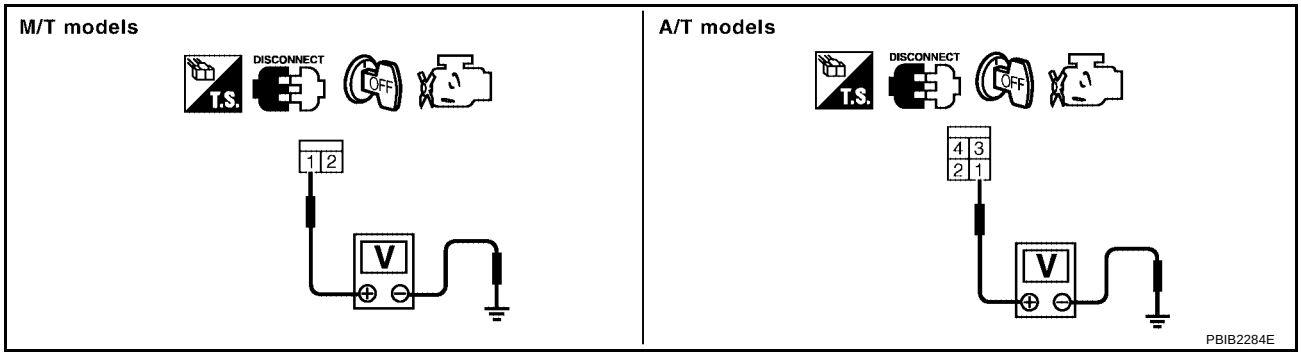
OK >> GO TO 18.
NG >> Replace ASCD clutch switch.

13. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between stop lamp switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

17. CHECK STOP LAMP SWITCH

Refer to EC-558, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace stop lamp switch.

18. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

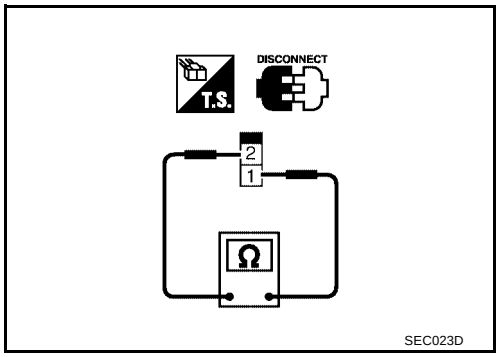
UBS00BFK

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check harness continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
When brake pedal is fully released.	Should exist.
When brake pedal is depressed.	Should not exist.

If NG, adjust ASCD brake switch installation, refer to BR-11, "BRAKE PEDAL AND BRACKET" , and perform step 3 again.

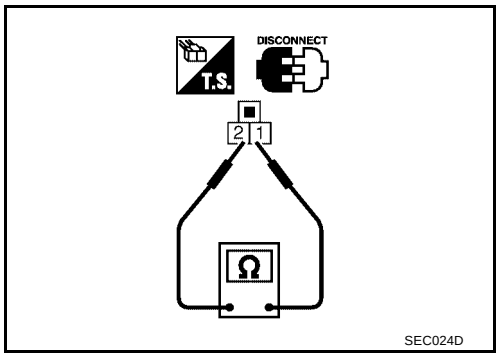


ASCD CLUTCH SWITCH (FOR M/T MODELS)

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check harness continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

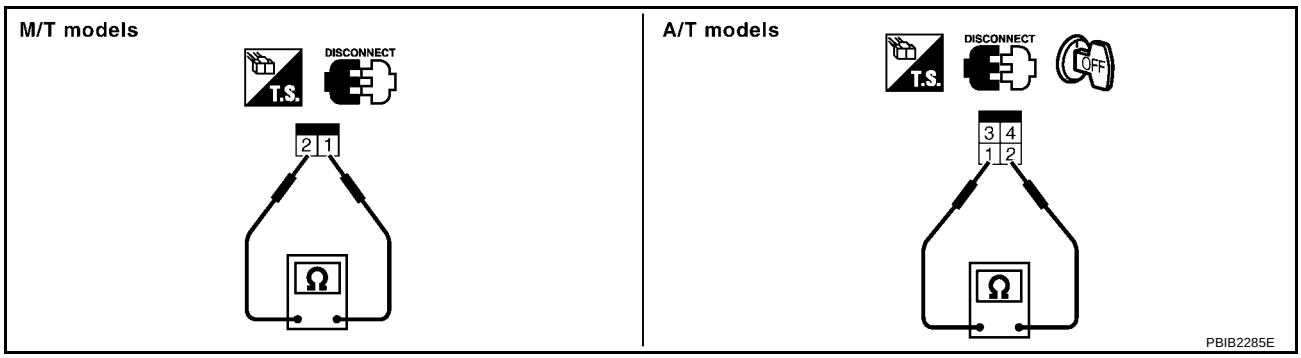
Condition	Continuity
When clutch pedal is fully released.	Should exist.
When clutch pedal is depressed.	Should not exist.

If NG, adjust ASCD clutch switch installation, refer to CL-6, "CLUTCH SYSTEM" , and perform step 3 again.



STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check harness continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
When brake pedal is fully released.	Should not exist.
When brake pedal is depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-11, "BRAKE PEDAL AND BRACKET" , and perform step 3 again.

DTC P1574 ASCD VEHICLE SPEED SENSOR

PFP:31036

Component Description

UBS00BFL

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-33, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

On Board Diagnosis Logic

UBS00BFM

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.

NOTE:

- **If DTC P1574 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-172, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-370, "DTC P0500 VSS"**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-381, "DTC P0605 ECM"**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1574 1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	● Harness or connectors (The CAN communication line is open or shorted.) ● Combination meter ● Vehicle speed sensor ● TCM ● ECM

DTC Confirmation Procedure

UBS00BFN

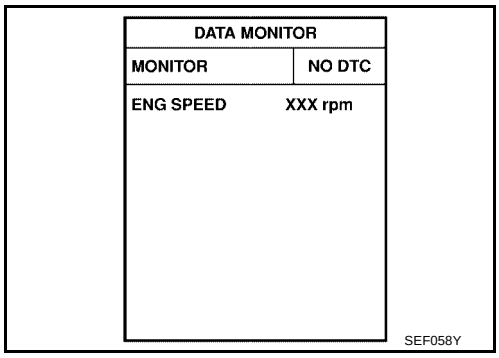
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at more than 30 km/h (19 MPH).
4. If DTC is detected, go to EC-561, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00BFO

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-38, "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" .

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2. CHECK COMBINATION METER

Refer to DI-7, "Combination Meter" .

>> **INSPECTION END**

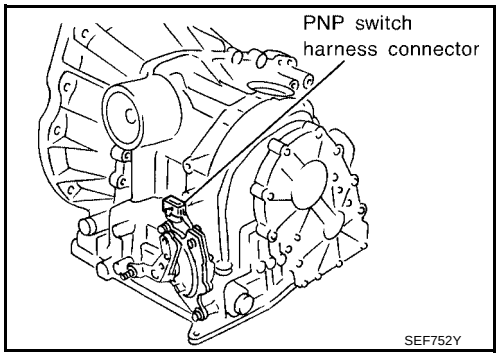
DTC P1706 PNP SWITCH

PFP:32006

Component Description

UBS00BFP

When the gear position is P or N (A/T models), Neutral (M/T models), park/neutral position (PNP) switch is ON.
ECM detects the park/neutral position when continuity with ground exists.
For A/T models, the park/neutral position (PNP) switch assembly also indicates a transmission range switch to detect selector lever position.



CONSULT-II Reference Value in Data Monitor Mode

UBS00BFQ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Except above	OFF

On Board Diagnosis Logic

UBS00BFR

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706 1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	● Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] ● Park/neutral position (PNP) switch

DTC Confirmation Procedure

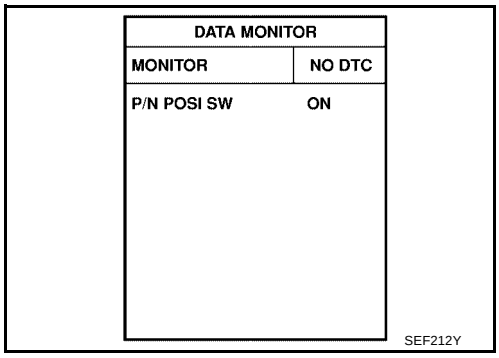
UBS00BFS

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II. Then check the “P/N POSI SW” signal under the following conditions.



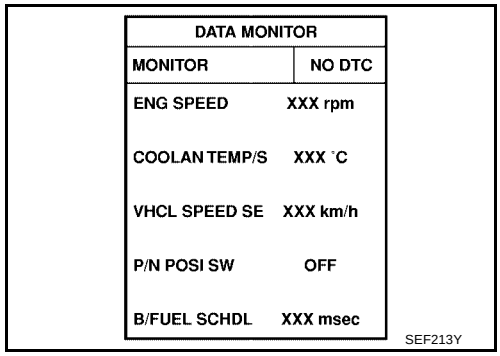
Position (Selector lever)	Known-good signal
N or P position (A/T models) Neutral position (M/T models)	ON
Except the above position	OFF

If NG, go to EC-565, "Diagnostic Procedure" .
If OK, go to following step.

3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and warm it up to normal operating temperature.

5. Maintain the following conditions for at least 50 consecutive seconds.

ENG SPEED	More that 1,550 (A/T) More that 1,850 (M/T)
B/FUEL SCHDL	3.0 - 31.8 msec (A/T) 2.8 - 31.8 msec (M/T)
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position



6. If 1st trip DTC is detected, go to EC-565, "Diagnostic Procedure" .

Overall Function Check

UBS00BFT

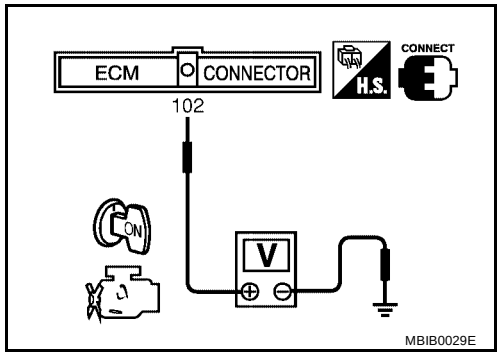
Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITHOUT CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 102 (PNP switch signal) and ground under the following conditions.

Condition (Gear position)	Voltage (V) (Known-good data)
P or N position (A/T models) Neutral position (M/T models)	Approx. 0
Except the above position	A/T models: Battery voltage M/T models: Approximately 5V

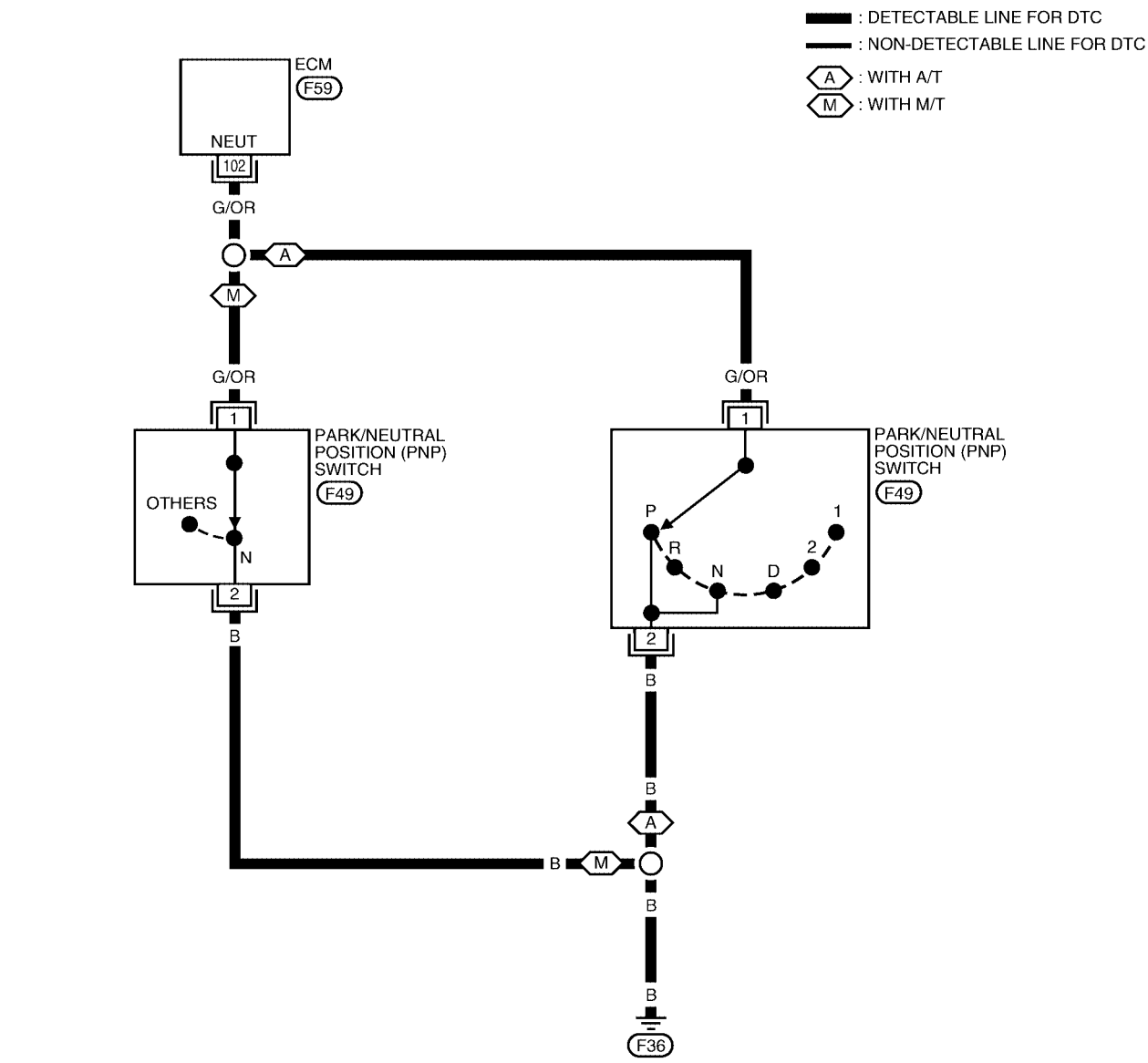
3. If NG, go to EC-565, "Diagnostic Procedure" .

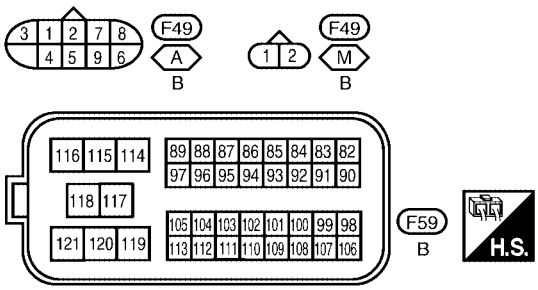


Wiring Diagram

UBS00BFU

EC-PNP/SW-01





BBWA0304E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	G/OR	PNP switch	**[Ignition switch: ON]** ● Shift lever: P or N (A/T), Neutral (M/T).	Approximately 0V
			[Ignition switch: ON] ● Except the above gear position	**A/T models** BATTERY VOLTAGE (11 - 14V) **M/T models** Approximately 5V

Diagnostic Procedure

UBS00BFV

1. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect PNP switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to power in harness or connectors.

2. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and PNP switch terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK PNP SWITCH

Refer to AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" (A/T models) or MT-12, "POSITION SWITCH" (M/T models).

OK or NG

OK >> GO TO 4.
NG >> Replace PNP switch.

4. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1805 BRAKE SWITCH

PFP:25320

Description

UBS00BFW

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

CONSULT-II Reference Value in Data Monitor Mode

UBS00BFX

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

UBS00BFY

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	● Harness or connectors (Stop lamp switch circuit is open or shorted.) ● Stop lamp switch

FALI-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

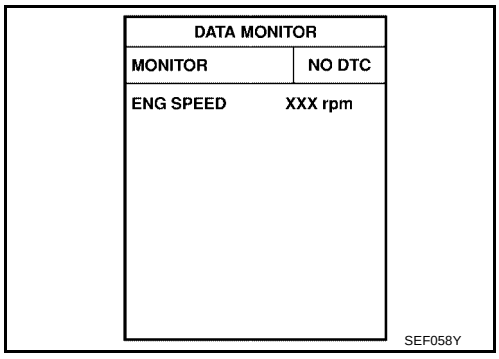
Engine operating condition in fail-safe mode	
ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.	
Vehicle condition	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration

DTC Confirmation Procedure

UBS00BFZ

WITH CONSULT-II

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-II.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If 1st trip DTC is detected, go to EC-568, "Diagnostic Procedure" .



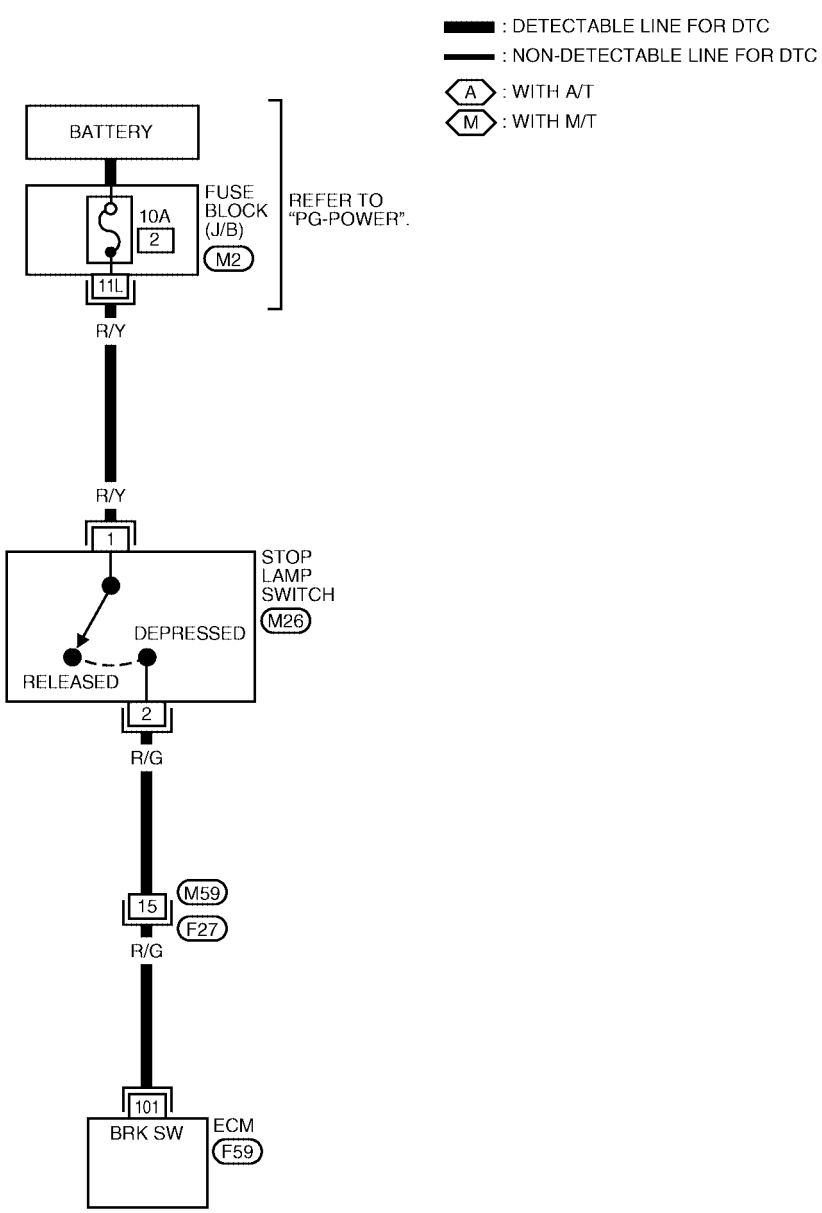
WITH GST

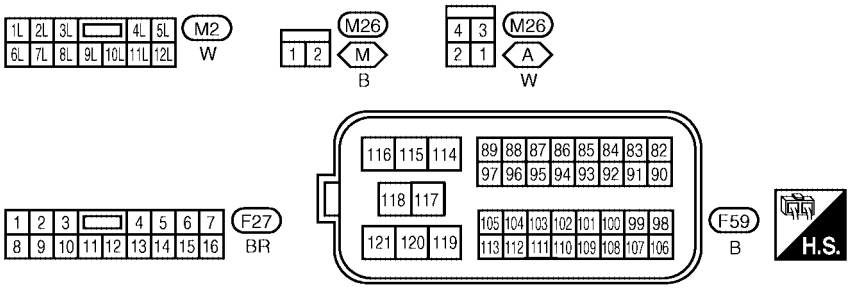
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00BG0

EC-BRK/SW-01





BBWA1445E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/G	Stop lamp switch	**[Ignition switch: ON]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Depressed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00BG1

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

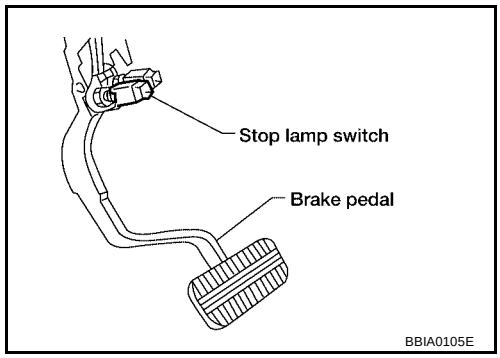
Brake pedal	Stop lamp
Fully released	Not illuminated
Depressed	Illuminated

OK or NG

OK >> GO TO 4.
NG >> GO TO 2.

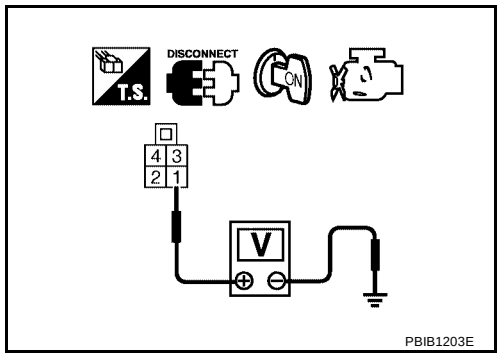
2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

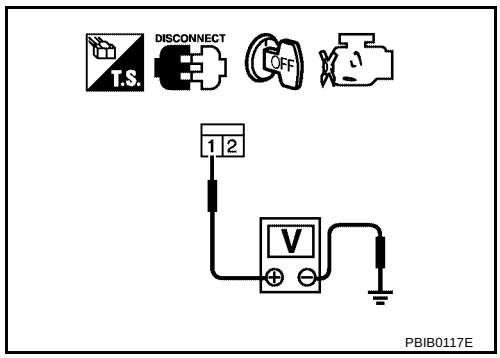
1. Disconnect stop lamp switch harness connector.



2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage





OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

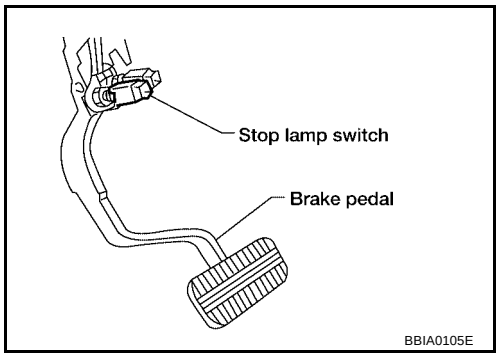
- 10A fuse
- Fuse block (J/B) connector M2
- Harness for open and short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect stop lamp switch harness connector.
4. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.
5. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK STOP LAMP SWITCH

Refer to EC-570, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace stop lamp switch.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

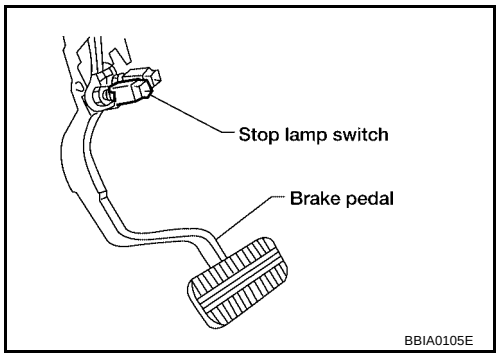
>> **INSPECTION END**

Component Inspection

UBS00BG2

STOP LAMP SWITCH

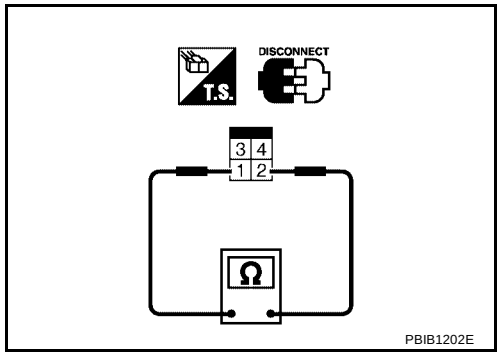
1. Disconnect stop lamp switch harness connector.

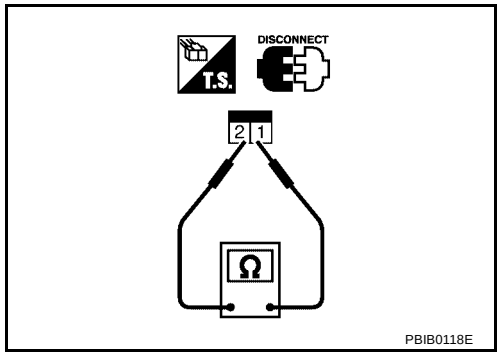


2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Conditions	Continuity
Brake pedal fully released	Should not exist.
Brake pedal depressed	Should exist.

If NG, adjust brake pedal installation, refer to BR-11, "BRAKE PEDAL AND BRACKET" , and perform step 2 again.





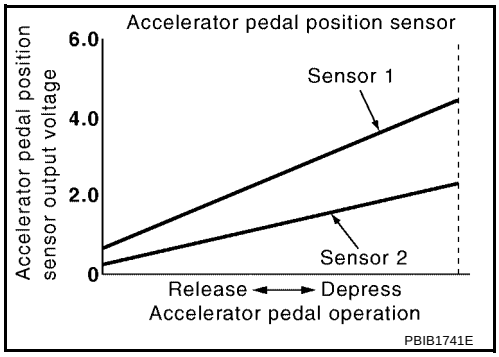
DTC P2122, P2123 APP SENSOR

PFP:18002

Component Description

UBS00BG3

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-II Reference Value in Data Monitor Mode

UBS00BG4

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.65 - 0.87V
		Accelerator pedal: Fully depressed	More than 4.3V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.56 - 0.96V
		Accelerator pedal: Fully depressed	More than 4.0V
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

UBS00BG5

These self-diagnoses have the one trip detection logic.

NOTE:
If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122 2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	● Harness or connectors (The APP sensor 1 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P2123 2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of throttle valve to be slower than the normal condition. So, the acceleration will be poor.

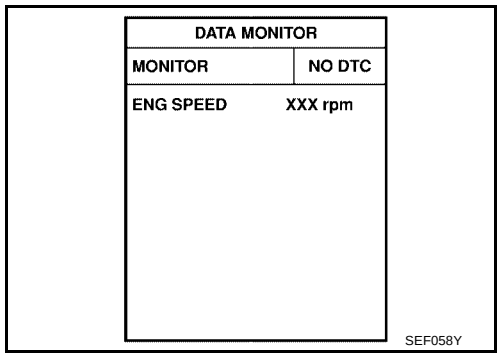
DTC Confirmation Procedure

UBS00BG6

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-575, "Diagnostic Procedure" .



WITH GST

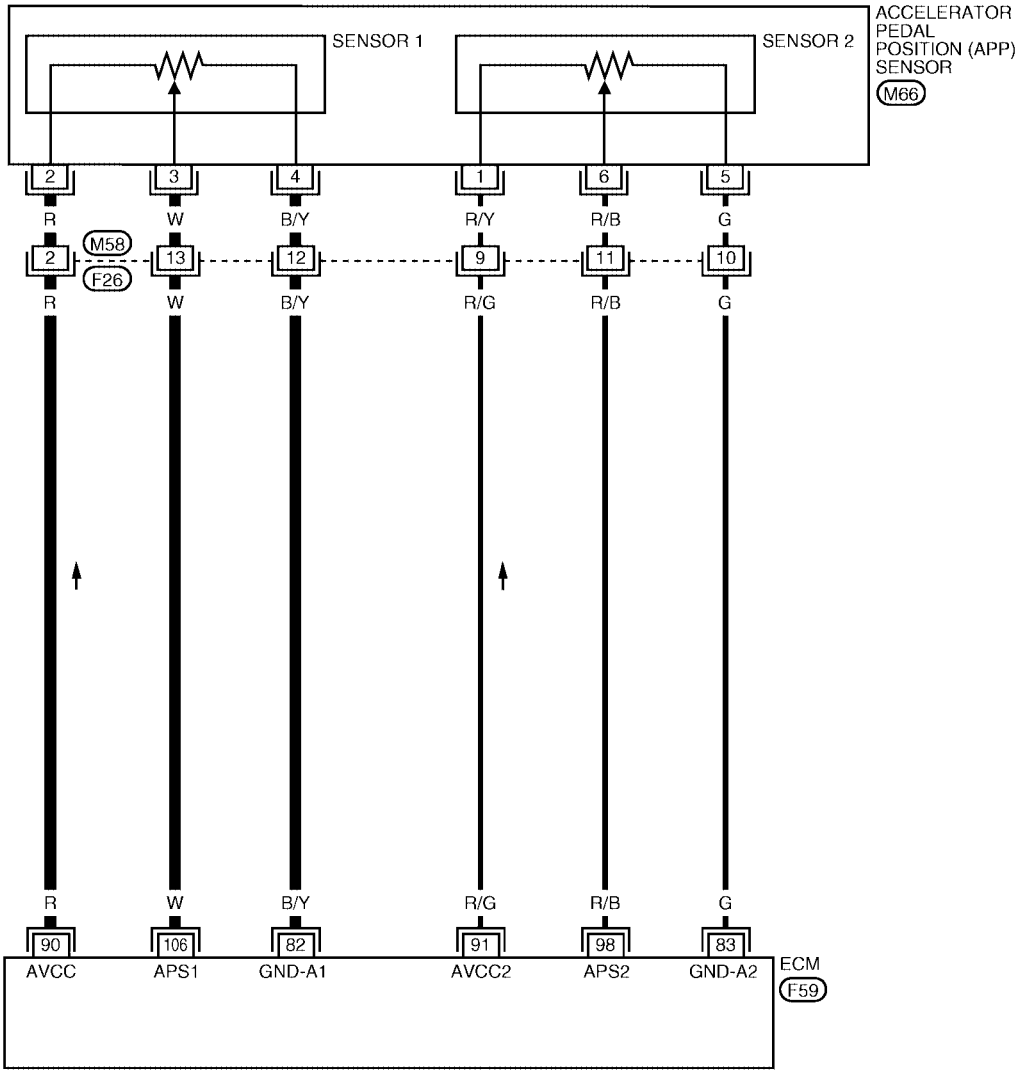
Follow the procedure “WITH CONSULT-II” above.

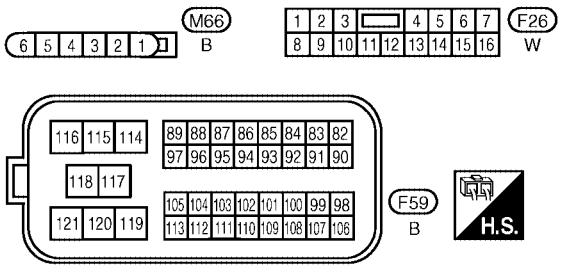
Wiring Diagram

UBS00BG7

EC-APPS1-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





BBWA1485E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

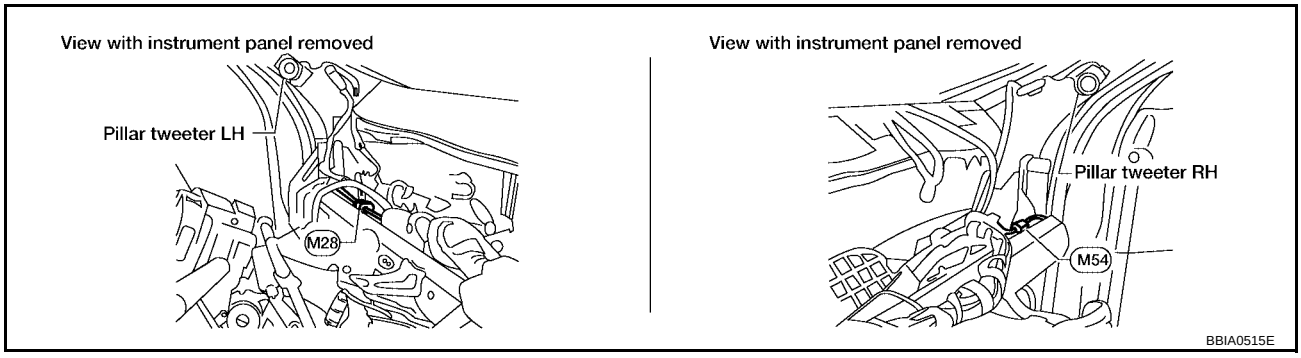
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B/Y	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	G	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	R/G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	R/B	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.28 - 0.48V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 2.0V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.65 - 0.87V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 4.3V

Diagnostic Procedure

UBS00BG8

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .

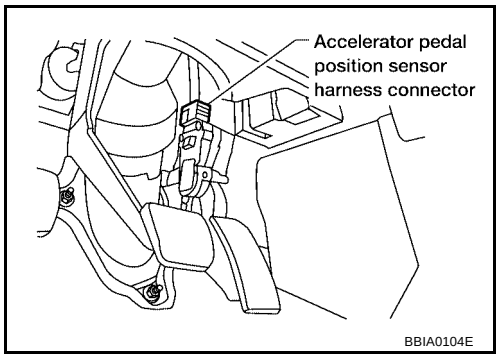


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

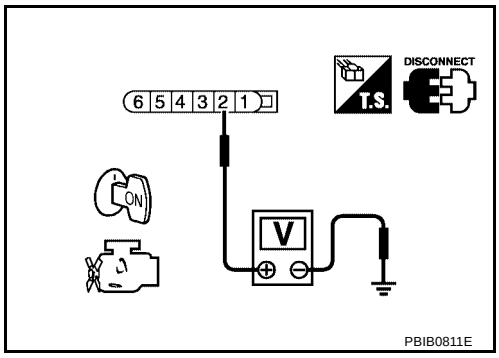
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 82 and APP sensor terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK APP SENSOR

Refer to EC-578, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSENBLY

1. Replace accelerator pedal assembly.
2. Perform EC-92, "Accelerator Pedal Released Position Learning" .
3. Perform EC-92, "Throttle Valve Closed Position Learning" .
4. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

10. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

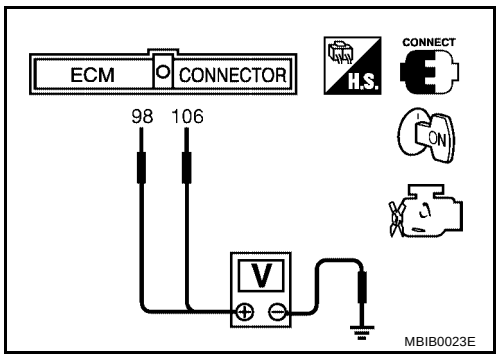
>> **INSPECTION END**

Component Inspection

UBS00BG9

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.65 - 0.87V
	Fully depressed	More than 4.3V
98 (Accelerator pedal position sensor 2)	Fully released	0.28 - 0.48V
	Fully depressed	More than 2.0V

4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-92, "Accelerator Pedal Released Position Learning" .
6. Perform EC-92, "Throttle Valve Closed Position Learning" .
7. Perform EC-92, "Idle Air Volume Learning" .

Removal and Installation

UBS00BGA

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

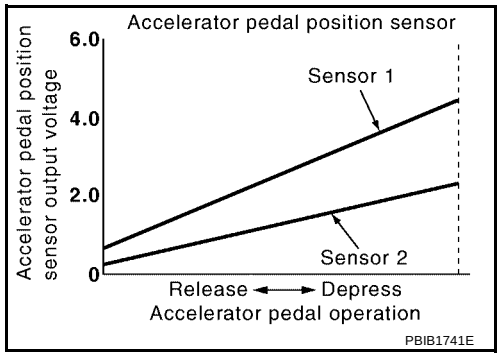
DTC P2127, P2128 APP SENSOR

PFP:18002

Component Description

UBS00BGB

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-II Reference Value in Data Monitor Mode

UBS00BGC

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.65 - 0.87V
		Accelerator pedal: Fully depressed	More than 4.3V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.56 - 0.96V
		Accelerator pedal: Fully depressed	More than 4.0V
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

UBS00BGD

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1227 1227	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	● Harness or connectors (The APP sensor 2 circuit is open or shorted.) (TP sensor circuit is shorted) ● Accelerator pedal position sensor (Accelerator pedal position sensor 2) ● Electric throttle control actuator (TP sensor 1 and 2)
P1228 1228	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

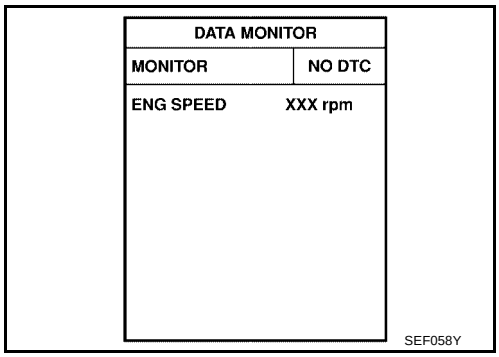
DTC Confirmation Procedure

UBS00BGE

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-582, "Diagnostic Procedure" .



WITH GST

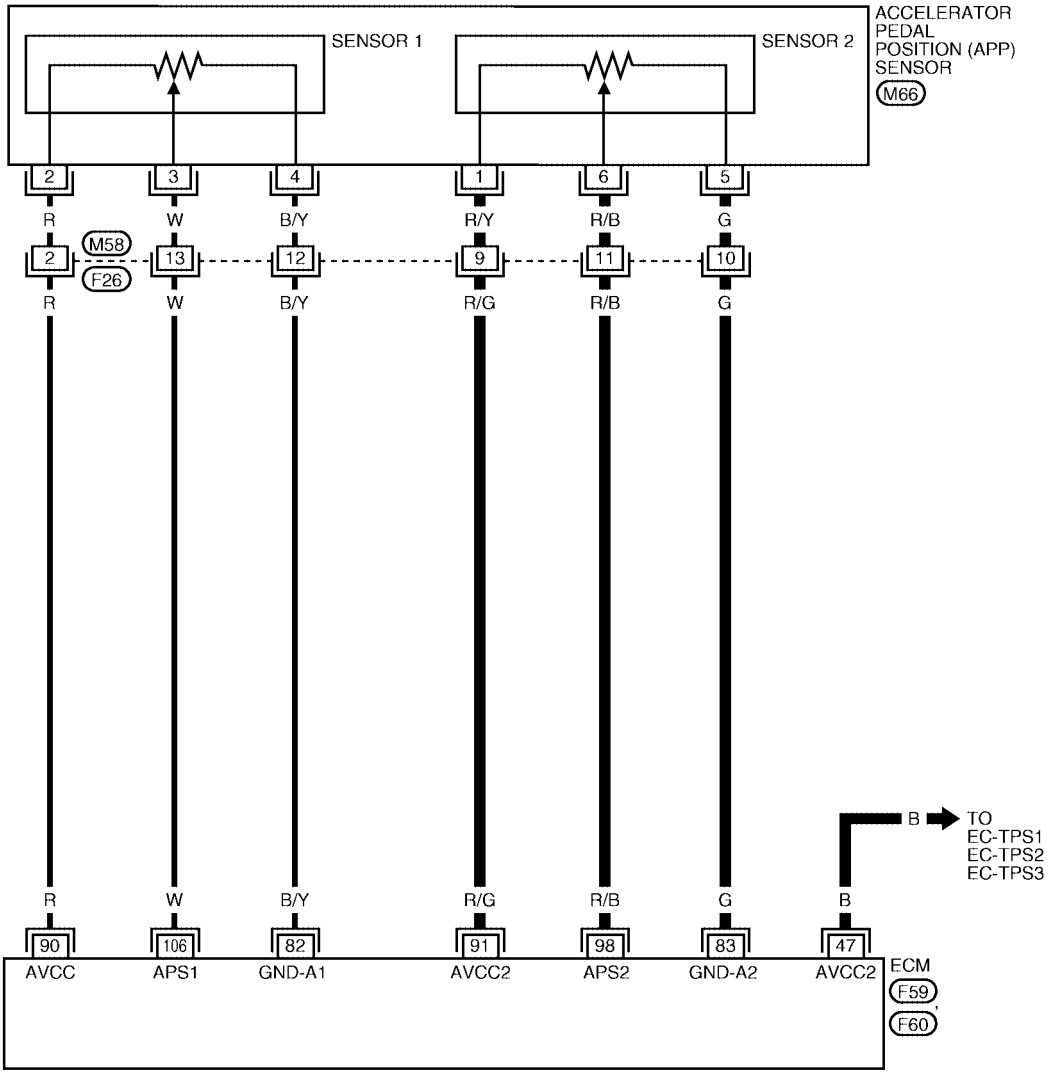
Follow the procedure “With CONSULT-II” above.

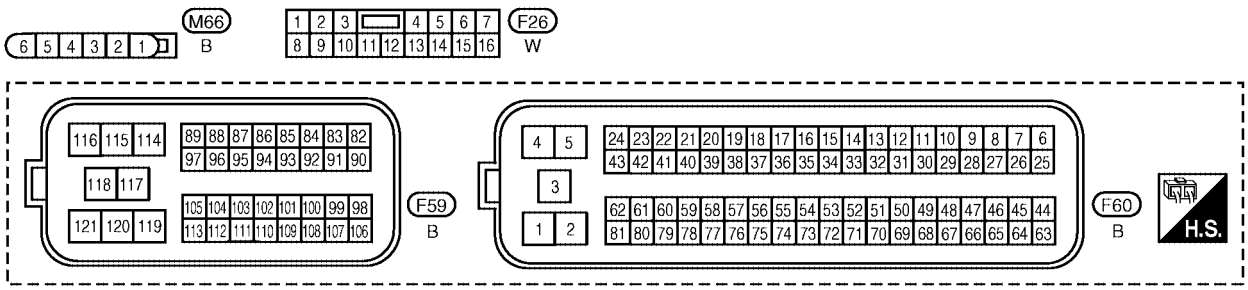
Wiring Diagram

UBS00BGF

EC-APPS2-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





BBWA1486E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

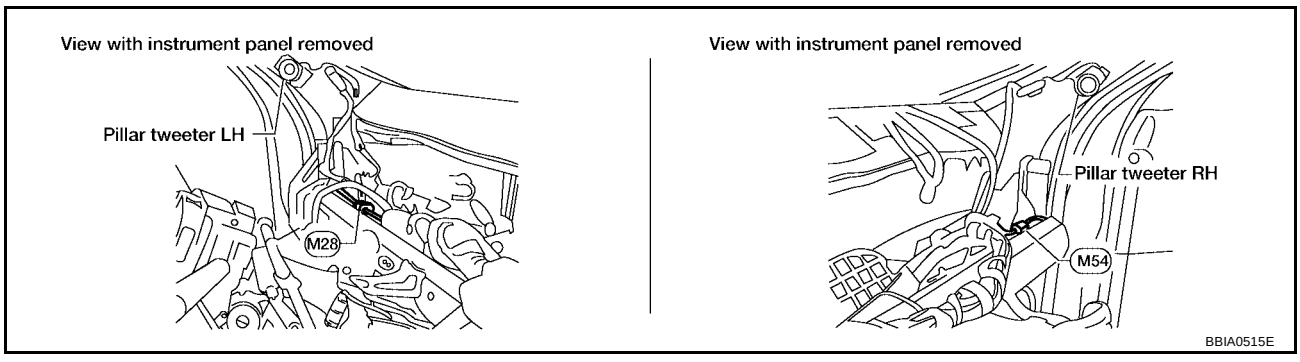
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	B	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
82	B/Y	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	G	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	R/G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	R/B	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.28 - 0.48V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 2.0V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.65 - 0.87V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 4.3V

Diagnostic Procedure

UBS00BGG

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .

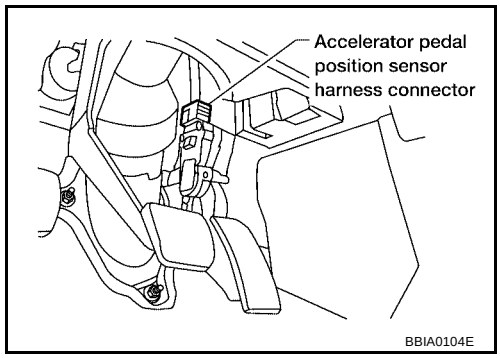


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

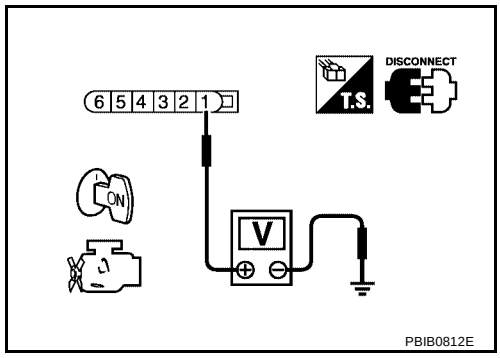
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 91. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness for open between ECM and accelerator pedal position sensor

>> Repair or replace open circuit.

5. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 1	EC-595
47	Electric throttle control actuator terminal 1	EC-400

OK or NG

OK >> GO TO 6.
NG >> Repair short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR

Refer to EC-270, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> GO TO 7.

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-92, "Throttle Valve Closed Position Learning" .
3. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

8. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ECM terminal 83 APP sensor terminal 5.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 98 and APP sensor terminal 6.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK APP SENSOR

Refer to EC-600, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace accelerator pedal assembly.

13. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-92, "Accelerator Pedal Released Position Learning" .
3. Perform EC-92, "Throttle Valve Closed Position Learning" .
4. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

14. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

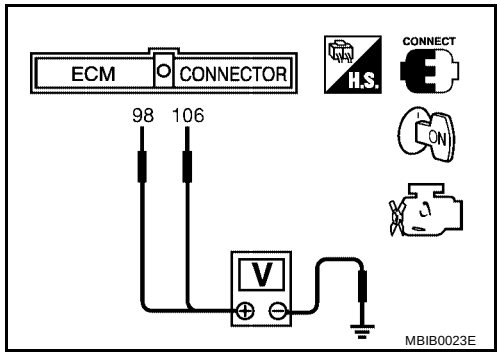
Component Inspection

UBS00BGH

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.65 - 0.87V
	Fully depressed	More than 4.3V
98 (Accelerator pedal position sensor 2)	Fully released	0.28 - 0.48V
	Fully depressed	More than 2.0V



4. If NG, replace accelerator pedal assembly.
5. Perform EC-92, "Accelerator Pedal Released Position Learning" .
6. Perform EC-92, "Throttle Valve Closed Position Learning" .
7. Perform EC-92, "Idle Air Volume Learning" .

Removal and Installation

UBS00BGI

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

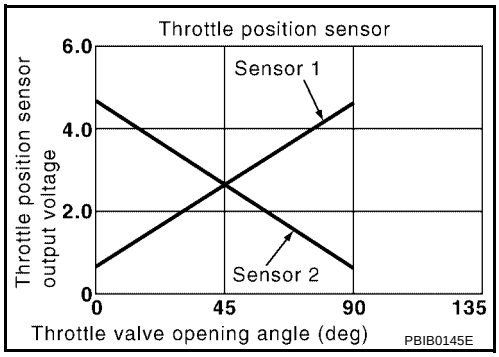
DTC P2135 TP SENSOR

PFP:16119

Component Description

UBS00BGJ

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-II Reference Value in Data Monitor Mode

UBS00BGK

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

UBS00BGL

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Throttle position sensor circuit range/performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	● Harness or connector (The TP sensor 1 and 2 circuit is open or shorted.) (APP sensor 2 circuit is shorted) ● Electric throttle control actuator (TP sensor 1 and 2) ● Accelerator pedal position sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

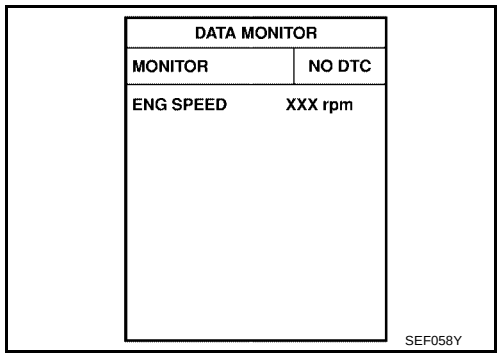
DTC Confirmation Procedure

UBS00BGM

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-589, "Diagnostic Procedure" .

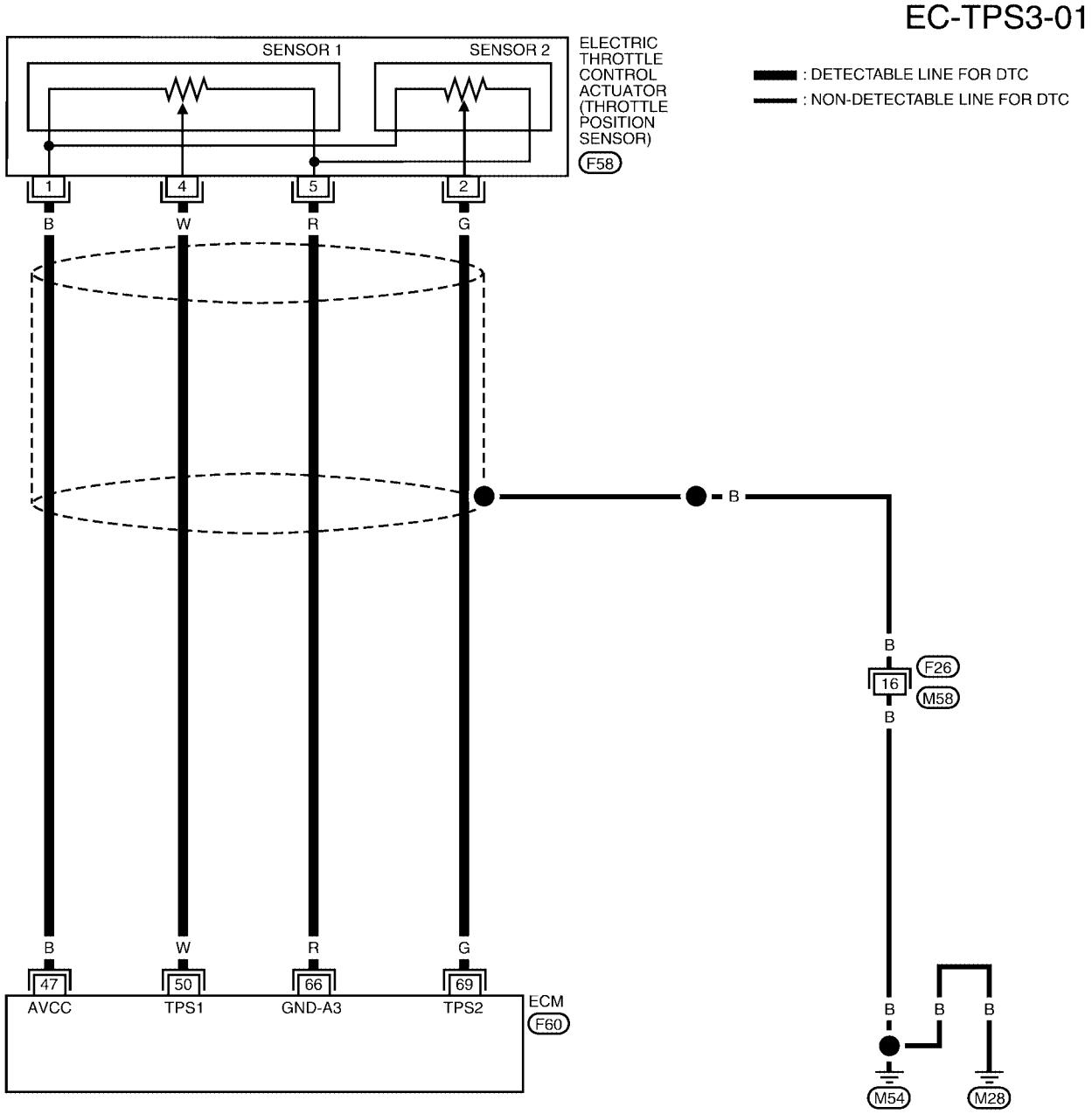


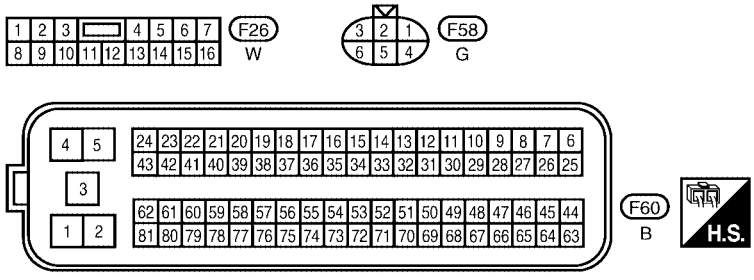
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00BGN





BBWA0706E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

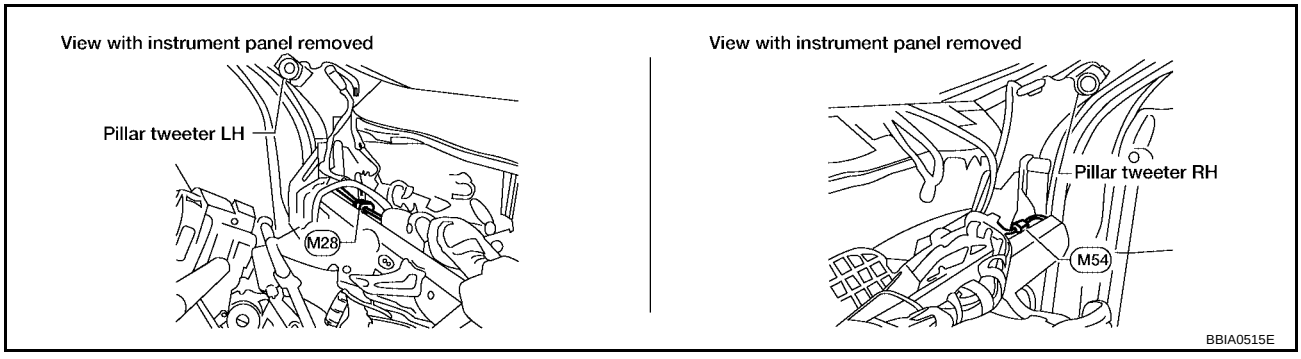
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	B	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
66	R	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
69	G	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
91	R/G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

UBS00BGO

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .



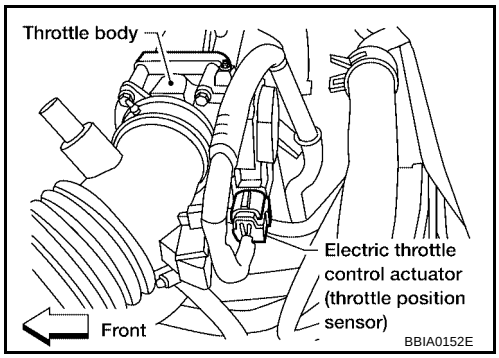
OK or NG

OK >> GO TO 2.

NG >> Repair or replace ground connections.

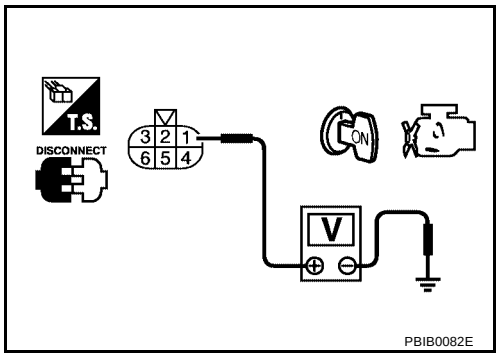
2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.



3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace open circuit.

4. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 1	EC-408
91	APP sensor terminal 1	EC-574

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-600, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-92, "Accelerator Pedal Released Position Learning" .
3. Perform EC-92, "Throttle Valve Closed Position Learning" .
4. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 66 and electric throttle control actuator terminal 5. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 4, ECM terminal 69 and electric throttle control actuator terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-270, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-92, "Throttle Valve Closed Position Learning" .
3. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

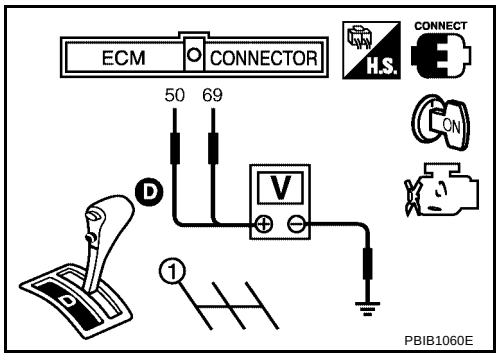
>> **INSPECTION END**

Component Inspection

UBS00BGP

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-92, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T models) or 1st position (M/T models).
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V

6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-92, "Throttle Valve Closed Position Learning" .
8. Perform EC-92, "Idle Air Volume Learning" .

Removal and Installation

UBS00BGQ

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-15, "Removal and Installation" .

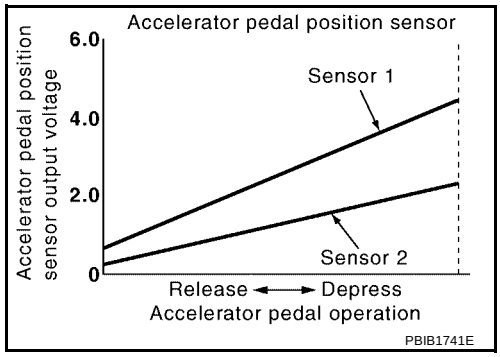
DTC P2138 APP SENSOR

PFP:18002

Component Description

UBS00BGR

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-II Reference Value in Data Monitor Mode

UBS00BGS

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.65 - 0.87V
		Accelerator pedal: Fully depressed	More than 4.3V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.56 - 0.96V
		Accelerator pedal: Fully depressed	More than 4.0V
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

UBS00BGT

This self-diagnosis has the one trip detection logic.

NOTE:
If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-473 .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138 2138	Accelerator pedal position sensor circuit range/performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	● Harness or connector (The APP sensor 1 and 2 circuit is open or shorted.) (TP sensor circuit is shorted.) ● Accelerator pedal position sensor 1 and 2 ● Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of throttle valve to be slower than the normal condition. So, the acceleration will be poor.

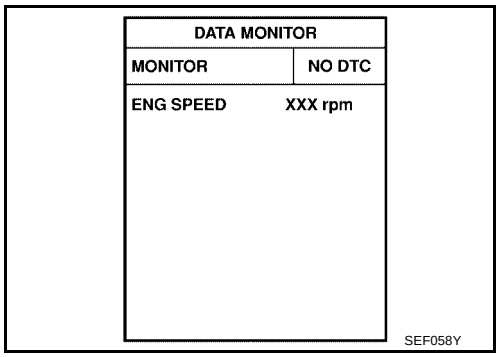
DTC Confirmation Procedure

UBS00BGU

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-596, "Diagnostic Procedure" .



WITH GST

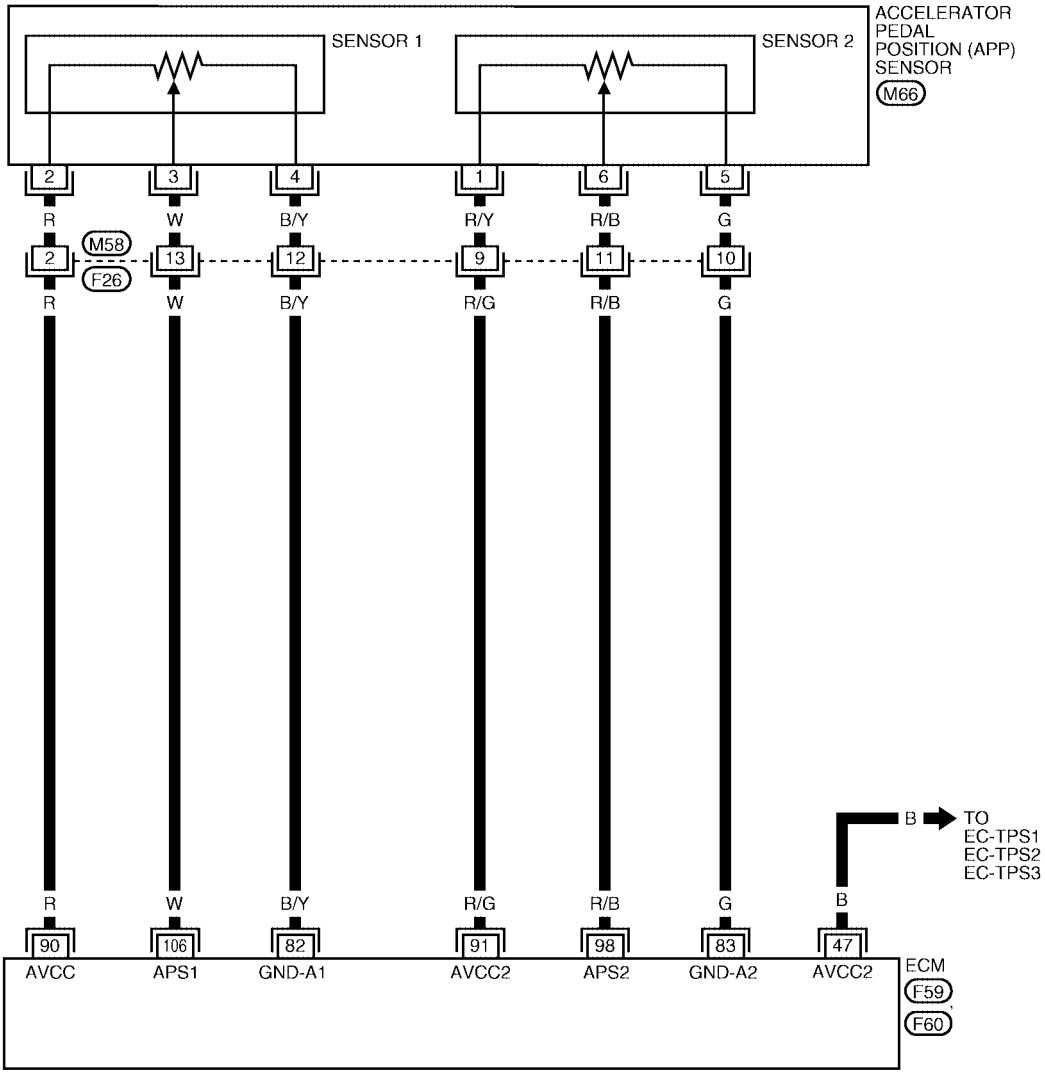
Follow the procedure “WITH CONSULT-II” above.

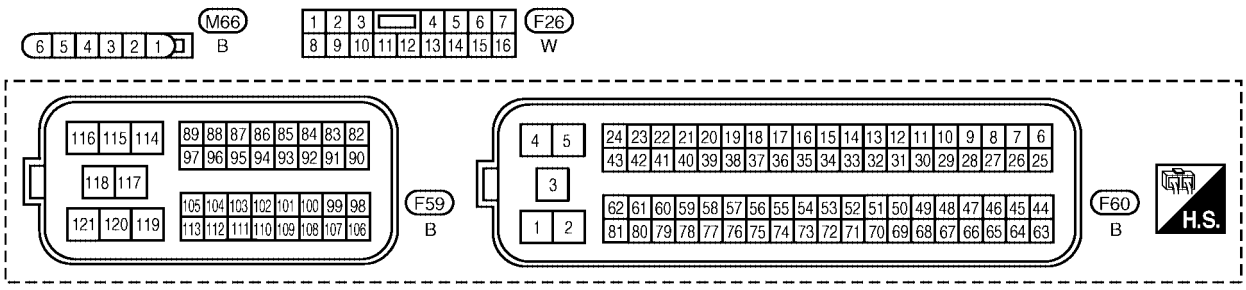
Wiring Diagram

UBS00BGV

EC-APPS3-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





BBWA1487E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

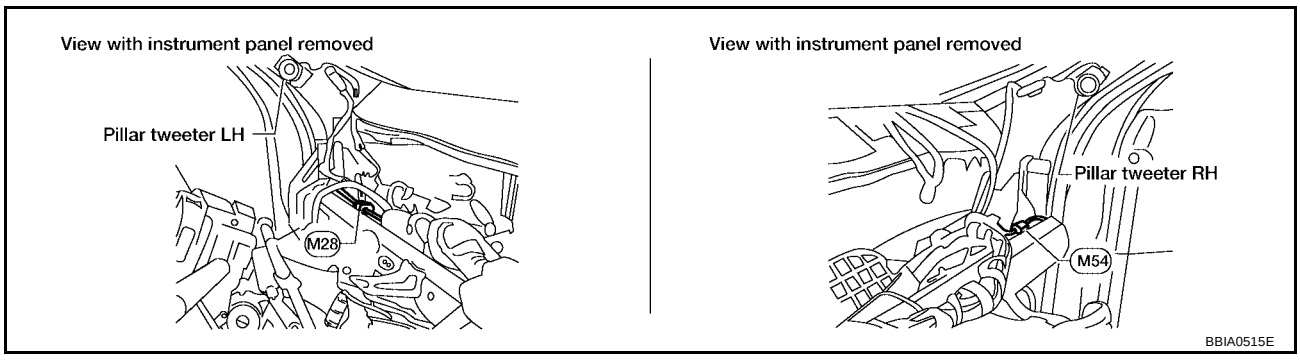
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	B	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
82	B/Y	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	G	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	R/G	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	R/B	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.28 - 0.48V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 2.0V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.65 - 0.87V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 4.3V

Diagnostic Procedure

UBS00BGW

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-170, "Ground Inspection" .

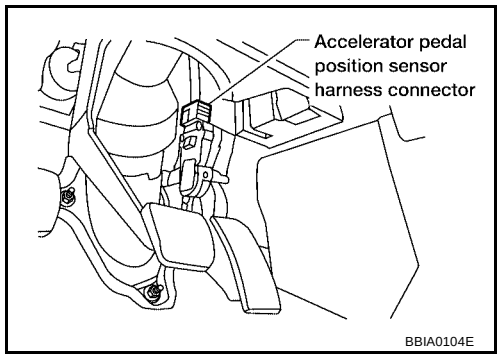


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

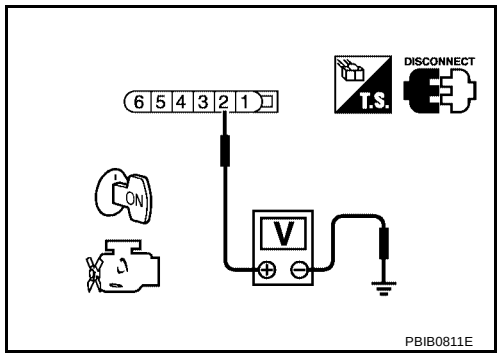


3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

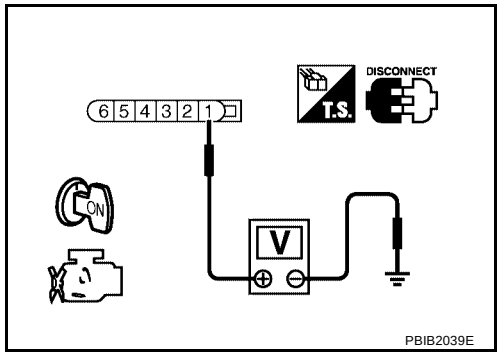
4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 10.
NG >> GO TO 5.



5. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 91. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness for open between ECM and accelerator pedal position sensor

>> Repair or replace open circuit.

7. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 1	EC-595
47	Electric throttle control actuator terminal 1	EC-400

OK or NG

OK >> GO TO 8.
NG >> Repair short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR

Refer to EC-270, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> GO TO 9.

9. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-92, "Throttle Valve Closed Position Learning" .
3. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

10. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 82, APP sensor terminal 5 and ECM terminal 83.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 3, ECM terminal 98 and APP sensor terminal 6.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK APP SENSOR

Refer to EC-600, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-92, "Accelerator Pedal Released Position Learning" .
3. Perform EC-92, "Throttle Valve Closed Position Learning" .
4. Perform EC-92, "Idle Air Volume Learning" .

>> **INSPECTION END**

16. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

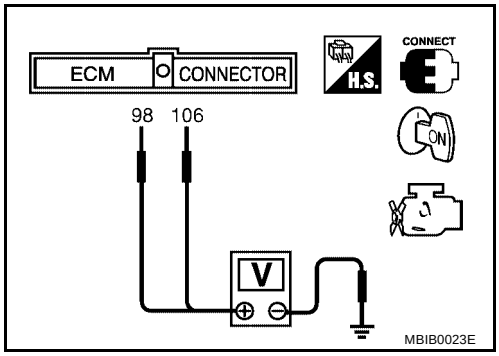
Component Inspection

UBS00BGX

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.65 - 0.87V
	Fully depressed	More than 4.3V
98 (Accelerator pedal position sensor 2)	Fully released	0.28 - 0.48V
	Fully depressed	More than 2.0V



4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-92, "Accelerator Pedal Released Position Learning" .
6. Perform EC-92, "Throttle Valve Closed Position Learning" .
7. Perform EC-92, "Idle Air Volume Learning" .

Removal and Installation

UBS00BGY

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

IGNITION SIGNAL

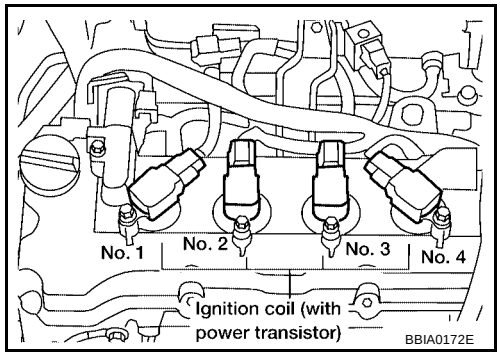
PFP:22448

Component Description

UBS00BGZ

IGNITION COIL & POWER TRANSISTOR

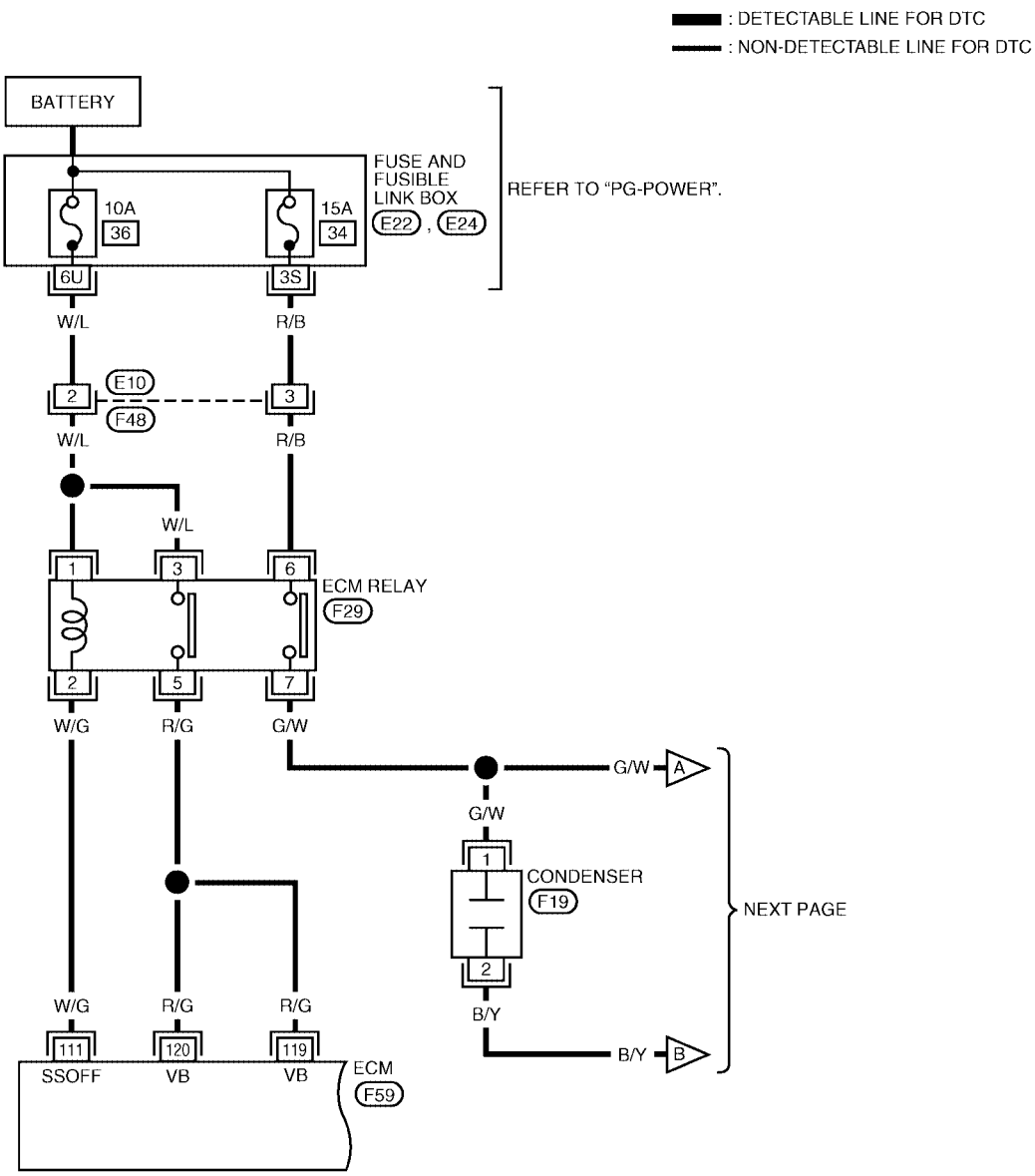
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

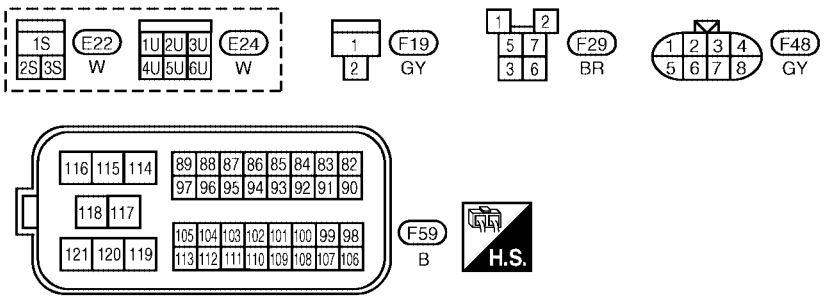


Wiring Diagram

UBS00BH0

EC-IGNSYS-01





BBWA1446E

Specification data are reference values and are measured between each terminal and ground.

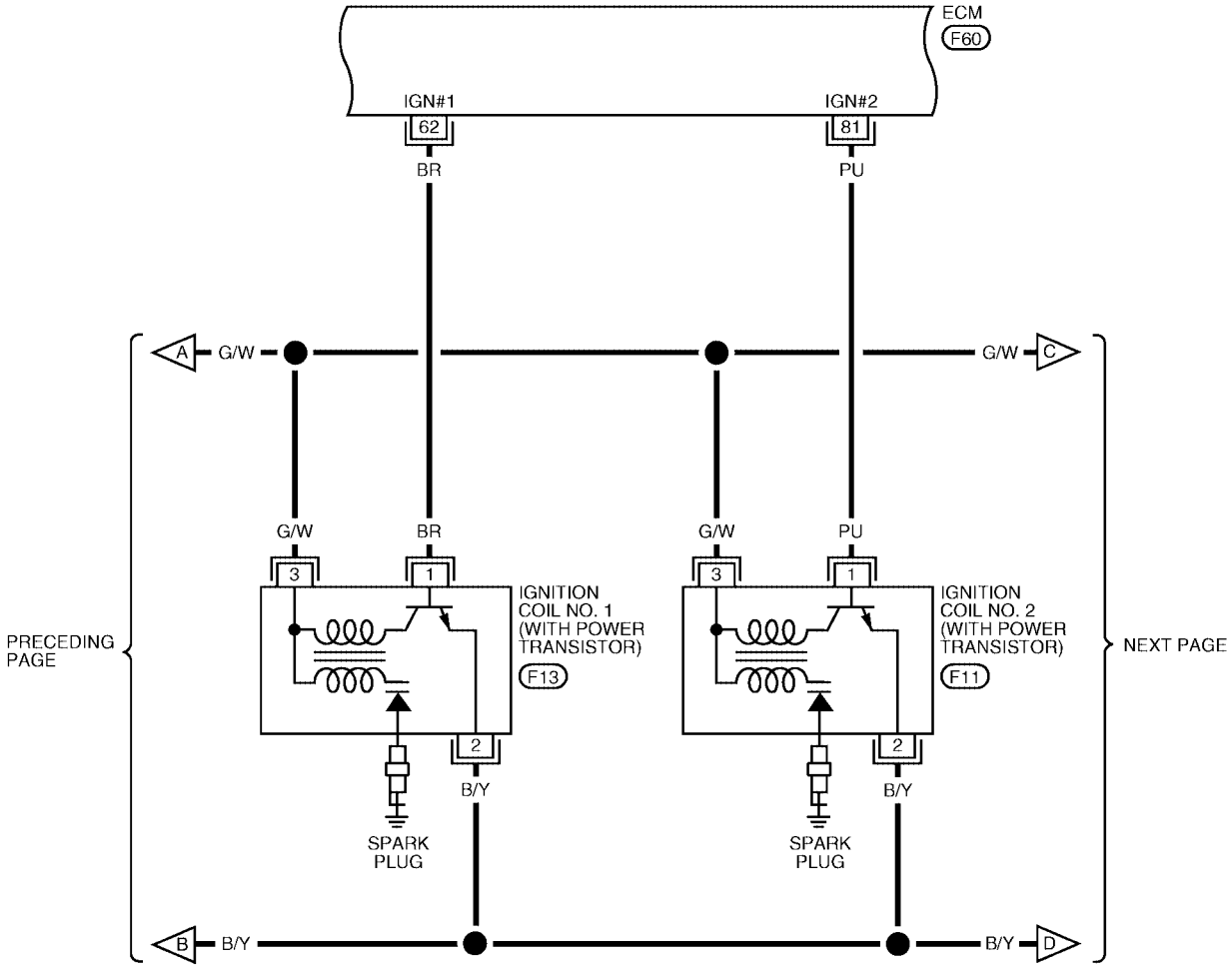
CAUTION:

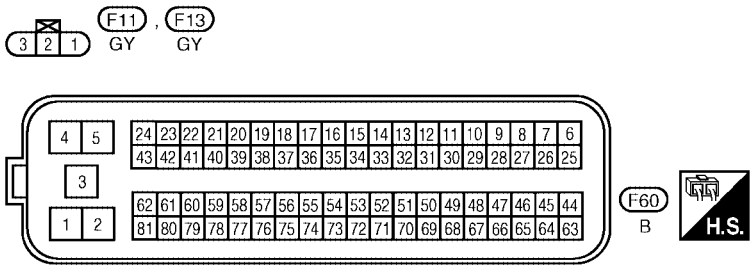
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

EC-IGNSYS-02

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



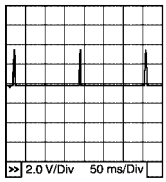
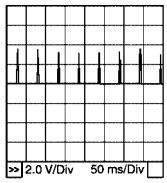


BBWA1447E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

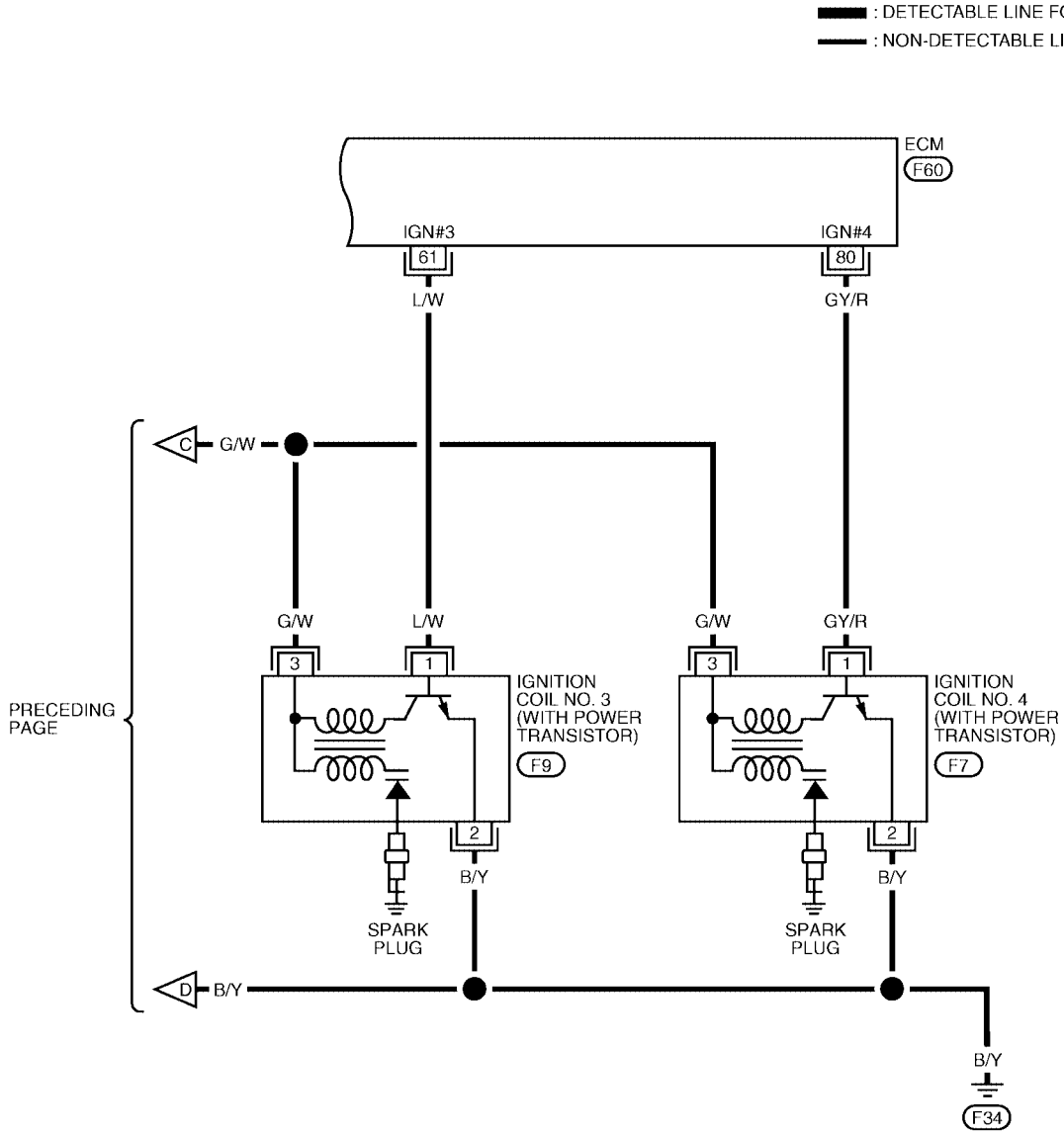
CAUTION:

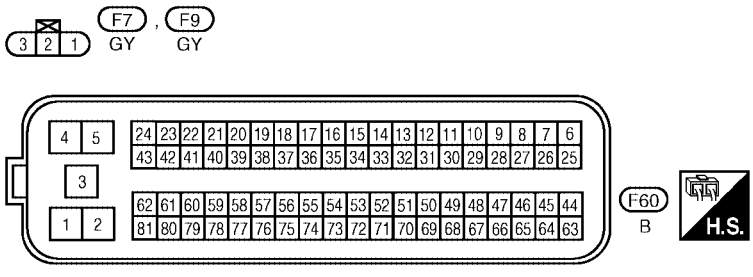
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62 81	BR PU	Ignition signal No. 1 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

EC-IGNSYS-03

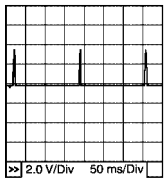
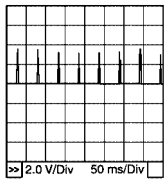




BBWA1448E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
61 80	L/W GY/R	Ignition signal No. 3 Ignition signal No. 4	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00BH1

1. CHECK ENGINE START

Turn ignition switch OFF, and restart engine.
Is engine running?

Yes or No

Yes (With CONSULT-II) >>GO TO 2.
Yes (Without CONSULT-II) >>GO TO 3.
No >> GO TO 4.

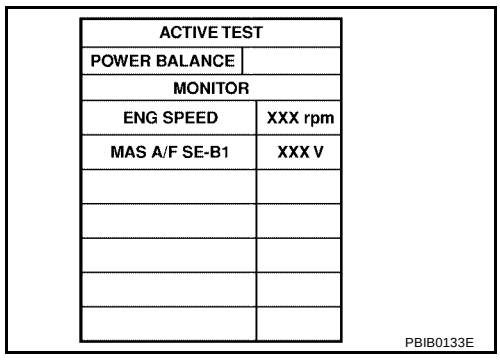
2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.



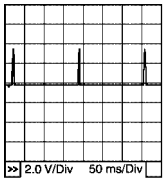
PBIB0133E

3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Let engine idle.
2. Read the voltage signal between ECM terminals 61, 62, 80, 81 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.

NOTE:
The pulse cycle changes depending on rpm at idle.



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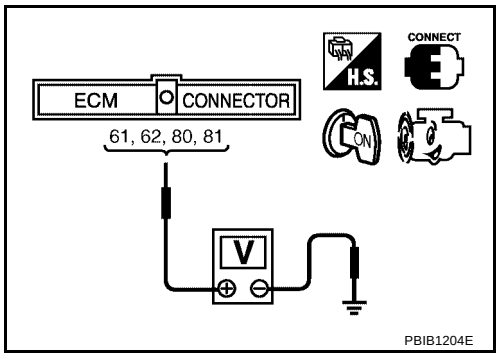


PBIB1204E

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

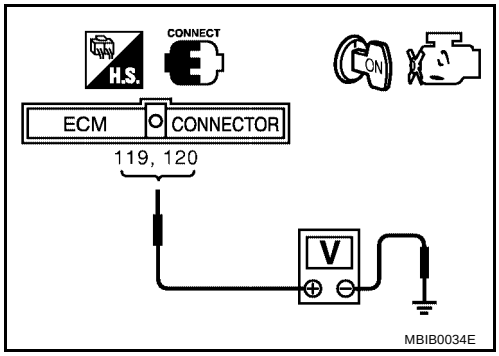
4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> Go to EC-164, "POWER SUPPLY AND GROUND CIRCUIT" .



MBIB0034E

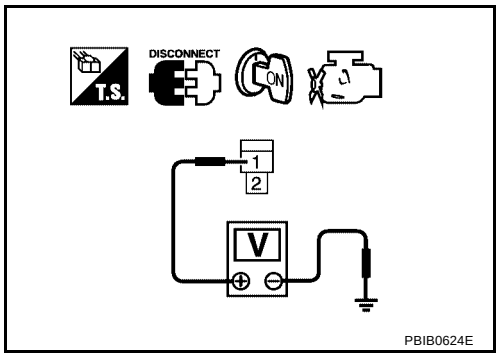
5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.
4. Check voltage between condenser terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 6.



PBIB0624E

6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

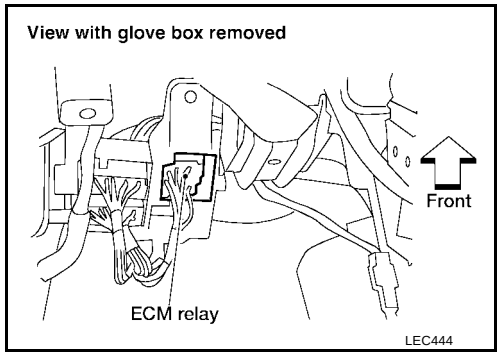
1. Turn ignition switch OFF.
2. Disconnect ECM relay.
3. Check harness continuity between ECM relay terminal 7 and condenser terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



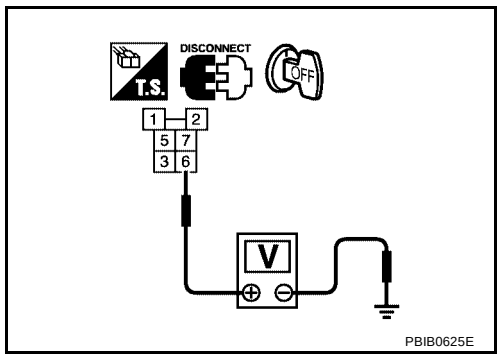
7. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

Check voltage between ECM relay terminal 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- 15A fuse
- Harness for open or short between ECM relay and battery

>> Repair or replace harness or connectors.

9. CHECK ECM RELAY

Refer to EC-611, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ECM relay.

10. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check harness continuity between condenser terminal 2 and ground.
   Refer to Wiring diagram.

   Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to power in harness or connector.

11. CHECK CONDENSER

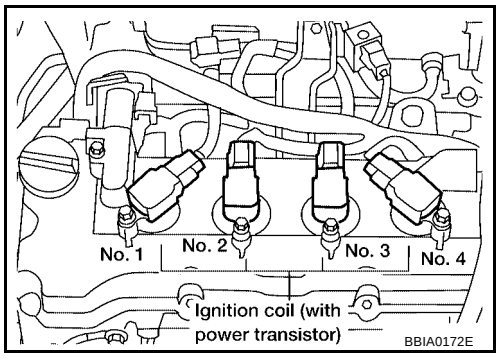
Refer to EC-611, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace condenser.

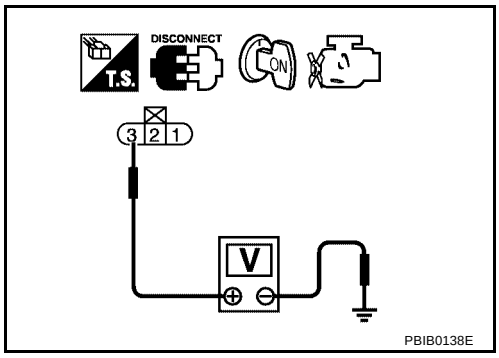
12. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil harness connector.
4. Turn ignition switch ON.



5. Check voltage between ignition coil terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ignition coil and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ignition coil terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 15.
NG >> Repair open circuit or short to power in harness or connectors.

15. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 61, 62, 80, 81 and ignition coil terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-611, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ignition coil with power transistor.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

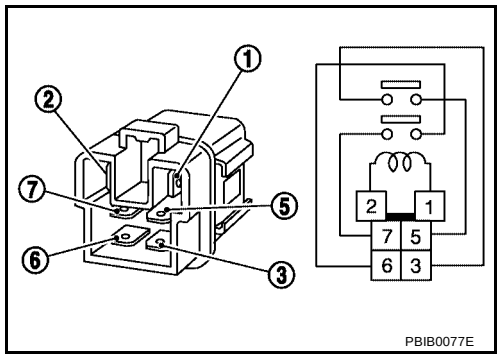
UBS00BH2

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.



IGNITION COIL WITH POWER TRANSISTOR

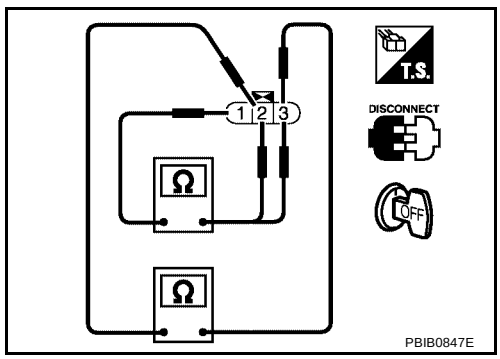
CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	

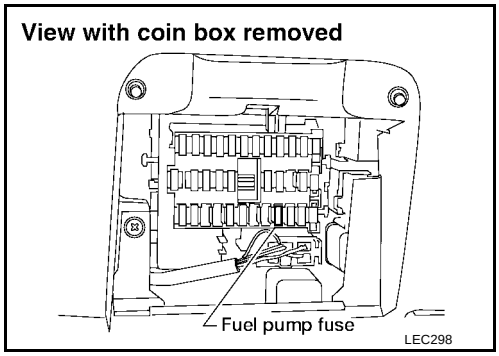
4. If NG, replace ignition coil with power transistor. If OK, go to next step.
5. Turn ignition switch OFF.
6. Reconnect all harness connectors disconnected.



7. Remove fuel pump fuse in fuse block No. 1 to release fuel pressure.

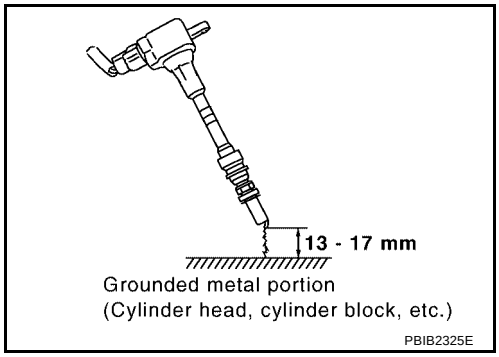
   NOTE:
   Do not use CONSULT-II to release fuel pressure, or fuel pressure applies again during the following procedure.

8. Start engine.
9. After engine stalls, crank it two or three times to release all fuel pressure.
10. Turn ignition switch OFF.
11. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.



12. Remove ignition coil and spark plug of the cylinder to be checked.
13. Crank engine for five seconds or more to remove combustion gas in the cylinder.
14. Connect spark plug and harness connector to ignition coil.
15. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
16. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

    Spark should be generated.



CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of 17 mm or more is taken.**

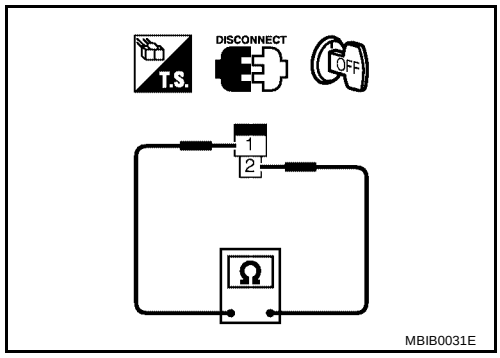
NOTE:
When the gap is 13 mm or less, the spark might be generated even if the coil is malfunctioning.

17. If NG, replace ignition coil with power transistor.

CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals 1 and 2.

Resistance: Above 1 MΩ at 25°C (77°F)



UBS00BH3

Removal and Installation

IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-15, "Removal and Installation" .

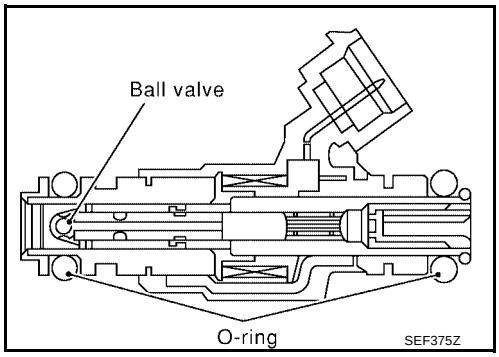
INJECTOR

PFP:16600

Component Description

UBS00BH4

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-II Reference Value in Data Monitor Mode

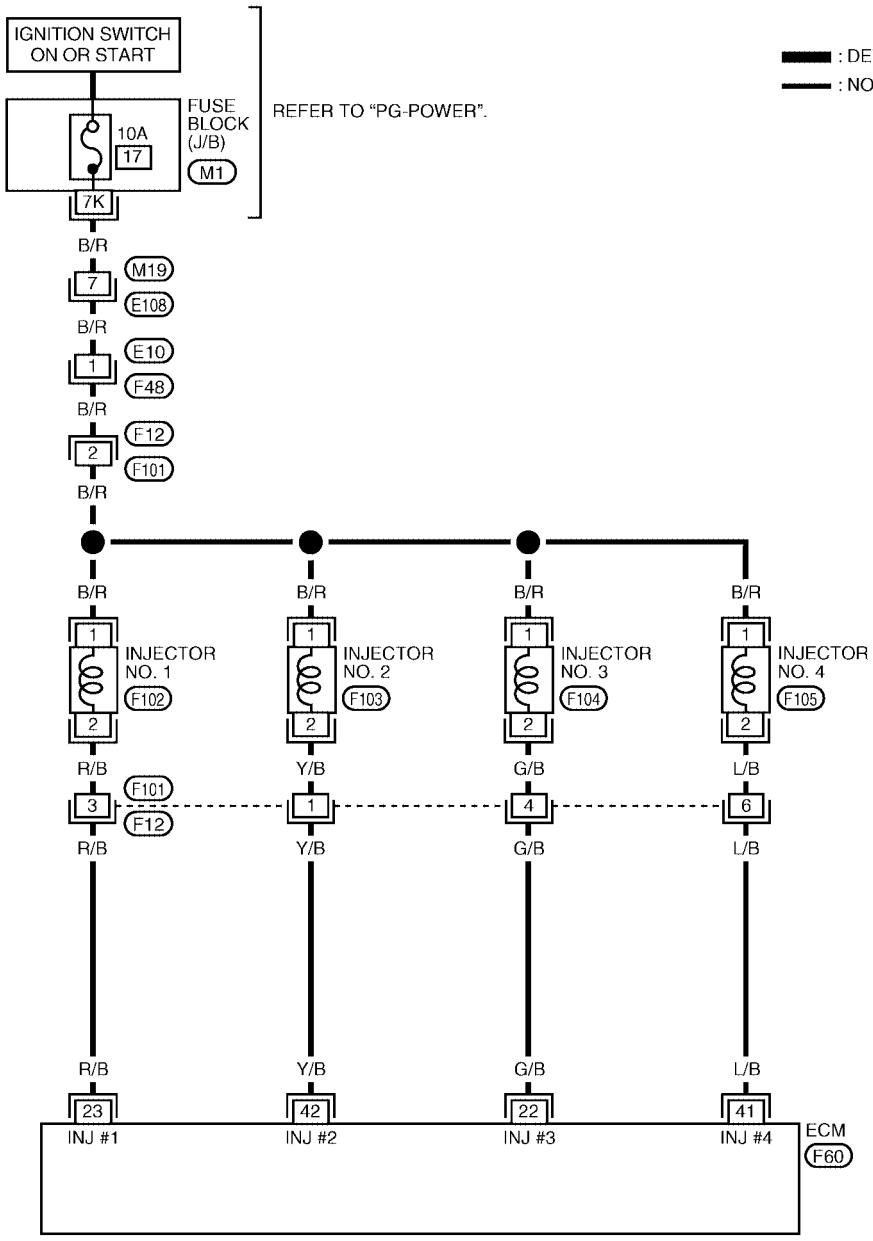
UBS00BH5

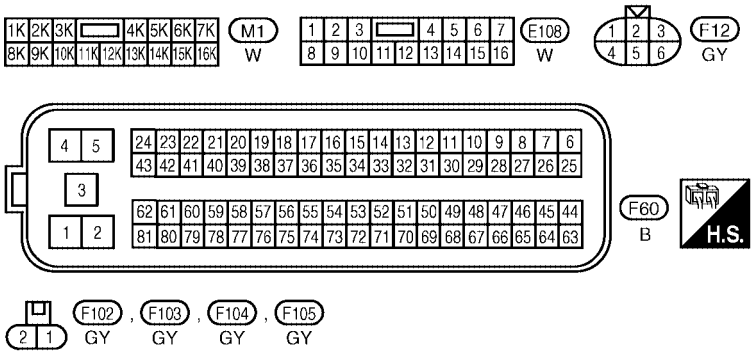
MONITOR ITEM	CONDITION		SPECIFICATION
INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No-load	Idle	2.4 - 3.2 msec
		2,000 rpm	1.9 - 3.2 msec
B/FUEL SCHDL	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● No-load	Idle	1.0 - 1.6 msec
		2,000 rpm	0.7 - 1.3 msec

Wiring Diagram

UBS00BH6

EC-INJECT-01



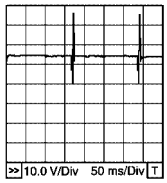
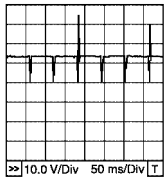


BBWA1450E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22 23 41 42	G/B R/B L/B Y/B	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00BH7

1. INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

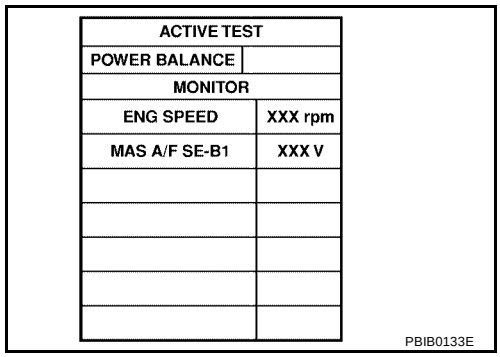
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

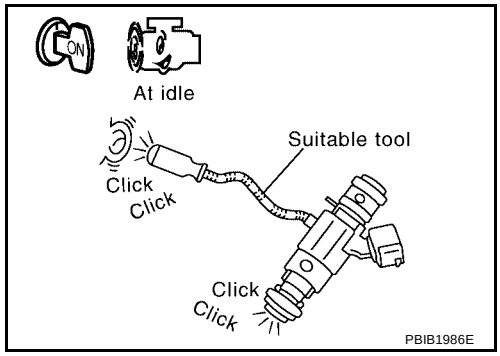
With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.

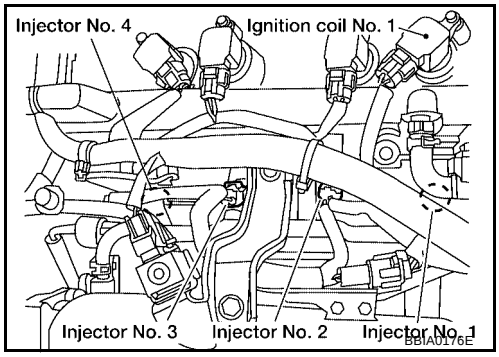


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

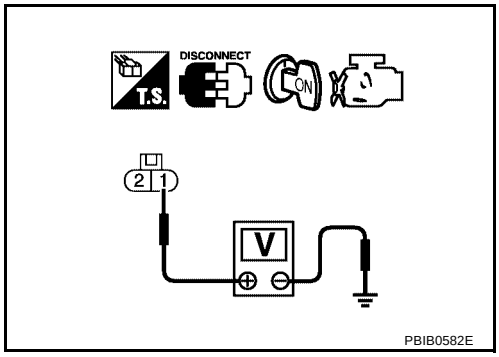
3. CHECK POWER SUPPLY CIRCUIT

1. Stop engine.
2. Disconnect injector harness connector.
3. Turn ignition switch ON.



4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E10, F48
- Harness connectors F12, F101
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between injector and fuse

>> Repair harness or connectors.

5. CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between injector harness connector terminal 2 and ECM terminals 22, 23, 41, 42.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F12, F101
- Harness for open or short between injector and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INJECTOR

Refer to EC-619, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace injector.

8. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

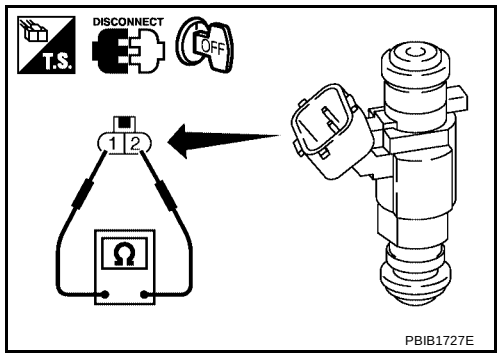
Component Inspection

UBS00BH8

INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 12.5 - 18.4Ω [at 20°C (68°F)]



Removal and Installation

UBS00BH9

INJECTOR

Refer to EM-21, "Removal and Installation" .

FUEL PUMP

PFP:17042

System Description

UBS00BHA

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay
Battery	Battery voltage*		

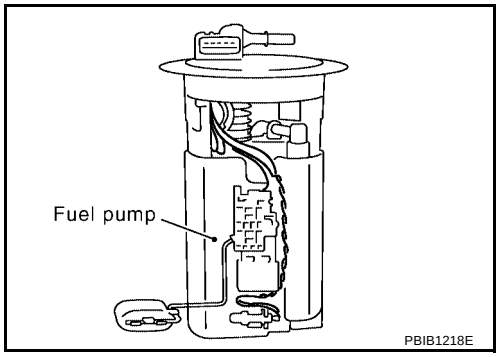
*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for 1 second after the ignition switch is turned ON to improve engine start-ability. If the ECM receives a engine speed signal from the camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON.	Operates for 1 second
Engine running and cranking	Operates
When engine is stopped	Stops in 1 second
Except as shown above	Stops

COMPONENT DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.



CONSULT-II Reference Value in Data Monitor Mode

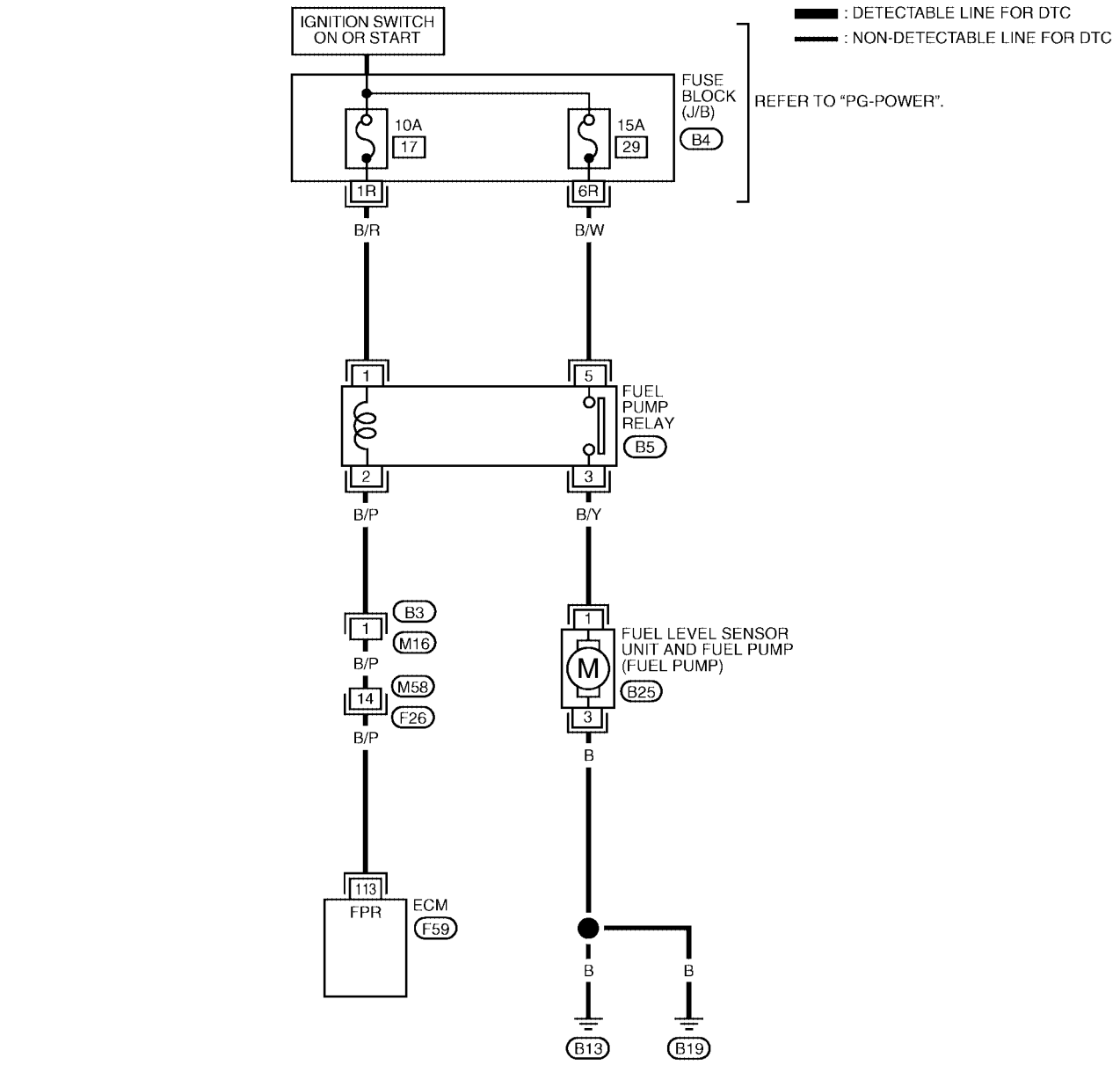
UBS00BHB

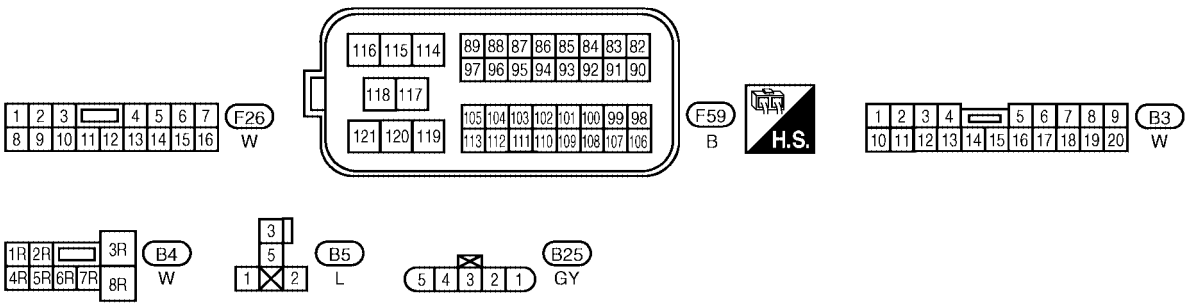
MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● Ignition switch is turned to ON (Operates for 1 second) ● Engine running and cranking ● When engine is stopped (Stops in 1 second)	ON
	● Except as shown above	OFF

Wiring Diagram

UBS00BHC

EC-F/PUMP-01





BBWA1451E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

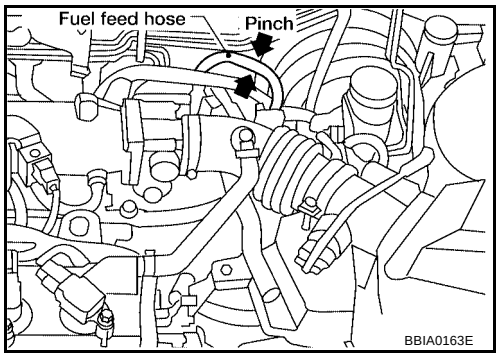
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
113	B/P	Fuel pump relay	**[Ignition switch: ON]** ● For 1 second after turning ignition switch ON. **[Engine is running]**	0 - 1.0V
			[Ignition switch: ON] ● More than 1 second after turning ignition switch ON.	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00BHD

1. CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with fingers.
   Fuel pressure pulsation should be felt on the fuel feed hose for 1 seconds after ignition switch is turned ON.

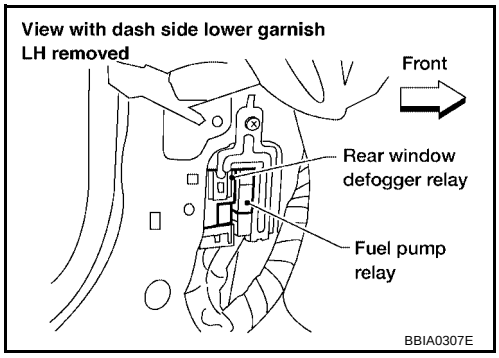


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

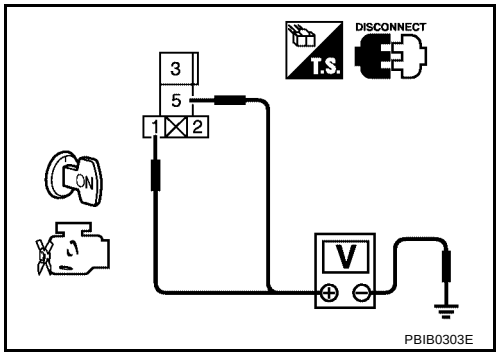
2. CHECK FUEL PUMP POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect fuel pump relay.
3. Turn ignition switch ON.



4. Check voltage between fuel pump relay terminals 1, 5 and ground with CONSULT-II or tester.

   Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- 15A fuse
- Fuse block (J/B) connector B4
- Harness for open or short between fuse and fuel pump relay

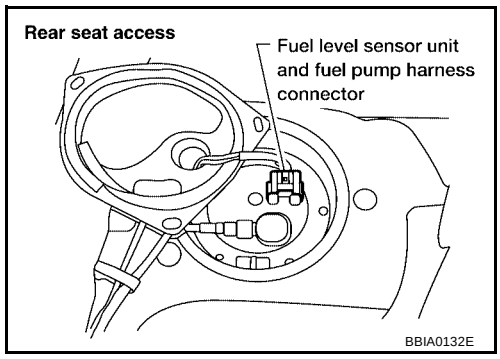
>> Repair harness or connectors.

4. CHECK POWER CIRCUIT AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 3 and body ground, “fuel level sensor unit and fuel pump” terminal 1 and fuel pump relay terminal 3. Refer to wiring diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between and “fuel level sensor unit and fuel pump” and ground
- Harness for open or short between and “fuel level sensor unit and fuel pump” and fuel pump relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 113 and fuel pump relay terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B3, M16
- Harness connector M58, F26
- Harness for open or short between ECM and fuel pump relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK FUEL PUMP RELAY

Refer to EC-624, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace fuel pump relay.

9. CHECK FUEL PUMP

Refer to EC-624, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace “fuel level sensor unit and fuel pump”.

10. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

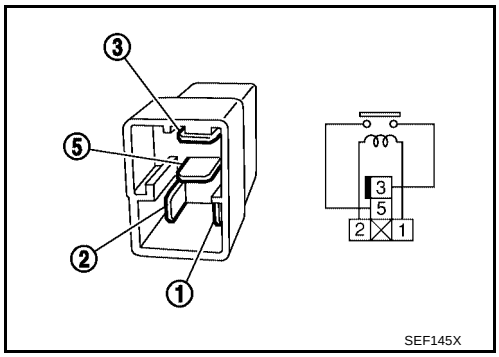
UBS00BHE

FUEL PUMP RELAY

Check continuity between terminals 3 and 5.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

If NG, replace relay.



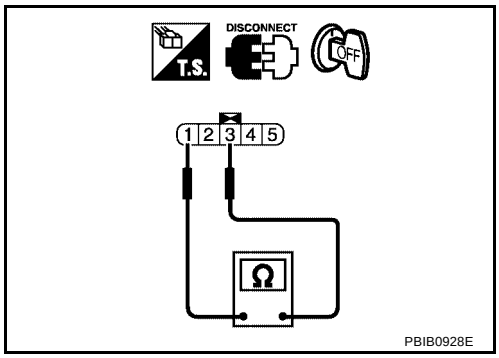
SEF145X

FUEL PUMP

1. Disconnect “fuel level sensor unit and fuel pump” harness connector.
2. Check resistance between “fuel level sensor unit and fuel pump” terminals 1 and 3.

Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]

If NG, replace “fuel level sensor unit and fuel pump”.



PBIB0928E

Removal and Installation

UBS00BHF

FUEL PUMP

Refer toDI-26, "FUEL LEVEL SENSOR UNIT CHECK" .

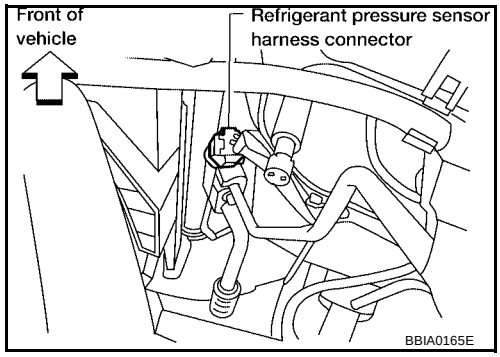
REFRIGERANT PRESSURE SENSOR

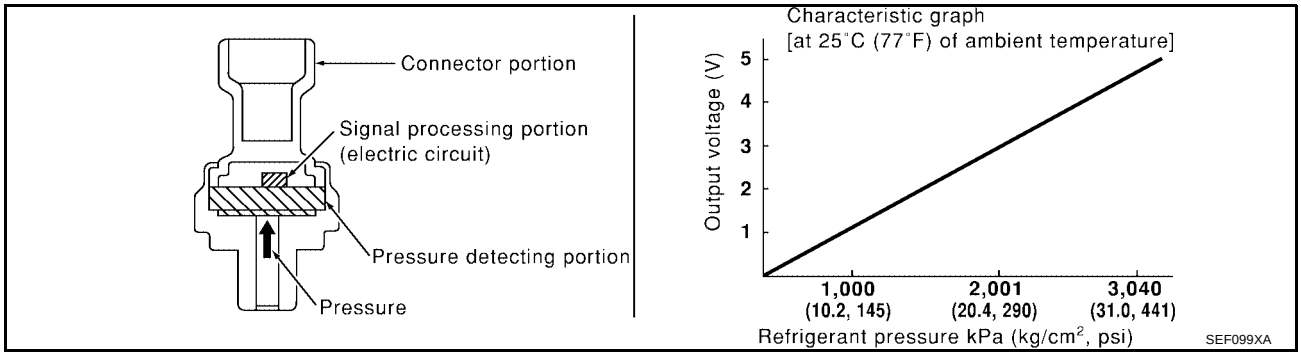
PFP:92136

Description

UBS00BHG

The refrigerant pressure sensor is installed at the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

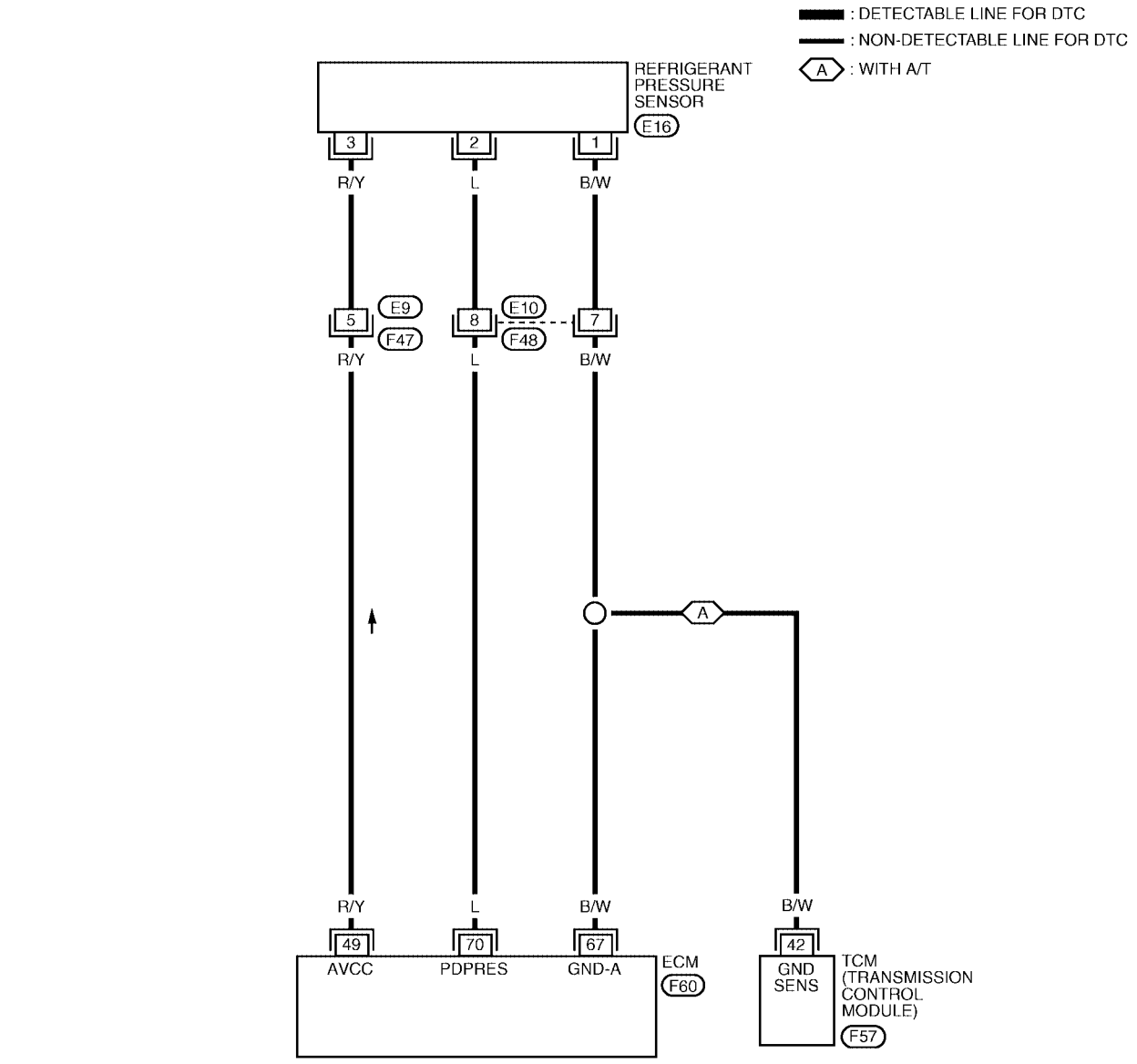


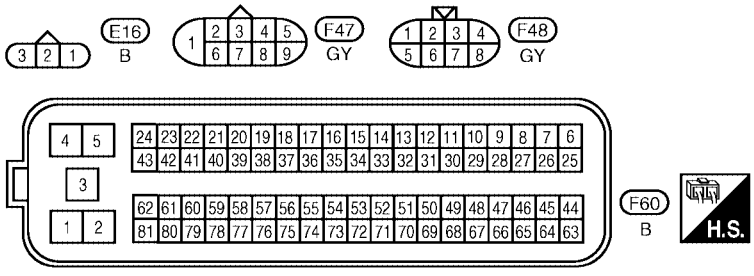


Wiring Diagram

UBS00BHH

EC-RP/SEN-01





REFER TO THE FOLLOWING.
F57 - ELECTRICAL UNITS

BBWA1452E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	R/Y	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
70	L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are ON (Compressor operates.)	1.0 - 4.0V

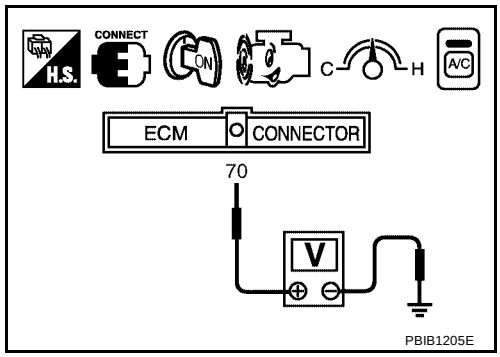
Diagnostic Procedure

UBS00BHI

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch ON.
3. Check voltage between ECM terminal 70 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

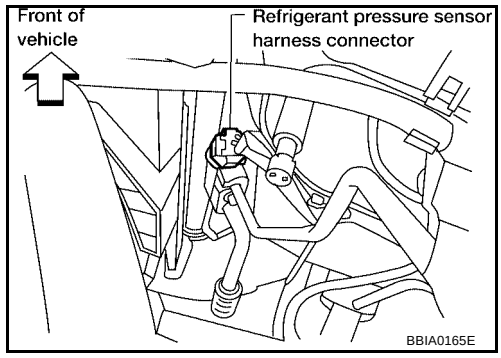


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

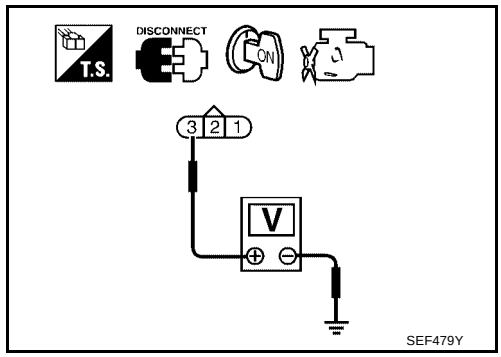
2. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn A/C switch and blower switch OFF.
2. Stop engine.
3. Disconnect refrigerant pressure sensor harness connector.
4. Turn ignition switch ON.



5. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair harness or connectors.

4. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector.
4. Check harness continuity between refrigerant pressure sensor terminal 1 and ECM terminal 67, TCM terminal 42.
   Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between TCM and refrigerant pressure sensor
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 70 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK REFRIGERANT PRESSURE SENSOR

Refer to MTC-15, "Refrigerant Pressure Sensor" .

OK or NG

OK >> GO TO 9.
NG >> Replace refrigerant pressure sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00BHJ

REFRIGERANT PRESSURE SENSOR

Refer to MTC-15, "REFRIGERATION SYSTEM" .

ELECTRICAL LOAD SIGNAL

PFP:25350

CONSULT-II Reference Value in Data Monitor Mode

UBS00BJC

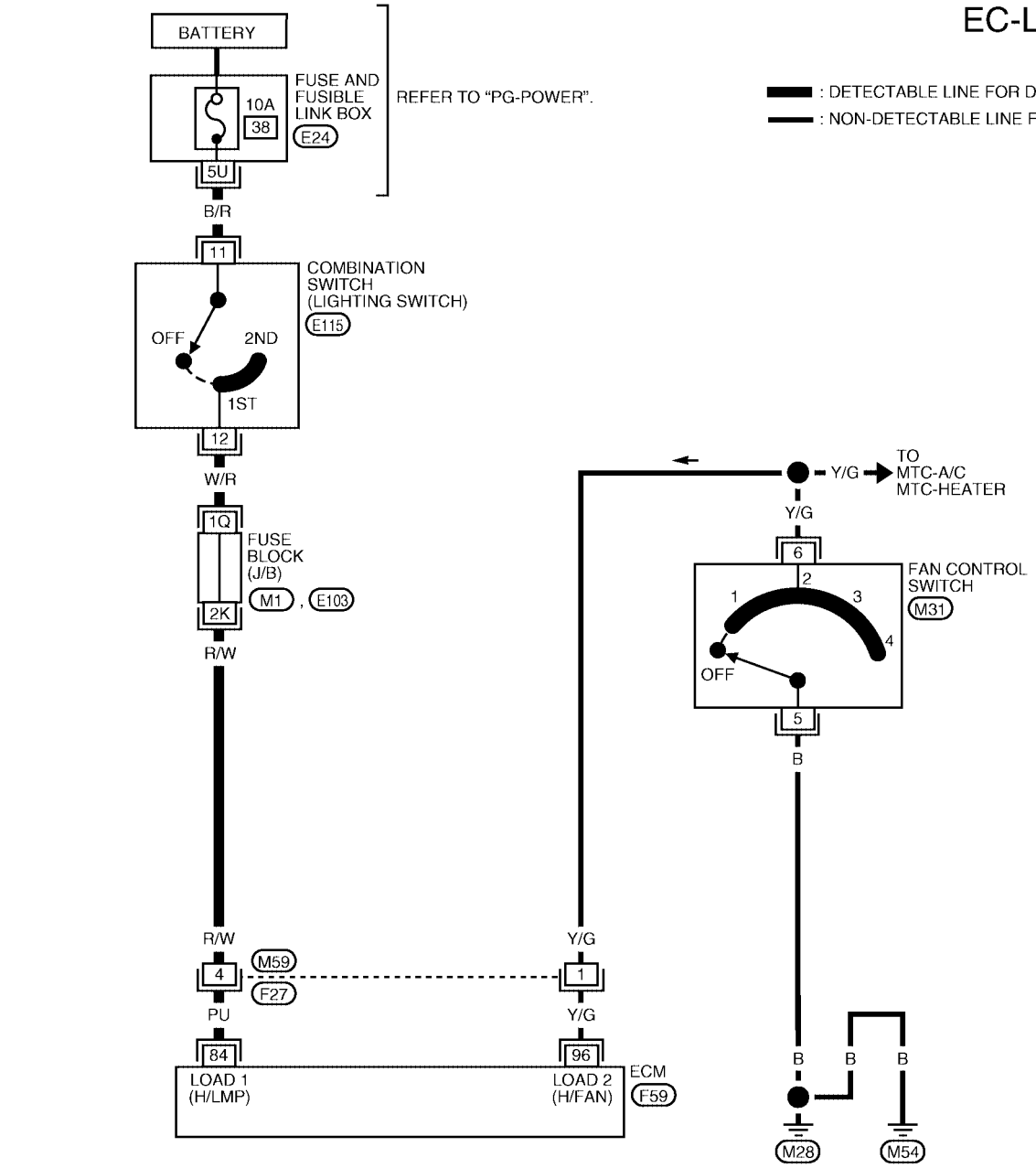
Specification data are reference values.

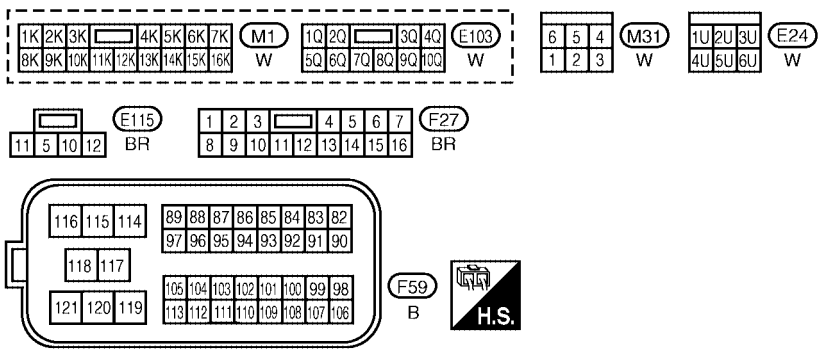
MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch and/or lighting switch is in 2nd	ON
		Rear window defogger switch is OFF and lighting switch is OFF	OFF
HEATER FAN SW	● Engine: After warming up, idle the engine	Heater fan is operating	ON
		Heater fan is not operating	OFF

Wiring Diagram

UBS00BJD

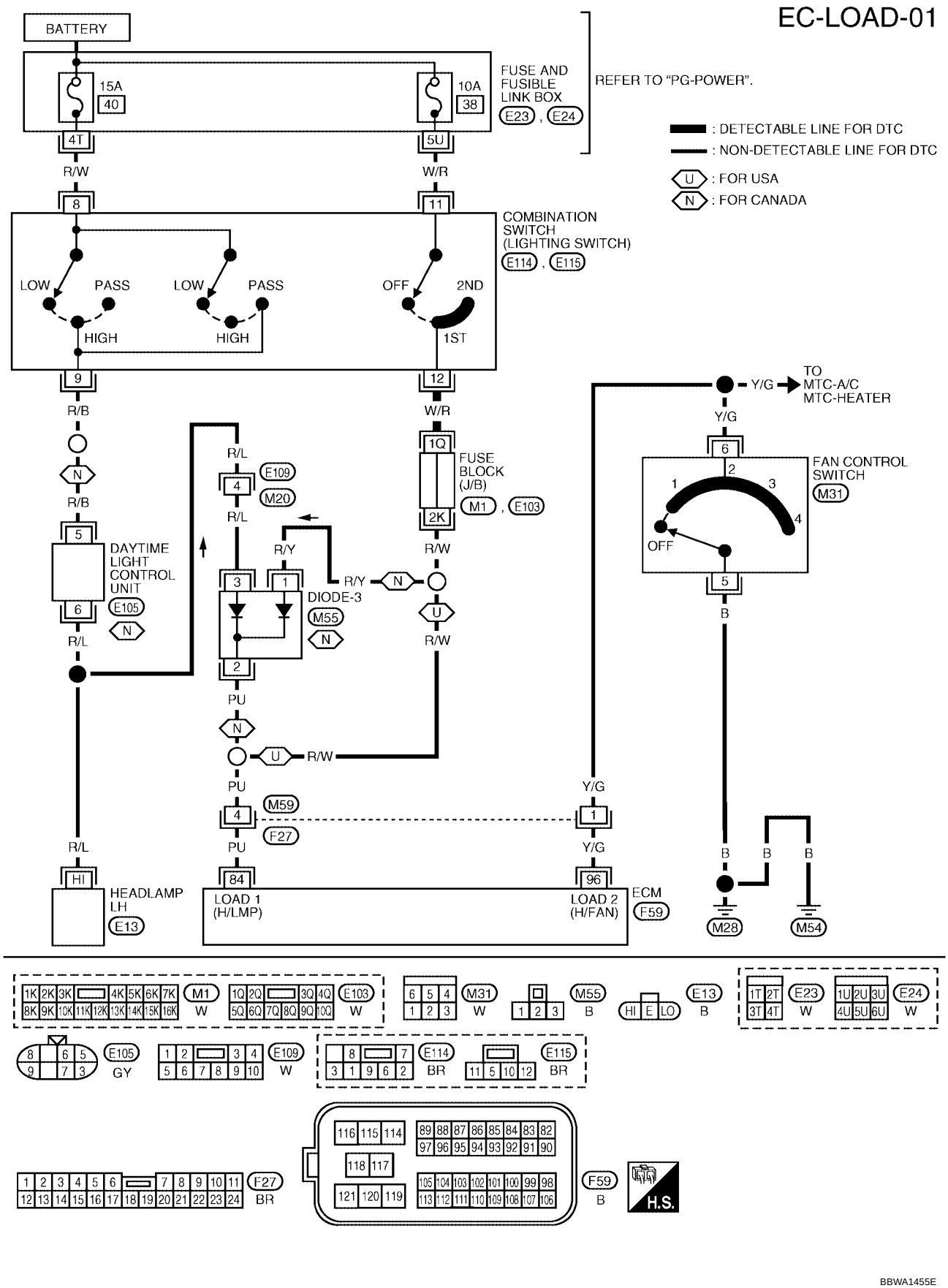
SULEV MODELS





BBWA1453E

EXCEPT SULEV MODELS



BBWA1455E

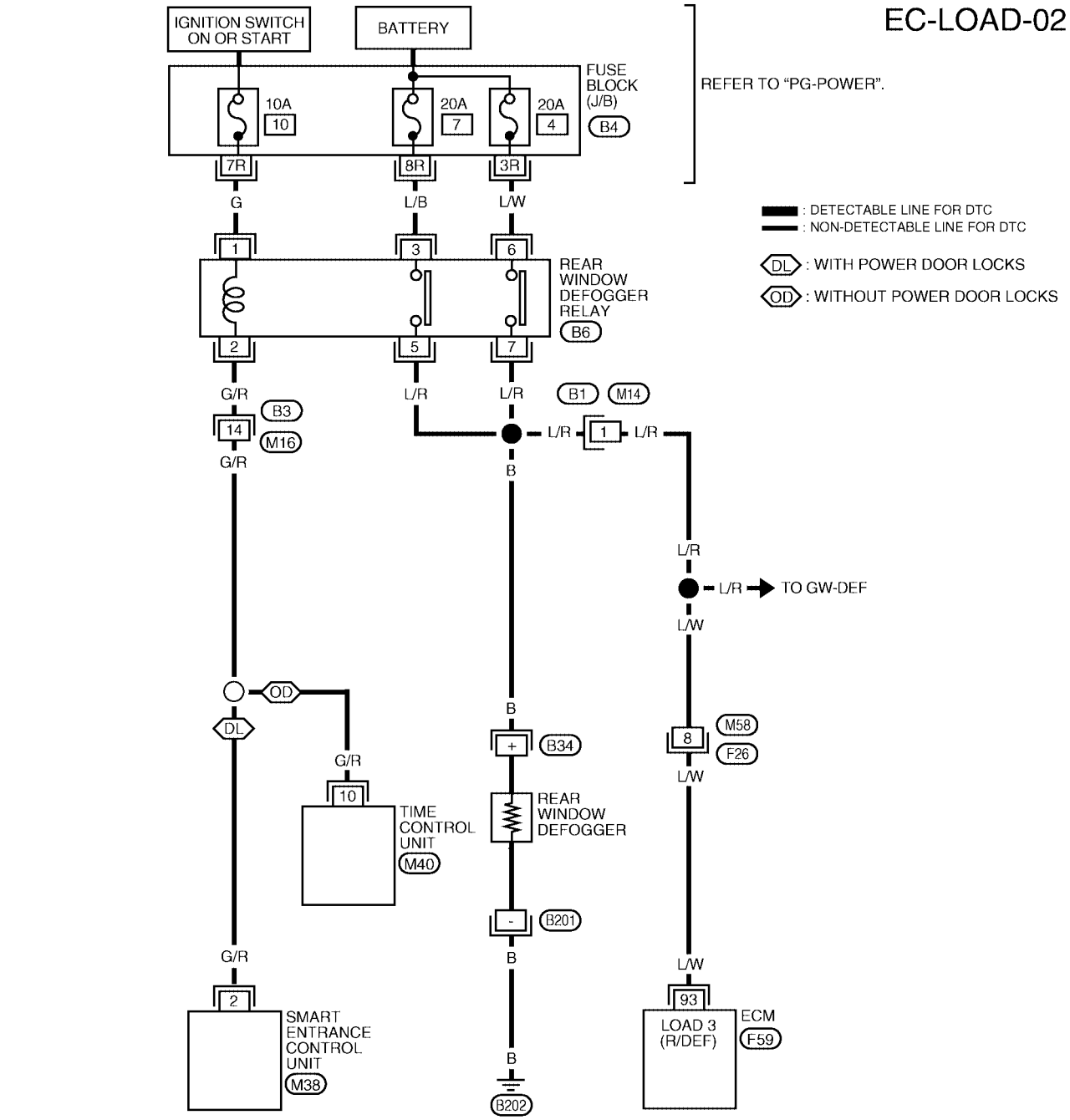
Specification data are reference values and are measured between each terminal and ground.

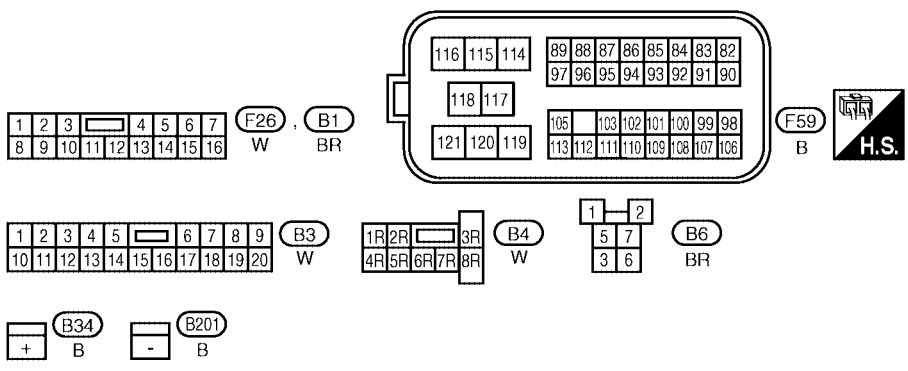
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	PU	Electrical load signal (Headlamp signal)	**[Ignition switch: ON]** ● Lighting switch: 2ND position	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Lighting switch: OFF	Approximately 0V
96	Y/G	Electrical load signal (Heater fan signal)	**[Engine is running]** ● Heater fan switch: ON	Approximately 0V
			[Engine is running] ● Heater fan switch: OFF	Approximately 5V

SULEV MODELS

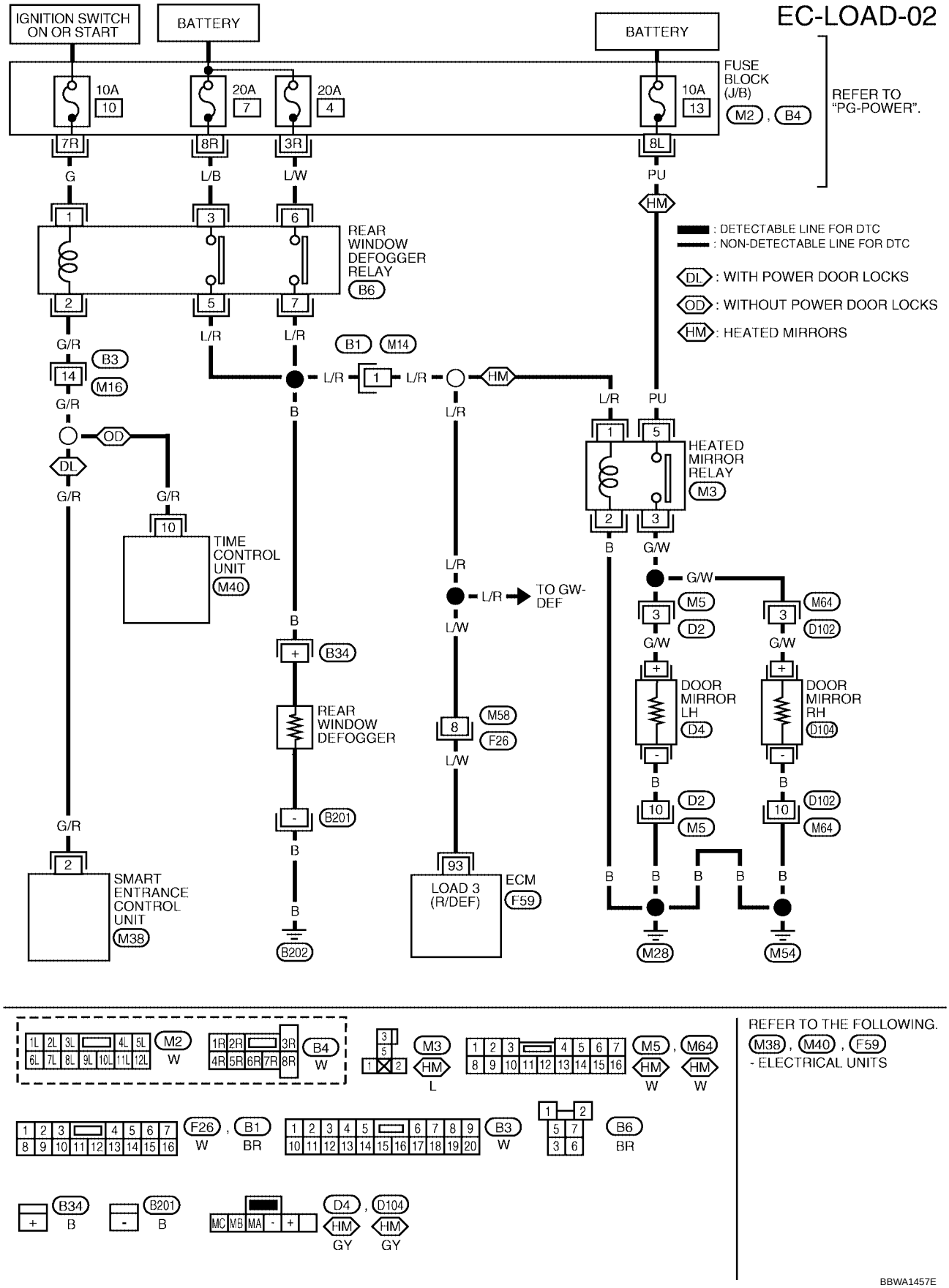




REFER TO THE FOLLOWING.
M38 , M40 - ELECTRICAL UNITS

BBWA1456E

EXCEPT SULEV MODELS



Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
93	L/W	Electrical load signal (Rear window defogger signal)	**[Ignition switch: ON]** ● Rear window defogger switch: ON	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Rear window defogger switch: OFF	Approximately 0V

Diagnostic Procedure

UBS00BJE

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

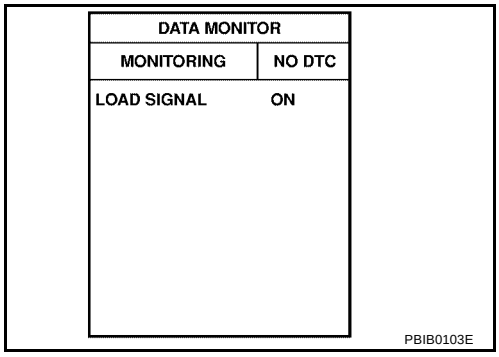
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Lighting switch ON at 2nd position	ON
Lighting switch OFF	OFF



OK or NG

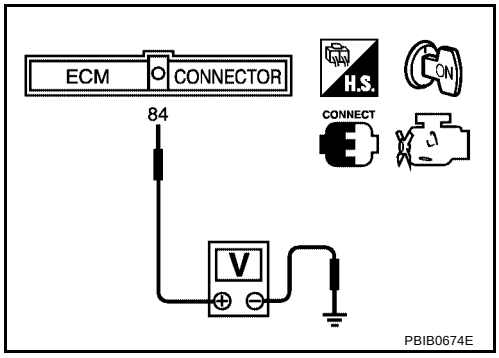
OK >> GO TO 4.
NG >> GO TO 8.

3. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 84 and ground under the following conditions.

Condition	Voltage
Lighting switch ON at 2nd position	BATTERY VOLTAGE
Lighting switch OFF	0V



OK or NG

OK >> GO TO 5.
NG >> GO TO 8.

4. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

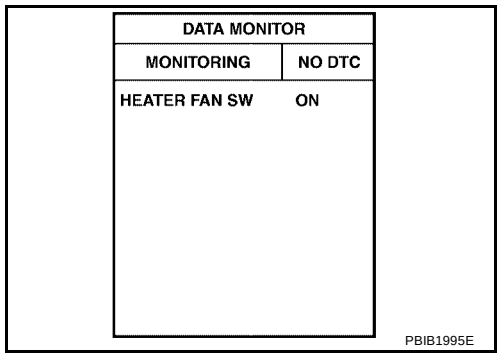
With CONSULT-II

1. Turn ignition switch ON.
2. Check “HEATER FAN SW” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	INDICATION
FAN control switch ON in any position	ON
FAN control switch OFF	OFF

OK or NG

OK >> GO TO 6.
NG >> GO TO 13.



5. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

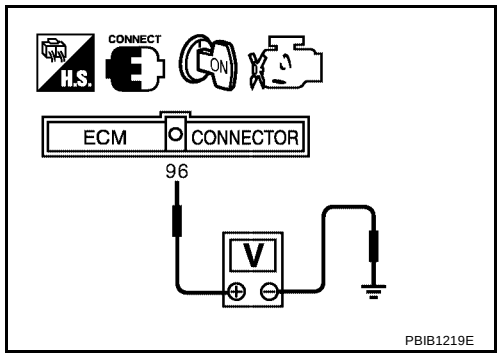
Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 96 and ground under the following conditions.

Condition	Voltage
FAN control switch ON in any position	Approximately 0V
FAN control switch OFF	Approximately 5V

OK or NG

OK >> GO TO 7.
NG >> GO TO 13.



6. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-III

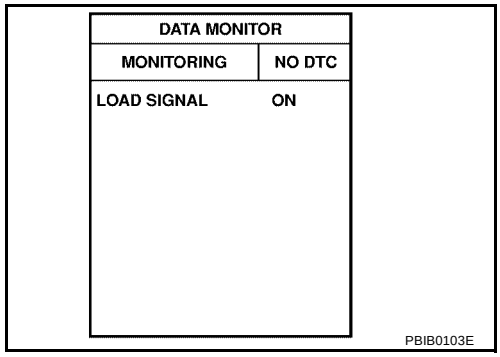
With CONSULT-II

1. Turn ignition switch ON.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Rear window defogger switch ON	ON
Rear window defogger switch OFF	OFF

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 16.

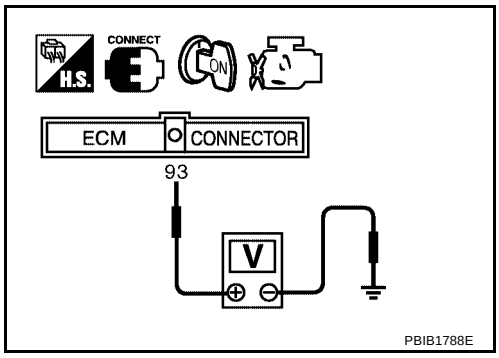


7. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-III

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 93 and ground under the following conditions.

Condition	Voltage
Rear window defogger switch ON	BATTERY VOLTAGE
Rear window defogger switch OFF	Approximately 0V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 16.

8. CHECK HEADLAMP FUNCTION

1. Start engine.
2. Turn the lighting switch ON at 2nd position.
3. Check that headlamps are illuminated.

OK or NG

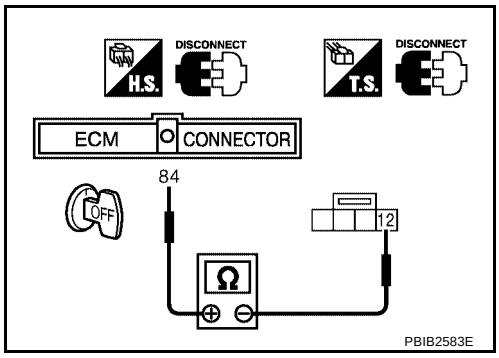
OK (Models for USA)>>GO TO 9.
OK (Models for Canada)>>GO TO 11.
NG >> Refer to LT-6, "HEADLAMP (FOR USA)" or LT-10, "HEADLAMP (FOR CANADA) — DAYTIME LIGHT SYSTEM —" .

9. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connector.
4. Check harness continuity between ECM terminal 84 and lighting switch terminal 12.

Continuity should exist.

5. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 19.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

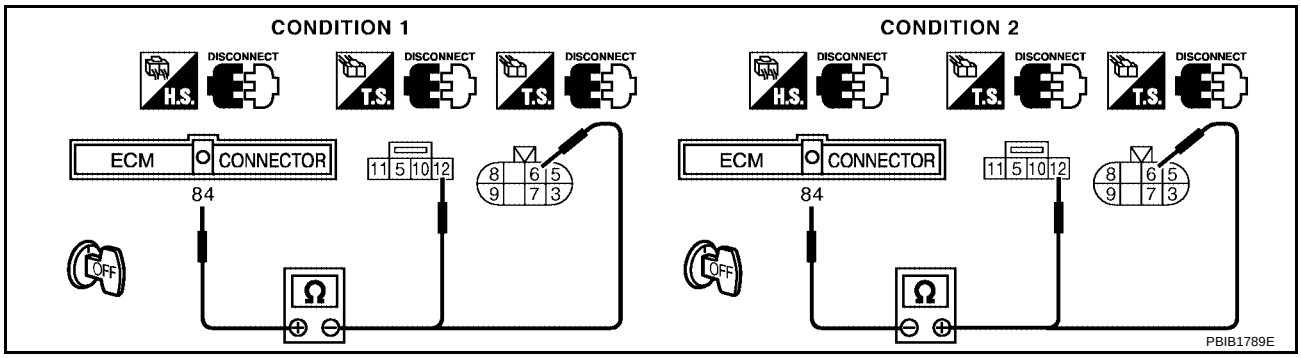
Check the following.

- Fuse block (J/B)
- Harness connectors M59, F27
- Harness for open and short between ECM and lighting switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connector E115.
   Disconnect daytime light control unit harness connector.
4. Check harness continuity between ECM terminal 84 and lighting switch terminal 12, daytime light control unit terminal 6 under the following conditions.



Condition	Continuity
1	Should exist
2	Should not exist

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 19.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E109, M20
- Harness connectors M59, F27
- Fuse block (J/B)
- Diode-3
- Harness for open and short between ECM and lighting switch
- Harness for open and short between ECM and daytime light control unit

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK HEATER FAN SWITCH FUNCTION

1. Start engine.
2. Turn the heater fan switch ON in any position.
3. Check that heater fan turns properly.

OK or NG

OK >> GO TO 14.
NG >> Refer to MTC-19, "TROUBLE DIAGNOSIS"

14. CHECK HEATER FAN INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect fan control switch harness connector.
4. Check harness continuity between ECM terminal 96 and fan control switch terminal 6.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 19.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open and short between ECM and fan control switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK REAR WINDOW DEFOGGER FUNCTION

1. Start engine.
2. Turn ON the rear window defogger switch.
3. Check the rear windshield. Is the rear windshield heated up?

Yes or No

Yes >> GO TO 17.
No >> Refer to GW-17, "REAR WINDOW DEFOGGER"

17. CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between ECM terminal 93 and rear window defogger relay terminals 5, 7.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 19.
NG >> GO TO 18.

18. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M58, F26
- Harness for open and short between ECM and rear window defogger relay.

>> Repair open circuit or short to ground or short to power in harness or connectors.

19. CHECK INTERMITTENT INCIDENT

Perform EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

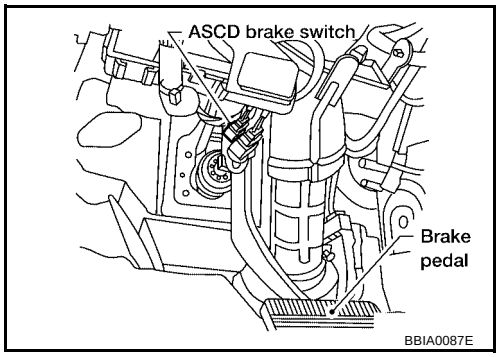
ASCD BRAKE SWITCH

PFP:25320

Component Description

UBS00BHN

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal)
Refer to EC-33, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

UBS00BHO

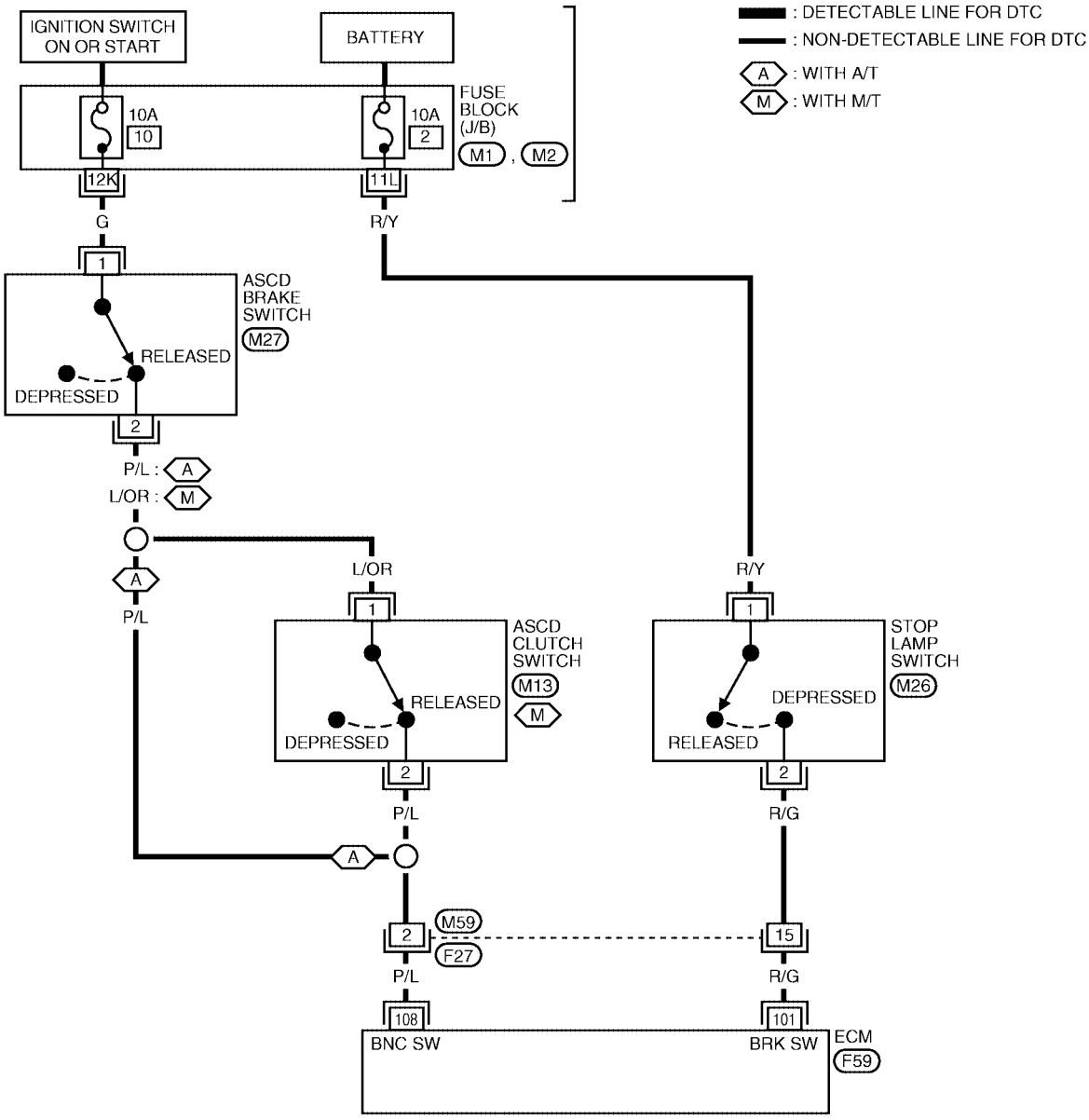
Specification data are reference values.

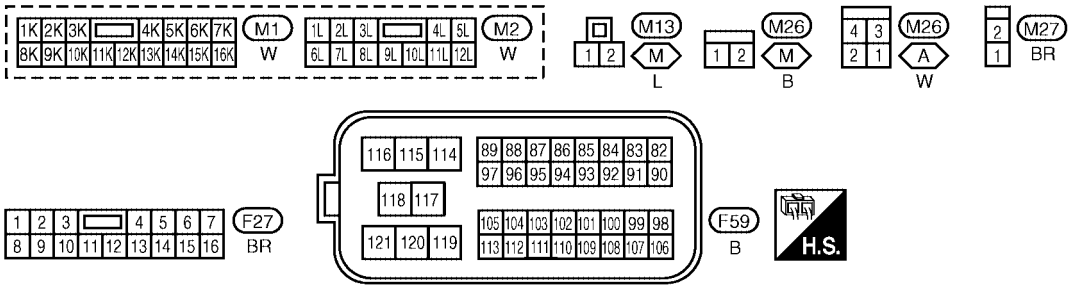
MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1	● Ignition switch: ON	Clutch pedal (M/T) and brake pedal: Fully released	ON
		Clutch pedal (M/T) and/or brake pedal: Depressed	OFF
BRAKE SW2	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly Depressed	ON

Wiring Diagram

UBS00BHP

EC-ASCBOF-01





BBWA1458E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/G	Stop lamp switch	**[Ignition switch: ON]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Depressed	BATTERY VOLTAGE (11 - 14V)
108	P/L	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal: Depressed ● Clutch pedal: Depressed (M/T models)	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Fully released ● Clutch pedal: Released (M/T models)	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00BHQ

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

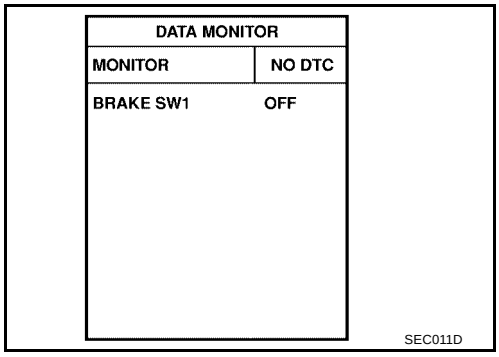
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

A/T models

CONDITION	INDICATION
When brake pedal is depressed	OFF
When brake pedal is fully released	ON

M/T models

CONDITION	INDICATION
When clutch pedal or brake pedal is depressed	OFF
When clutch pedal and brake pedal are fully released	ON



Without CONSULT-II

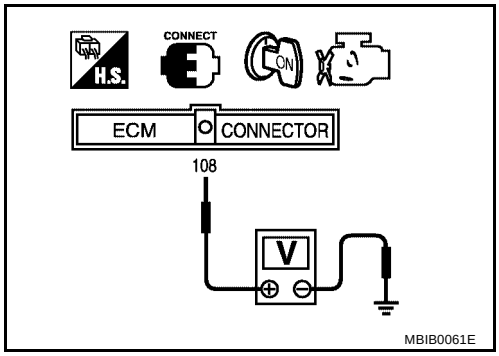
1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

A/T models

CONDITION	VOLTAGE
When brake pedal is depressed	Approximately 0V
When brake pedal is fully released	Battery voltage

M/T models

CONDITION	VOLTAGE
When clutch pedal or brake pedal is depressed	Approximately 0V
When clutch pedal and brake pedal are fully released	Battery voltage



OK or NG

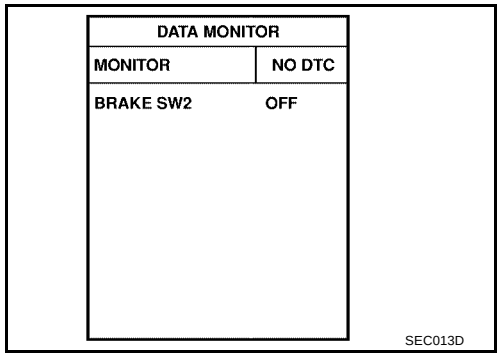
OK >> GO TO 2.
NG (M/T models) >>GO TO 3.
NG (A/T models) >>GO TO 4.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

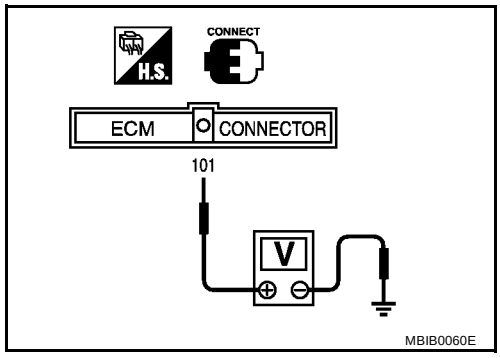
CONDITION	INDICATION
When brake pedal is released	OFF
When brake pedal is depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
When brake pedal is released	Approximately 0V
When brake pedal is depressed	Battery voltage

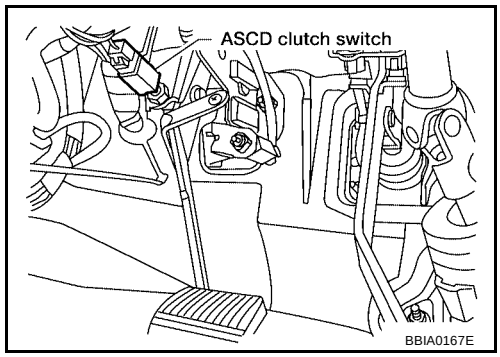


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 13.

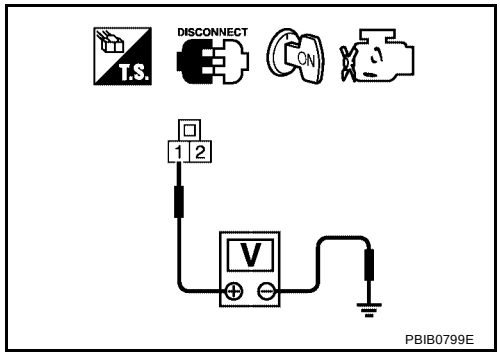
3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD clutch switch terminal 1 and ground under the following conditions with CONSULT-II or tester.

CONDITION	VOLTAGE
When brake pedal is released	Battery voltage
When brake pedal is depressed	Approx. 0V

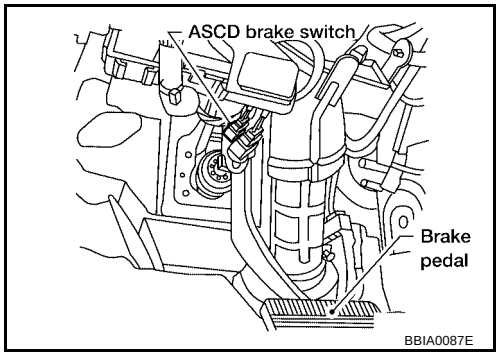


OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

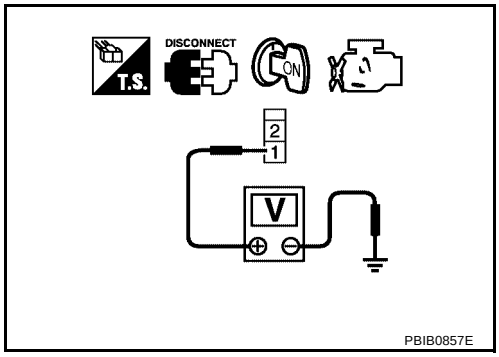
4. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK (M/T models)>>GO TO 6.
OK (A/T models)>>GO TO 7.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and ASCD brake switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ASCD BRAKE SWITCH

Refer to EC-649, "Component Inspection"

OK or NG

OK >> GO TO 18.
NG >> Replace ASCD brake switch.

10. CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and ASCD clutch switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK ASCD CLUTCH SWITCH

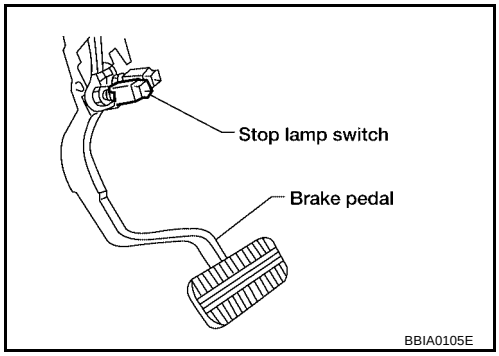
Refer to EC-649, "Component Inspection"

OK or NG

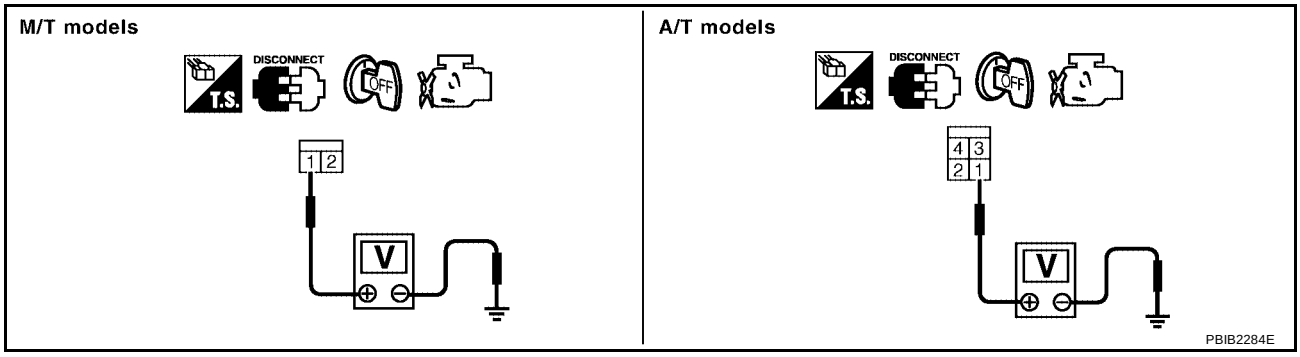
OK >> GO TO 18.
NG >> Replace ASCD clutch switch.

13. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -II or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between stop lamp switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

17. CHECK STOP LAMP SWITCH

Refer to EC-649, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace stop lamp switch.

18. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

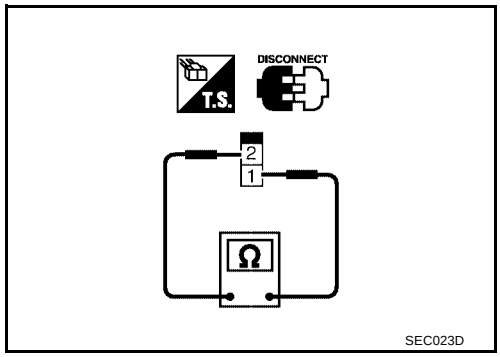
UBS00BHR

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check harness continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
When brake pedal is fully released.	Should exist.
When brake pedal is depressed.	Should not exist.

If NG, adjust ASCD brake switch installation, refer to BR-11, "BRAKE PEDAL AND BRACKET" , and perform step 3 again.

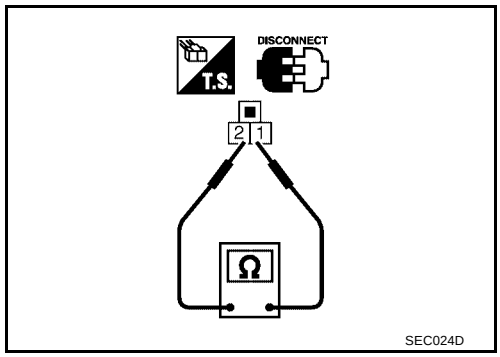


ASCD CLUTCH SWITCH (FOR M/T MODELS)

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

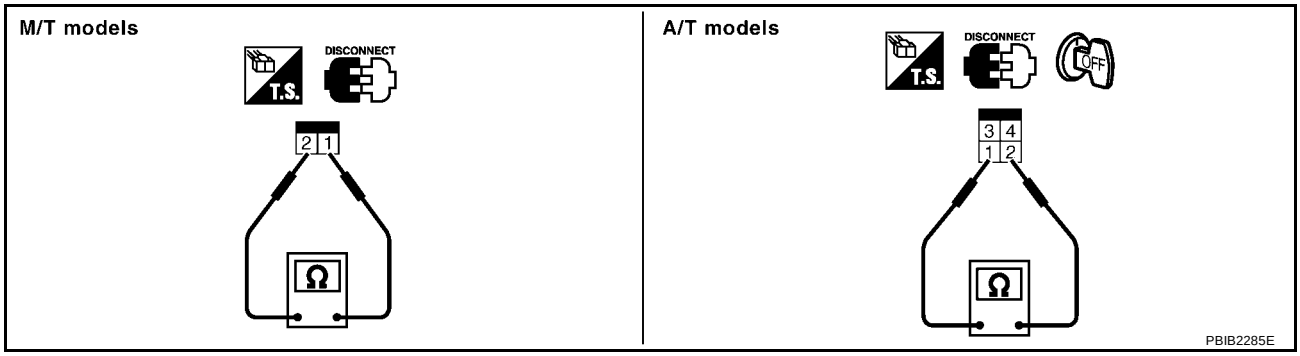
Condition	Continuity
When clutch pedal is fully released.	Should exist.
When clutch pedal is depressed.	Should not exist.

If NG, adjust ASCD clutch switch installation, refer to CL-6, "CLUTCH SYSTEM" , and perform step 3 again.



STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check harness continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
When brake pedal is fully released.	Should not exist.
When brake pedal is depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-11, "BRAKE PEDAL AND BRACKET" , and perform step 3 again.

ASCD INDICATOR

PFP:24814

Component Description

UBS00BHS

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicate that ASCD system is ready for operation.
SET indicator illuminates when following conditions are met.

- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET indicator remains lit during ASCD control.
Refer to EC-33, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

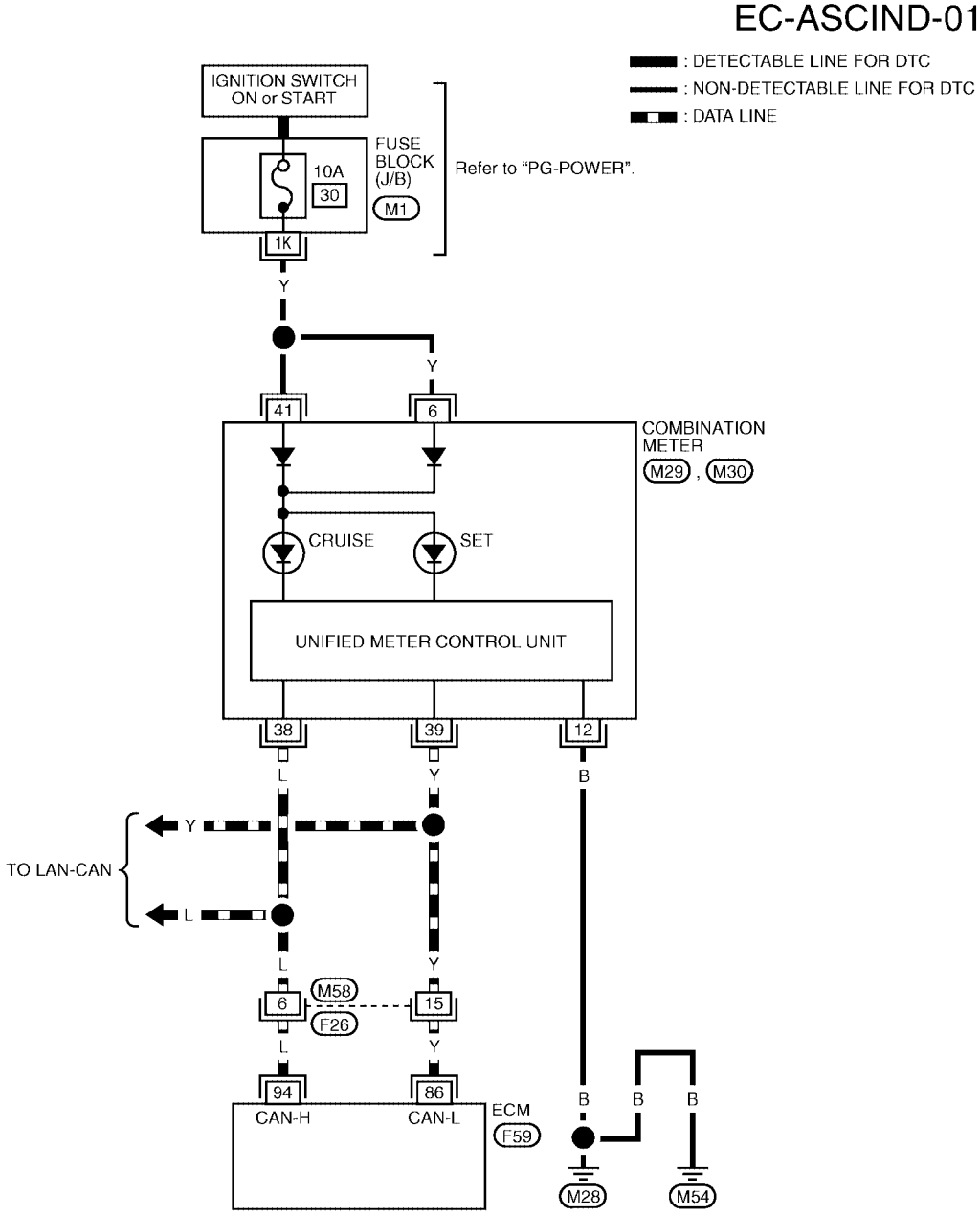
UBS00BHT

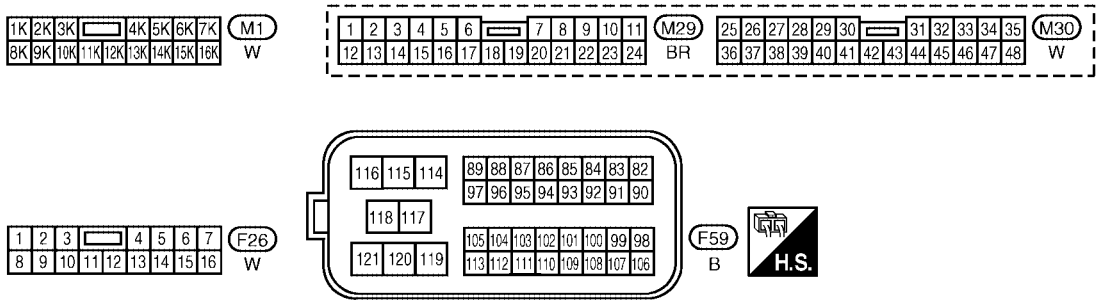
Specification data are reference value.

MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
SET LAMP	● MAIN switch: ON ● When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD is operating	ON
		ASCD is not operating	OFF

Wiring Diagram

UBS00BHU





BBWA1459E

Diagnostic Procedure

UBS00BHV

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	MAIN switch: At the 1st time → at the 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD is operating	ON
		ASCD is not operating	OFF

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK DTC

Check that DTC U1000 or U1001 is not displayed.

Yes or No

Yes >> Perform trouble diagnoses for DTC U1000, U1001, refer to EC-172, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
No >> GO TO 3.

3. CHECK COMBINATION METER OPERATION

Does combination meter operate normally?

Yes or No

Yes >> GO TO 4.
No >> Check combination meter circuit. Refer to DI-7, "Combination Meter" .

4. CHECK INTERMITTENT INCIDENT

Refer to EC-163, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

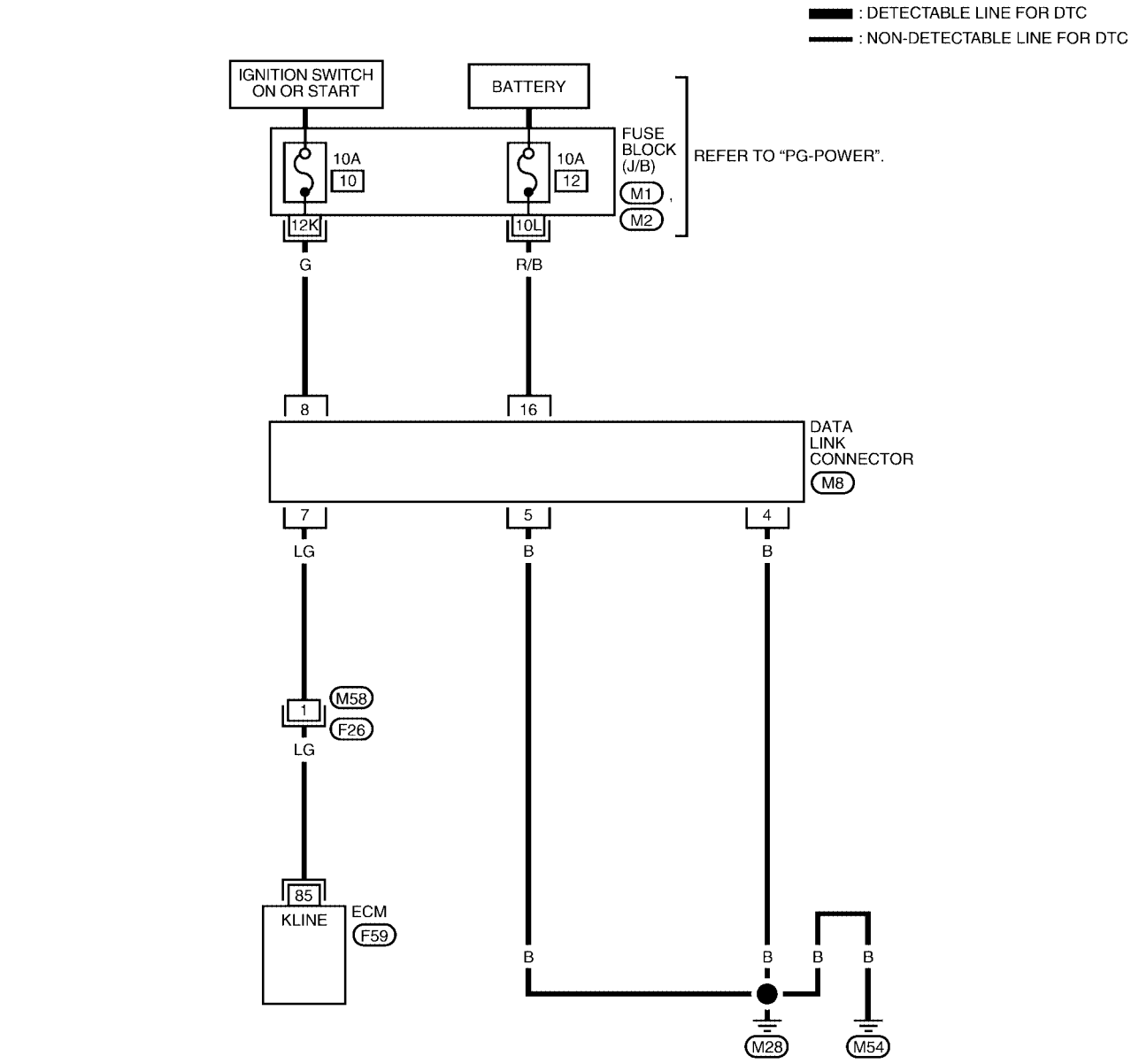
MIL & DATA LINK CONNECTORS

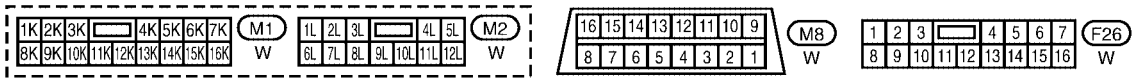
PFP:24814

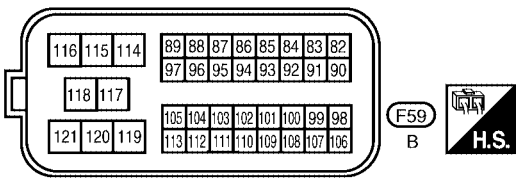
Wiring Diagram

UBS00BHW

EC-MIL/DL-02







BBWA1460E

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Fuel Pressure

UBS00BI8

Fuel pressure at idling kPa (kg/cm^2 , psi)	Approximately 350 (3.57, 51)

Idle Speed and Ignition Timing

UBS00BI9

Target idle speed (Engine is warmed up to normal operating temperature)	A/T	No-load* (in P or N position)	800 ± 50 rpm
	M/T	No-load* (in Neutral position)	650 ± 50 rpm
Air conditioner: ON	A/T	In P or N position	850 rpm or more
	M/T	In Neutral position	
Ignition timing	A/T	In P or N position	18° ± 5° BTDC
	M/T	In Neutral position	7° ± 5° BTDC

*: Under the following conditions:

- Air conditioner switch: OFF
- Electrical load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

UBS00BIA

Supply voltage V	Battery voltage (11 - 14)
Output voltage at idle V	0.9 - 1.2
Mass air flow (Using CONSULT-II or GST) g·m/sec	1.4 - 4.0 at idle* 5.0 - 10.0 at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and idling under no-load.

Engine Coolant Temperature Sensor

UBS00BIB

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Fuel Pump

UBS00BIC

Resistance [at 25°C (77°F)] Ω	0.2 - 5.0

Injector

UBS00BID

Resistance [at 20°C (68°F)] Ω	12.5 - 18.4

Resistor

UBS00BIE

Resistance [at 25°C (77°F)] Ω	4 - 8

Throttle Control Motor

UBS00BIF

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Air Fuel Ratio (A/F) Sensor 1 Heater

UBS00BIG

Resistance [at 25°C (77°F)] Ω	2.3 - 4.3

Heated Oxygen Sensor 2 Heater

UBS00BIN

Resistance [at 25°C (77°F)] Ω	8 - 10

Calculated Load Value

UBS00BIH

Condition	Calculated load value % (Using CONSULT-II or GST)
At idle	20.0 - 35.5
At 2,500 rpm	12.0 - 30.0

Intake Air Temperature Sensor

UBS00BII

Temperature °C (°F)	Resistance kΩ
25 (77)	1.9 - 2.1

Crankshaft Position Sensor (POS)

UBS00BIK

Refer toEC-288, "Component Inspection" .

Camshaft Position Sensor (PHASE)

UBS00KTC

Refer to EC-296, "Component Inspection" .

Fuel Tank Temperature Sensor

UBS00BIL

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

INDEX FOR DTC

PFP:00024

DTC No. Index

UBS00KJE

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-840, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3 *7		
No DTC	Flashing*4	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	EC-714
U1000	1000*5	CAN COMM CIRCUIT	EC-840
U1001	1001*5	CAN COMM CIRCUIT	EC-840
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—
P0011	0011	INT/V TIM CONT-B1	EC-843
P0031	0031	HO2S1 HTR (B1)*7	EC-847
P0032	0032	HO2S1 HTR (B1)*7	EC-847
P0037	0037	HO2S2 HTR (B1)	EC-853
P0038	0038	HO2S2 HTR (B1)	EC-853
P0101	0101	MAF SEN/CIRCUIT	EC-859
P0102	0102	MAF SEN/CIRCUIT	EC-868
P0103	0103	MAF SEN/CIRCUIT	EC-868
P0112	0112	IAT SEN/CIRCUIT	EC-876
P0113	0113	IAT SEN/CIRCUIT	EC-876
P0117	0117	ECT SEN/CIRCUIT	EC-882
P0118	0118	ECT SEN/CIRCUIT	EC-882
P0122	0122	TP SEN 2/CIRC	EC-888
P0123	0123	TP SEN 2/CIRC	EC-888
P0125	0125	ECT SENSOR	EC-895
P0127	0127	IAT SENSOR	EC-898
P0128	0128	THERMSTAT FNCTN	EC-901
P0132	0132	HO2S1 (B1)*7	EC-903
P0133	0133	HO2S1 (B1)*7	EC-910
P0134	0134	HO2S1 (B1)*7	EC-920
P0138	0138	HO2S2 (B1)	EC-927
P0139	0139	HO2S2 (B1)	EC-933
P0171	0171	FUEL SYS-LEAN-B1	EC-941
P0172	0172	FUEL SYS-RICH-B1	EC-952
P0181	0181	FTT SENSOR	EC-962
P0182	0182	FTT SEN/CIRCUIT	EC-967
P0183	0183	FTT SEN/CIRCUIT	EC-967
P0222	0222	TP SEN 1/CIRC	EC-971
P0223	0223	TP SEN 1/CIRC	EC-971
P0300	0300	MULTI CYL MISFIRE	EC-978

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3 *7		
P0301	0301	CYL 1 MISFIRE	EC-978
P0302	0302	CYL 2 MISFIRE	EC-978
P0303	0303	CYL 3 MISFIRE	EC-978
P0304	0304	CYL 4 MISFIRE	EC-978
P0327	0327	KNOCK SEN/CIRC-B1	EC-985
P0328	0328	KNOCK SEN/CIRC-B1	EC-985
P0335	0335	CKP SEN/CIRCUIT	EC-990
P0340	0340	CMP SEN/CIRC-B1	EC-997
P0420	0420	TW CATALYST SYS-B1	EC-1004
P0441	0441	EVAP PURG FLOW/MON	EC-1014
P0442	0442	EVAP SMALL LEAK	EC-1020
P0444	0444	PURG VOLUME CONT/V	EC-1029
P0445	0445	PURG VOLUME CONT/V	EC-1029
P0447	0447	VENT CONTROL VALVE	EC-1036
P0451	0451	EVAP SYS PRES SEN	EC-1043
P0452	0452	EVAP SYS PRES SEN	EC-1046
P0453	0453	EVAP SYS PRES SEN	EC-1052
P0455	0455	EVAP GROSS LEAK	EC-1059
P0456	0456	EVAP VERY SML LEAK	EC-1067
P0460	0460	FUEL LEV SEN SLOSH	EC-1077
P0461	0461	FUEL LEVEL SENSOR	EC-1079
P0462	0462	FUEL LEVL SEN/CIRC	EC-1081
P0463	0463	FUEL LEVL SEN/CIRC	EC-1081
P0500	0500	VEH SPEED SEN/CIRC*6	EC-1083
P0506	0506	ISC SYSTEM	EC-1085
P0507	0507	ISC SYSTEM	EC-1087
P0550	0550	PW ST P SEN/CIRC	EC-1089
P0605	0605	ECM	EC-1094
P0705	0705	PNP SW/CIRC	AT-487
P0710	0710	ATF TEMP SEN/CIRC	AT-493
P0720	0720	VEH SPD SEN/CIR AT*6	AT-499
P0725	0725	ENGINE SPEED SIG	AT-504
P0731	0731	A/T 1ST GR FNCTN	AT-508
P0732	0732	A/T 2ND GR FNCTN	AT-513
P0733	0733	A/T 3RD GR FNCTN	AT-518
P0734	0734	A/T 4TH GR FNCTN	AT-523
P0740	0740	TCC SOLENOID/CIRC	AT-530
P0744	0744	A/T TCC S/V FNCTN	AT-535
P0745	0745	L/PRESS SOL/CIRC	AT-543
P0750	0750	SFT SOL A/CIRC	AT-549
P0755	0755	SFT SOL B/CIRC	AT-554
P1031	1031	A/F SEN1 HTR (B1)*8	EC-1097

DTC*1		Items (CONSULT-II screen terms)	Reference page
CONSULT-II GST*2	ECM*3 *7		
P1032	1032	A/F SEN1 HTR (B1)*8	EC-1097
P1065	1065	ECM BACK UP/CIRC	EC-1102
P1111	1111	INT/V TIM V/CIR-B1	EC-1106
P1121	1121	ETC ACTR	EC-1110
P1122	1122	ETC FUNCTION/CIRC	EC-1112
P1124	1124	ETC MOT PWR	EC-1119
P1126	1126	ETC MOT PWR	EC-1119
P1128	1128	ETC MOT	EC-1124
P1143	1143	HO2S1 (B1)*7	EC-1129
P1144	1144	HO2S1 (B1)*7	EC-1135
P1146	1146	HO2S2 (B1)	EC-1141
P1147	1147	HO2S2 (B1)	EC-1149
P1148	1148	CLOSED LOOP-B1	EC-1157
P1217	1217	ENG OVER TEMP	EC-1159
P1225	1225	CTP LEARNING	EC-1172
P1226	1226	CTP LEARNING	EC-1174
P1229	1229	SENSOR POWER/CIRC	EC-1176
P1271	1271	A/F SENSOR1 (B1)*8	EC-1181
P1272	1272	A/F SENSOR1 (B1)*8	EC-1187
P1273	1273	A/F SENSOR1 (B1)*8	EC-1193
P1274	1274	A/F SENSOR1 (B1)*8	EC-1200
P1276	1276	A/F SENSOR1 (B1)*8	EC-1207
P1278	1278	A/F SENSOR1 (B1)*8	EC-1214
P1279	1279	A/F SENSOR1 (B1)*8	EC-1223
P1444	1444	PURG VOLUME CONT/V	EC-1232
P1446	1446	VENT CONTROL VALVE	EC-1240
P1564	1564	ASCD SW	EC-1247
P1572	1572	ASCD BRAKE SW	EC-1254
P1574	1574	ASCD VHL SPD SEN	EC-1265
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	EC-695
P1705	1705	TP SEN/CIRC A/T	AT-559
P1706	1706	P-N POS SW/CIRCUIT	EC-1267
P1760	1760	O/R CLTCH SOL/CIRC	AT-564
P1800	1800	VIAS S/V CIRC	EC-1271
P1805	1805	BRAKE SW/CIRCUIT	EC-1277
P2122	2122	APP SEN 1/CIRC	EC-1282
P2123	2123	APP SEN 1/CIRC	EC-1282
P2127	2127	APP SEN 2/CIRC	EC-1289
P2128	2128	APP SEN 2/CIRC	EC-1289
P2135	2135	TP SENSOR	EC-1297
P2138	2138	APP SENSOR	EC-1304

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: When engine is running.
*5: The troubleshooting for this DTC needs CONSULT-II.
*6: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.
*7: A/T models ULEV and M/T models.
*8: A/T models except ULEV.

Alphabetical Index

UBS00KJF

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-840, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
A/F SENSOR1 (B1)*8	P1271	1271	EC-1181
A/F SENSOR1 (B1)*8	P1272	1272	EC-1187
A/F SENSOR1 (B1)*8	P1273	1273	EC-1193
A/F SENSOR1 (B1)*8	P1274	1274	EC-1200
A/F SENSOR1 (B1)*8	P1276	1276	EC-1207
A/F SENSOR1 (B1)*8	P1278	1278	EC-1214
A/F SENSOR1 (B1)*8	P1279	1279	EC-1223
A/F SEN1 HTR (B1)*8	P1031	1031	EC-1097
A/F SEN1 HTR (B1)*8	P1032	1032	EC-1097
A/T 1ST GR FNCTN	P0731	0731	AT-508
A/T 2ND GR FNCTN	P0732	0732	AT-513
A/T 3RD GR FNCTN	P0733	0733	AT-518
A/T 4TH GR FNCTN	P0734	0734	AT-523
A/T TCC S/V FNCTN	P0744	0744	AT-535
APP SEN 1/CIRC	P2122	2122	EC-1282
APP SEN 1/CIRC	P2123	2123	EC-1282
APP SEN 2/CIRC	P2127	2127	EC-1289
APP SEN 2/CIRC	P2128	2128	EC-1289
APP SENSOR	P2138	2138	EC-1304
ASCD BRAKE SW	P1572	1572	EC-1254
ASCD SW	P1564	1564	EC-1247
ASCD VHL SPD SEN	P1574	1574	EC-1265
ATF TEMP SEN/CIRC	P0710	0710	AT-493
BRAKE SW/CIRCUIT	P1805	1805	EC-1277
CAN COMM CIRCUIT	U1000	1000*5	EC-840
CAN COMM CIRCUIT	U1001	1001*5	EC-840
CKP SEN/CIRCUIT	P0335	0335	EC-990
CLOSED LOOP-B1	P1148	1148	EC-1157
CMP SEN/CIRC-B1	P0340	0340	EC-997
CTP LEARNING	P1225	1225	EC-1172
CTP LEARNING	P1226	1226	EC-1174

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
CYL 1 MISFIRE	P0301	0301	EC-978
CYL 2 MISFIRE	P0302	0302	EC-978
CYL 3 MISFIRE	P0303	0303	EC-978
CYL 4 MISFIRE	P0304	0304	EC-978
ECM	P0605	0605	EC-1094
ECM BACK UP/CIRC	P1065	1065	EC-1102
ECT SEN/CIRCUIT	P0117	0117	EC-882
ECT SEN/CIRCUIT	P0118	0118	EC-882
ECT SENSOR	P0125	0125	EC-895
ENG OVER TEMP	P1217	1217	EC-1159
ENGINE SPEED SIG	P0725	0725	AT-504
ETC ACTR	P1121	1121	EC-1110
ETC FUNCTION/CIRC	P1122	1122	EC-1112
ETC MOT	P1128	1128	EC-1124
ETC MOT PWR	P1124	1124	EC-1119
ETC MOT PWR	P1126	1126	EC-1119
EVAP GROSS LEAK	P0455	0455	EC-1059
EVAP PURG FLOW/MON	P0441	0441	EC-1014
EVAP SMALL LEAK	P0442	0442	EC-1020
EVAP SYS PRES SEN	P0451	0451	EC-1043
EVAP SYS PRES SEN	P0452	0452	EC-1046
EVAP SYS PRES SEN	P0453	0453	EC-1052
EVAP VERY SML LEAK	P0456	0456	EC-1067
FTT SEN/CIRCUIT	P0182	0182	EC-967
FTT SEN/CIRCUIT	P0183	0183	EC-967
FTT SENSOR	P0181	0181	EC-962
FUEL LEV SEN SLOSH	P0460	0460	EC-1077
FUEL LEVEL SENSOR	P0461	0461	EC-1079
FUEL LEVL SEN/CIRC	P0462	0462	EC-1081
FUEL LEVL SEN/CIRC	P0463	0463	EC-1081
FUEL SYS-LEAN-B1	P0171	0171	EC-941
FUEL SYS-RICH-B1	P0172	0172	EC-952
HO2S1 (B1)*7	P0132	0132	EC-903
HO2S1 (B1)*7	P0133	0133	EC-910
HO2S1 (B1)*7	P0134	0134	EC-920
HO2S1 (B1)*7	P1143	1143	EC-1129
HO2S1 (B1)*7	P1144	1144	EC-1135
HO2S1 HTR (B1)*7	P0031	0031	EC-847
HO2S1 HTR (B1)*7	P0032	0032	EC-847
HO2S2 (B1)	P0138	0138	EC-927
HO2S2 (B1)	P0139	0139	EC-933

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
HO2S2 (B1)	P1146	1146	EC-1141
HO2S2 (B1)	P1147	1147	EC-1149
HO2S2 HTR (B1)	P0037	0037	EC-853
HO2S2 HTR (B1)	P0038	0038	EC-853
IAT SEN/CIRCUIT	P0112	0112	EC-876
IAT SEN/CIRCUIT	P0113	0113	EC-876
IAT SENSOR	P0127	0127	EC-898
INT/V TIM CONT-B1	P0011	0011	EC-843
INT/V TIM V/CIR-B1	P1111	1111	EC-1106
ISC SYSTEM	P0506	0506	EC-1085
ISC SYSTEM	P0507	0507	EC-1087
KNOCK SEN/CIRC-B1	P0327	0327	EC-985
KNOCK SEN/CIRC-B1	P0328	0328	EC-985
L/PRESS SOL/CIRC	P0745	0745	AT-543
MAF SEN/CIRCUIT	P0101	0101	EC-859
MAF SEN/CIRCUIT	P0102	0102	EC-868
MAF SEN/CIRCUIT	P0103	0103	EC-868
MULTI CYL MISFIRE	P0300	0300	EC-978
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	EC-695
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	No DTC	Flashing*4 *7	EC-714
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	**—**
O/R CLTCH SOL/CIRC	P1760	1760	AT-564
P-N POS SW/CIRCUIT	P1706	1706	AT-564
PNP SW/CIRC	P0705	0705	AT-487
PURG VOLUME CONT/V	P0444	0444	EC-1029
PURG VOLUME CONT/V	P0445	0445	EC-1029
PURG VOLUME CONT/V	P1444	1444	EC-1232
PW ST P SEN/CIRC	P0550	0550	EC-1089
SENSOR POWER/CIRC	P1229	1229	EC-1176
SFT SOL A/CIRC	P0750	0750	AT-549
SFT SOL B/CIRC	P0755	0755	AT-554
TCC SOLENOID/CIRC	P0740	0740	AT-530
THERMSTAT FNCTN	P0128	0128	EC-901
TP SEN 1/CIRC	P0222	0222	EC-971
TP SEN 1/CIRC	P0223	0223	EC-971
TP SEN 2/CIRC	P0122	0122	EC-888
TP SEN 2/CIRC	P0123	0123	EC-888
TP SENSOR	P2135	2135	EC-1297
TP SEN/CIRC A/T	P1705	1705	AT-559
TW CATALYST SYS-B1	P0420	0420	EC-1004

Items (CONSULT-II screen terms)	DTC*1		Reference page
	CONSULT-II GST*2	ECM*3	
VEH SPD SEN/CIR AT*6	P0720	0720	AT-499
VEH SPEED SEN/CIRC*6	P0500	0500	EC-1083
VENT CONTROL VALVE	P0447	0447	EC-1036
VENT CONTROL VALVE	P1446	1446	EC-1240
VIAS S/V CIRC	P1800	1800	EC-1271

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: When engine is running.
*5: The troubleshooting for this DTC needs CONSULT-II.
*6: When the fail-safe operations for both self-diagnoses occur, the MIL illuminates.
*7: A/T models ULEV and M/T models.
*8: A/T models except ULEV.

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

UBS00KU5

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

On Board Diagnostic (OBD) System of Engine and A/T

UBS00J8T

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

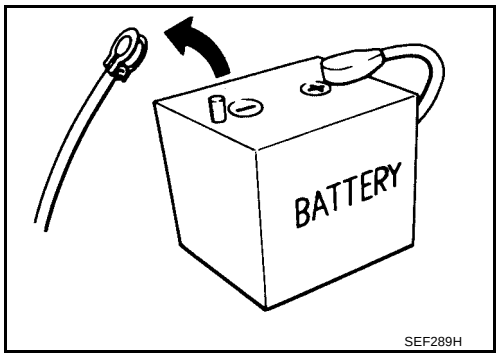
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the battery ground cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-47, "HARNESS CONNECTOR" .**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to the malfunction of the fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

Precaution

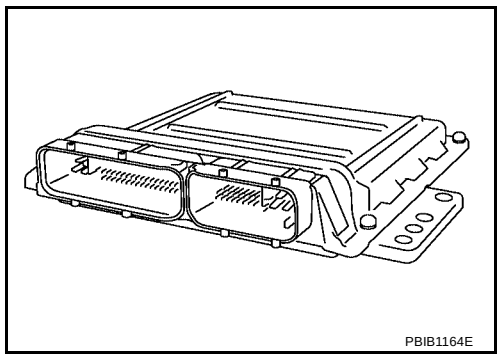
UBS00J8U

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect battery ground cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.**

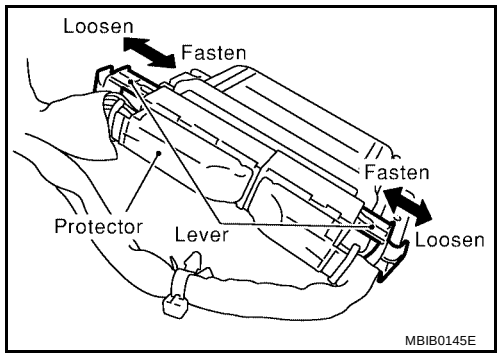


SEF289H

- **Do not disassemble ECM.**
- **If battery cable is disconnected, the memory will return to the initial ECM values.**
  The ECM will now start to self-control at its initial values. Engine operation can vary slightly when the cable is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.
- **If the battery is disconnected, the following emission-related diagnostic information will be lost within 24 hours.**
  - **Diagnostic trouble codes**
  - **1st trip diagnostic trouble codes**
  - **Freeze frame data**
  - **1st trip freeze frame data**
  - **System readiness test (SRT) codes**
  - **Test values**

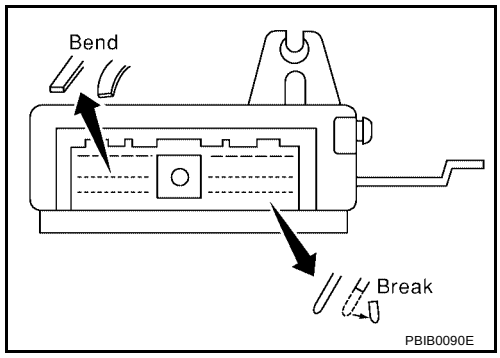

PBIB1164E

- **When connecting ECM harness connector, fasten it securely with a lever as far as it will go as shown in the figure.**



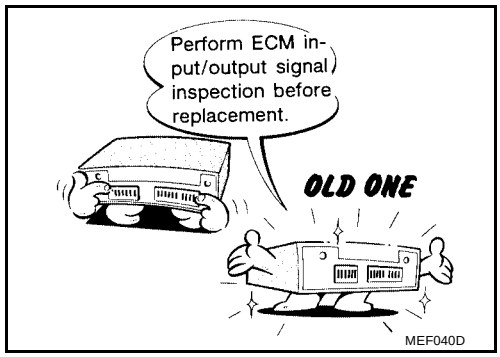
MBIB0145E

- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**



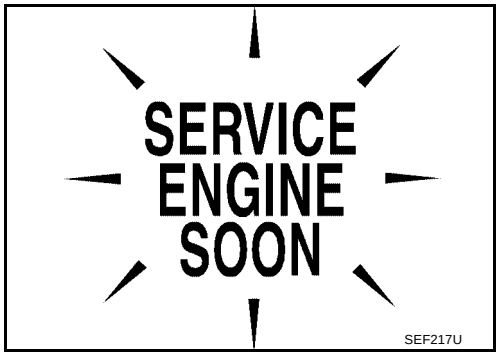
PBIB0090E

- **Before replacing ECM, perform “ECM Terminals and Reference Value” inspection and make sure ECM functions properly. Refer to EC-782 .**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**

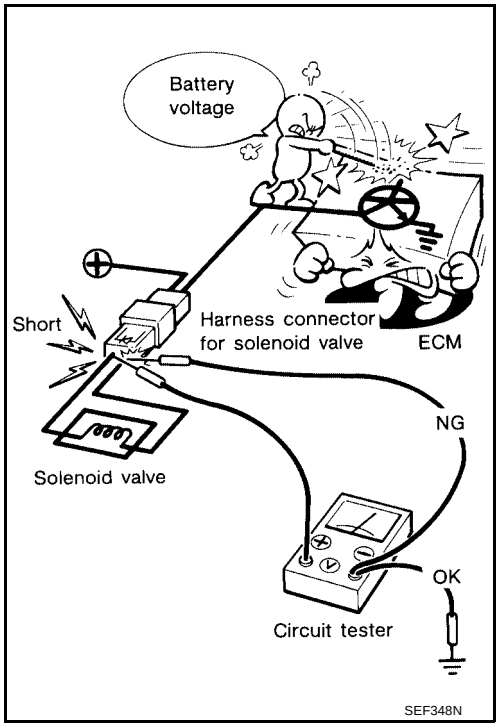


MEF040D

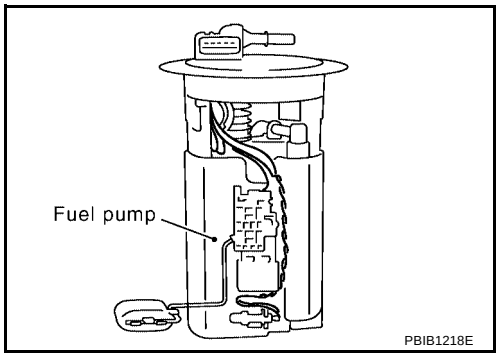
- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check.**
  The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.



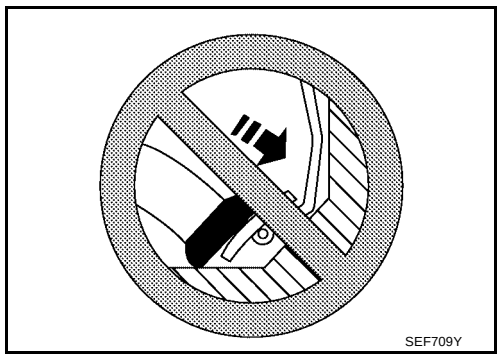
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



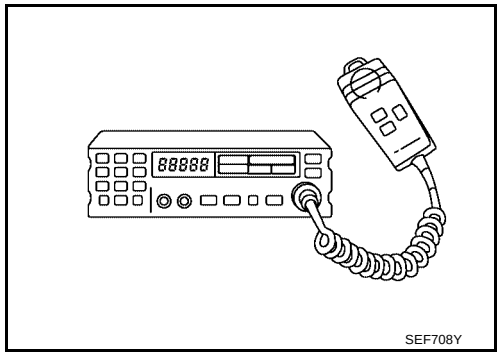
- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**



- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**


SEF709Y

- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
  - **Keep the antenna as far as possible from the electronic control units.**
  - **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
    Do not let them run parallel for a long distance.
  - **Adjust the antenna and feeder line so that the standing-wave radio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**


SEF708Y

Wiring Diagrams and Trouble Diagnosis

UBS00J8V

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams"
- PG-3, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident"

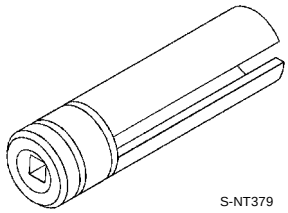
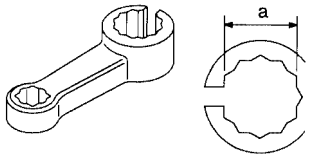
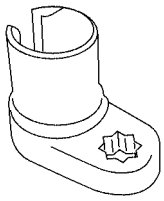
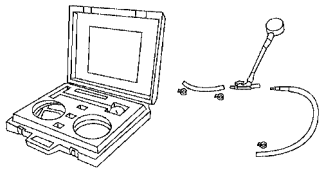
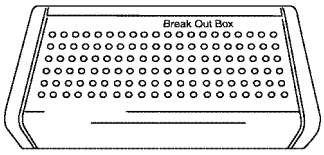
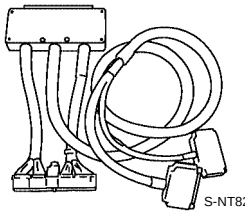
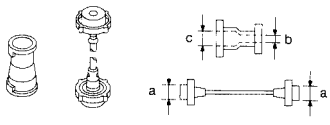
PREPARATION

PFP:00002

Special Service Tools

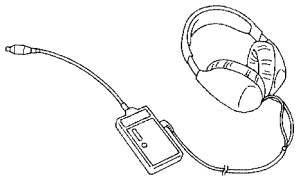
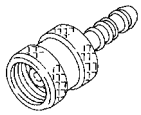
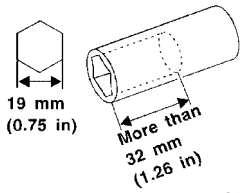
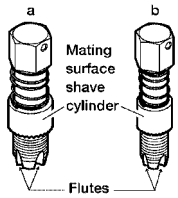
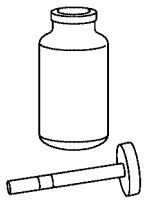
UBS00KJG

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	
KV10117100 (J-36471-A) Heated oxygen sensor wrench	 S-NT379	Loosening or tightening heated oxygen sensors with 22 mm (0.87 in) hexagon nut
KV10114400 (J-38365) Heated oxygen sensor wrench	 S-NT636	Loosening or tightening heated oxygen sensors **a: 22 mm (0.87 in)**
(J-44626) Air fuel ratio (A/F) sensor wrench	 LEM054	Loosening or tightening air fuel ratio (A/F) sensor 1
(J-44321) Fuel pressure gauge kit	 LEC642	Checking fuel pressure
KV109E0010 (J-46209) Break-out box	 S-NT825	Measuring the ECM signals with a circuit tester
KV109E0080 (J-45819) Y-cable adapter	 S-NT826	Measuring the ECM signals with a circuit tester
EG17650301 (J-33984-A) Radiator cap tester adapter	 S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)

Commercial Service Tools

UBS00KJH

Tool name (Kent-Moore No.)	Description	
Fuel filler cap adapter (J-45356)	S-NT815	Checking fuel tank vacuum relief valve opening pressure
Leak detector ie: (J-41416)	 S-NT703	Locating the EVAP leak
EVAP service port adapter ie: (J-41413-OBD)	 S-NT704	Applying positive pressure through EVAP service port
Socket wrench	 S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner ie: (J-43897-18) (J-43897-12)	 AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant ie: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

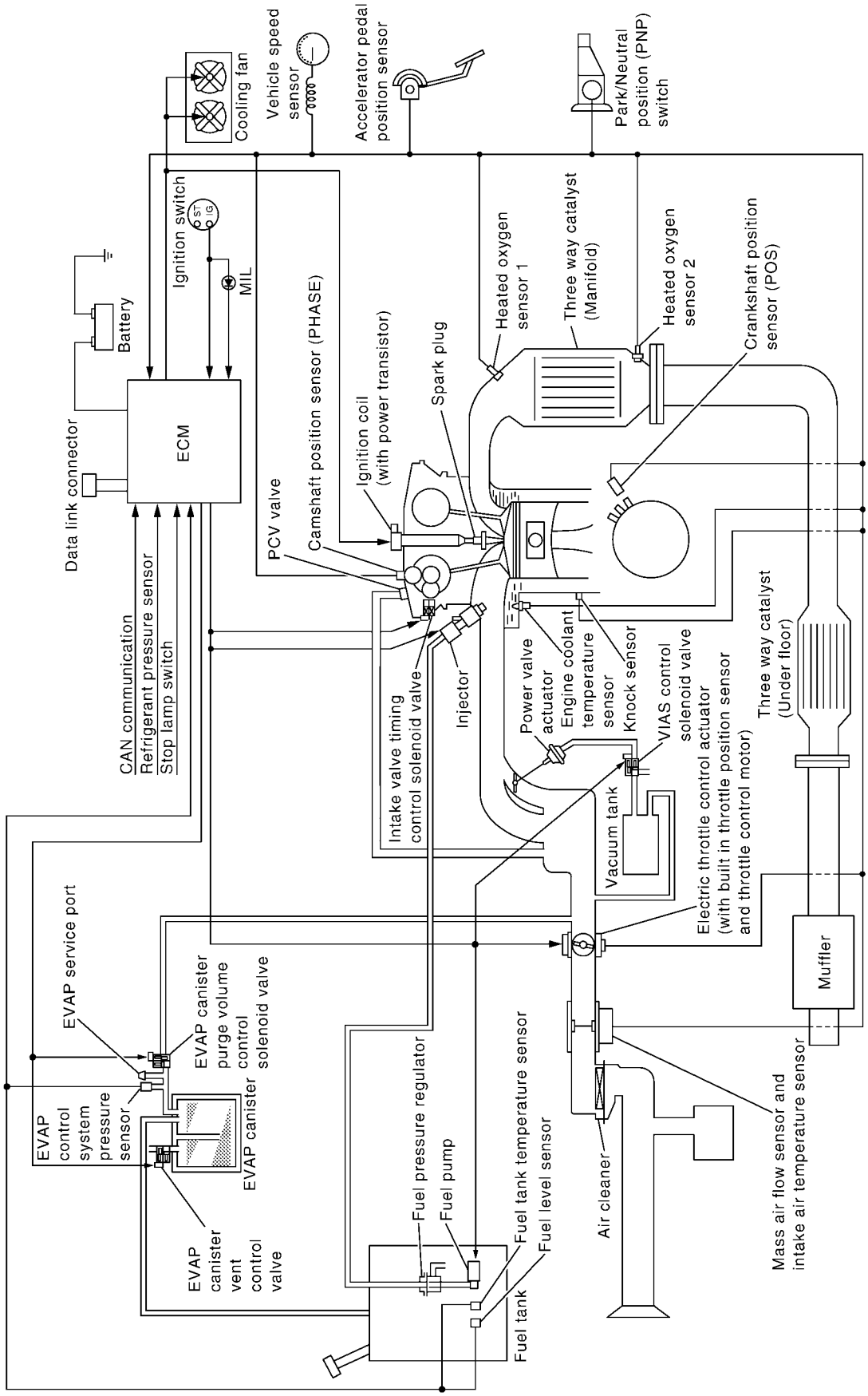
ENGINE CONTROL SYSTEM

PFP:23710

System Diagram

UBS00KJC

A/T MODELS ULEV AND M/T MODELS



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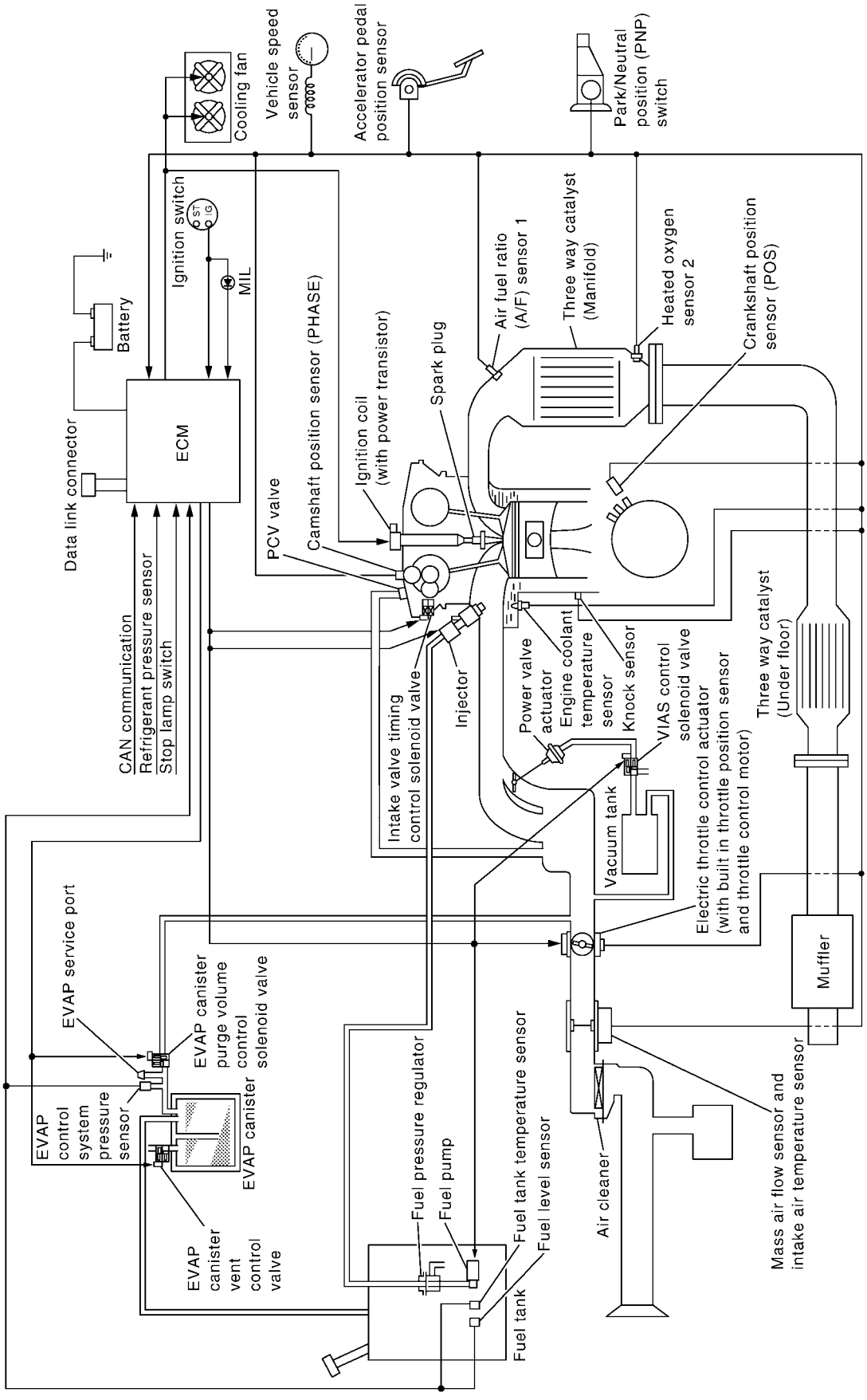
A/T MODELS EXCEPT ULEV



PBIB2512E

Multiport Fuel Injection (MFI) System

UBS00KJD

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*5 Piston position	Fuel injection & mixture ratio control	Fuel injector
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1*1	Density of oxygen in exhaust gas		
Air fuel ratio (A/F) sensor 1*2	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Knock sensor	Engine knocking condition		
Battery	Battery voltage*5		
Power steering pressure sensor	Power steering operation		
Heated oxygen sensor 2*3	Density of oxygen in exhaust gas		
Vehicle speed sensor*4	Vehicle speed		
Air conditioner switch	Air conditioner operation		

*1: A/T models ULEV and M/T models.
*2: A/T models except ULEV.
*3: Under normal conditions, this sensor is not for engine control operation.
*4: This signal is sent to the ECM through CAN communication line.
*5: ECM determines the start signal status by the signal of engine speed and battery voltage.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from both the crankshaft position sensor and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

<Fuel increase>

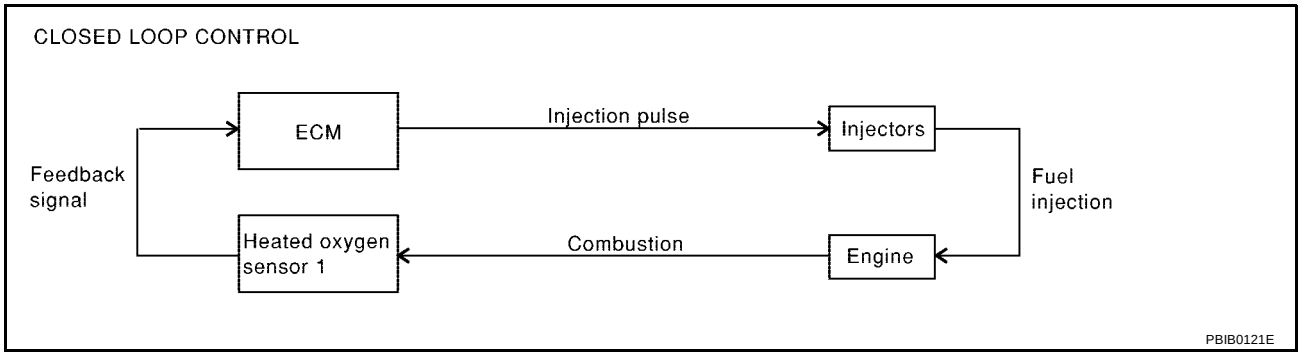
- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (A/T models)
- High-load, high-speed operation

<Fuel decrease>

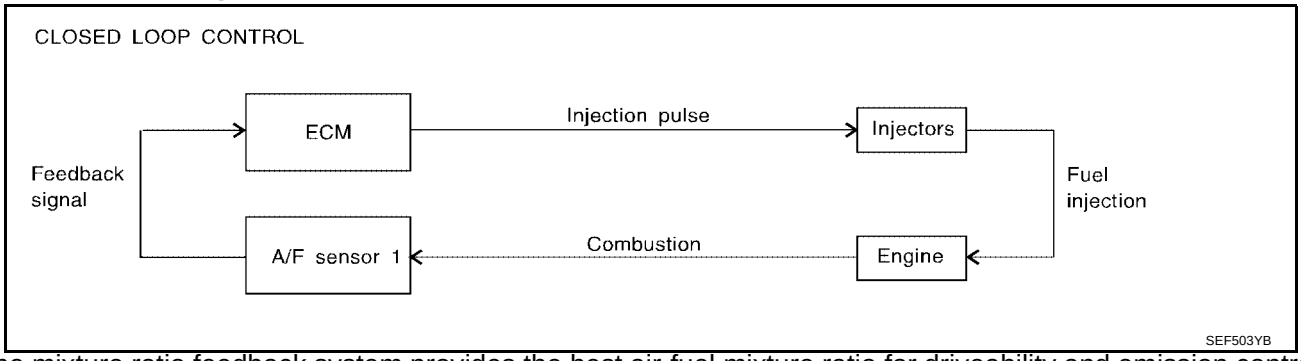
- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)

A/T Models ULEV and M/T Models



A/T Models Except ULEV



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses heated oxygen sensor 1 (A/T models ULEV and M/T models), air fuel ratio (A/F) sensor 1 (A/T models except ULEV) in the exhaust manifold to monitor if the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about heated oxygen sensor 1 (A/T models ULEV and M/T models), air fuel ratio (A/F) sensor 1 (A/T models except ULEV), refer to EC-903 / EC-1181 This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of heated oxygen sensor 1 (A/T models ULEV and M/T models), air-fuel ratio (A/F) sensor 1 (A/T models except ULEV) shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

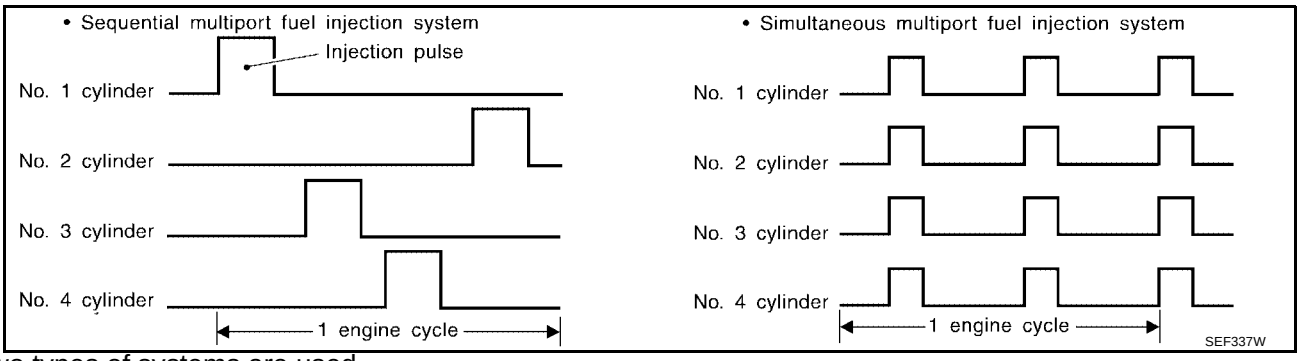
- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 (A/T models ULEV and M/T models), air fuel ratio (A/F) sensor 1 (A/T models except ULEV) or their circuits
- Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from heated oxygen sensor 1 (A/T models ULEV and M/T models), air fuel ratio (A/F) sensor 1 (A/T models except ULEV). This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.

Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.
“Fuel trim” refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
“Short term fuel trim” is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from heated oxygen sensor 1 (A/T models ULEV and M/T models), air fuel ratio (A/F) sensor 1 (A/T models except ULEV) indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
“Long term fuel trim” is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

Sequential Multiport Fuel Injection System

Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System

Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The four injectors will then receive the signals two times for each engine cycle.
This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration, operation of the engine at excessively high speeds or operation of the vehicle at excessively high speeds.

Electronic Ignition (EI) System

UBS00J90

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2	Ignition timing control	Power transistor
Camshaft position sensor (PHASE)	Piston position		
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Vehicle speed sensor*1	Vehicle speed		
Battery	Battery voltage*2		

*1: This signal is sent to the ECM through CAN communication line.

*2: ECM determines the start signal status by the signal of engine speed and battery voltage.

SYSTEM DESCRIPTION

Firing order: 1 - 3 - 4 - 2
The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.

- At starting
- During warm-up
- At idle
- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Fuel Cut Control (at No Load and High Engine Speed)

UBS00J91

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM function	Actuator
Park/neutral position (PNP) switch	Neutral position	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Vehicle speed sensor*	Vehicle speed		

*: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

If the engine speed is above 1,800 rpm under no load (for example, the shift position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.
Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:
This function is different from deceleration control listed under “Multiport Fuel Injection (MFI) System”, EC-672
.

AIR CONDITIONING CUT CONTROL

PFP:23710

Input/output Signal Chart

UBS00J92

Sensor	Input Signal to ECM	ECM function	Actuator
Air conditioner switch*1	Air conditioner ON signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		
Power steering pressure sensor	Power steering operation		
Vehicle speed sensor*1	Vehicle speed		
Battery	Battery voltage*2		

*1: This signal is sent to the ECM through CAN communication line.
*2: ECM determines the start signal status by the signal of engine speed and battery voltage.

System Description

UBS00J93

This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

PFP:18930

System Description

UBS00JT1

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch	Brake pedal operation		
ASCD clutch switch (M/T models)	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/Neutral position (PNP) switch (A/T models)	Gear position		
Combination meter*	Vehicle speed		
TCM*	Powertrain revolution		

*: This signal is sent to the ECM through CAN communication line.

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates the control.

NOTE:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press MAIN switch. (The CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH), press SET/COAST switch. (Then SET indicator in combination meter illuminates.)

ACCEL OPERATION

If the RESUME/ACCELERATE switch is depressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to the neutral position (M/T models)
- Selector lever is changed to N, P, R position (A/T models)
- Vehicle speed decreased to 13km/h(8MPH) lower than the set speed

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released.
- Clutch pedal is released (M/T models).
- A/T selector lever is in other than P and N positions (A/T models).
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH).

Component Description

UBS00JT2

ASCD STEERING SWITCH

Refer to EC-1247 .

ASCD BRAKE SWITCH

Refer to EC-1277 .

ASCD CLUTCH SWITCH

Refer to EC-1254 .

STOP LAMP SWITCH

Refer to EC-1254 .

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EC-1110 .

ASCD INDICATOR

Refer to EC-1378 .

CAN COMMUNICATION

PFP:23710

System Description

UBS00J96

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-4 , about CAN communication for detail.

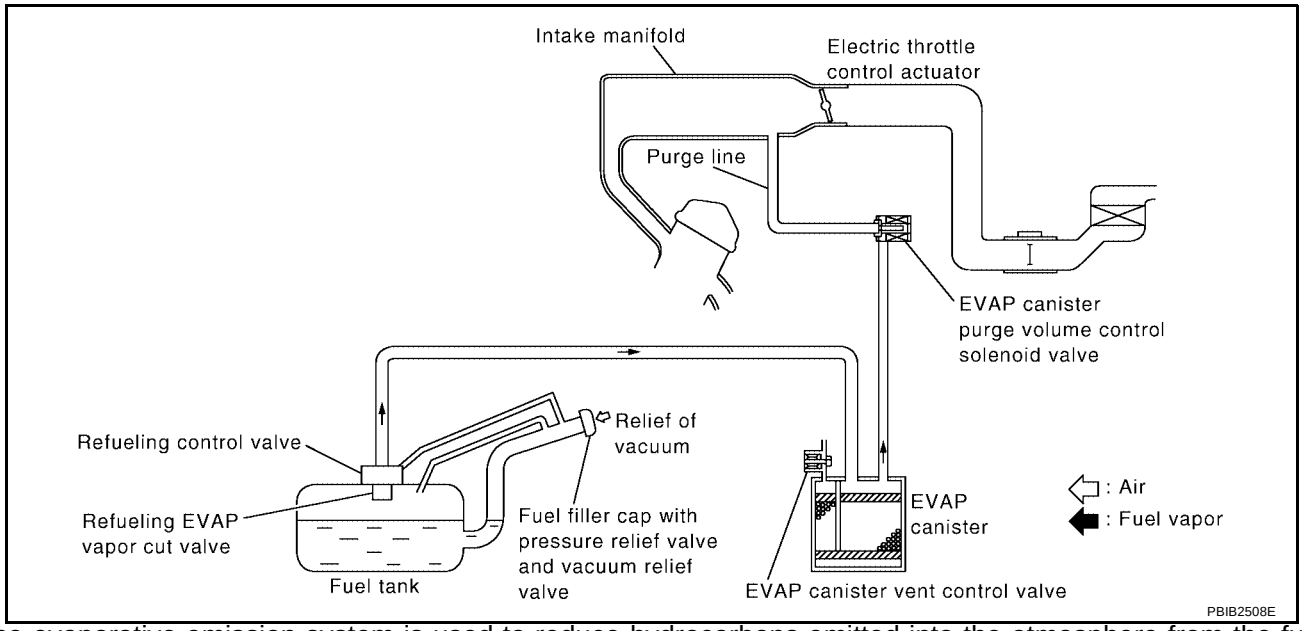
EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description

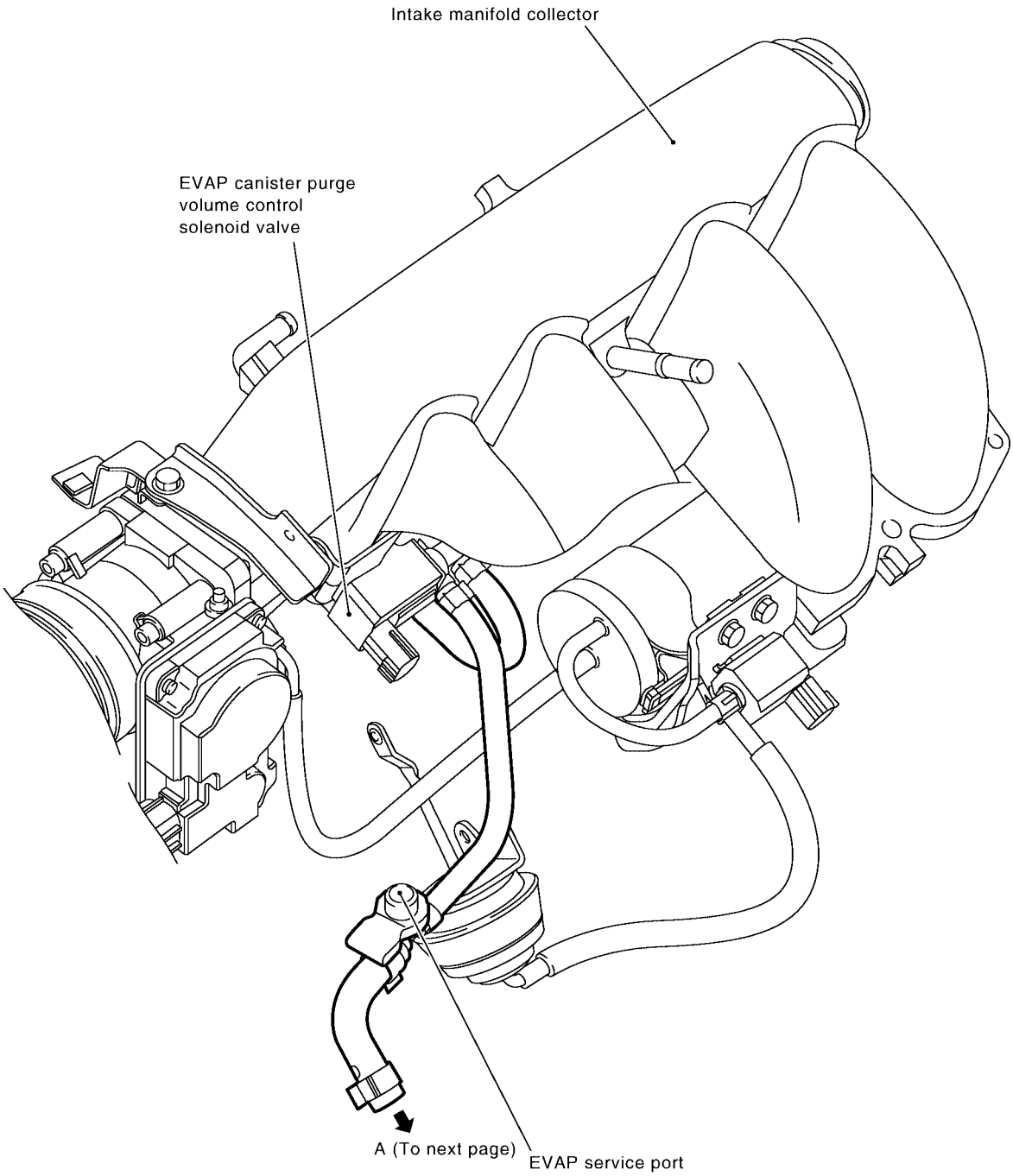
UBS00JT3

SYSTEM DESCRIPTION



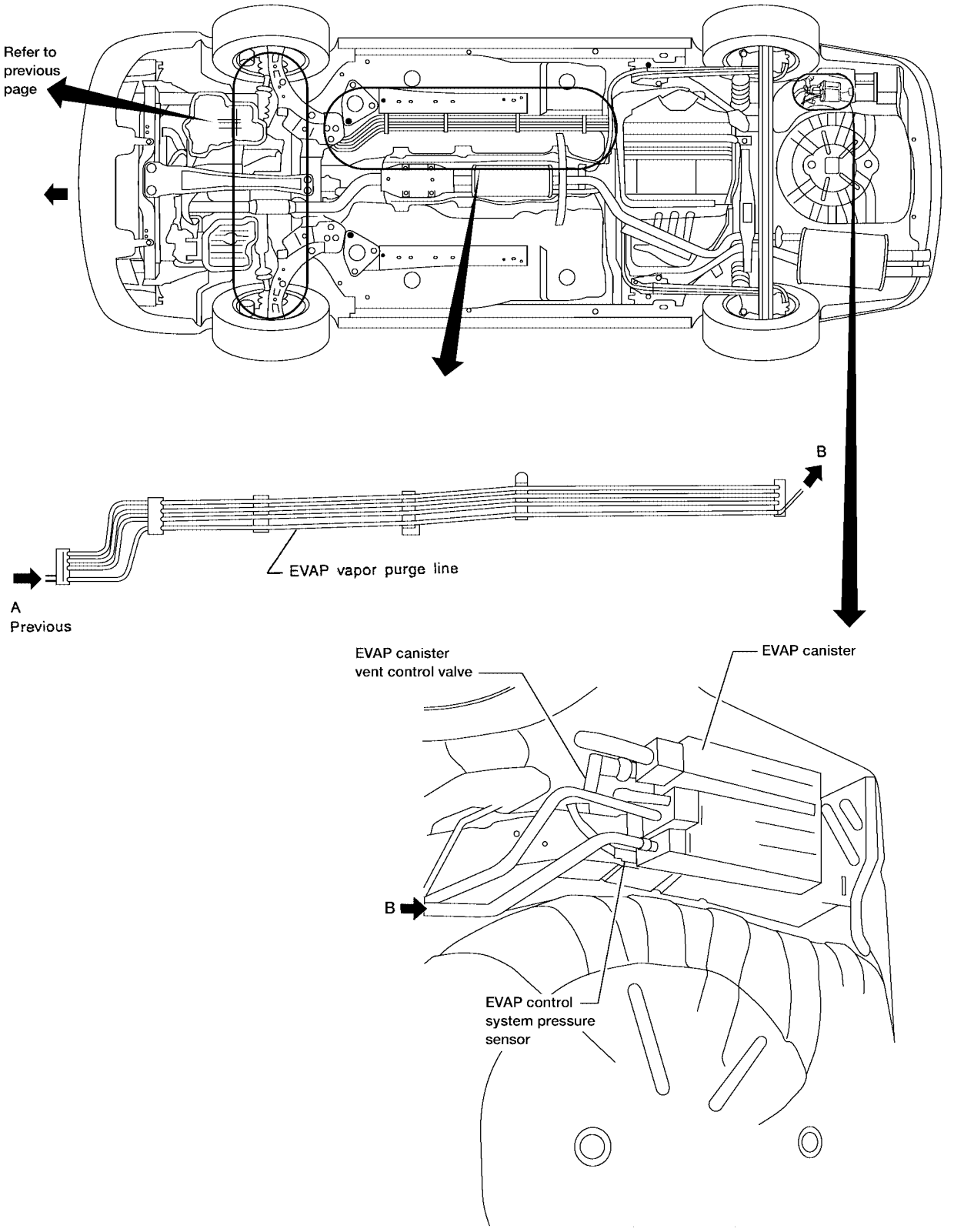
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

EVAPORATIVE EMISSION LINE DRAWING



BBIA0293E

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.


Refer to previous page
B
EVAP vapor purge line
A
Previous
EVAP canister vent control valve
EVAP canister
B
EVAP control system pressure sensor

BBIA0294E

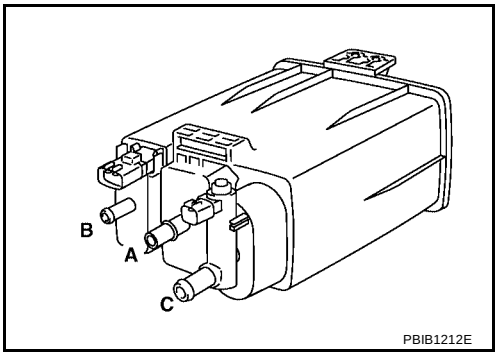
Component Inspection

UBS00JT4

EVAP CANISTER

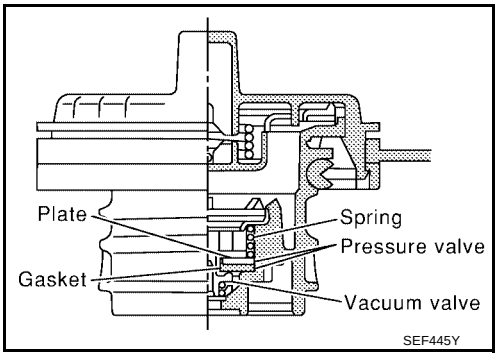
Check EVAP canister as follows:

1. Block port **B** .
2. Blow air into port **A** and check that it flows freely out of port **C** .
3. Release blocked port **B** .
4. Apply vacuum pressure to port **B** and check that vacuum pressure exists at the ports **A** and **C** .
5. Block port **A** and **B** .
6. Apply pressure to port **C** and check that there is no leakage.



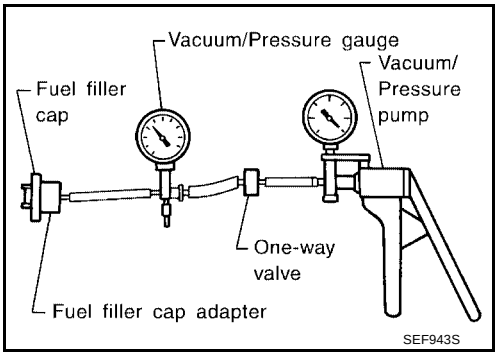
FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)

1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa
(0.156 - 0.204 kg/cm^2 , 2.22 - 2.90 psi)
Vacuum: –6.0 to –3.3 kPa
(–0.061 to –0.034 kg/cm^2 , –0.87 to –0.48 psi)



3. If out of specification, replace fuel filler cap as an assembly.

CAUTION:
Use only a genuine fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1029

FUEL TANK TEMPERATURE SENSOR

Refer to EC-962 .

EVAP CANISTER VENT CONTROL VALVE

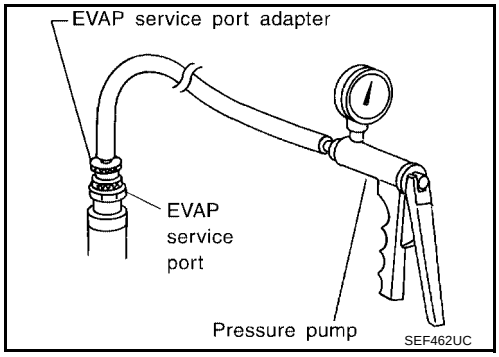
Refer to EC-1036 .

EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1046 .

EVAP SERVICE PORT

Positive pressure is delivered to the EVAP system through the EVAP service port. If fuel vapor leakage in the EVAP system occurs, use a leak detector to locate the leak.

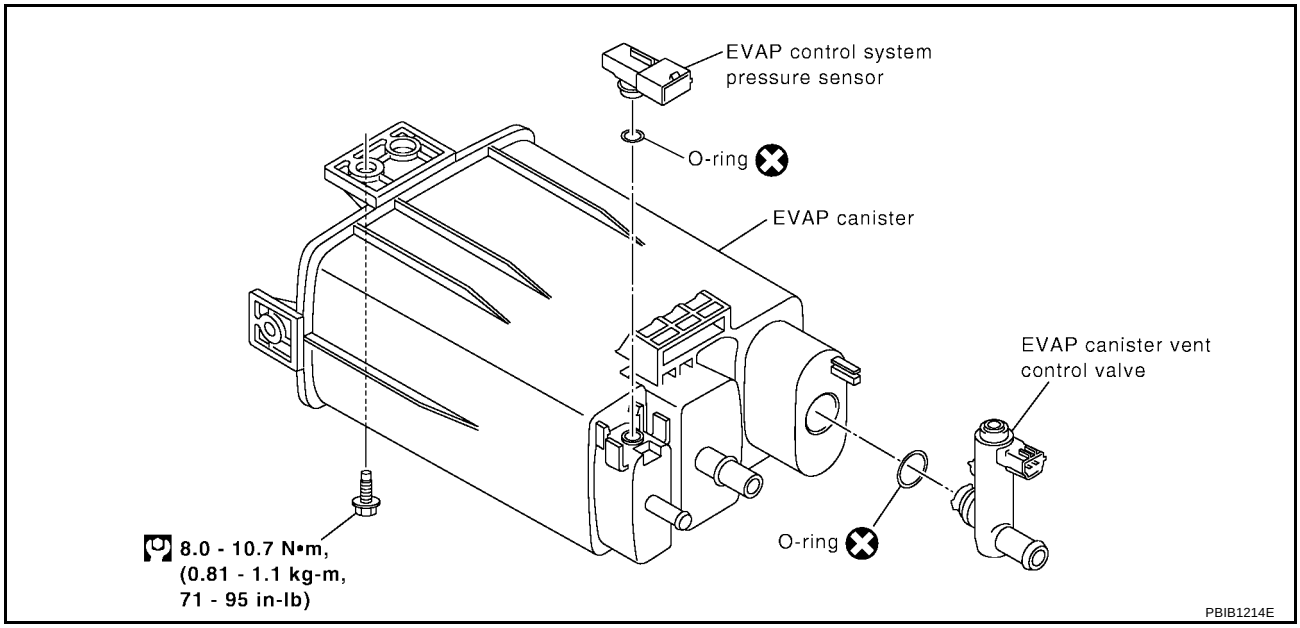


Removal and Installation

UBS00JT5

EVAP CANISTER

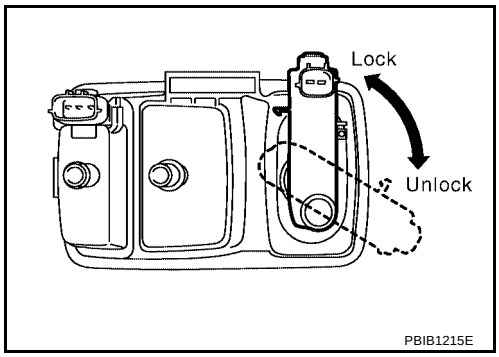
Tighten EVAP canister as shown in the figure.



EVAP CANISTER VENT CONTROL VALVE

1. Turn EVAP canister vent control valve clockwise.
2. Remove the EVAP canister vent control valve.

Do not reuse the O-ring, replace it with a new one.



How to Detect Fuel Vapor Leakage

UBS00JT6

CAUTION:

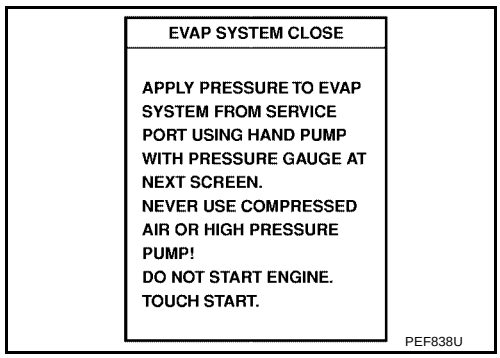
- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in EVAP system.**

NOTE:

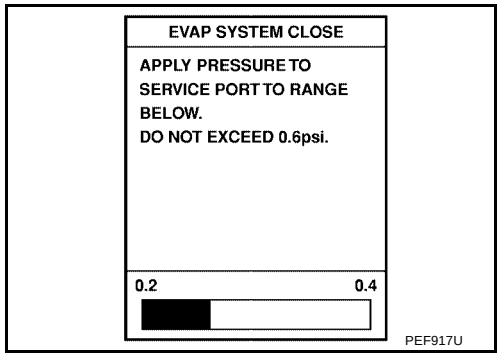
- Do not start engine.
- Improper installation of EVAP service port adapter to the EVAP service port may cause a leak.

WITH CONSULT-II

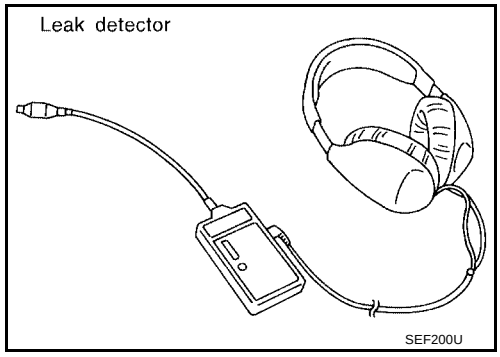
1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump and hose to the EVAP service port adapter.
3. Turn ignition switch ON.
4. Select the “EVAP SYSTEM CLOSE” of “WORK SUPPORT MODE” with CONSULT-II.
5. Touch “START”. A bar graph (Pressure indicating display) will appear on the screen.



6. Apply positive pressure to the EVAP system until the pressure indicator reaches the middle of the bar graph.
7. Remove EVAP service port adapter and hose with pressure pump.

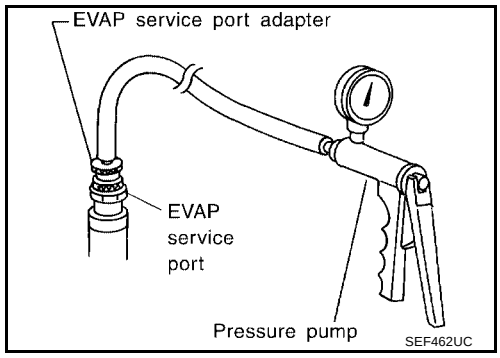


8. Locate the leak using a leak detector. Refer to EC-681, "EVAPORATIVE EMISSION LINE DRAWING" .

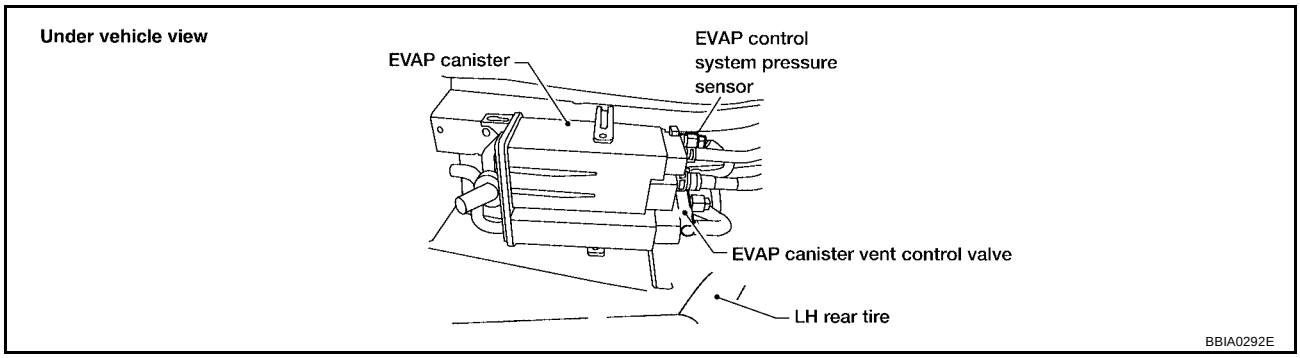


WITHOUT CONSULT-II

1. Attach the EVAP service port adapter securely to the EVAP service port.
2. Also attach the pressure pump with pressure gauge to the EVAP service port adapter.



3. Apply battery voltage to the terminal of EVAP canister vent control valve to make a closed EVAP system.



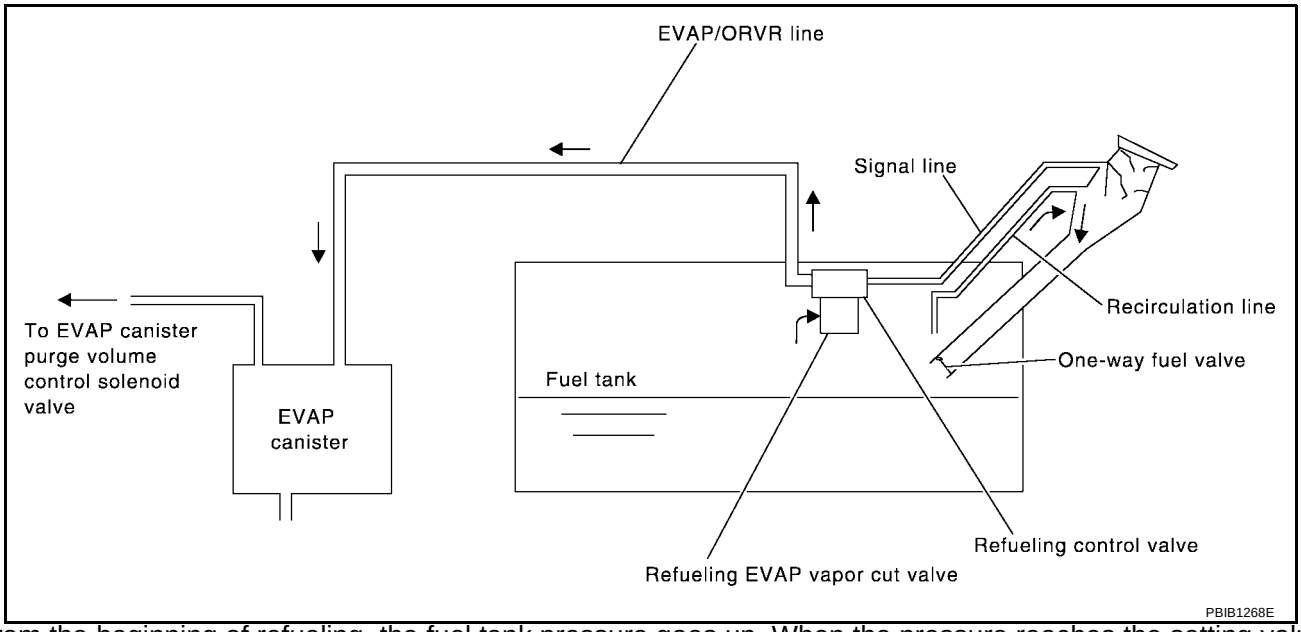
4. To locate the leak, deliver positive pressure to the EVAP system until pressure gauge points reach 1.38 to 2.76 kPa (0.014 to 0.028 kg/cm^2 , 0.2 to 0.4 psi).
5. Remove EVAP service port adapter and hose with pressure pump.
6. Locate the leak using a leak detector. Refer to EC-681, "EVAPORATIVE EMISSION LINE DRAWING" .

ON BOARD REFUELING VAPOR RECOVERY (ORVR)

PFP:00032

System Description

UBS00JT7



From the beginning of refueling, the fuel tank pressure goes up. When the pressure reaches the setting value of the refueling control valve (RCV) opening pressure, the RCV is opened. After RCV opens, the air and vapor inside the fuel tank go through refueling EVAP vapor cut valve, RCV and EVAP/ORVR line to the EVAP canister. The vapor is absorbed by the EVAP canister and the air is released to the atmosphere.

When the refueling has reached the full level of the fuel tank, the refueling EVAP vapor cut valve is closed and refueling is stopped because of auto shut-off. The vapor which was absorbed by the EVAP canister is purged during driving.

The RCV is always closed during driving and the evaporative emission control system is operated the same as conventional system.

WARNING:

When conducting inspections below, be sure to observe the following:

- **Put a “CAUTION: INFLAMMABLE” sign in workshop.**
- **Do not smoke while servicing fuel system. Keep open flames and sparks away from work area.**
- **Be sure to furnish the workshop with a CO_2 fire extinguisher.**

CAUTION:

- **Before removing fuel line parts, carry out the following procedures:**
  - **Put drained fuel in an explosion-proof container and put lid on securely.**
  - **Release fuel pressure from fuel line. Refer to EC-751, "FUEL PRESSURE RELEASE" .**
  - **Disconnect battery ground cable.**
- **Always replace O-ring when the fuel gauge retainer is removed.**
- **Do not kink or twist hose and tube when they are installed.**
- **Do not tighten hose and clamps excessively to avoid damaging hoses.**
- **After installation, run engine and check for fuel leaks at connection.**
- **Do not attempt to top off the fuel tank after the fuel pump nozzle shuts off automatically. Continued refueling may cause fuel overflow, resulting in fuel spray and possibly a fire.**

Diagnostic Procedure

UBS00JT8

SYMPTOM: FUEL ODOR FROM EVAP CANISTER IS STRONG.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.9 kg (4.2 lb).

OK or NG

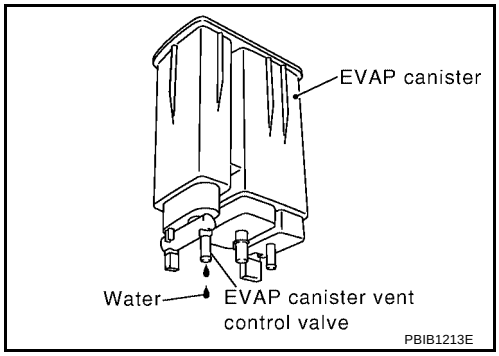
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No >> GO TO 5.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

5. CHECK REFUELING CONTROL VALVE

Refer to EC-690, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace refueling control valve.

6. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-690, "Component Inspection" .

OK or NG

OK >> **INSPECTION END**.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

SYMPTOM: CANNOT REFUEL/FUEL ODOR FROM THE FUEL FILLER OPENING IS STRONG WHILE REFUELING.

1. CHECK EVAP CANISTER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Weigh the EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
   The weight should be less than 1.9 kg (4.2 lb).

OK or NG

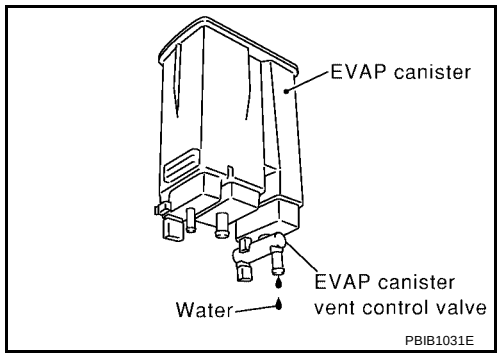
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK IF EVAP CANISTER SATURATED WITH WATER

Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 3.
No >> GO TO 5.



3. REPLACE EVAP CANISTER

Replace EVAP canister with a new one.

>> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the EVAP hose between EVAP canister and vehicle frame for clogging or poor connection.

>> Repair or replace EVAP hose.

5. CHECK VENT HOSES AND VENT TUBES

Check hoses and tubes between EVAP canister and refueling control valve for clogging, kink, looseness and improper connection.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace hoses and tubes.

6. CHECK FILLER NECK TUBE

Check signal line and recirculation line for clogging, dents and cracks.

OK or NG

OK >> GO TO 7.
NG >> Replace filler neck tube.

7. CHECK REFUELING CONTROL VALVE

Refer to EC-690, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace refueling control valve.

8. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-690, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

9. CHECK FUEL FILLER TUBE

Check filler neck tube and hose connected to the fuel tank for clogging, dents and cracks.

OK or NG

OK >> GO TO 10.
NG >> Replace fuel filler tube.

10. CHECK ONE-WAY FUEL VALVE-I

Check one-way valve for clogging.

OK or NG

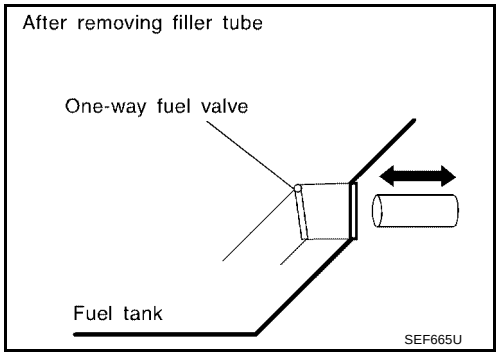
OK >> GO TO 11.
NG >> Repair or replace one-way fuel valve with fuel tank.

11. CHECK ONE-WAY FUEL VALVE-II

1. Make sure that fuel is drained from the tank.
2. Remove fuel filler tube and hose.
3. Check one-way fuel valve for operation as follows.
   When a stick is inserted, the valve should open, when removing stick it should close.
   Do not drop any material into the tank.

OK or NG

OK >> **INSPECTION END**
NG >> Replace fuel filler tube or replace one-way fuel valve with fuel tank.



Component Inspection

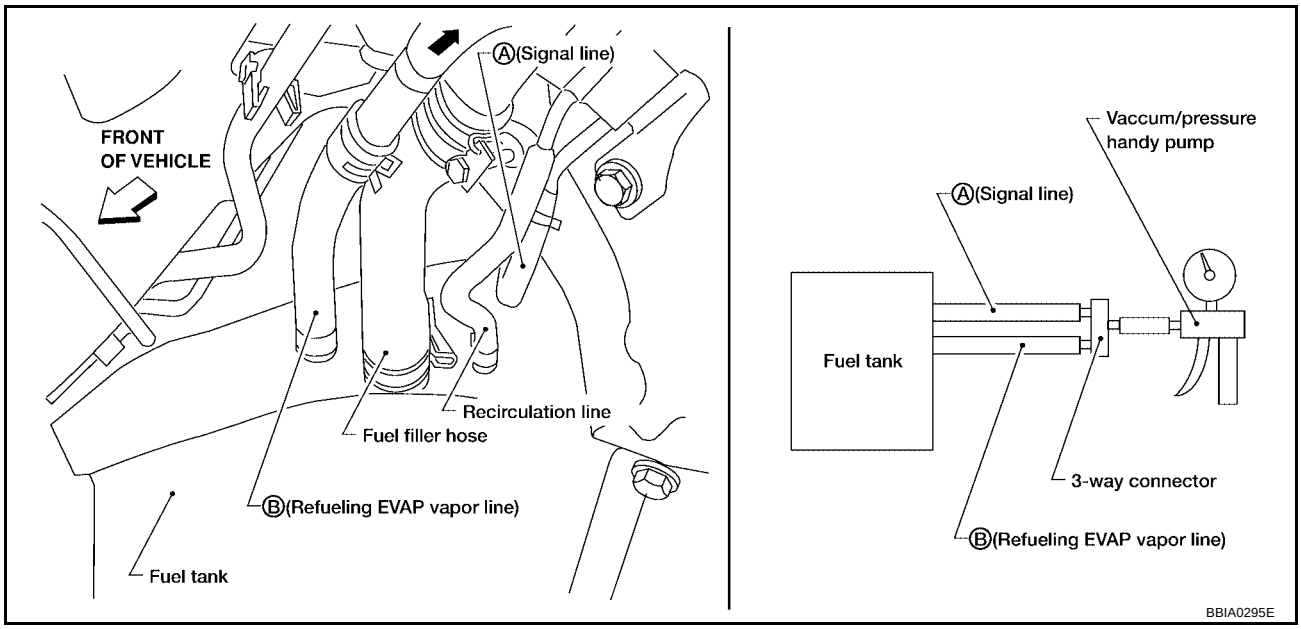
UBS00JT9

REFUELING EVAP VAPOR CUT VALVE

With CONSULT-II

1. Remove fuel tank. Refer to FL-7, "FUEL TANK" .
2. Drain fuel from the tank as follows:
   - Remove fuel feed hose located on ”fuel level sensor and fuel pump”.
   - Connect a spare fuel hose, one side to fuel gauge retainer where the hose was removed and the other side to a fuel container.
   - Drain fuel using “FUEL PUMP RELAY” in “ACTIVE TEST” mode with CONSULT-II.
3. Check refueling EVAP vapor cut valve for being stuck to close as follows.
   Blow air into the refueling EVAP vapor cut valve (from hose end **B**), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck to open as follows.

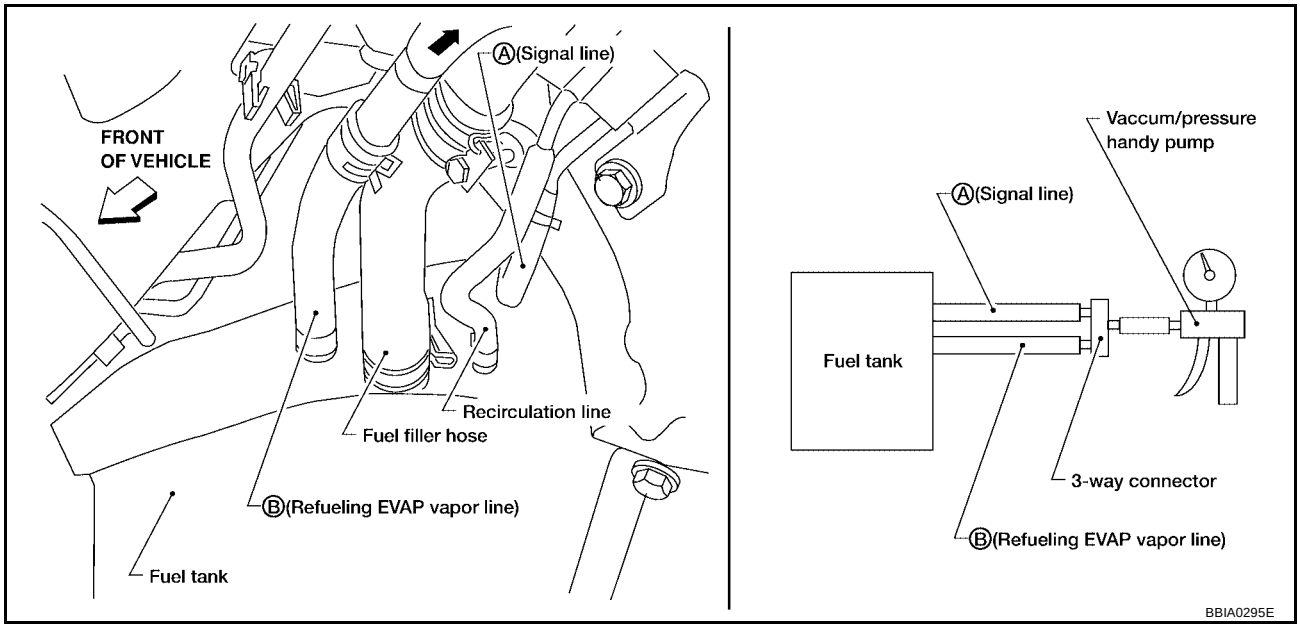
- Connect vacuum pump to hose ends **A** and **B** using a suitable 3-way connector.
- Remove fuel gauge retainer with fuel gauge unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.
- Apply vacuum pressure to both hose ends **A** and **B** [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel gauge retainer remaining open and check that the pressure is applicable.



With GST

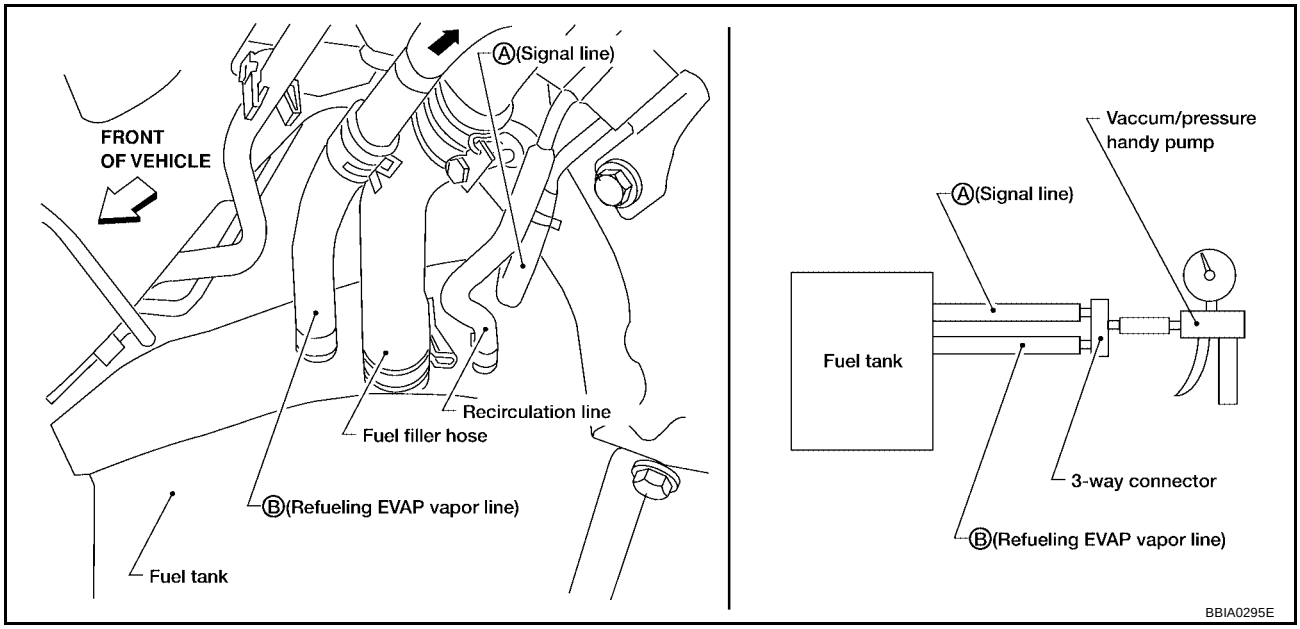
1. Remove fuel tank. Refer to FL-7, "FUEL TANK" .
2. Drain fuel from the tank as follows:
- Remove ”fuel level sensor and fuel pump”.
- Drain fuel from the tank using a handy pump into a fuel container.
3. Check refueling EVAP vapor cut valve for being stuck closed as follows.
   Blow air into the refueling EVAP vapor cut valve (from hose end **B**), and check that the air flows freely into the tank.
4. Check EVAP vapor cut valve for being stuck open as follows.
- Connect vacuum pump to hose ends **A** and **B** using a suitable 3-way connector.
- Remove fuel level sensor unit retainer with fuel level sensor unit.
  Always replace O-ring with new one.
- Put fuel tank upside down.

– Apply vacuum pressure to both hose ends **A** and **B** [–13.3 kPa (–100 mmHg, –3.94 inHg)] with fuel level sensor unit retainer remaining open and check that the pressure is applicable.



REFUELING CONTROL VALVE

1. Remove fuel filler cap.
2. Check air continuity between hose ends A and B.
   Blow air into the hose end B. Air should flow freely into the fuel tank.
3. Blow air into hose end A and check there is no leakage.
4. Apply pressure to both hose ends A and B [20 kPa (150 mmHg, 5.91 inHg)] using a pressure pump and a suitable 3-way connector. Check that there is no leakage.



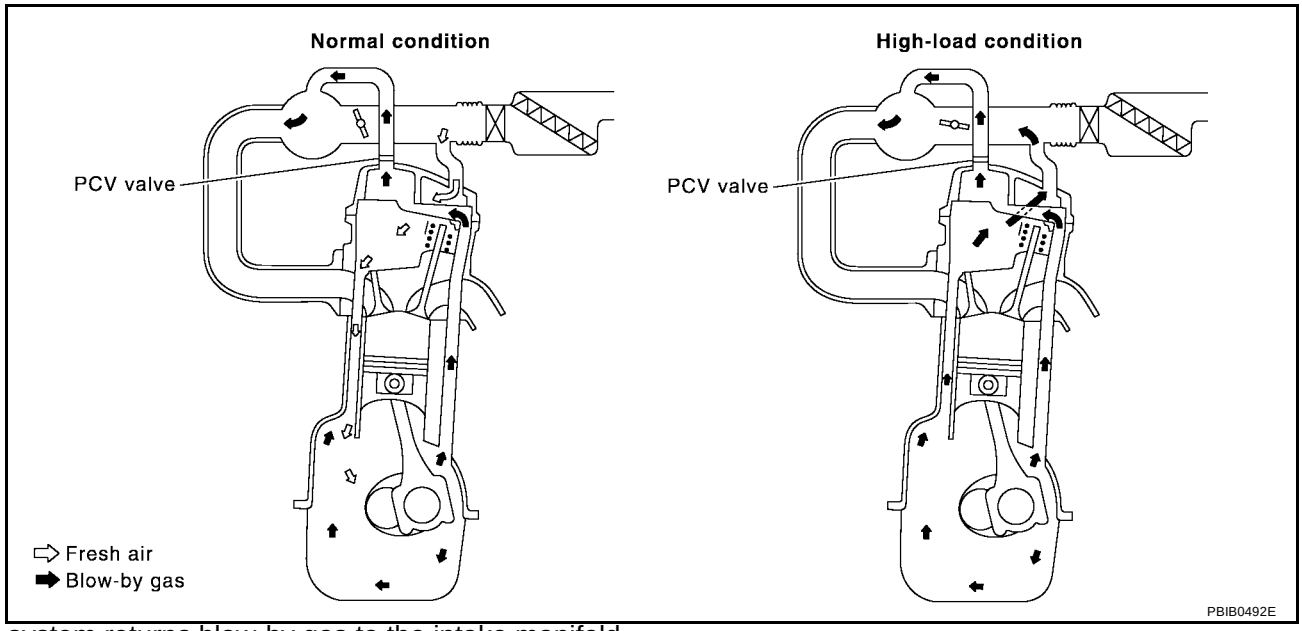
POSITIVE CRANKCASE VENTILATION

PFP:11810

Description

UBS00JTA

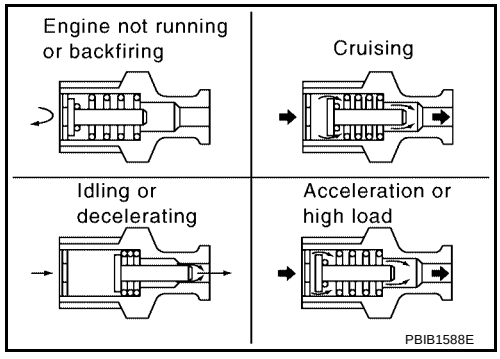
SYSTEM DESCRIPTION



This system returns blow-by gas to the intake manifold.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold. During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve. Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover. Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.

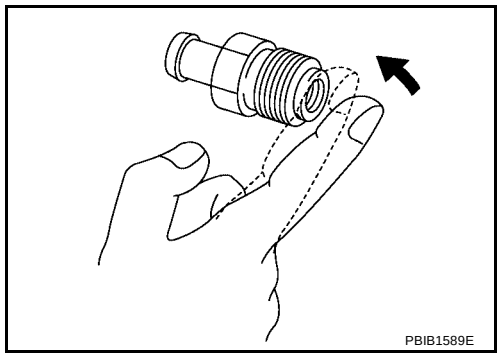


Component Inspection

UBS00JTB

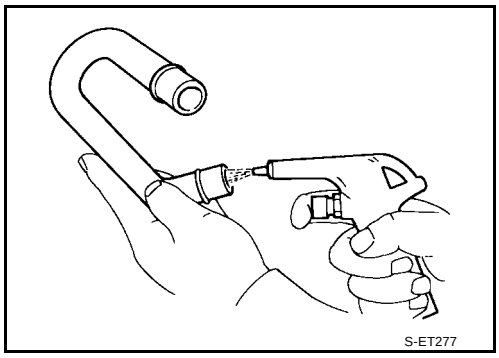
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



PCV VALVE VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM-NATS)

PFP:25386

Description

UBS00J9G

- **If the security indicator lights up with the ignition switch in the ON position or "NATS MALFUNCTION" is displayed on "SELF-DIAG RESULTS" screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .**
- **Confirm no self-diagnostic results of NVIS (NATS) is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.**
- **When replacing ECM, initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs must be carried out with CONSULT-II using NATS program card.**
  Therefore, be sure to receive all keys from vehicle owner. Regarding the procedures of NVIS (NATS) initialization and all NVIS (NATS) ignition key ID registration, refer to CONSULT-II Operation Manual, IVIS/NVIS.

SELF DIAG RESULTS	
DTC RESULTS	TIME
NATS MALFUNCTION [P1610]	0

SEF543X

ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

UBS00J9H

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	Diagnostic service
Diagnostic Trouble Code (DTC)	Service $03 of SAE J1979
Freeze Frame data	Service $02 of SAE J1979
System Readiness Test (SRT) code	Service $01 of SAE J1979
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service $07 of SAE J1979
1st Trip Freeze Frame data	
Test values and Test limits	Service $06 of SAE J1979
Calibration ID	Service $09 of SAE J1979

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	SRT status	Test value
CONSULT-II	×	×	×	×	×	×	—
GST	×	×	×	—	×	×	×
ECM	×	×*	—	—	—	×	—

*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator lamp (MIL) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-762 .)

Two Trip Detection Logic

UBS00J9I

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MIL will not light up at this stage. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MIL lights up. The MIL lights up at the same time when the DTC is stored. <2nd trip> The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MIL, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MIL				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-697, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" .)	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MIL circuit are detected, and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Emission-related Diagnostic Information

UBS00J9J

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

×: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL light-ing up	Reference page
	CONSULT-II GST*2	ECM*11					
CAN COMM CIRCUIT	U1000	1000*5	—	—	1 (A/T) 2 (M/T)	× —	EC-840
CAN COMM CIRCUIT	U1001	1001*5	—	—	2	—	EC-840
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	—	**Flashing** *9 *10	EC-714
INT/V TIM CONT-B1	P0011	0011	—	—	2	×	EC-843
HO2S1 HTR (B1)*7	P0031	0031	×	×	2	×	EC-847
HO2S1 HTR (B1)*7	P0032	0032	×	×	2	×	EC-847
HO2S2 HTR (B1)	P0037	0037	×	×	2	×	EC-853
HO2S2 HTR (B1)	P0038	0038	×	×	2	×	EC-853
MAF SEN/CIRCUIT	P0101	0101	—	—	2	×	EC-859
MAF SEN/CIRCUIT	P0102	0102	—	—	1	×	EC-868
MAF SEN/CIRCUIT	P0103	0103	—	—	1	×	EC-868
IAT SEN/CIRCUIT	P0112	0112	—	—	2	×	EC-876
IAT SEN/CIRCUIT	P0113	0113	—	—	2	×	EC-876
ECT SEN/CIRCUIT	P0117	0117	—	—	1	×	EC-882
ECT SEN/CIRCUIT	P0118	0118	—	—	1	×	EC-882
TP SEN 2/CIRC	P0122	0122	—	—	1	×	EC-888
TP SEN 2/CIRC	P0123	0123	—	—	1	×	EC-888
ECT SENSOR	P0125	0125	—	—	1	×	EC-895
IAT SENSOR	P0127	0127	—	—	2	×	EC-898
THERMSTAT FNCTN	P0128	0128	—	—	2	×	EC-901
HO2S1 (B1)*7	P0132	0132	—	×	2	×	EC-903
HO2S1 (B1)*7	P0133	0133	×	×	2	×	EC-910
HO2S1 (B1)	P0134	0134	—	×	2	×	EC-920
HO2S2 (B1)	P0138	0138	—	×	2	×	EC-927
HO2S2 (B1)	P0139	0139	×	×	2	×	EC-933
FUEL SYS-LEAN-B1	P0171	0171	—	—	2	×	EC-941
FUEL SYS-RICH-B1	P0172	0172	—	—	2	×	EC-952
FTT SENSOR	P0181	0181	—	—	2	×	EC-962
FTT SEN/CIRCUIT	P0182	0182	—	—	2	×	EC-967
FTT SEN/CIRCUIT	P0183	0183	—	—	2	×	EC-967
TP SEN 1/CIRC	P0222	0222	—	—	1	×	EC-971
TP SEN 1/CIRC	P0223	0223	—	—	1	×	EC-971

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL light-ing up	Reference page
	CONSULT-II GST*2	ECM*11					
MULTI CYL MISFIRE	P0300	0300	—	—	2	×	EC-978
CYL 1 MISFIRE	P0301	0301	—	—	2	×	EC-978
CYL 2 MISFIRE	P0302	0302	—	—	2	×	EC-978
CYL 3 MISFIRE	P0303	0303	—	—	2	×	EC-978
CYL 4 MISFIRE	P0304	0304	—	—	2	×	EC-978
KNOCK SEN/CIRC-B1	P0327	0327	—	—	2	—	EC-985
KNOCK SEN/CIRC-B1	P0328	0328	—	—	2	—	EC-985
CKP SEN/CIRCUIT	P0335	0335	—	—	2	×	EC-990
CMP SEN/CIRC-B1	P0340	0340	—	—	2	×	EC-997
TW CATALYST SYS-B1	P0420	0420	×	×	2	×	EC-1004
EVAP PURG FLOW/MON	P0441	0441	×	×	2	×	EC-1014
EVAP SMALL LEAK	P0442	0442	×	×	2	×	EC-1020
PURG VOLUME CONT/V	P0444	0444	—	—	2	×	EC-1029
PURG VOLUME CONT/V	P0445	0445	—	—	2	×	EC-1029
VENT CONTROL VALVE	P0447	0447	—	—	2	×	EC-1036
EVAP SYS PRES SEN	P0451	0451	—	—	2	×	EC-1043
EVAP SYS PRES SEN	P0452	0452	—	—	2	×	EC-1046
EVAP SYS PRES SEN	P0453	0453	—	—	2	×	EC-1052
EVAP GROSS LEAK	P0455	0455	—	—	2	×	EC-1059
EVAP VERY SML LEAK	P0456	0456	×*3	×	2	×	EC-1067
FUEL LEV SEN SLOSH	P0460	0460	—	—	2	×	EC-1077
FUEL LEVEL SENSOR	P0461	0461	—	—	2	×	EC-1079
FUEL LEVL SEN/CIRC	P0462	0462	—	—	2	×	EC-1081
FUEL LEVL SEN/CIRC	P0463	0463	—	—	2	×	EC-1081
VEH SPEED SEN/CIRC*6	P0500	0500	—	—	2	×	EC-1083
ISC SYSTEM	P0506	0506	—	—	2	×	EC-1085
ISC SYSTEM	P0507	0507	—	—	2	×	EC-1087
PW STP SEN/CIRC	P0550	0550	—	—	2	—	EC-1089
ECM	P0605	0605	—	—	1 or 2	— or ×	EC-1094
PNP SW/CIRC	P0705	0705	—	—	2	×	AT-487
ATF TEMP SEN/CIRC	P0710	0710	—	—	2	×	AT-493
VEH SPD SEN/CIR AT*6	P0720	0720	—	—	2	×	AT-499
ENGINE SPEED SIG	P0725	0725	—	—	2	×	AT-504
A/T 1ST GR FNCTN	P0731	0731	—	—	2	×	AT-508
A/T 2ND GR FNCTN	P0732	0732	—	—	2	×	AT-513
A/T 3RD GR FNCTN	P0733	0733	—	—	2	×	AT-518
A/T 4TH GR FNCTN	P0734	0734	—	—	2	×	AT-523
TCC SOLENOID/CIRC	P0740	0740	—	—	2	×	AT-530
A/T TCC S/V FNCTN	P0744	0744	—	—	2	×	AT-535
L/PRESS SOL/CIRC	P0745	0745	—	—	2	×	AT-543
SFT SOL A/CIRC	P0750	0750	—	—	1	×	AT-549
SFT SOL B/CIRC	P0755	0755	—	—	1	×	AT-554

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test value/ Test limit (GST only)	Trip	MIL light-ing up	Reference page
	CONSULT-II GST*2	ECM*11					
A/F SEN1 HTR (B1)*8	P1031	1031	×	×	2	×	EC-1097
A/F SEN1 HTR (B1)*8	P1032	1032	×	×	2	×	EC-1097
ECM BACK UP/CIRC	P1065	1065	—	—	2	×	EC-1102
INT/V TIM V/CIR-B1	P1111	1111	—	—	2	×	EC-1106
ETC ACTR	P1121	1121	—	—	1	×	EC-1110
ETC FUNCTION/CIRC	P1122	1122	—	—	1	×	EC-1112
ETC MOT PWR	P1124	1124	—	—	1	×	EC-1119
ETC MOT PWR	P1126	1126	—	—	1	×	EC-1119
ETC MOT	P1128	1128	—	—	1	×	EC-1124
HO2S1 (B1)*7	P1143	1143	×	×	2	×	EC-1129
HO2S1 (B1)*7	P1144	1144	×	×	2	×	EC-1135
HO2S2 (B1)	P1146	1146	×	×	2	×	EC-1141
HO2S2 (B1)	P1147	1147	×	×	2	×	EC-1149
CLOSED LOOP-B1	P1148	1148	—	—	1	×	EC-1157
ENG OVER TEMP	P1217	1217	—	—	1	×	EC-1159
CTP LEARNING	P1225	1225	—	—	2	—	EC-1172
CTP LEARNING	P1226	1226	—	—	2	—	EC-1174
SENSOR POWER/CIRC	P1229	1229	—	—	1	×	EC-1176
A/F SENSOR*8	P1271	1271	—	×	2	×	EC-1181
A/F SENSOR*8	P1272	1272	—	×	2	×	EC-1187
A/F SENSOR*8	P1273	1273	—	×	2	×	EC-1193
A/F SENSOR*8	P1274	1274	—	×	2	×	EC-1200
A/F SENSOR*8	P1276	1276	—	×	2	×	EC-1207
A/F SENSOR*8	P1278	1278	×	×	2	×	EC-1214
A/F SENSOR*8	P1279	1279	×	×	2	×	EC-1223
PURG VOLUME CONT/V	P1444	1444	—	—	2	×	EC-1232
VENT CONTROL VALVE	P1446	1446	—	—	2	×	EC-1240
ASCD SW	P1564	1564	—	—	1	—	EC-1247
ASCD BRAKE SW	P1572	1572	—	—	1	—	EC-1254
ASCD VHL SPD SEN	P1574	1574	—	—	1	—	EC-1265
TPV SEN/CIRC A/T	P1705	1705	—	—	1	×	AT-559
P-N POS SW/CIRCUIT	P1706	1706	—	—	2	×	EC-1267
O/R CLTCH SOL/CIRC	P1760	1760	—	—	2	×	AT-564
VIAS S/V CIRC	P1800	1800	—	—	2	—	EC-1271
BRAKE SW/CIRCUIT	P1805	1805	—	—	2	—	EC-1277
APP SEN 1/CIRC	P2122	2122	—	—	1	×	EC-1282
APP SEN 1/CIRC	P2123	2123	—	—	1	×	EC-1282
APP SEN 2/CIRC	P2127	2127	—	—	1	×	EC-1289
APP SEN 2/CIRC	P2128	2128	—	—	1	×	EC-1289
TP SENSOR	P2135	2135	—	—	1	×	EC-1297
APP SENSOR	P2138	2138	—	—	1	×	EC-1304

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by SAE J2012.
*3: SRT code will not be set if the self-diagnostic result is NG.
*4: This is not displayed with GST.
*5: The troubleshooting for this DTC needs CONSULT-II.
*6: When the fail-safe operations for both self-diagnoses occur at the same time, the MIL illuminates.
*7: A/T models ULEV and M/T models.
*8: A/T models except ULEV.
*9: When the ECM in the mode of displaying SRT status, MIL may flash. For the details, refer to EC-705, "How to Display SRT Status" .
*10: When engine is running, MIL may flash. For the details, refer to EC-714, "MIL Flashing Without DTC" .
*11: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MIL will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MIL lights up. In other words, the DTC is stored in the ECM memory and the MIL lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MIL during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
For malfunctions in which 1st trip DTCs are displayed, refer to EC-697, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" . These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.
1st trip DTC is specified in Service $07 of SAE J1979. 1st trip DTC detection occurs without lighting up the MIL and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step II, refer to EC-755, "WORK FLOW" . Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

WITH CONSULT-II

WITH GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P1148, P1706, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

NO TOOLS

The number of blinks of the MIL in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0340, 1148, 1706, etc.
These DTCs are controlled by NISSAN.

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, GST or the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.**

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in SELF-DIAGNOSTIC RESULTS mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.
If the DTC is being detected currently, the time data will be 0.

If a 1st trip DTC is stored in the ECM, the time data will be [1t].

DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	1t

PBIB0911E

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-701, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in EC-697, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" .

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service $01 of SAE J1979.
As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.
If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.
In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.
Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.

NOTE:
The SRT will also indicate “INCMP” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.

If, during the state emissions inspection, the SRT indicates “CMPLT” for all test items, the inspector will continue with the emissions test. However, if the SRT indicates “INCMP” for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:
If MIL is ON during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates “CMPLT” for all test items. Therefore, it is important to check SRT (“CMPLT”) and DTC (No DTCs) before the inspection.

SRT Item

The table below shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item (CONSULT-II indication)	Performance Priority*1	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
EVAPORATIVE SYSTEM	1	EVAP control system	P0442
	2	EVAP control system	P0456
	2	EVAP control system purge flow monitoring	P0441
HO2S	2	Heated oxygen sensor 1*2	P0133
		Heated oxygen sensor 1*2	P1143
		Heated oxygen sensor 1*2	P1144
		Air fuel ratio (A/F) sensor 1*3	P1278, P1279
		Heated oxygen sensor 2	P0139
		Heated oxygen sensor 2	P1146
		Heated oxygen sensor 2	P1147
HO2S HTR	2	Heated oxygen sensor 1 heater	P0031, P0032
		Air fuel ratio (A/F) sensor 1 heater*3	P1031, P1032
		Heated oxygen sensor 2 heater	P0037, P0038

*1: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT-II.
*2: A/T models ULEV and M/T models
*3: A/T models except ULEV

SRT Set Timing

SRT is set as “CMPLT” after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON →	OFF	← ON →	OFF ← ON → OFF ← ON →
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MIL “ON”)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

OK: Self-diagnosis is carried out and the result is OK.
NG: Self-diagnosis is carried out and the result is NG.

—: Self-diagnosis is not carried out.

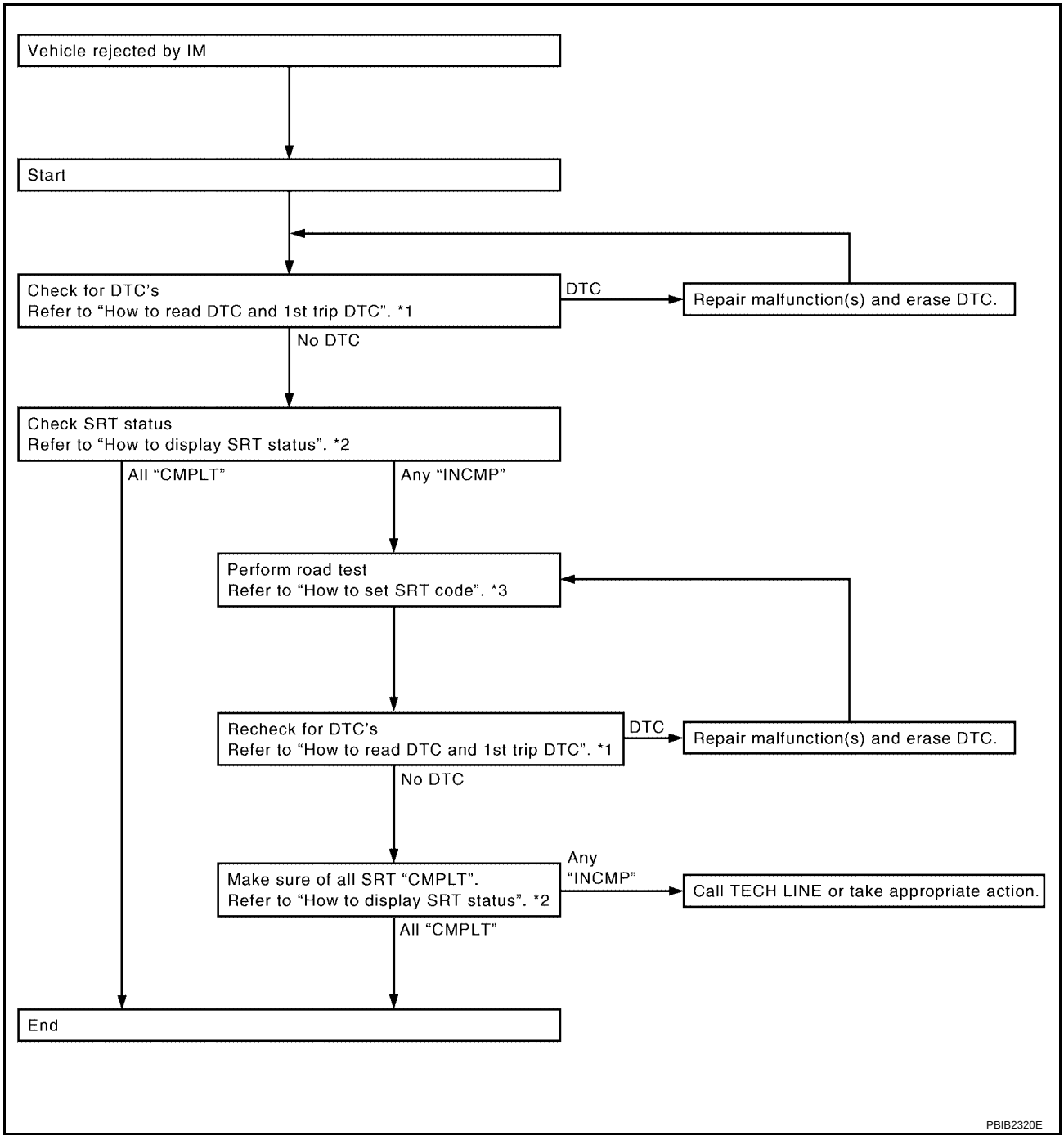
When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above
If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”. → Case 3 above
The table above shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “CMPLT” of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate “INCMP”.

  NOTE:
  SRT can be set as “CMPLT” together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates “CMPLT”.

SRT Service Procedure

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating “INCMP”, review the flowchart diagnostic sequence on the next page.



*1 EC-700 *2 EC-705 *3 EC-706

How to Display SRT Status

WITH CONSULT-II

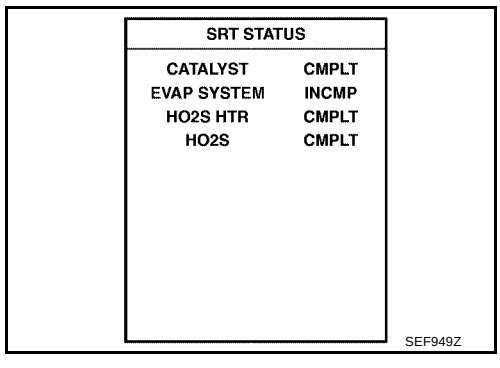
Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.

For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-II screen; for items whose SRT codes are not set, "INCMP" is displayed.

A sample of CONSULT-II display for SRT code is shown at right.

"INCMP" means the self-diagnosis is incomplete and SRT is not set.

"CMPLT" means the self-diagnosis is complete and SRT is set.



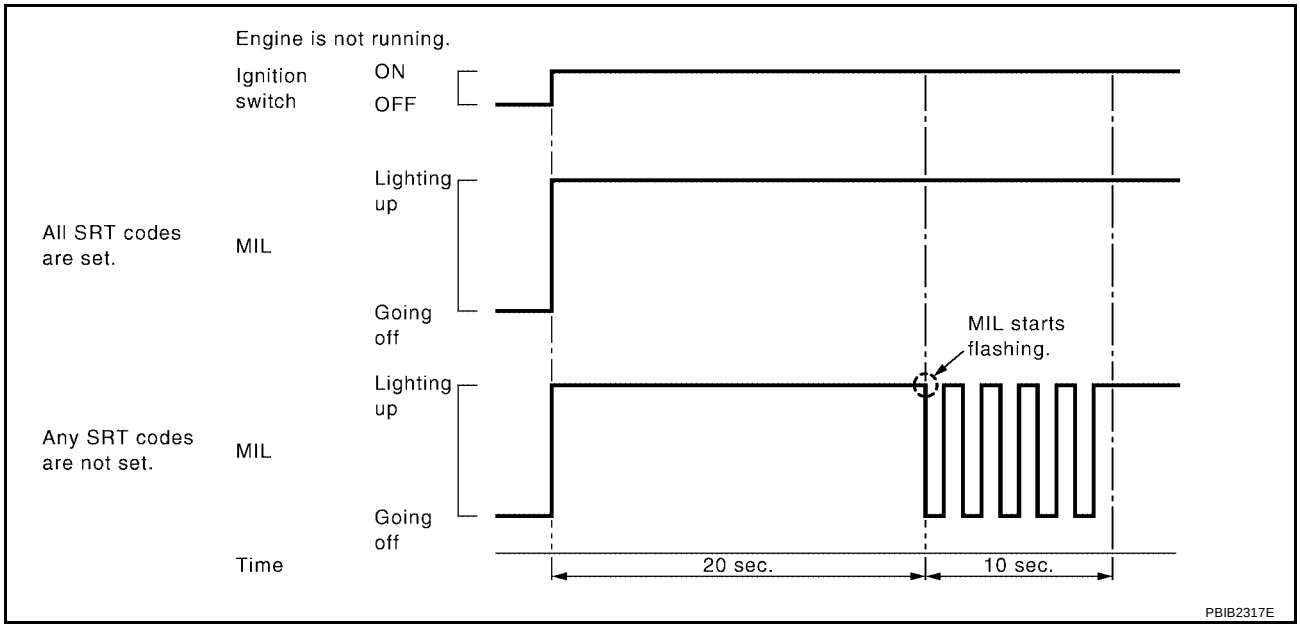
WITH GST

Selecting Service $01 with GST (Generic Scan Tool)

NO TOOLS

A SRT code itself can not be displayed while only SRT status can be.

1. Turn ignition switch ON and wait 20 seconds.
2. SRT status is indicated as shown below.
   - When all SRT codes are set, MIL lights up continuously.
   - When any SRT codes are not set, MIL will flash periodically for 10 seconds.



How to Set SRT Code

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

WITH CONSULT-II

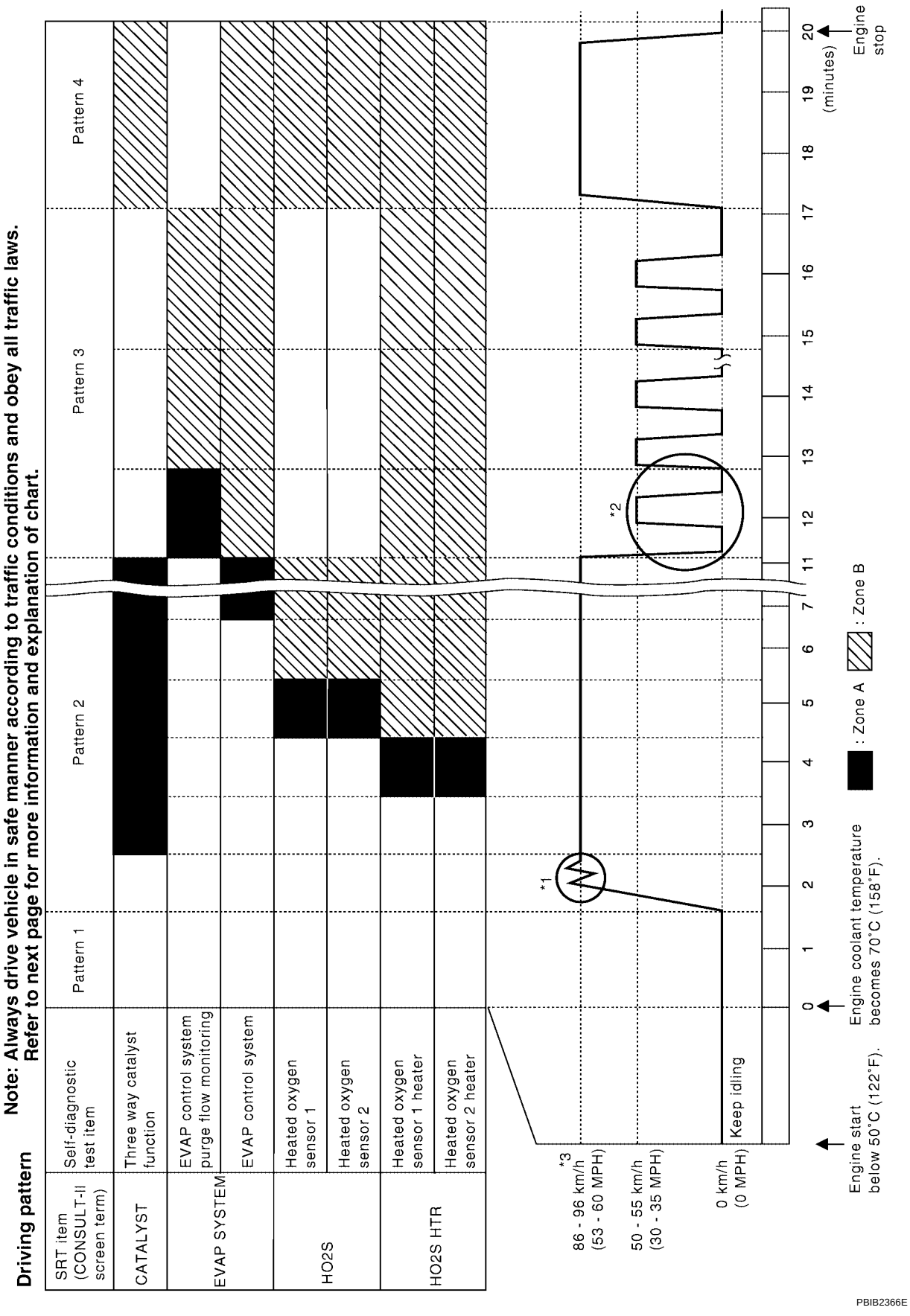
Perform corresponding DTC Confirmation Procedure one by one based on Performance Priority in the table on EC-703, "SRT Item" .

WITHOUT CONSULT-II

The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

A/T MODELS ULEV AND M/T MODELS



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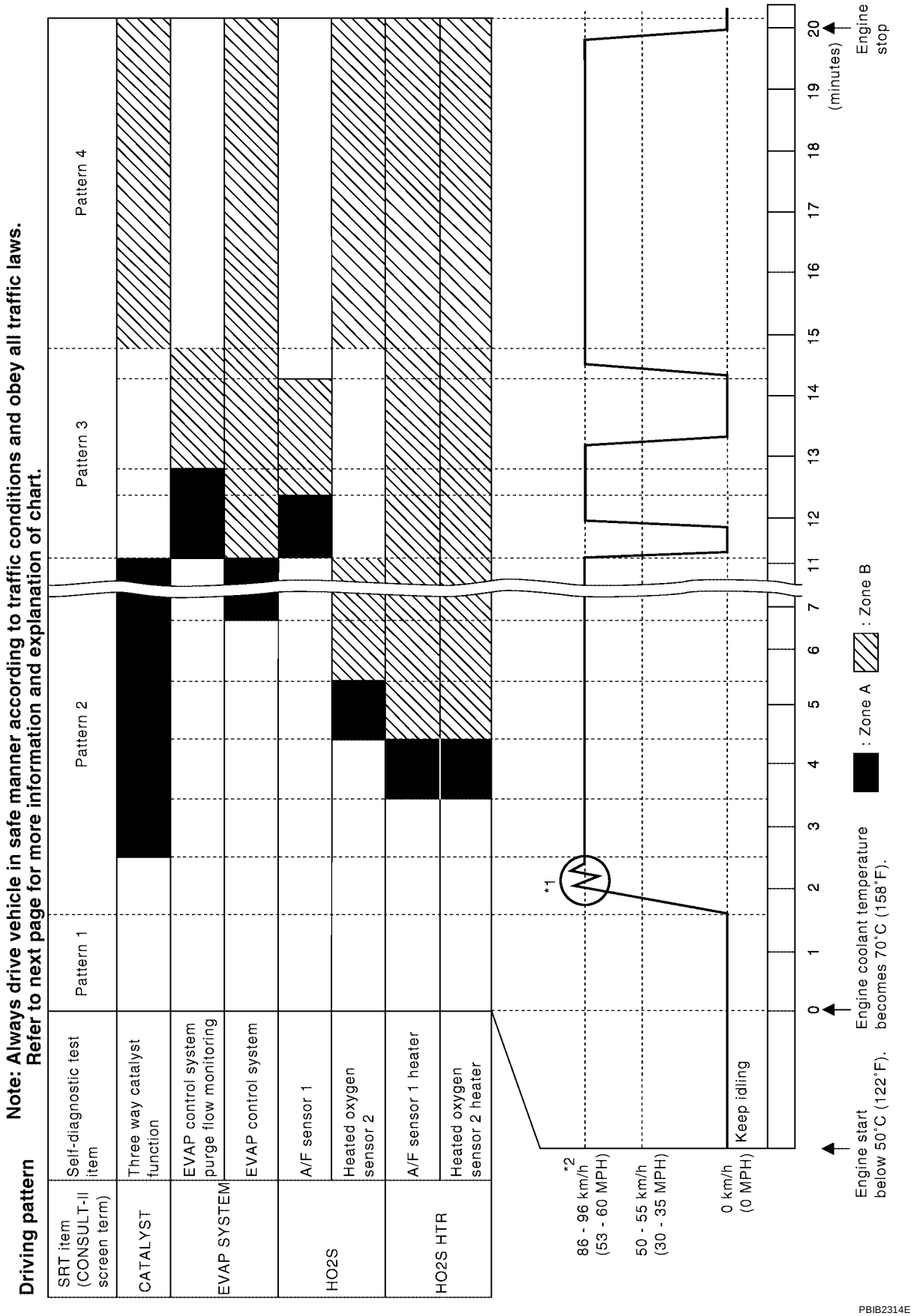
A/T MODELS EXCEPT ULEV



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- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
  Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.
  Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
  Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

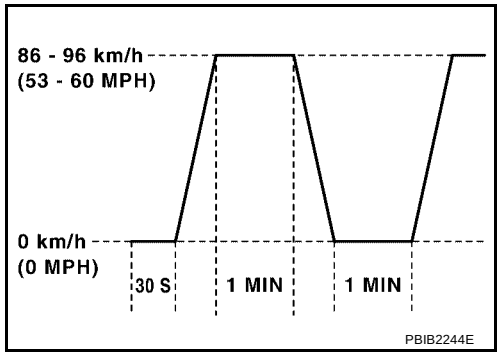
- **The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 73 and ground is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 73 and ground is lower than 1.4V).**
- **The engine is started at the fuel tank temperature of warmer than 0°C (32°F) (where the voltage between the ECM terminal 107 and ground is less than 4.1V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

Pattern 3:

- Operate vehicle following the driving pattern shown in the figure.
- Release the accelerator pedal during decelerating vehicle speed from 90 km/h (56 MPH) to 0 km/h (0 MPH).



Pattern 4:

- The accelerator pedal must be held very steady during steady-state driving.
- If the accelerator pedal is moved, the test must be conducted all over again.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.
*2: Checking the vehicle speed with GST is advised.

Suggested Transmission Gear Position for A/T Models
Set the selector lever in the D position with the overdrive switch turned ON.
Suggested upshift speeds for M/T models
Shown below are suggested vehicle speeds for shifting into a higher gear. These suggestions relate to fuel economy and vehicle performance. Actual upshift speeds will vary according to road conditions, the weather and individual driving habits.

	For normal acceleration in low altitude areas [less than 1,219 m (4,000 ft)]:	For quick acceleration in low altitude areas	For high attitude areas [over 1,219m (4,000 ft)]:
Gear change	ACCEL shift point km/h (MPH)	km/h (MPH)	km/h (MPH)
1st to 2nd	16 (10)	26 (16)	24 (15)
2nd to 3rd	23 (14)	42 (26)	40 (25)
3rd to 4th	40 (25)	55 (34)	64 (40)
4th to 5th	60 (37)	66 (41)	72 (45)
5th to 6th	72 (45)	72 (45)	80 (50)

Suggested Maximum Speed in Each Gear

Downshift to a lower gear if the engine is not running smoothly, or if you need to accelerate.

Do not exceed the maximum suggested speed (shown below) in any gear. For level road driving, use the highest gear suggested for that speed. Always observe posted speed limits and drive according to the road conditions to ensure safe operation. Do not over-rev the engine when shifting to a lower gear as it may cause engine damage or loss of vehicle control.

Gear	km/h (MPH)
1st	45 (25)
2nd	80 (50)
3rd	130 (80)
4th	—
5th	—
6th	—

TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-II)

The following is the information specified in Service $06 of SAE J1979.

The test value is a parameter used to determine whether a system/circuit diagnostic test is “OK” or “NG” while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.

These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

A/T Models ULEV and M/T Models

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit	Conversion
			TID	CID		
CATALYST	Three way catalyst function	P0420	01H	01H	Max.	1/128
		P0420	02H	81H	Min.	1
EVAP SYSTEM	EVAP control system (Small leak)	P0442	05H	03H	Max.	1/128 mm^2
	EVAP control system purge flow monitoring	P0441	06H	83H	Min.	20 mV
	EVAP control system (Very small leak)	P0456	07H	03H	Max.	1/128 mm^2
HO2S	Heated oxygen sensor 1	P0133	09H	04H	Max.	16 ms
		P1143	0AH	84H	Min.	10 mV
		P1144	0BH	04H	Max.	10 mV
	Heated oxygen sensor 2	P0139	19H	86H	Min.	10 mV/500 ms
		P1147	1AH	86H	Min.	10 mV
		P1146	1BH	06H	Max.	10 mV
HO2S HTR	Heated oxygen sensor 1 heater	P0032	29H	08H	Max.	20 mV
		P0031	2AH	88H	Min.	20 mV
	Heated oxygen sensor 2 heater	P0038	2DH	0AH	Max.	20 mV
		P0037	2EH	8AH	Min.	20 mV

A/T Models Except ULEV

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit	Conversion
			TID	CID		
CATALYST	Three way catalyst function	P0420	01H	01H	Max.	1/128
		P0420	02H	81H	Min.	1
EVAP SYSTEM	EVAP control system (Small leak)	P0442	05H	03H	Max.	1/128 mm^2
	EVAP control system purge flow monitoring	P0441	06H	83H	Min.	20 mV
	EVAP control system (Very small leak)	P0456	07H	03H	Max.	1/128 mm^2

Item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit	Conversion
			TID	CID		
HO2S	A/F sensor 1	P1271	41H	8EH	Min.	5 mV
		P1272	42H	0EH	Max.	5 mV
		P1273	43H	0EH	Max.	0.002
		P1274	44H	8EH	Min.	0.002
		P1278	45H	8EH	Min.	0.002
		P1276	46H	0EH	Max.	5 mV
		P1276	47H	8EH	Min.	5 mV
		P1279	48H	8EH	Min.	0.002
	Heated oxygen sensor 2	P0139	19H	86H	Min.	10mV/500 ms
		P1147	1AH	86H	Min.	10 mV
		P1146	1BH	06H	Max.	10 mV
		P0138	1CH	06H	Max.	10 mV
HO2S HEATER	A/F sensor 1 heater	P1032	57H	10H	Max.	5 mV
		P1031	58H	90H	Min.	5 mV
	Heated oxygen sensor 2 heater	P0038	2DH	0AH	Max.	20 mV
		P0037	2EH	8AH	Min.	20 mV

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC

With CONSULT-II

The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.
If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).

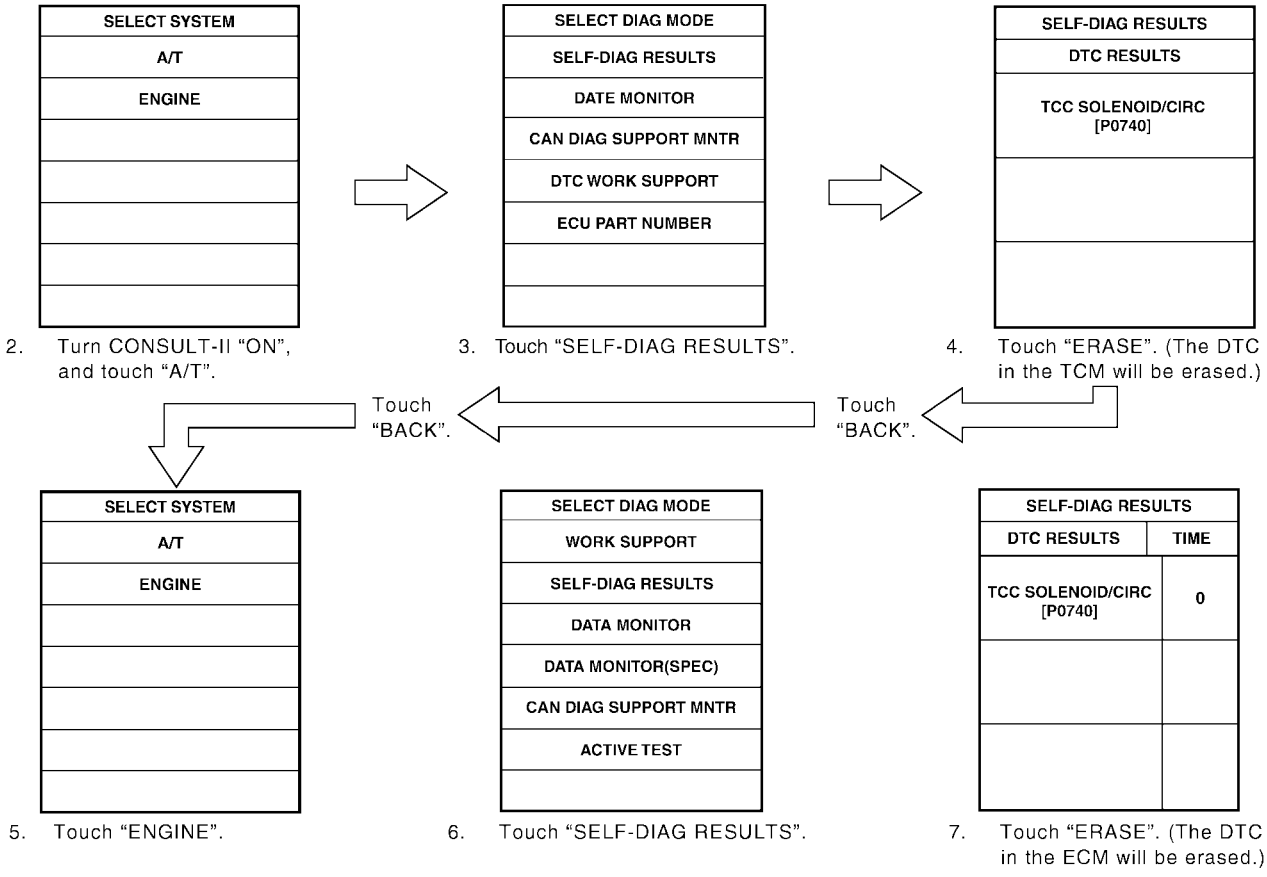
NOTE:
If the DTC is not for A/T related items (see EC-657, "INDEX FOR DTC"), skip steps 2 through 4.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Turn CONSULT-II ON and touch “A/T”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. [The DTC in the TCM (Transmission control module) will be erased.] Then touch “BACK” twice.
5. Touch “ENGINE”.
6. Touch “SELF-DIAG RESULTS”.

7. Touch “ERASE”. (The DTC in the ECM will be erased.)

How to erase DTC (With CONSULT-II)

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 10 seconds and then turn it “ON” (engine stopped) again.



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With GST

The emission related diagnostic information in the ECM can be erased by selecting Service $04 with GST.

NOTE:

If the DTC is not for A/T related items (see EC-657, "INDEX FOR DTC" , skip step 2.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Perform AT-429, "HOW TO ERASE DTC (WITH GST)" . (The DTC in the TCM will be erased.)
3. Select Service $04 with GST (Generic Scan Tool).

No Tools

NOTE:

If the DTC is not for A/T related items (see EC-657, "INDEX FOR DTC"), skip step 2.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Perform AT-429, "HOW TO ERASE DTC (NO TOOLS)" . (The DTC in the TCM will be erased.)
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to EC-714, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

– Diagnostic trouble codes
– 1st trip diagnostic trouble codes
– Freeze frame data
– 1st trip freeze frame data

- System readiness test (SRT) codes
- Test values

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

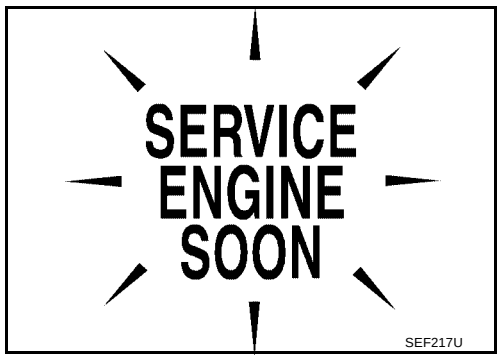
Malfunction Indicator Lamp (MIL)

UBS00J9K

DESCRIPTION

The MIL is located on the instrument panel.

1. The MIL will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MIL does not light up, refer to DI-27, "WARNING LAMPS" , or see EC-1381, "MIL AND DATA LINK CONNECTOR" .
2. When the engine is started, the MIL should go off.
   If the MIL remains on, the on board diagnostic system has detected an engine system malfunction.



ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following 4 functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position Engine stopped	BULB CHECK	This function checks the MIL bulb for damage (blown, open circuit, etc.). If the MIL does not come on, check MIL circuit.
	Engine running	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MIL will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MIL in the 1st trip. ● Misfire (Possible three way catalyst damage) ● One trip detection diagnoses
Mode II	Ignition switch in ON position Engine stopped	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running	HEATED OXYGEN SENSOR 1 MONITOR*	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

*: A/T models ULEV and M/T models

When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MIL circuit are detected, and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

MIL Flashing Without DTC

- When any SRT codes are not set, MIL may flash without DTC. For the details, refer to EC-705, "How to Display SRT Status"
- If the ECM is in Diagnostic Test Mode II, MIL may flash when engine is running. In this case, check ECM diagnostic test mode. EC-714, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
  How to switch the diagnostic test (function) modes, and details of the above functions are described later. EC-714, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
  The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

How to Set Diagnostic Test Mode II (Self-diagnostic Results)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

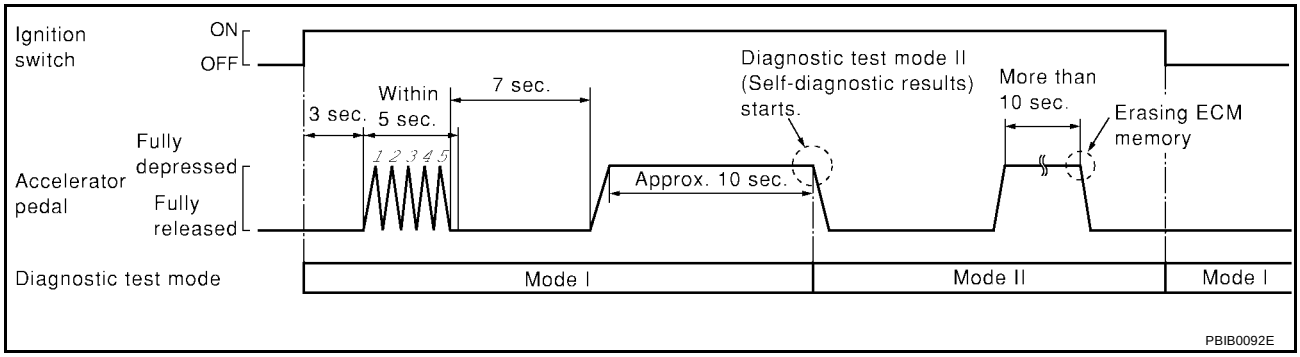
a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MIL starts blinking.

   NOTE:
   Do not release the accelerator pedal for 10 seconds if MIL may start blinking on the halfway of this 10 seconds. This blinking is displaying SRT status and is continued for another 10 seconds. For the details, refer to EC-705, "How to Display SRT Status" .

4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).

   NOTE:
   Wait until the same DTC (or 1st trip DTC) appears to confirm all DTCs certainly.



How to Set Diagnostic Test Mode II (Heated Oxygen Sensor 1 Monitor)

1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-715, "DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS" .
2. Start Engine.
   ECM has entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).
   ECM will start heated oxygen sensor 1 monitoring from the bank 1 sensor.

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-714, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MIL on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to DI-27, "WARNING LAMPS" .

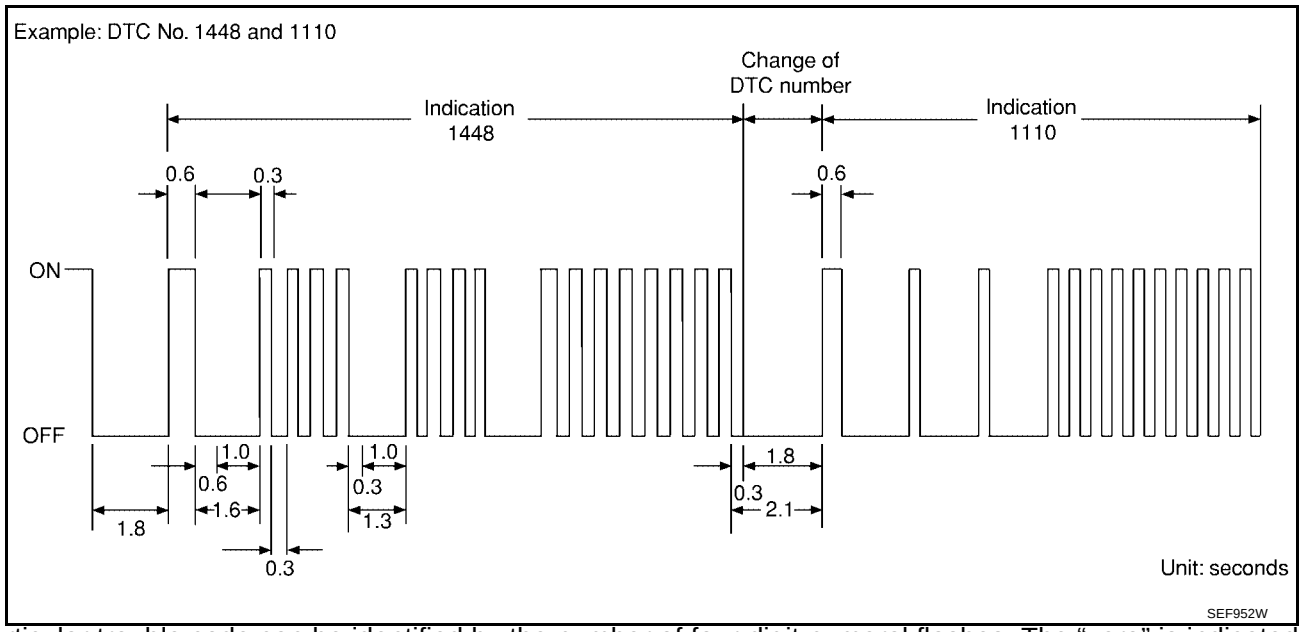
DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MIL	Condition
ON	When the malfunction is detected.
OFF	No malfunction

These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MIL as shown below.
The DTC and 1st trip DTC are displayed at the same time. If the MIL does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MIL illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-II or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.

A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-657, "INDEX FOR DTC")

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back-up memory in the ECM by depressing accelerator pedal. Refer to EC-715, "How to Erase Diagnostic Test Mode II (Self-diagnostic Results)" .

- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

DIAGNOSTIC TEST MODE II — HEATED OXYGEN SENSOR 1 MONITOR

In this mode, the MIL displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MIL	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.

To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Next run engine at about 2,000 rpm for about 2 minutes under no-load conditions. Then make sure that the MIL comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

OBD System Operation Chart

UBS00J9L

RELATIONSHIP BETWEEN MIL, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

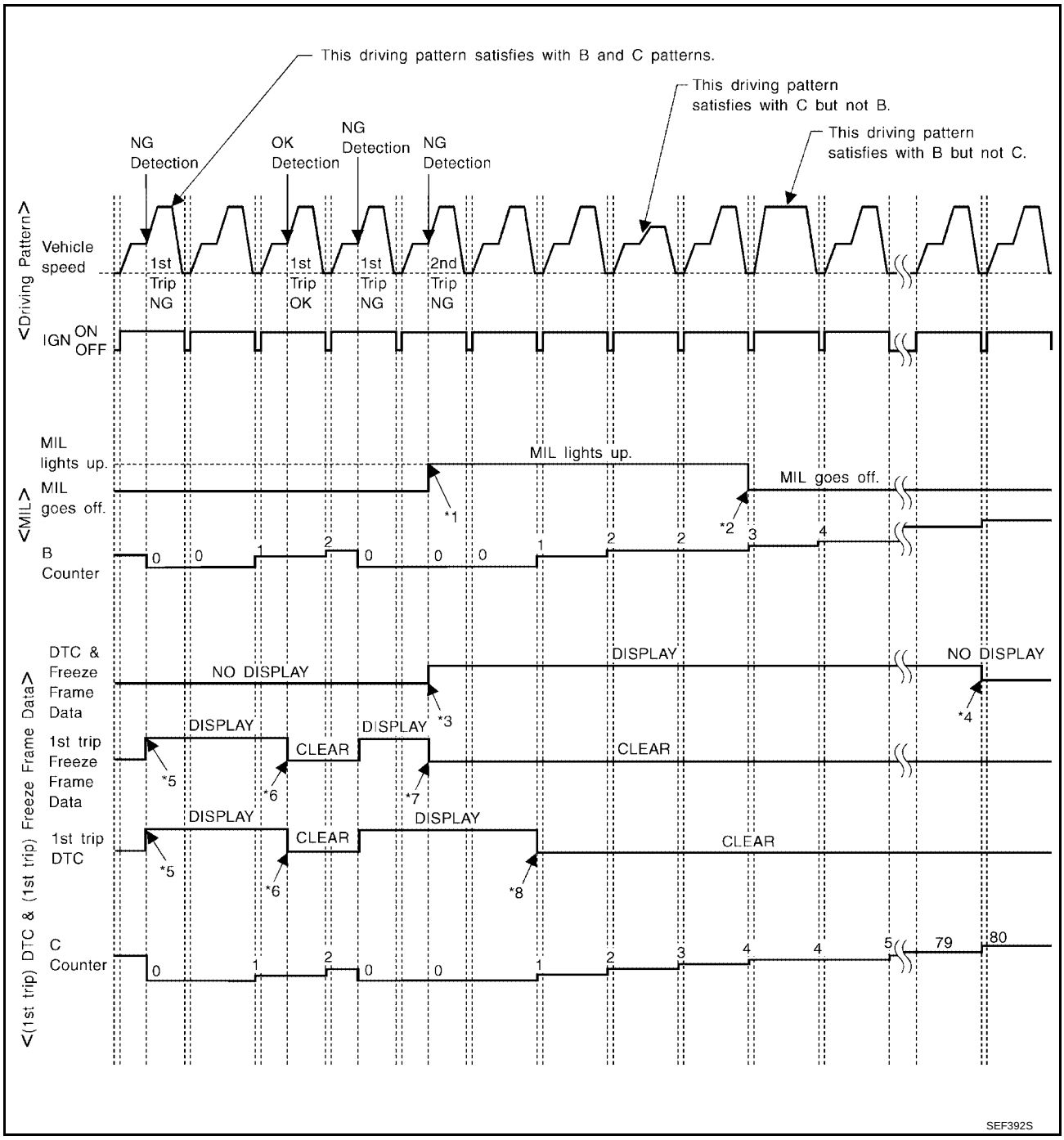
- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MIL will come on. For details, refer to EC-696, "Two Trip Detection Logic" .
- The MIL will go off after the vehicle is driven 3 times (driving pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

SUMMARY CHART

Items	Fuel Injection System	Misfire	Other
MIL (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1, *2	*1, *2	1 (pattern B)

For details about patterns B and C under “Fuel Injection System” and “Misfire”, see EC-718 .
For details about patterns A and B under “Other”, see EC-720 .
*1: Clear timing is at the moment OK is detected.
*2: Clear timing is when the same malfunction is detected in the 2nd trip.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MIL will go off when the B counter reaches 3. (*2 in "OBD SYSTEM OPERATION CHART")

<Driving Pattern C>

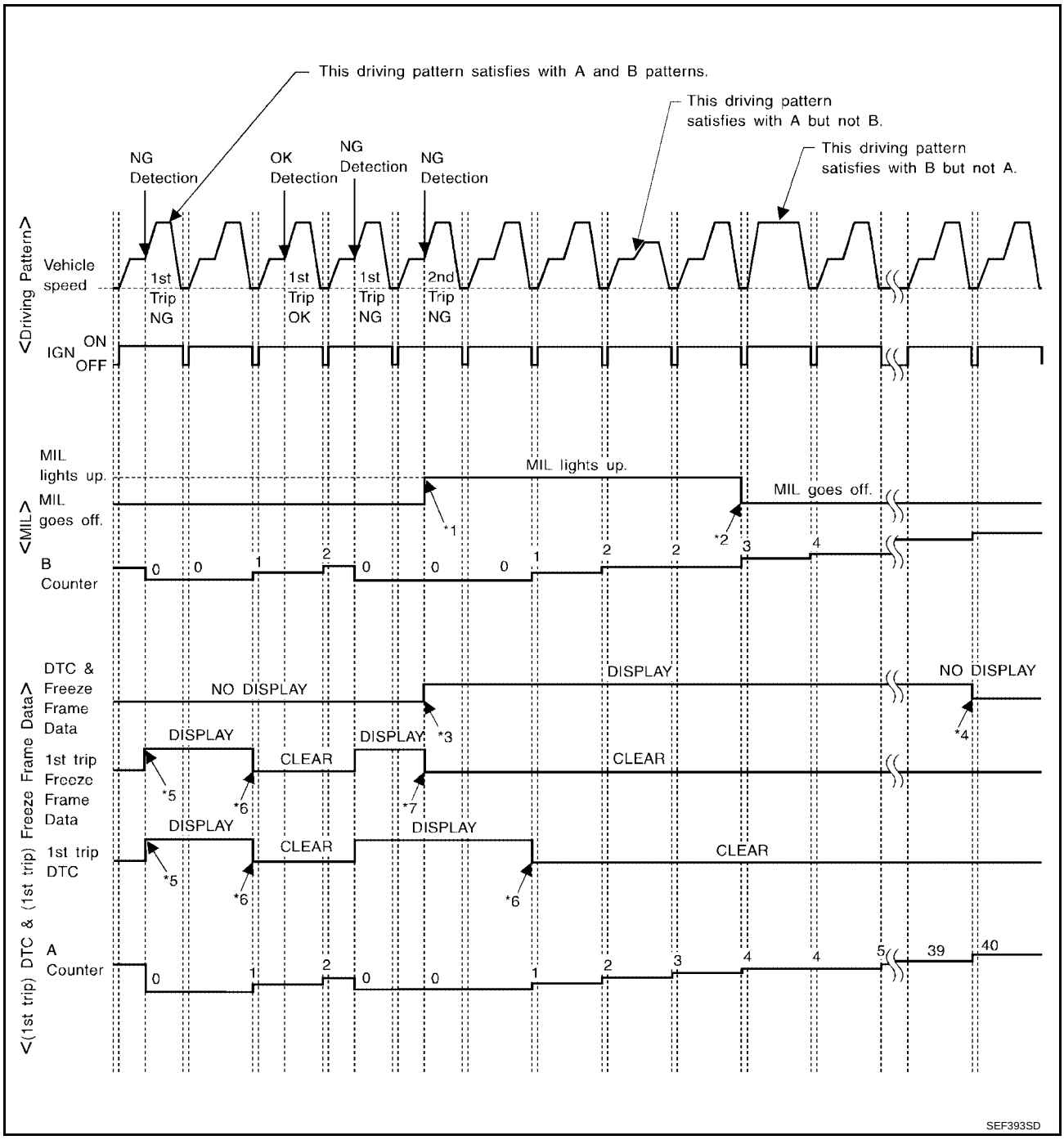
Driving pattern C means the vehicle operation as follows:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature (T) condition:

- When the freeze frame data shows lower than 70°C (158°F), "T" should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), "T" should be higher than or equal to 70°C (158°F).

Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of vehicle conditions above.
- The C counter will be counted up when vehicle conditions above is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80. (*2 in "OBD SYSTEM OPERATION CHART")
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

RELATIONSHIP BETWEEN MIL, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"



*1: When the same malfunction is detected in two consecutive trips, MIL will light up.

*2: MIL will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

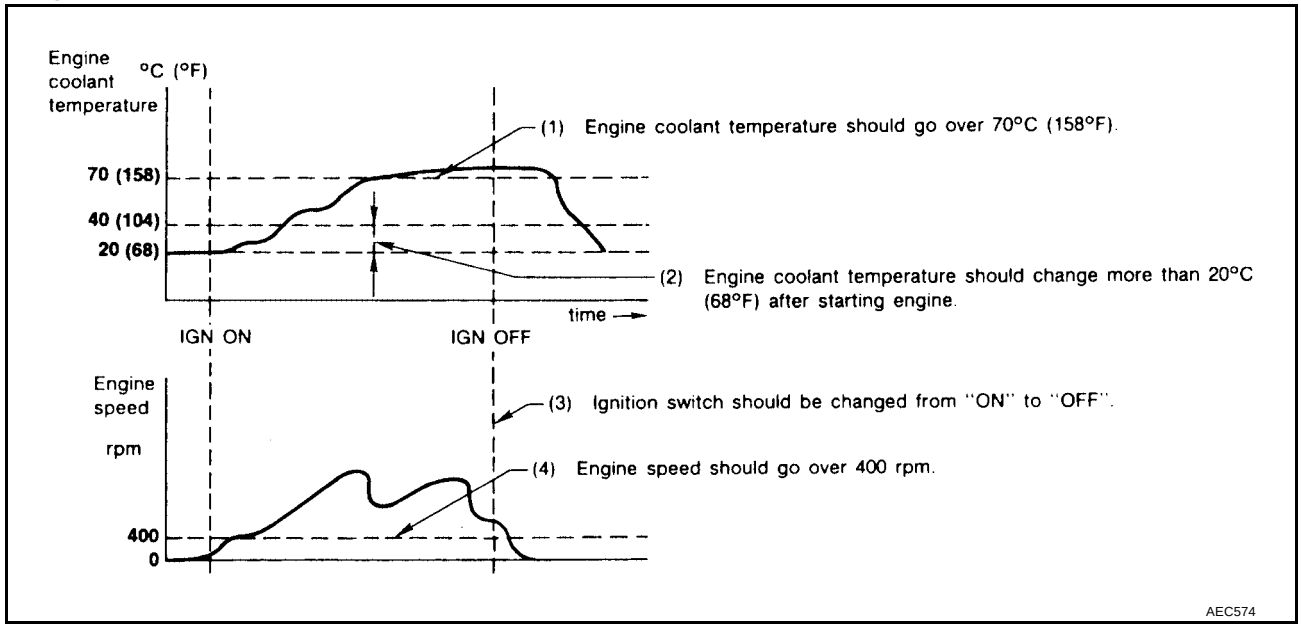
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

<Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40. (*2 in "OBD SYSTEM OPERATION CHART")

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MIL will go off when the B counter reaches 3 (*2 in "OBD SYSTEM OPERATION CHART").

BASIC SERVICE PROCEDURE

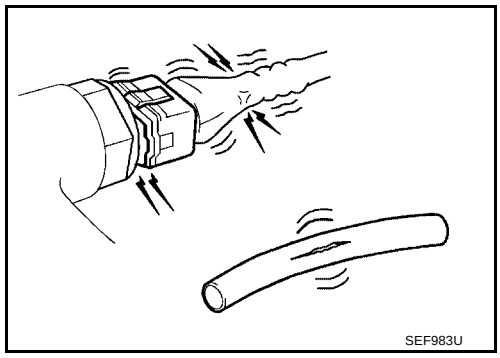
PFP:00018

Basic Inspection

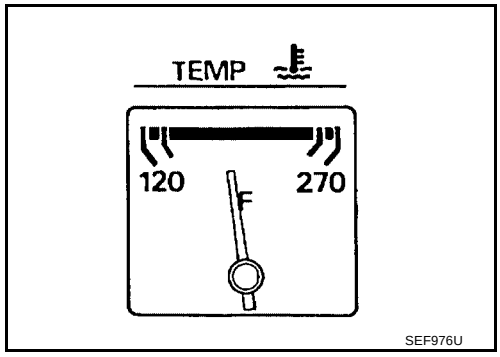
UBS00J9M

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket


SEF983U

3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.
4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
Ensure engine stays below 1,000 rpm.

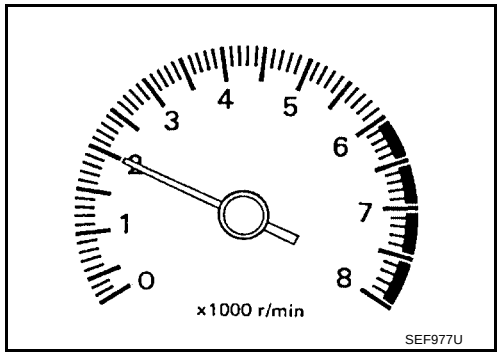


SEF976U

5. Run engine at about 2,000 rpm for about 2 minutes under no-load.
6. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



SEF977U

2. REPAIR OR REPLACE

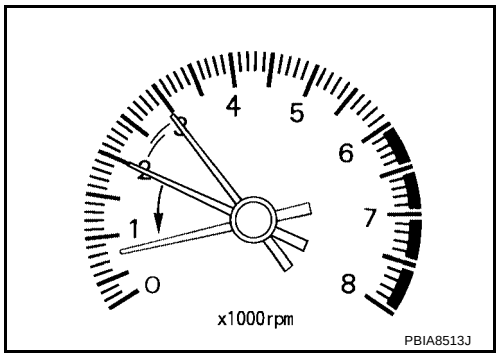
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

3. CHECK TARGET IDLE SPEED

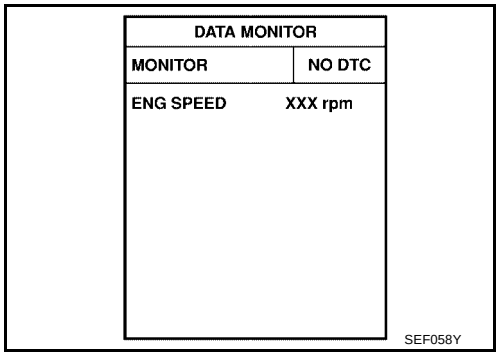
With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load, then run engine at idle speed for about 1 minute.



3. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-726, "IDLE SPEED" .

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)



Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load, then run engine at idle speed for about 1 minute.
3. Check idle speed. Refer to EC-726, "IDLE SPEED" .

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-748, "Accelerator Pedal Released Position Learning" .

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-748, "Throttle Valve Closed Position Learning" .

>> GO TO 6.

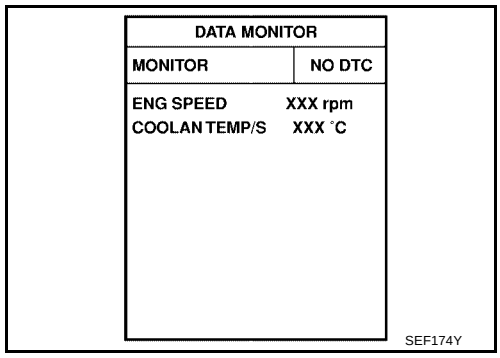
6. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-749, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?
Yes or No
Yes >> GO TO 7.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-726, "IDLE SPEED" .

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)



Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-726, "IDLE SPEED" .

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)

OK or NG
OK >> GO TO 10.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-997 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-990 .

OK or NG
OK >> GO TO 9.
NG >> 1. Repair or replace.
2. GO TO 4.

9. CHECK ECM FUNCTION

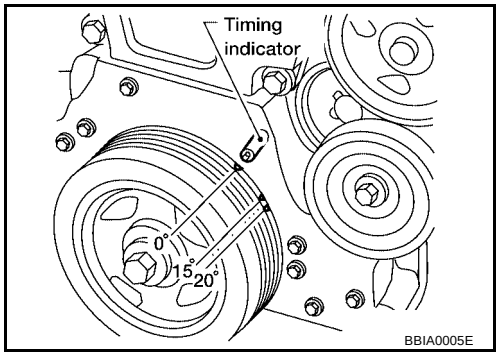
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light. Refer to EC-726, "IGNITION TIMING" .

M/T: 15 ± 5° BTDC (in Neutral position)
A/T: 15 ± 5° BTDC (in P or N position)



OK or NG

OK >> GO TO 19.
NG >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-748, "Accelerator Pedal Released Position Learning" .

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-748, "Throttle Valve Closed Position Learning" .

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-749, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

Yes or No

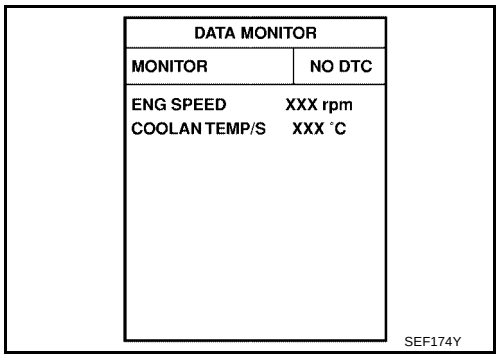
Yes >> GO TO 14.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-726, "IDLE SPEED" .

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-726, "IDLE SPEED" .

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)

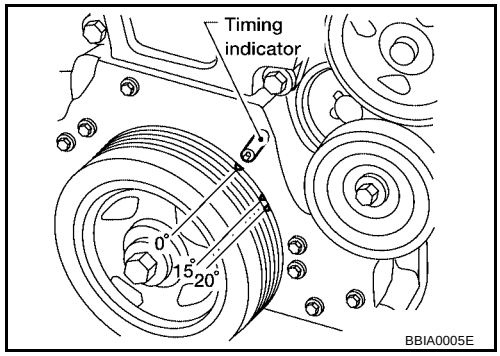
OK or NG

OK >> GO TO 15.
NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light. Refer to EC-726, "IDLE SPEED" .

M/T: 15 ± 5° BTDC (in Neutral position)
A/T: 15 ± 5° BTDC (in P or N position)



OK or NG

OK >> GO TO 19
NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-136, "TIMING CHAIN" .

OK or NG

OK >> GO TO 17.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-997 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-990 .

OK or NG

OK >> GO TO 18.
NG >> 1. Repair or replace.
2. GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .

>> GO TO 4.

19. INSPECTION END

Did you replace ECM, referring this Basic Inspection procedure?

Yes or No

Yes >> 1. Perform EC-748, "VIN Registration" .
2. **INSPECTION END**
No >> **INSPECTION END**

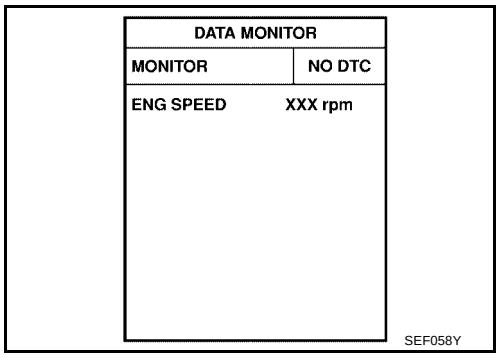
Idle Speed and Ignition Timing Check

UBS00J9N

IDLE SPEED

With CONSULT-II

Check idle speed in “DATA MONITOR” mode with CONSULT-II.



With GST

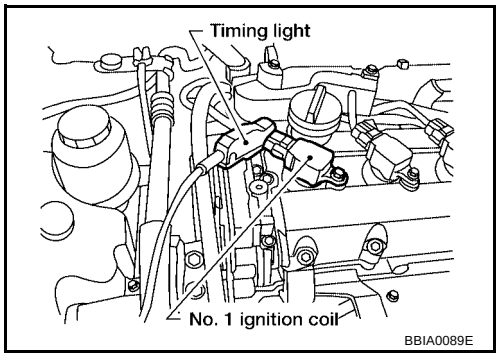
Check idle speed in Service $01 with GST.

IGNITION TIMING

Any of following two methods may be used.

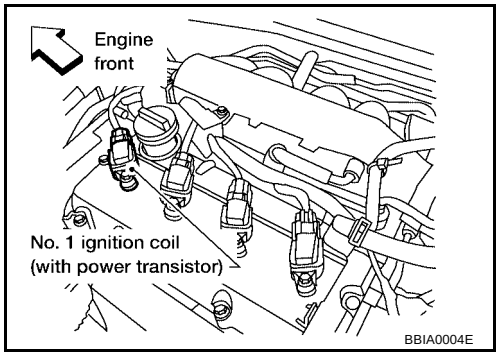
Method A

1. Slide the harness protector off the ignition coil No.1 to clear the wires.
2. Attach timing light to the ignition coil No. 1 wires as shown in the figure.
3. Check ignition timing.

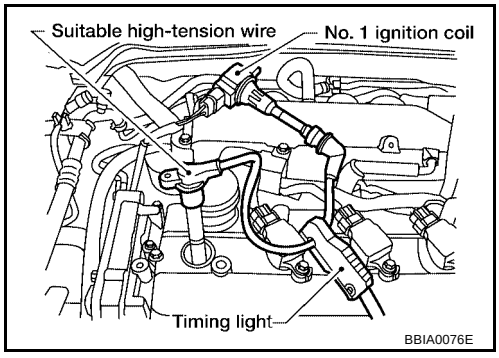


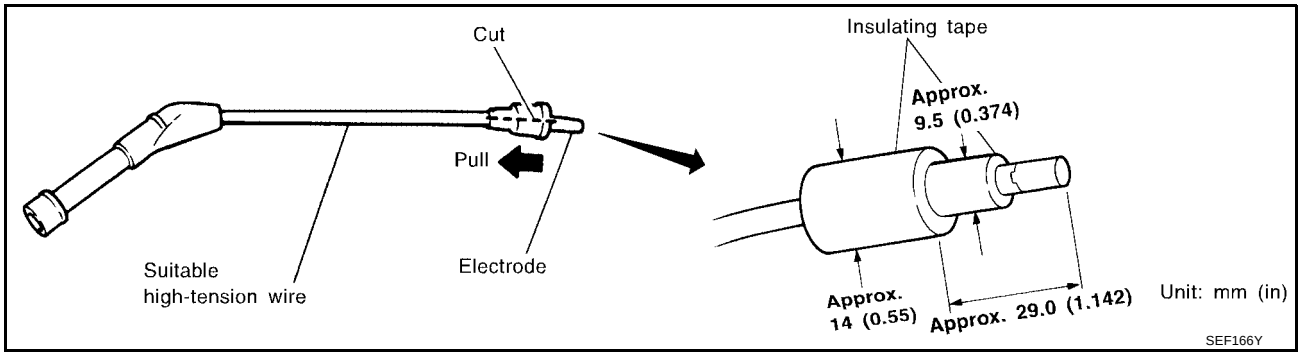
Method B

1. Remove No. 1 ignition coil.

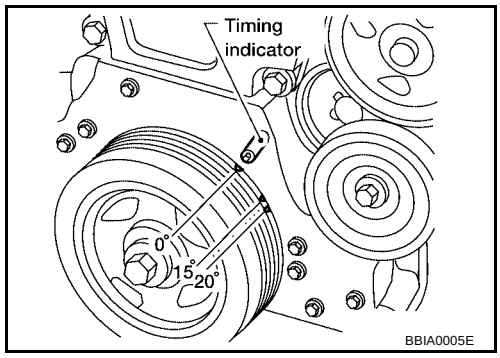


2. Connect No. 1 ignition coil and No. 1 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.





3. Check ignition timing.



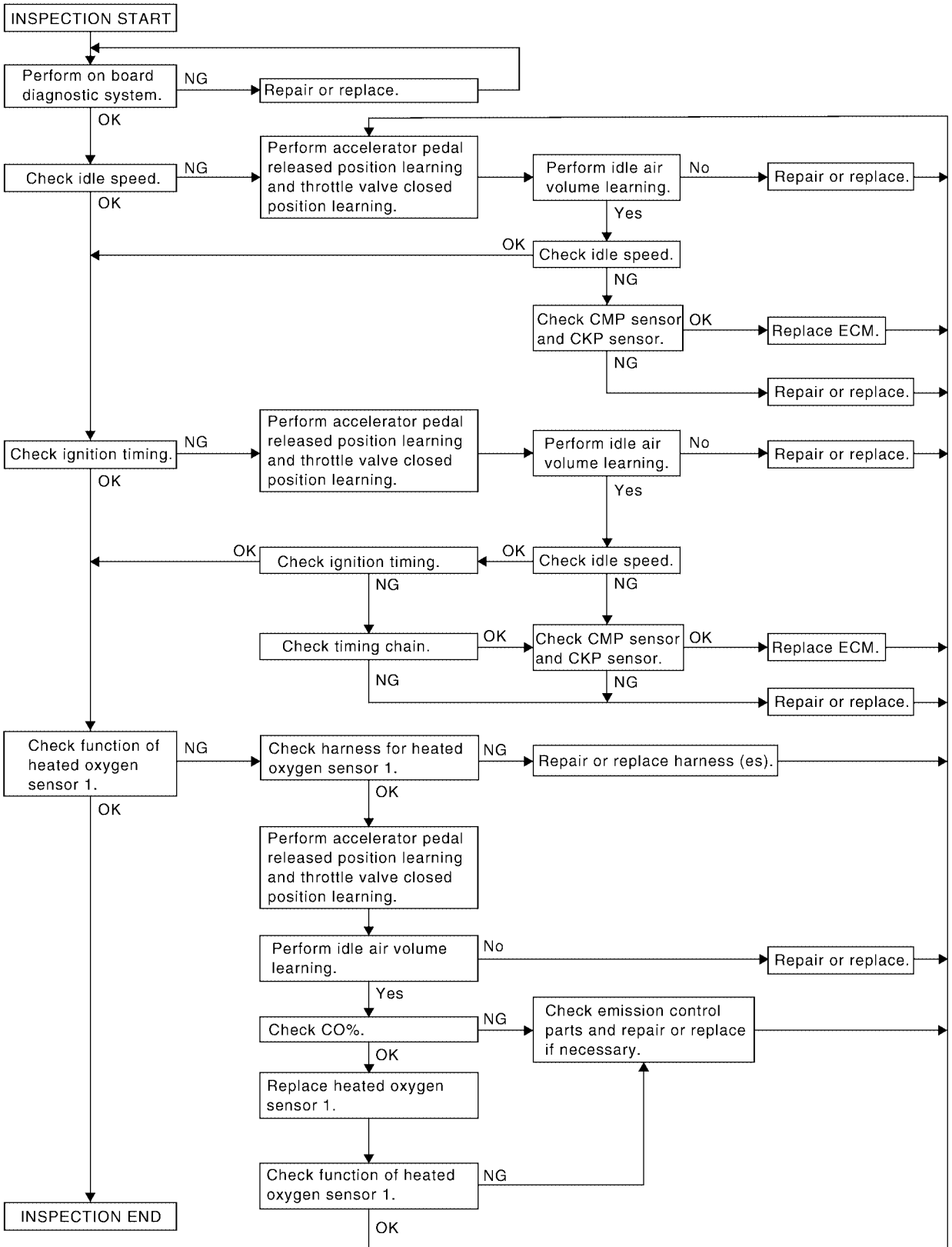
Idle Mixture Ratio Adjustment (A/T Models ULEV and M/T Models)

UBS00KK2

PREPARATION

1. Make sure that the following parts are in good order.
   - Battery
   - Ignition system
   - Engine oil and coolant levels
   - Fuses
   - ECM harness connector
   - Vacuum hoses
   - Air intake system
     (Oil filler cap, oil level gauge, etc.)
   - Fuel pressure
   - Engine compression
   - Throttle valve
   - Evaporative emission system
2. On air conditioner equipped models, checks should be carried out while the air conditioner is OFF.
3. On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while shift lever is in P or N (A/T), Neutral (M/T) position.
4. When measuring CO percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
5. Turn OFF headlamps, heater blower, rear window defogger.
6. Keep front wheels pointed straight ahead.

OVERALL SEQUENCE



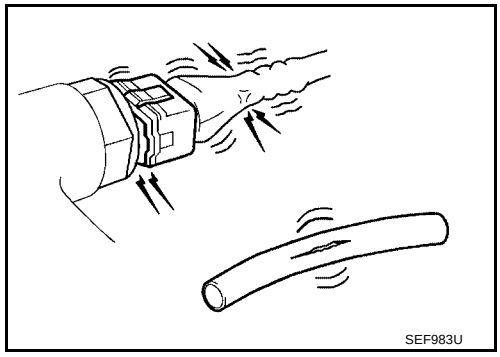
NOTE:
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected to detect the resulting malfunction.

PBIB2001E

DETAILED PROCEDURE

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket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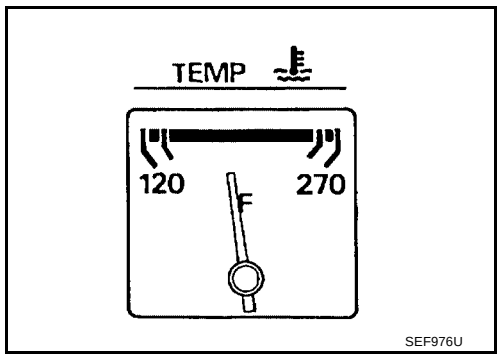
3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.

4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
Ensure engine stays below 1,000 rpm.



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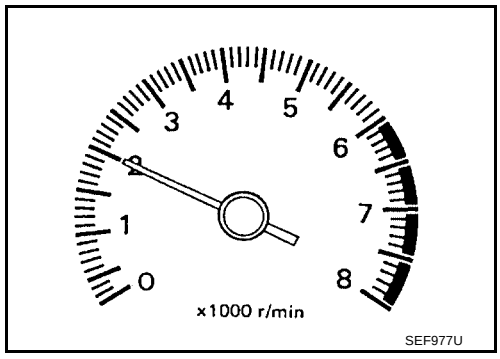
5. Run engine at about 2,000 rpm for about 2 minutes under no-load.
6. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



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2. REPAIR OR REPLACE

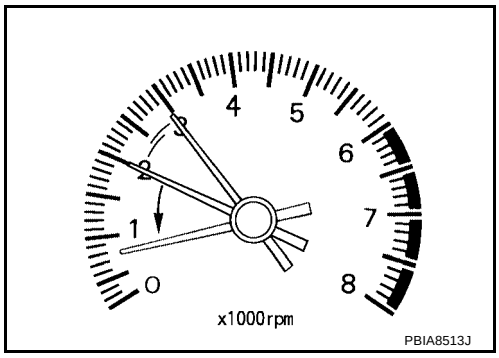
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

3. CHECK TARGET IDLE SPEED

With CONSULT-II

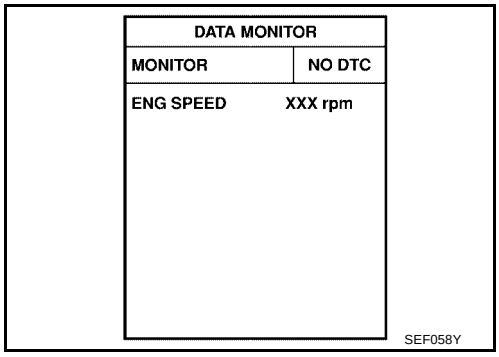
1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load, then run engine at idle speed for about 1 minute.



3. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-726, "IDLE SPEED" .

   M/T: 700 ± 50 rpm (in Neutral position)

   A/T: 700 ± 50 rpm (in P or N position)



Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load, then run engine at idle speed for about 1 minute.
3. Check idle speed. Refer to EC-726, "IDLE SPEED" .

   M/T: 700 ± 50 rpm (in Neutral position)

   A/T: 700 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-748, "Accelerator Pedal Released Position Learning" .

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-748, "Throttle Valve Closed Position Learning" .

>> GO TO 6.

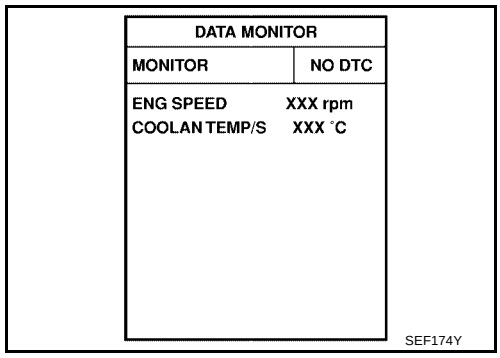
6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-749, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?
Yes or No
Yes >> GO TO 7.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-726, "IDLE SPEED" .

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)



Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-726, "IDLE SPEED" .

M/T: 700 ± 50 rpm (in Neutral position)
A/T: 700 ± 50 rpm (in P or N position)

OK or NG
OK >> GO TO 10.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-997 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-990 .

OK or NG
OK >> GO TO 9.
NG >> 1. Repair or replace.
2. GO TO 4.

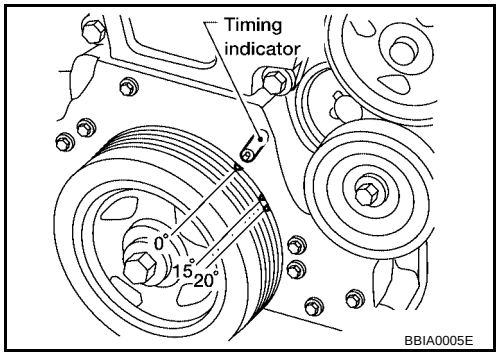
9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light. Refer to EC-726, "IGNITION TIMING" .



M/T: 15 ± 5° BTDC (in Neutral position)

A/T: 15 ± 5° BTDC (in P or N position)

OK or NG

OK (With CONSULT-II)>>GO TO 19.
OK (Without CONSULT-II)>>GO TO 20.
NG >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-748, "Accelerator Pedal Released Position Learning" .

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-748, "Throttle Valve Closed Position Learning" .

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-749, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

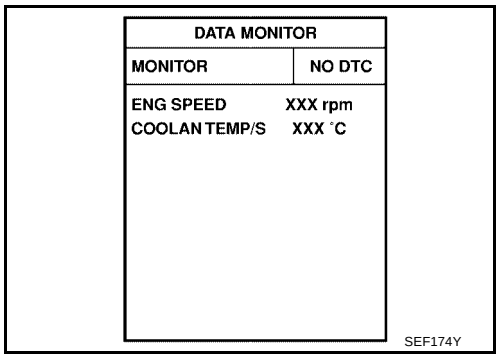
Yes or No

Yes >> GO TO 14.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-726, "IDLE SPEED" .



M/T: 700 ± 50 rpm (in Neutral position)

A/T: 700 ± 50 rpm (in P or N position)

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-726, "IDLE SPEED" .

M/T: 700 ± 50 rpm (in Neutral position)

A/T: 700 ± 50 rpm (in P or N position)

OK or NG

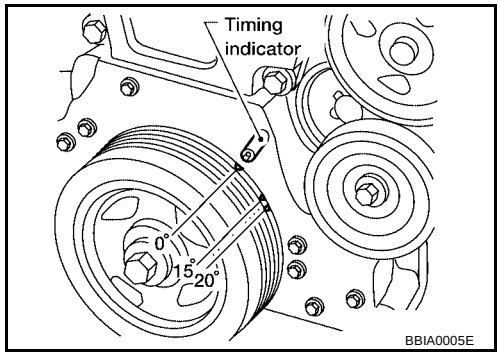
OK >> GO TO 15.
NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light. Refer to EC-726, "IGNITION TIMING" .

M/T: 15 ± 5° BTDC (in Neutral position)

A/T: 15 ± 5° BTDC (in P or N position)



OK or NG

OK (With CONSULT-II)>>GO TO 19.
OK (Without CONSULT-II)>>GO TO 20.
NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-136, "TIMING CHAIN" .

OK or NG

OK >> GO TO 17.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-997 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-990 .

OK or NG

OK >> GO TO 18.
NG >> 1. Repair or replace.
2. GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .

>> GO TO 4.

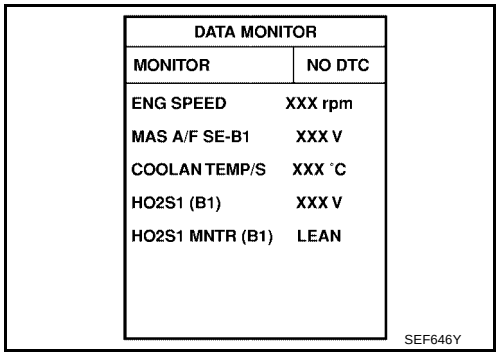
19. CHECK HEATED OXYGEN SENSOR 1 SIGNAL

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. See “HO2S1 MNTR (B1)” in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

   1 time: RICH → LEAN → RICH

   2 times: RICH → LEAN → RICH → LEAN → RICH



OK or NG

OK >> **INSPECTION END**
NG (Monitor does not fluctuate.)>>GO TO 21.
NG (Monitor fluctuates less than 5 times.)>>GO TO 28.

20. CHECK HEATED OXYGEN SENSOR 1 SIGNAL

Without CONSULT-II

1. Stop engine and set ECM to Self-diagnostic mode II (Heated oxygen sensor 1 monitor).
   Refer to EC-714, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
2. Start engine and run it at about 2,000 rpm for about 2 minutes under no-load.
3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the MIL comes on more than 5 times during 10 seconds.

OK or NG

OK >> **INDPECTION END**
NG (MIL does not come on)>>GO TO 21.
NG (MIL comes on less than 5 times)>>GO TO 28.

21. CHECK HEATED OXYGEN SENSOR 1 HARNESS

1. Turn ignition switch OFF and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect heated oxygen sensor 1 harness connector.
4. Check harness continuity between ECM terminal 35 and heated oxygen sensor 1 terminal 1.
   Refer to EC-905, "Wiring Diagram" .

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 22.
NG >> 1. Repair or replace harness between ECM and heated oxygen sensor 1.
2. GO TO 4.

22. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Reconnect ECM harness connector.
2. Perform EC-748, "Accelerator Pedal Released Position Learning" .

>> GO TO 23.

23. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-748, "Throttle Valve Closed Position Learning" .

>> GO TO 24.

24. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-749, "Idle Air Volume Learning" .
Is the Idle Air Volume Learning carried out successfully?
Yes or No

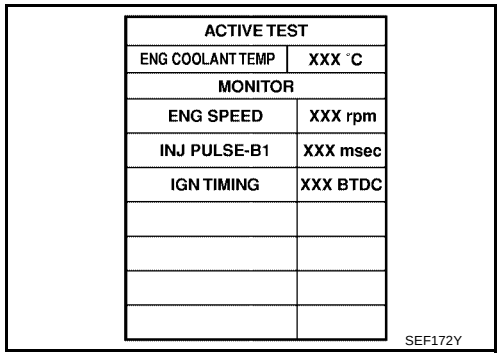
Yes (With CONSULT-II)>>GO TO 25.
Yes (Without CONSULT-II)>> GO TO 26.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

25. CHECK CO%

With CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Select “ENG COOLANT TEMP” in “ACTIVE TEST” mode.
4. Set “ENG COOLANT TEMP” to 5°C (41°F) by touching “DOWN” and “Qd”.
5. Start engine and rev it (2,000 to 3,000 rpm) 2 or 3 times under no-load, then run engine at idle speed.
6. Check CO%.

Idle CO: 0.3 – 9.5% and engine runs smoothly.



OK or NG

OK >> GO TO 28.
NG >> GO TO 27.

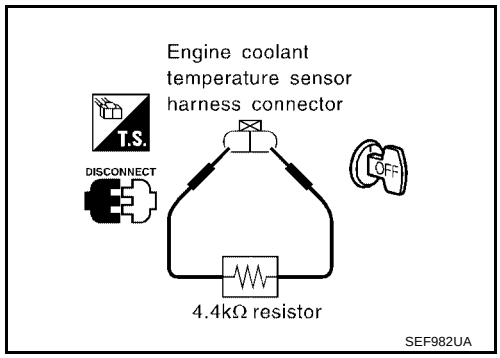
26. CHECK CO%

Without CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.
2. Turn ignition switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.
5. Start engine and rev it (2,000 to 3,000 rpm) 2 or 3 times under no-load, then run engine at idle speed.
6. Check CO%.

Idle CO: 0.3 – 9.5% and engine runs smoothly.

7. After checking CO%, turn ignition switch OFF, disconnect the resistor from the terminals of engine coolant temperature sensor harness connector, and then connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.



OK or NG

OK >> GO TO 28.
NG >> GO TO 27.

27. RECONNECT HEATED OXYGEN SENSOR 1 HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Reconnect heated oxygen sensor 1 harness connector.

>> GO TO 31.

28. REPLACE HEATED OXYGEN SENSOR 1

1. Stop engine.
2. Replace heated oxygen sensor 1.

With CONSULT-II>>GO TO 29.
Without CONSULT-II>>GO TO 30.

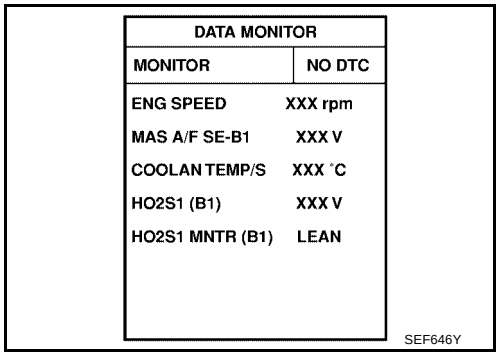
29. CHECK HEATED OXYGEN SENSOR 1 SIGNAL

With CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
2. See “HO2S1 MNTR (B1)” in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

   1 time: RICH → LEAN → RICH

   2 times: RICH → LEAN → RICH → LEAN → RICH



OK or NG

OK >> GO TO 4.
NG >> GO TO 31.

30. CHECK HEATED OXYGEN SENSOR 1 SIGNAL

Without CONSULT-II

1. Set ECM to Self-diagnostic mode II (Heated oxygen sensor 1 monitor). Refer to EC-716, "DIAGNOSTIC TEST MODE II — HEATED OXYGEN SENSOR 1 MONITOR" .
2. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the MIL comes on more than 5 times during 10 seconds.

OK or NG

OK >> GO TO 4.
NG >> GO TO 31.

31. DETECT MALFUNCTIONING PART

Check the following.

- Check fuel pressure regulator and repair or replace if necessary.
  Refer to EC-752, "FUEL PRESSURE CHECK" .
- Check mass air flow sensor and its circuit, and repair or replace if necessary.
  Refer to EC-859, "DTC P0101 MAF SENSOR" , EC-868, "DTC P0102, P0103 MAF SENSOR" .
- Check injector and its circuit, and repair or replace if necessary.
  Refer to EC-1334, "INJECTOR CIRCUIT" .
- Check engine coolant temperature sensor and its circuit, and repair or replace if necessary.
  Refer to EC-882, "DTC P0117, P0118 ECT SENSOR" and EC-895, "DTC P0125 ECT SENSOR" .

OK or NG

OK >> GO TO 33.
NG >> 1. Repair or replace.
2. GO TO 32.

32. ERASE UNNECESSARY DTC

After this inspection, unnecessary DTC might be displayed.
Erase the stored memory in ECM and TCM.
Refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and AT-428, "HOW TO ERASE DTC" .

>> GO TO 4.

33. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs.
   Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .

>> GO TO 4.

Idle Mixture Ratio Adjustment (A/T Models except ULEV)

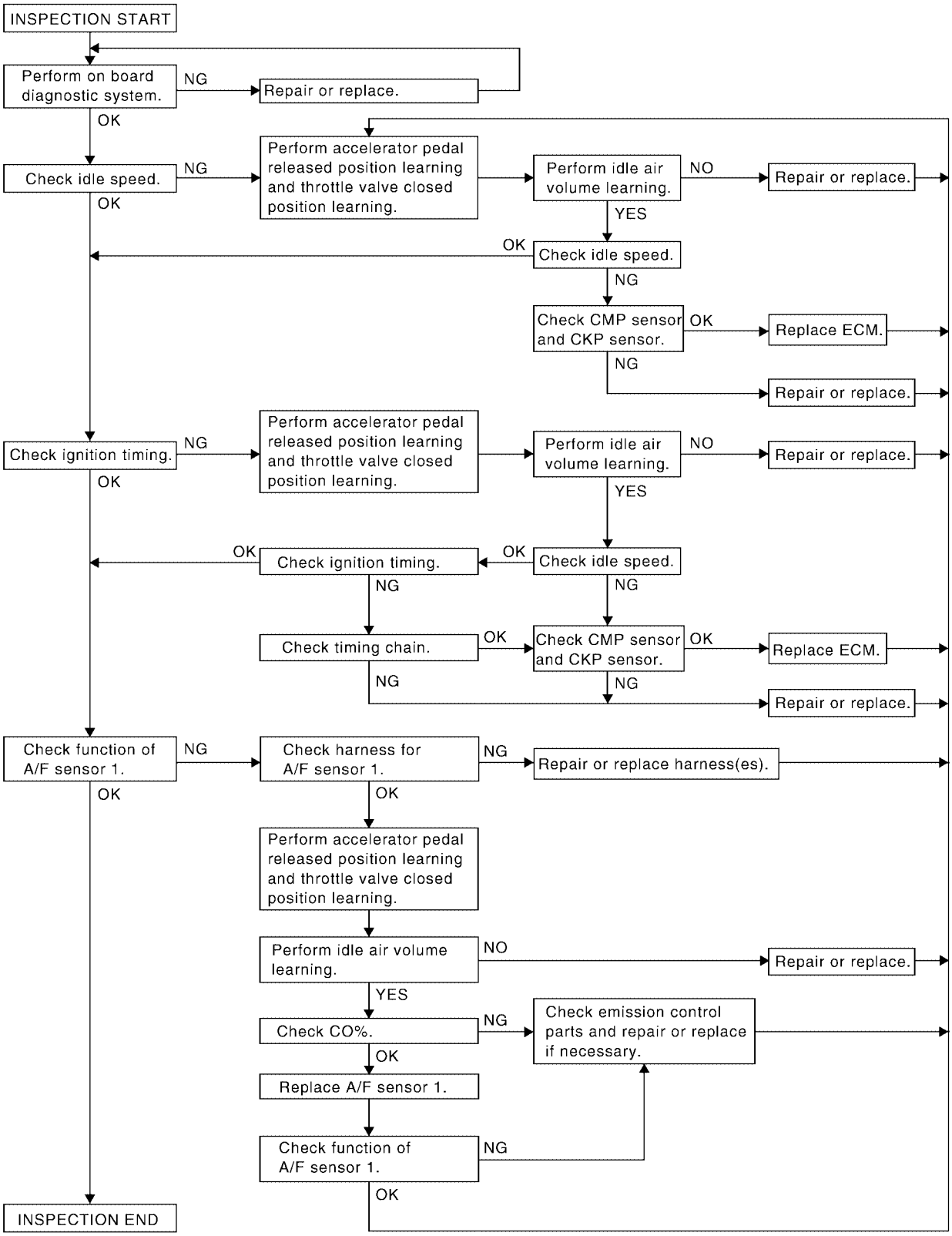
UBS00J9O

PREPARATION

1. Make sure that the following parts are in good order.
   - Battery
   - Ignition system
   - Engine oil and coolant levels
   - Fuses
   - ECM harness connector
   - Vacuum hoses
   - Air intake system
     (Oil filler cap, oil level gauge, etc.)
   - Fuel pressure
   - Engine compression
   - Throttle valve
   - Evaporative emission system
2. On air conditioner equipped models, checks should be carried out while the air conditioner is OFF.
3. On automatic transmission equipped models, when checking idle rpm, ignition timing and mixture ratio, checks should be carried out while selector lever is in P or N position.
4. When measuring CO percentage, insert probe more than 40 cm (15.7 in) into tail pipe.
5. Turn OFF headlamps, heater blower, rear window defogger.

6. Keep front wheels pointed straight ahead.

OVERALL SEQUENCE



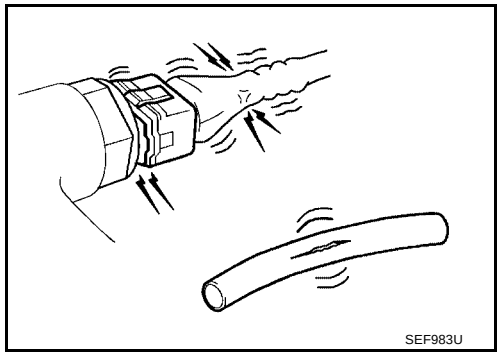
NOTE:
If a vehicle contains a part which is operating outside of design specifications with no MIL illumination, the part shall not be replaced prior to emission testing unless it is determined that the part has been tampered with or abused in such a way that the diagnostic system cannot reasonably be expected to detect the resulting malfunction.

PBIB2061E

DETAILED PROCEDURE

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket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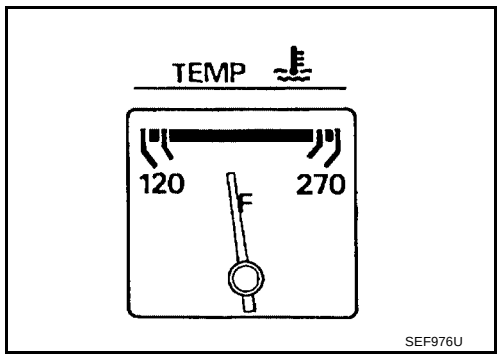
3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.

4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
Ensure engine stays below 1,000 rpm.



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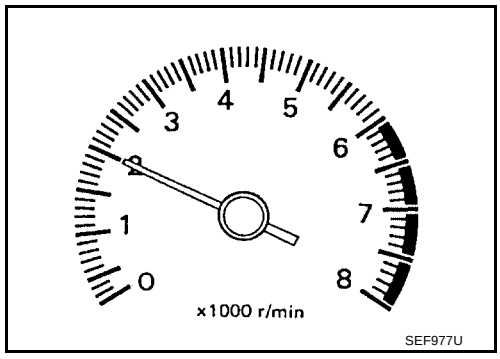
5. Run engine at about 2,000 rpm for about 2 minutes under no-load.
6. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



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2. REPAIR OR REPLACE

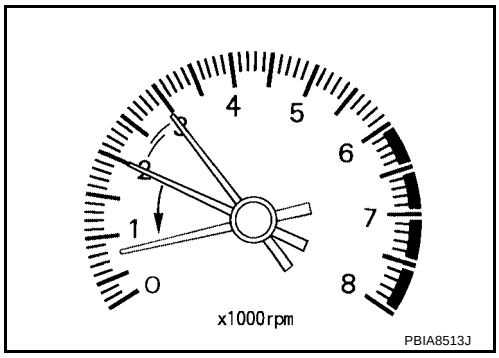
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3.

3. CHECK TARGET IDLE SPEED

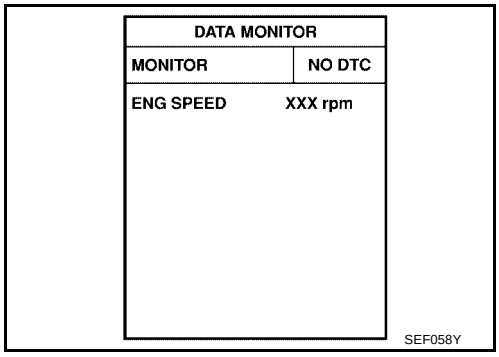
With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load, then run engine at idle speed for about 1 minute.



3. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-726, "IDLE SPEED" .

   700 ± 50 rpm (in P or N position)



Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Rev engine (2,000 to 3,000 rpm) 2 or 3 times under no-load, then run engine at idle speed for about 1 minute.
3. Check idle speed. Refer to EC-726, "IDLE SPEED" .

   700 ± 50 rpm (in P or N position)

OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-748, "Accelerator Pedal Released Position Learning" .

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-748, "Throttle Valve Closed Position Learning" .

>> GO TO 6.

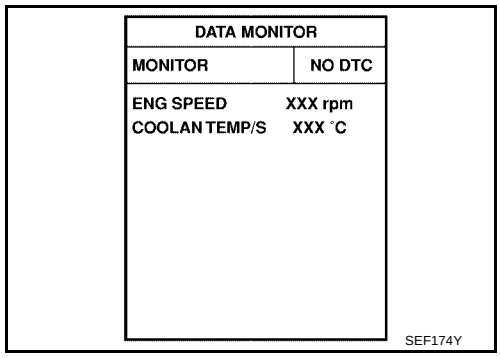
6. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-749, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?
Yes or No
Yes >> GO TO 7.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-726, "IDLE SPEED" .

700 ± 50 rpm (in P or N position)



Without CONSULT-II
1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-726, "IDLE SPEED" .

700 ± 50 rpm (in P or N position)

OK or NG
OK >> GO TO 10.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.
- Check camshaft position sensor (PHASE) and circuit. Refer to EC-997 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-990 .

OK or NG
OK >> GO TO 9.
NG >> 1. Repair or replace.
2. GO TO 4.

9. CHECK ECM FUNCTION

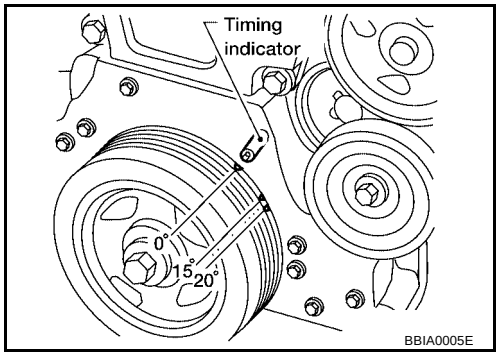
1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light. Refer to EC-726, "IGNITION TIMING" .

15 ± 5° BTDC (in P or N position)



OK or NG

OK (With CONSULT-II)>>GO TO 19.
OK (Without CONSULT-II)>>GO TO 20.
NG >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-748, "Accelerator Pedal Released Position Learning" .

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-748, "Throttle Valve Closed Position Learning" .

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Perform EC-749, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

Yes or No

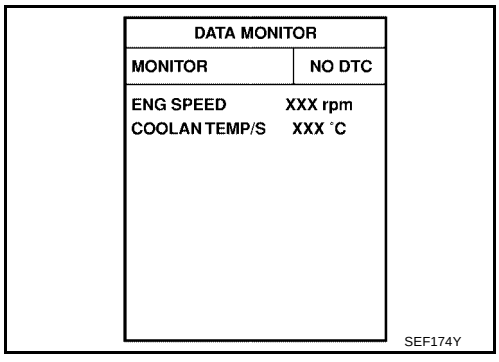
Yes >> GO TO 14.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II. Refer to EC-726, "IDLE SPEED" .

700 ± 50 rpm (in P or N position)



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed. Refer to EC-726, "IDLE SPEED" .

700 ± 50 rpm (in P or N position)

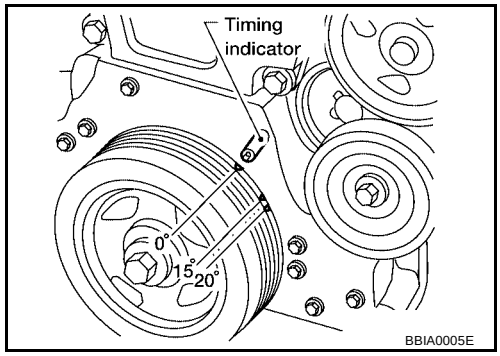
OK or NG

OK >> GO TO 15.
NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light. Refer to EC-726, "IGNITION TIMING" .

15 ± 5° BTDC (in P or N position)



OK or NG

OK (With CONSULT-II)>>GO TO 19.
OK (With GST)>>GO TO 20.
NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-136, "TIMING CHAIN" .

OK or NG

OK >> GO TO 17.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-997 .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-990 .

OK or NG

OK >> GO TO 18.
NG >> 1. Repair or replace.
2. GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .

>> GO TO 4.

19. CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

With CONSULT-II

1. Turn ignition switch OFF and wait at a least 10 seconds.
2. Start engine and warm it up to normal operating temperature.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position with OD OFF.

   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.
4. Set OD ON, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

   NOTE:
   Never apply brake during releasing the accelerator pedal.
5. Repeat steps 3 to 4 for 5 times.
6. Stop the vehicle and connect CONSULT-II to the vehicle.
7. Make sure that no (1st trip) DTC is displayed in “SELF-DIAG RESULTS” mode.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 21.

20. CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

With GST

1. Turn ignition switch OFF and wait at a least 10 seconds.
2. Start engine and warm it up to normal operating temperature.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position with OD OFF.

   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.
4. Set OD ON, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

   NOTE:
   Never apply brake during releasing the accelerator pedal.
5. Repeat steps 3 to 4 for 5 times.
6. Stop the vehicle and connect GST to the vehicle.
7. Make sure that no (1st trip) DTC is displayed.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 21.

21. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HARNESS

1. Turn ignition switch OFF and disconnect battery ground cable.
2. Disconnect ECM harness connector.
3. Disconnect A/F sensor 1 harness connector.
4. Check harness continuity between the following terminals. Refer to EC-1183, "Wiring Diagram" .

A/F sensor 1 terminal	ECM terminal
4	2
1	16
5	35
6	56
2	75

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 22.
NG >> 1. Repair open circuit or short to ground or short to power in harness or connectors between ECM and A/F sensor 1.
2. GO TO 4.

22. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Reconnect ECM harness connector.
2. Perform EC-748, "Accelerator Pedal Released Position Learning" .

>> GO TO 23.

23. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-748, "Throttle Valve Closed Position Learning" .

>> GO TO 24.

24. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-749, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

Yes or No

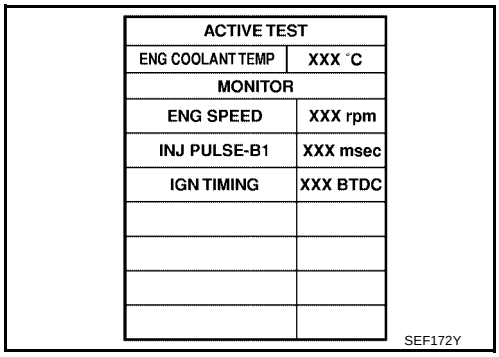
Yes (With CONSULT-II)>>GO TO 25.
Yes (Without CONSULT-II)>>GO TO 26.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

25. CHECK CO%

With CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Select “ENG COOLANT TEMP” in “ACTIVE TEST” mode.
4. Set “ENG COOLANT TEMP” to 5°C (41°F) by touching “DOWN” and “Qd”.
5. Start engine and rev it (2,000 to 3,000 rpm) 2 or 3 times under no load, then run engine at idle speed.
6. Check CO%.

Idle CO: 0.3 – 9.5% and engine runs smoothly.



OK or NG

OK >> GO TO 28.
NG >> GO TO 27.

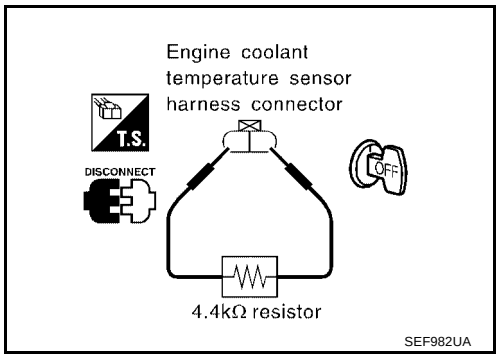
26. CHECK CO%

Without CONSULT-II

1. Start engine and warm it up until engine coolant temperature indicator points to the middle of gauge.
2. Turn ignition switch OFF.
3. Disconnect engine coolant temperature sensor harness connector.
4. Connect a resistor (4.4 kΩ) between terminals of engine coolant temperature sensor harness connector.
5. Start engine and rev it (2,000 to 3,000 rpm) 2 or 3 times under no load, then run engine at idle speed.
6. Check CO%.

Idle CO: 0.3 – 9.5% and engine runs smoothly.

7. After checking CO%, turn ignition switch OFF, disconnect the resistor from the terminals of engine coolant temperature sensor harness connector, and then connect engine coolant temperature sensor harness connector to engine coolant temperature sensor.



OK or NG

OK >> GO TO 28.
NG >> GO TO 27.

27. RECONNECT AIR FUEL RATIO (A/F) SENSOR 1 HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Reconnect A/F sensor 1 harness connector.

>> GO TO 31.

28. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

1. Stop engine.
2. Replace A/F sensor 1.

With CONSULT-II>>GO TO 29.
With GST>>GO TO 30.

29. CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

With CONSULT-II

1. Turn ignition switch OFF and wait at a least 10 seconds.
2. Start engine and warm it up to normal operating temperature.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position with OD OFF.
   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.
4. Set OD ON, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
   NOTE:
   Never apply brake during releasing the accelerator pedal.
5. Repeat steps 3 to 4 for 5 times.
6. Stop the vehicle and connect CONSULT-II to the vehicle.
7. Make sure that no (1st trip) DTC is displayed in “SELF-DIAG RESULTS” mode.

OK or NG

OK >> GO TO 4.
NG >> GO TO 31.

30. CHECK AIR FUEL RATIO (A/F) SENSOR 1 FUNCTION

With GST

1. Turn ignition switch OFF and wait at a least 10 seconds.
2. Start engine and warm it up to normal operating temperature.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in D position with OD OFF.
   NOTE:
   Keep the accelerator pedal as steady as possible during the cruising.
4. Set OD ON, then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).
   NOTE:
   Never apply brake during releasing the accelerator pedal.
5. Repeat steps 3 to 4 for 5 times.
6. Stop the vehicle and connect GST to the vehicle.
7. Make sure that no (1st trip) DTC is displayed.

OK or NG

OK >> GO TO 4.
NG >> GO TO 31.

31. DETECT MALFUNCTIONING PART

Check the following.

- Check fuel pressure regulator, and repair or replace if necessary.
  Refer toEC-751, "Fuel Pressure Check"
- Check mass air flow sensor and its circuit, and repair or replace if necessary.
  Refer to EC-859, "DTC P0101 MAF SENSOR" and EC-868, "DTC P0102, P0103 MAF SENSOR" .
- Check injector and its circuit, and repair or replace if necessary.
  Refer to EC-1334, "INJECTOR CIRCUIT" .
- Check engine coolant temperature sensor and its circuit, and repair or replace if necessary.
  Refer to EC-882, "DTC P0117, P0118 ECT SENSOR" and EC-895, "DTC P0125 ECT SENSOR" .

OK or NG

OK >> GO TO 33.
NG >> 1. Repair or replace.
2. GO TO 32.

32. ERASE UNNECESSARY DTC

After this inspection, unnecessary DTC might be displayed.
Erase the stored memory in ECM and TCM.
Refer to AT-428, "HOW TO ERASE DTC" and EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 4.

33. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .

>> GO TO 4.

VIN Registration

UBS00J9P

DESCRIPTION

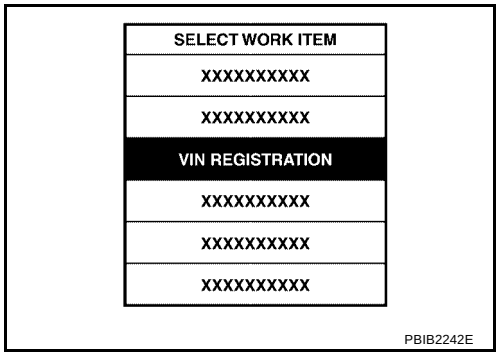
VIN Registration is an operation to registering VIN in ECM. It must be performed each time ECM is replaced.

NOTE:
Accurate VIN which is registered in ECM may be required for Inspection & Maintenance (I/M).

OPERATION PROCEDURE

With CONSULT-II

1. Check the VIN of the vehicle and note it. Refer to GI-46, "IDENTIFICATION INFORMATION" .
2. Turn ignition switch ON and engine stopped.
3. Select “VIN REGISTRATION” in “WORK SUPPORT” mode.
4. Follow the instruction of CONSULT-II display.



Accelerator Pedal Released Position Learning

UBS00J9Q

DESCRIPTION

Accelerator Pedal Released Position Learning is an operation to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF and wait at least 10 seconds.

Throttle Valve Closed Position Learning

UBS00J9R

DESCRIPTION

Throttle Valve Closed Position Learning is an operation to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

Idle Air Volume Learning

UBS00J9S

DESCRIPTION

Idle Air Volume Learning is an operation to learn the idle air volume that keeps each engine within the specific range. It must be performed under any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

PREPARATION

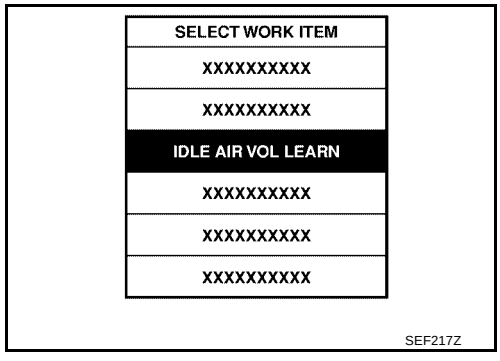
Before performing Idle Air Volume Learning, make sure that all of the following conditions are satisfied. Learning will be cancelled if any of the following conditions are missed for even a moment.

- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 95°C (158 - 203°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
  On vehicles equipped with daytime light systems, if the parking brake is applied before the engine is started the headlamp will not be illuminated.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
  For A/T models with CONSULT-II, drive vehicle until “FLUID TEMP SE” in “DATA MONITOR” mode of “A/T” system indicates less than 0.9V.
  For A/T models without CONSULT-II and M/T models, drive vehicle for 10 minutes.

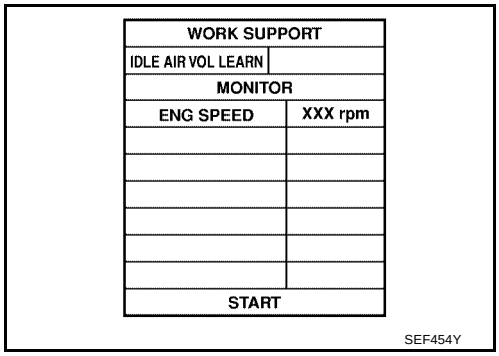
OPERATION PROCEDURE

With CONSULT-II

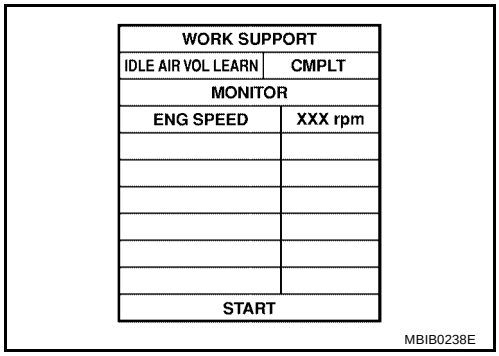
1. Perform EC-748, "Accelerator Pedal Released Position Learning" .
2. Perform EC-748, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.



6. Touch “START” and wait 20 seconds.



7. Make sure that “CMPLT” is displayed on CONSULT-II screen. If “CMPLT” is not displayed, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.
8. Rev up the engine 2 or 3 times and make sure that idle speed and ignition timing are within the specifications. Refer to EC-726, "IDLE SPEED" .



ITEM	SPECIFICATION
Idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Ignition timing	M/T: 15 ± 5° BTDC (in Neutral position) A/T: 15 ± 5° BTDC (in P or N position)

Without CONSULT-II

NOTE:

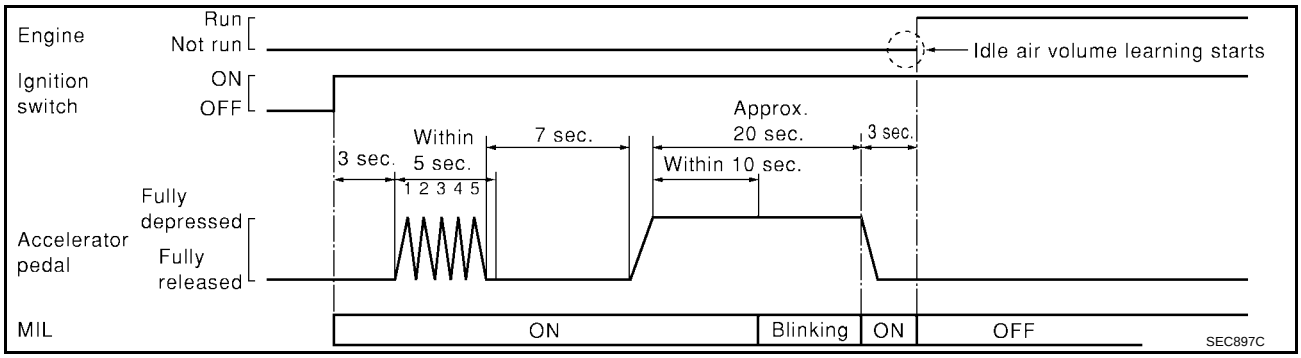
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform EC-748, "Accelerator Pedal Released Position Learning" .
2. Perform EC-748, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
7. Repeat the following procedure quickly 5 times within 5 seconds.

a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

8. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MIL stops blinking and turned ON.
9. Fully release the accelerator pedal within 3 seconds after the MIL turned ON.
10. Start engine and let it idle.

11. Wait 20 seconds.



12. Rev up the engine 2 or 3 times and make sure that idle speed and ignition timing are within the specifications. Refer to EC-726, "IDLE SPEED" .

ITEM	SPECIFICATION
Idle speed	M/T: 700 ± 50 rpm (in Neutral position) A/T: 700 ± 50 rpm (in P or N position)
Ignition timing	M/T: 15 ± 5° BTDC (in Neutral position) A/T: 15 ± 5° BTDC (in P or N position)

13. If idle speed and ignition timing are not within the specification, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the Diagnostic Procedure below.

DIAGNOSTIC PROCEDURE

If idle air volume learning cannot be performed successfully, proceed as follows:

1. **Check that throttle valve is fully closed.**
2. **Check PCV valve operation.**
3. **Check that downstream of throttle valve is free from air leakage.**
4. **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.**
   It is useful to perform EC-813, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .
5. **If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle air volume learning all over again:**

- **Engine stalls.**
- **Erroneous idle.**

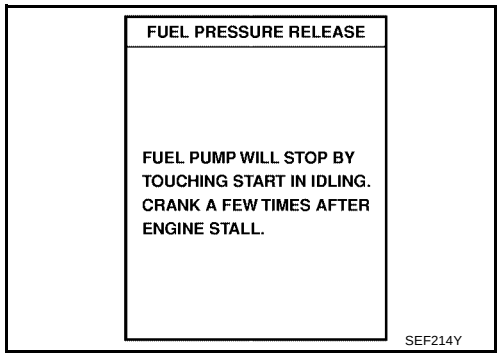
Fuel Pressure Check

UBS00J9T

FUEL PRESSURE RELEASE

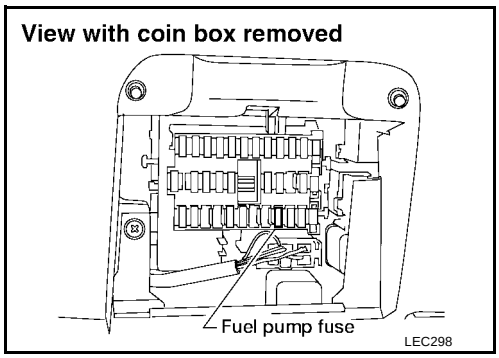
With CONSULT-II

1. Turn ignition switch ON.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-II.
3. Start engine.
4. After engine stalls, crank it 2 or 3 times to release all fuel pressure.
5. Turn ignition switch OFF.



Without CONSULT-II

1. Remove fuel pump fuse located.
2. Start engine.
3. After engine stalls, crank it 2 or 3 times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.



FUEL PRESSURE CHECK

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

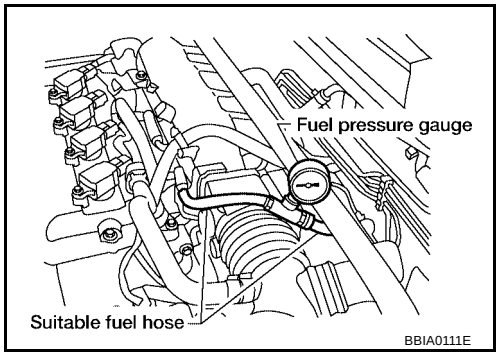
NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because B15 models do not have fuel return system.

CAUTION:

- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains saleability with O-rings inside.**

1. Release fuel pressure to zero. Refer to EC-751, "FUEL PRESSURE RELEASE" .
2. Prepare fuel hose and fuel hose clamp for fuel pressure check, and connect fuel pressure gauge.
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use fuel pressure gauge to check fuel pressure.
3. Remove fuel hose. Refer to EM-108, "INTAKE MANIFOLD" .
   - Do not twist or kink fuel hose because it is plastic hose.
   - Do not remove fuel hose from quick connector.
   - Keep the original fuel hose to be free from intrusion of dust or foreign substances with a suitable cover.
4. Install the fuel pressure gauge as shown in the figure.
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube and No.1 spool.
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - When reconnecting fuel hose, check the original fuel hose for damage and abnormality.
   - Use a torque driver to tighten clamps.

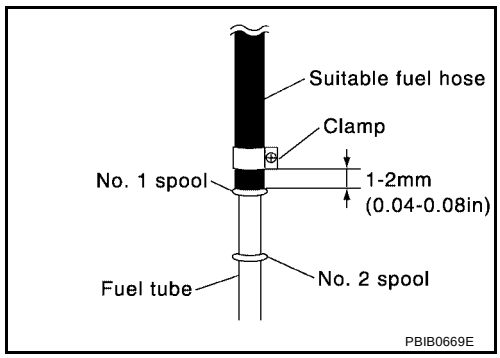


- Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).

Tightening torque:

1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb.)

- Make sure that clamp screw does not contact adjacent parts.



5. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb.) to confirm fuel tube does not come off.
6. Turn ignition switch ON, and check for fuel leakage.
7. Start engine and check for fuel leakage.
8. Read the indication of fuel pressure gauge.
   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.

At idling: Approximately 350 kPa (3.57 kg/cm^2 , 51 psi)

9. If result is unsatisfactory, go to next step.
10. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.

TROUBLE DIAGNOSIS

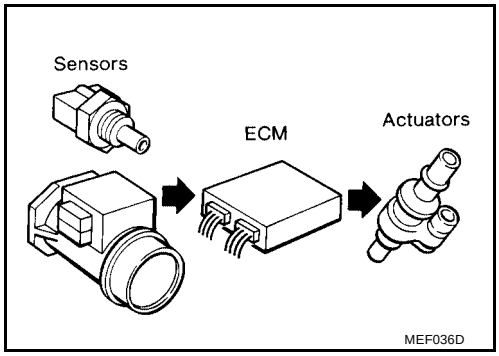
PFP:00004

Trouble Diagnosis Introduction

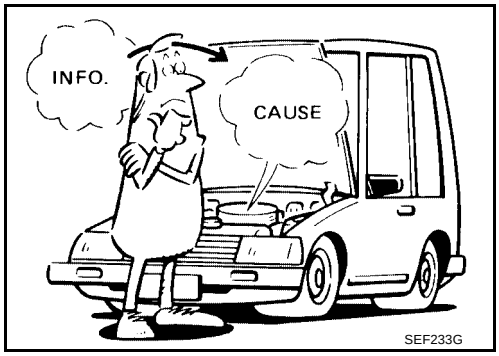
UBS00J9U

INTRODUCTION

The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine.



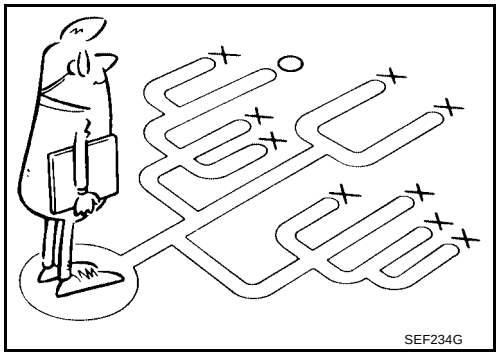
It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



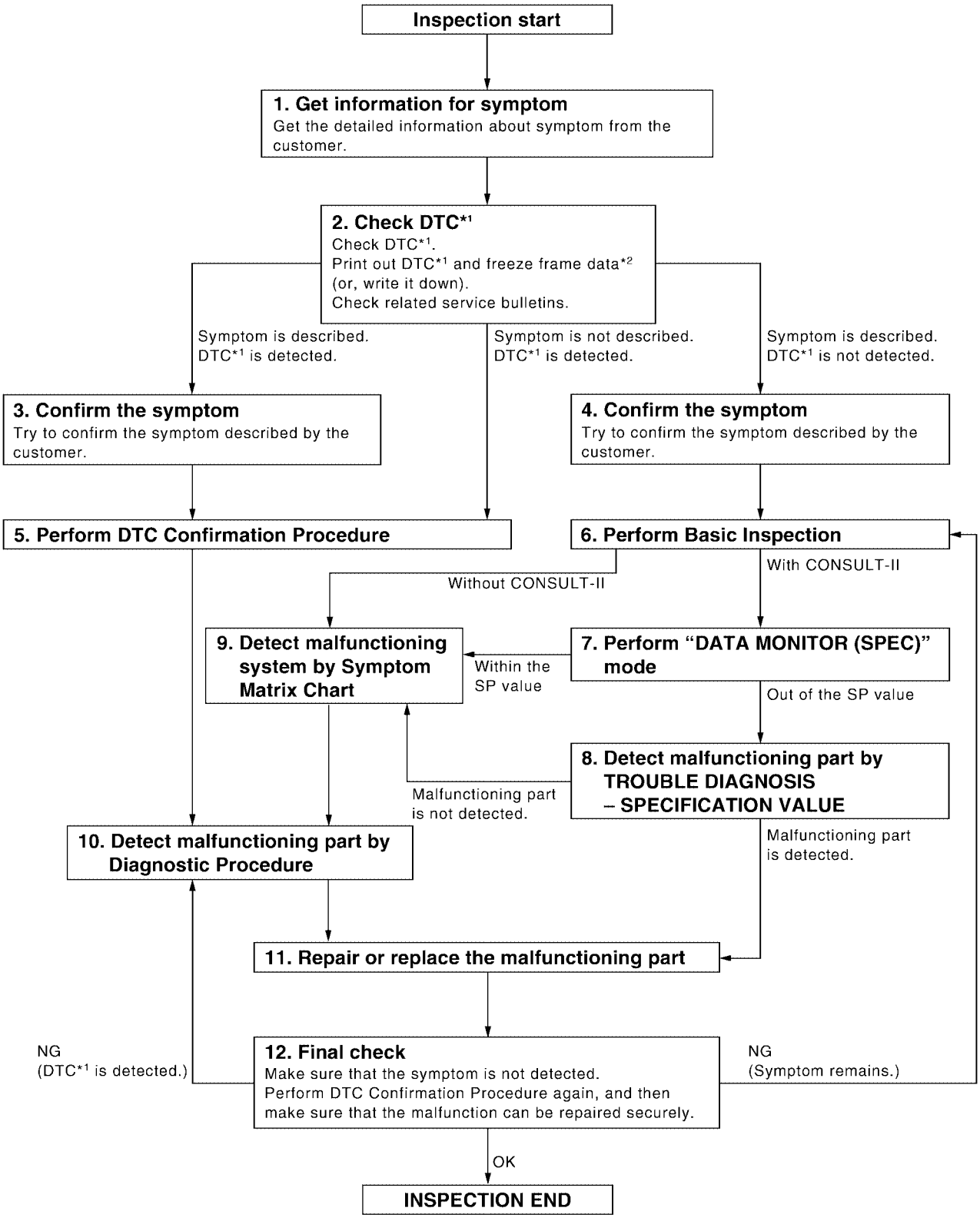
A visual check only may not find the cause of the incidents. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the WORK FLOW on EC-755 .

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A DIAGNOSTIC WORKSHEET like the example on EC-759 should be used.

Start your diagnosis by looking for conventional malfunctions first. This will help troubleshoot driveability malfunctions on an electronically controlled engine vehicle.



WORK FLOW
Overall Sequence



*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

PBIB2267E

Detailed Flow

1. GET INFORMATION FOR SYMPTOM

Get the detailed information from the customer about the symptom (the condition and the environment when the incident/malfunction occurred) using the EC-758, "DIAGNOSTIC WORKSHEET" .

>> GO TO 2.

2. CHECK DTC*1

1. Check DTC*1 .
2. Perform the following procedure if DTC*1 is displayed.

- Record DTC*1 and freeze frame data*2 . (Print them out with CONSULT-II or GST.)
- Erase DTC*1 . (Refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .)
- Study the relationship between the cause detected by DTC*1 and the symptom described by the customer. (Symptom Matrix Chart is useful. Refer to EC-763 .)

3. Check related service bulletins for information.

Is any symptom described and any DTC detected?

Symptom is described, DTC*1 is displayed>>GO TO 3.
Symptom is described, DTC*1 is not displayed>>GO TO 4.
Symptom is not described, DTC*1 is displayed>>GO TO 5.

3. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer (except MIL ON).
DIAGNOSIS WORK SHEET is useful to verify the incident.
Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 5.

4. CONFIRM THE SYMPTOM

Try to confirm the symptom described by the customer.
DIAGNOSIS WORK SHEET is useful to verify the incident.
Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results.
Verify relation between the symptom and the condition when the symptom is detected.

>> GO TO 6.

5. PERFORM DTC CONFIRMATION PROCEDURE

Perform DTC Confirmation Procedure for the displayed DTC*1 , and then make sure that DTC*1 is detected again.
At this time, always connect CONSULT-II to the vehicle, and check diagnostic results in real time on “DATA MONITOR (AUTO TRIG)”.
If two or more DTCs*1 are detected, refer to EC-760, "DTC Inspection Priority Chart" and determine trouble diagnosis order.

NOTE:

- Freeze frame data*2 is useful if the DTC*1 is not detected.
- Perform Overall Function Check if DTC Confirmation Procedure is not included on Service Manual. This simplified check procedure is an effective alternative though DTC*1 cannot be detected during this check. If the result of Overall Function Check is NG, it is the same as the detection of DTC*1 by DTC Confirmation Procedure.

Is DTC*1 detected?

Yes >> GO TO 10.
No >> Check according to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

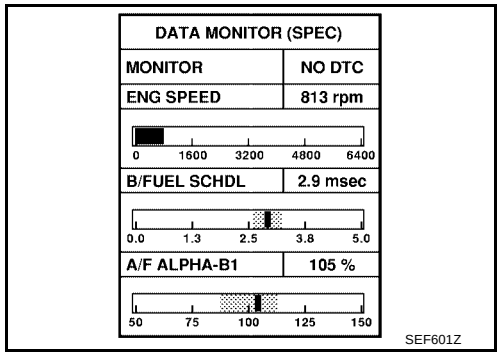
6. PERFORM BASIC INSPECTION

Perform EC-721, "Basic Inspection" .

With CONSULT-II>>GO TO 7.
Without CONSULT-II>>GO TO 9.

7. PERFORM DATA MONITOR (SPEC) MODE

With CONSULT-II
Make sure that “MAS A/F SE-B1”, “B/FUEL SCHDL”, and “A/F ALPHA-B1” are within the SP value using CONSULT-II “DATA MONITOR (SPEC)” mode. Refer to EC-814, "Diagnostic Procedure (A/T Models ULEV and M/T Models)" .



Are they within the SP value?

Yes >> GO TO 9.
No >> GO TO 8.

8. DETECT MALFUNCTIONING PART BY TROUBLE DIAGNOSIS - SPECIFICATION VALUE

Detect malfunctioning part according to EC-813, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .

Is malfunctioning part detected?

Yes >> GO TO 11.
No >> GO TO 9.

9. DETECT MALFUNCTIONING SYSTEM BY SYMPTOM MATRIX CHART

Detect malfunctioning system according to EC-763, "Symptom Matrix Chart" based on the confirmed symptom in step 4, and determine the trouble diagnosis order based on possible causes and symptom.

>> GO TO 10.

10. DETECT MALFUNCTIONING PART BY DIAGNOSTIC PROCEDURE

Inspect according to Diagnostic Procedure of the system.

NOTE:
The Diagnostic Procedure in EC section described based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to Circuit Inspection in GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" .

Is malfunctioning part detected?

Yes >> GO TO 11.
No >> Monitor input data from related sensors or check voltage of related ECM terminals using CONSULT-II. Refer to EC-805, "CONSULT-II Reference Value in Data Monitor Mode" , EC-782, "ECM Terminals and Reference Value" .

11. REPAIR OR REPLACE THE MALFUNCTIONING PART

1. Repair or replace the malfunctioning part.
2. Reconnect parts or connectors disconnected during Diagnostic Procedure again after repair and replacement.
3. Check DTC. If DTC is displayed, erase it, refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 12.

12. FINAL CHECK

When DTC was detected in step 2, perform DTC Confirmation Procedure or Overall Function Check again, and then make sure that the malfunction have been repaired securely.
When symptom was described from the customer, refer to confirmed symptom in step 3 or 4, and make sure that the symptom is not detected.

OK or NG

NG (DTC*1 is detected)>>GO TO 10.
NG (Symptom remains)>>GO TO 6.
OK >> 1. Before returning the vehicle to the customer, make sure to erase unnecessary DTC*1 in ECM and TCM (Transmission Control Module). (Refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and AT-428, "HOW TO ERASE DTC" .)
2. If the completion of SRT is needed, drive vehicle under the specific driving pattern. Refer to EC-707, "Driving Pattern" .
3. **INSPECTION END**

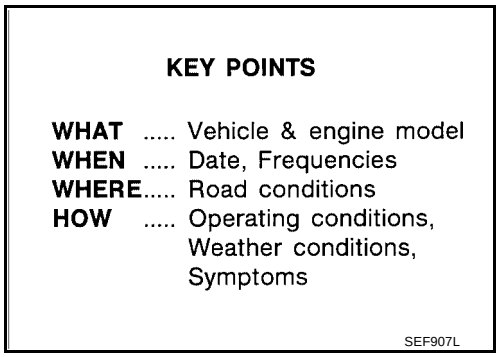
*1: Include 1st trip DTC.
*2: Include 1st trip freeze frame data.

DIAGNOSTIC WORKSHEET

Description

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about an incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.
Some conditions may cause the MIL to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.
- Fuel filler cap was left off or incorrectly screwed on, allowing fuel to evaporate into the atmosphere.



Worksheet Sample

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp		☐ Turned on ☐ Not turned on	

MTBL0017

DTC Inspection Priority Chart

UBS00J9V

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

NOTE:
If DTC U1000 and/or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000 and U1001. Refer to EC-840 .

Priority	Detected items (DTC)
1	● U1000 U1001 CAN communication line ● P0101 P0102 P0103 Mass air flow sensor ● P0112 P0113 P0127 Intake air temperature sensor ● P0117 P0118 P0125 Engine coolant temperature sensor ● P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor ● P0128 Thermostat function ● P0181 P0182 P0183 Fuel tank temperature sensor ● P0327 P0328 Knock sensor ● P0335 Crankshaft position sensor (POS) ● P0340 Camshaft position sensor (PHASE) ● P0460 P0461 P0462 P0463 Fuel level sensor ● P0500 Vehicle speed sensor ● P0605 ECM ● P1229 Sensor power supply ● P1610-P1615 NATS ● P1706 Park/Neutral position (PNP) switch ● P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor

Priority	Detected items (DTC)
2	● P0031 P0032 Heated oxygen sensor 1 heater*1 ● P0037 P0038 Heated oxygen sensor 2 heater ● P0132 P0133 P0134 P1143 P1144 Heated oxygen sensor 1*1 ● P0138 P0139 P1146 P1147 Heated oxygen sensor 2 ● P0441 EVAP control system purge flow monitoring ● P0444 P0445 P1444 EVAP canister purge volume control solenoid valve ● P0447 P1446 EVAP canister vent control valve ● P0451 P0452 P0453 EVAP control system pressure sensor ● P0506 P0507 Idle speed control system ● P0550 power steering pressure sensor ● P0705 P0710 P0720 P0725 P0740 P0745 P0750 P0755 P1705 P1760 A/T related sensors and solenoid valves ● P1031, P1032 A/F sensor 1 heater*2 ● P1065 ECM power supply ● P1111 Intake valve timing control solenoid valve ● P1122 Electric throttle control function ● P1124 P1126 Electric throttle control motor relay ● P1128 Electric throttle control actuator ● P1271, P1272, P1273, P1274, P1276, P1278, P1279 A/F sensor 1*2 ● P1800 VIAS control solenoid valve ● P1805 Brake switch
3	● P0011 Intake valve timing control ● P0171 P0172 Fuel injection system function ● P0300 - P0304 Misfire ● P0420 Three way catalyst function ● P0442 P0455 P0456 EVAP control system (SMALL LEAK, VERY SMALL LEAK, GROSS LEAK) ● P0731 - P0734 A/T function ● P1121 Electric throttle control actuator ● P1148 Closed loop control ● P1217 Engine over temperature (OVERHEAT) ● P1564 ASCD steering switch ● P1572 ASCD brake switch ● P1574 ASCD vehicle speed sensor

*1: A/T models ULEV and M/T models.
*2: A/T models except ULEV.

Fail-safe Chart

UBS00J9W

When the DTC listed below is detected, the ECM enters fail-safe mode and the MIL lights up.

DTC No.	Detected items	Engine operating condition in fail-safe mode	
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.	
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
		Condition	Engine coolant temperature decided (CONSULT-II display)
		Just as ignition switch is turned ON or START	40°C (104°F)
		More than approx. 4 minutes after ignition ON or START	80°C (176°F)
		Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	
P0122 P0123 P0222 P0223 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	
P1121	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.	
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.	
		(When ECM detects the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P (A/T), Neutral (M/T) position, and engine speed will not exceed 1,000 rpm or more.	
P1122	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1124 P1126	Throttle control relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1128	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P1229	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.	
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.	

- When there is an open circuit on MIL circuit, the ECM cannot warn the driver by lighting up MIL when there is malfunction on engine control system.
  Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system malfunctions and MIL circuit is open by means of operating fail-safe function.
  The fail-safe function also operates when above diagnoses except MIL circuit are detected, and demands the driver to repair the malfunction.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Symptom Matrix Chart

UBS00KJI

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-1340
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-752
	Injector circuit	1	1	2	3	2		2	2			2			EC-1334
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-680
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-693
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-721
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-1110, EC-1112, EC-1119, EC-1124
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-721
	Ignition circuit	1	1	2	2	2		2	2			2			EC-1312
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3		2	EC-833
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-859, EC-868,
A/F sensor 1 circuit*1			1	2	3	2		2	2			2			EC-1181
Engine coolant temperature sensor circuit		1	1	2	2	2	3	2	2	3	1	2			EC-882, EC-895
Throttle position sensor circuit			1	2		2	2	2	2	2		2			EC-888, EC-971, EC-1172, EC-1174, EC-1297
Accelerator pedal position sensor circuit				3	2	1	2			2					EC-1176, EC-1282, EC-1289, EC-1304
Heated oxygen sensor 1 circuit *2			1	2	3	2		2	2			2			EC-903, EC-910, EC-920, EC-1129, EC-1135
Knock sensor circuit				2	2							3			EC-985
Crankshaft position sensor (POS) circuit		2	2												EC-990

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Camshaft position sensor (PHASE) circuit	2	2												EC-997
Vehicle speed signal circuit		2	3		3						3			EC-1083
Power steering pressure sensor circuit		2				3	3	3	3					EC-1089
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-1094, EC-1102
Intake valve timing control solenoid valve circuit	3	3	2		1	3	2	2	3		3			EC-1106
VIAS control solenoid valve circuit					1									EC-1271, EC-1325
PNP switch circuit			3		3	3	3	3	3		3			EC-1267
Refrigerant pressure sensor circuit		2				3	3	3	3		4			EC-1345
Electrical load signal circuit						3	3	3	3					EC-1350
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	MTC-19

1 - 6: The numbers refer to the order of inspection.

(continued on next page)

*1: A/T models except ULEV.

*2: A/T models ULEV and M/T models.

SYSTEM — ENGINE MECHANICAL & OTHER

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-7
	Fuel piping			5	5	5		5	5			5			FL-2
	Vapor lock														—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct		5	5		5		5	5			5			EM-106
	Air cleaner														EM-106
	Air leakage from air duct (Mass air flow sensor —electric throttle control actuator)	5			5		5			5					EM-106
	Electric throttle control actuator														EC-1127
	Air leakage from intake manifold/ Collector/Gasket														EM-108
Cranking	Battery	1	1	1		1		1	1			1		1	SC-6
	Alternator circuit														SC-24
	Starter circuit	3													SC-13
	Signal plate/Flywheel/Drive plate	6													CL-33or EM-164
	PNP switch	4													EC-1267 AT-641 or AT-487
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-148
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-164
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														

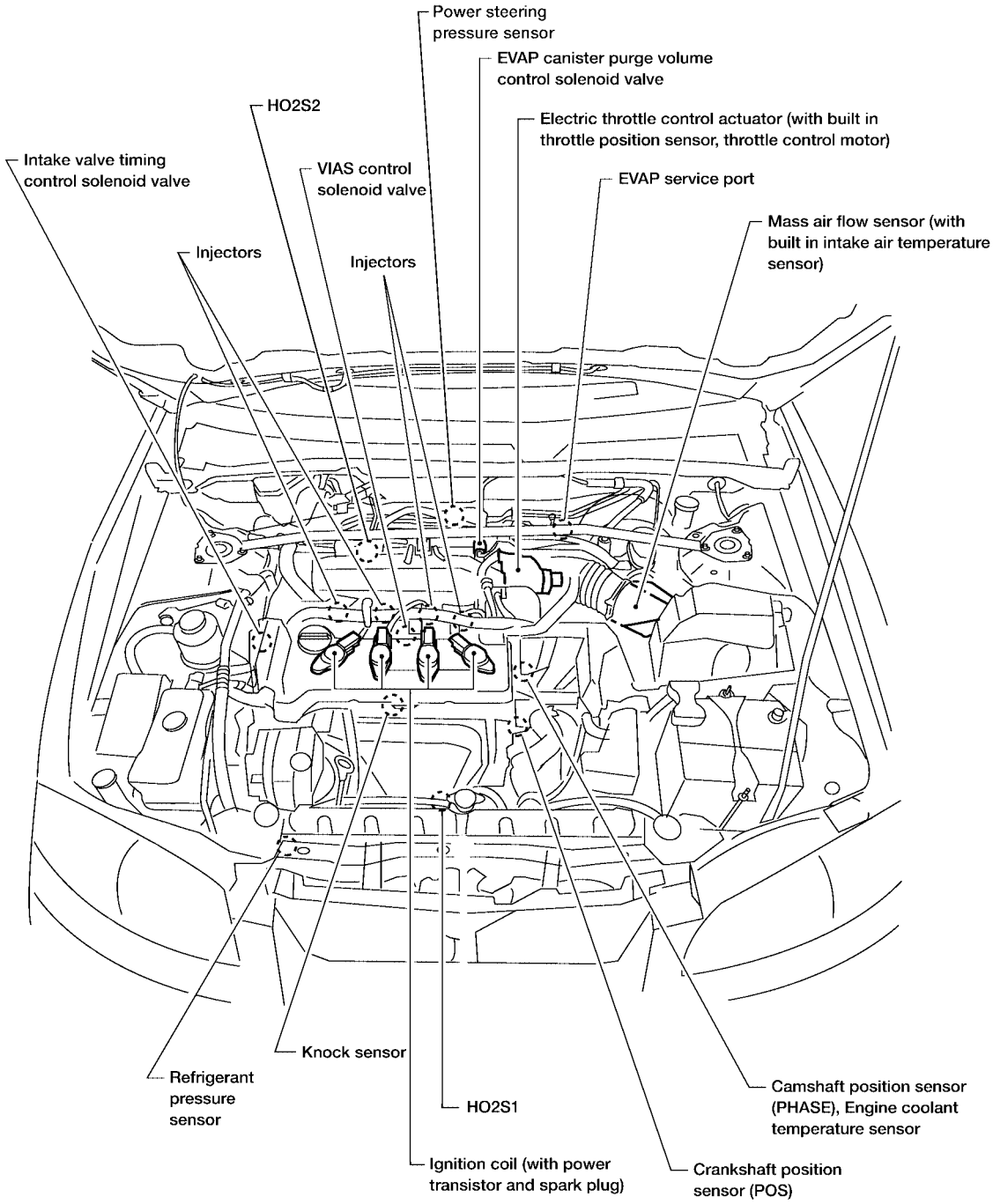
		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM-136
	Camshaft														EM-126
	Intake valve timing control														EM-136
	Intake valve												3		EM-148
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-113, EX-3
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5	2		EM-115, LU-19 , LU-18
	Oil level (Low)/Filthy oil														LU-16
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		2	5			CO-32
	Thermostat									5					CO-30
	Water pump														CO-28
	Water gallery														CO-25
	Cooling fan									5					CO-37
	Coolant level (low)/Contaminated coolant														CO-26
NVIS (NISSAN Vehicle Immobilizer System — NATS)		1	1												EC-695 or BL-97

1 - 6: The numbers refer to the order of inspection.

Engine Control Component Parts Location

UBS00J9Y

A/T MODELS ULEV AND M/T MODELS



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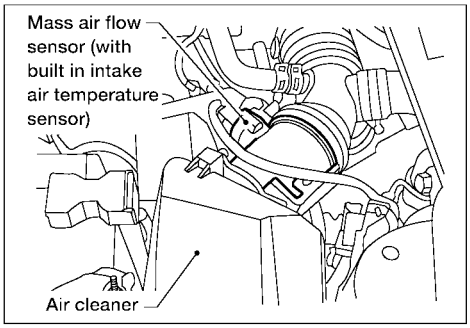
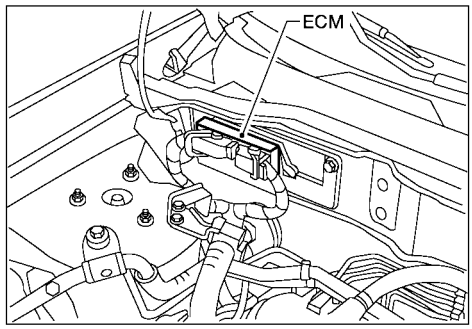
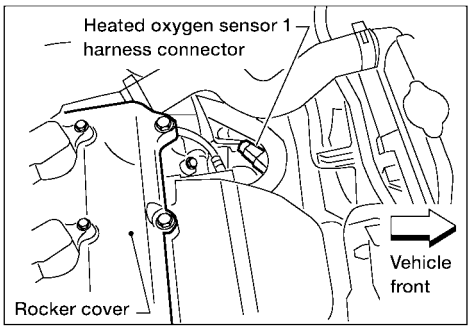
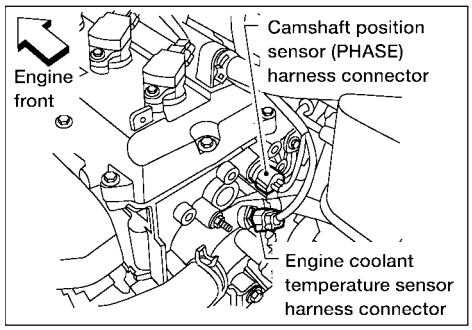
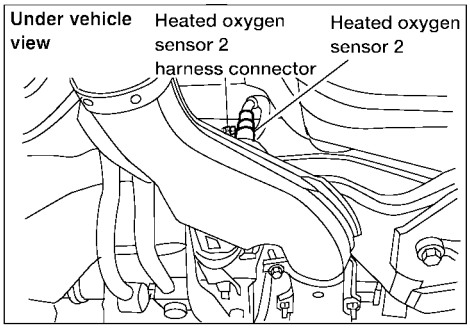
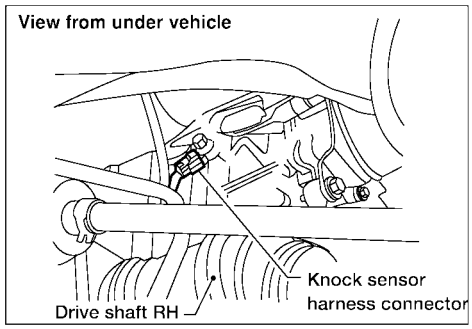

Mass air flow sensor (with built in intake air temperature sensor)
Air cleaner

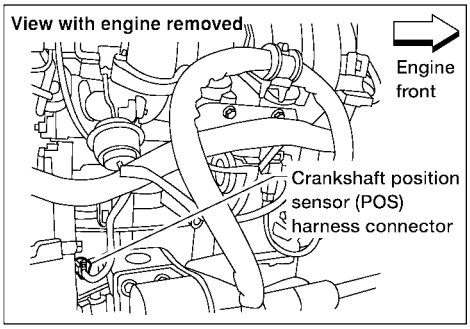

ECM

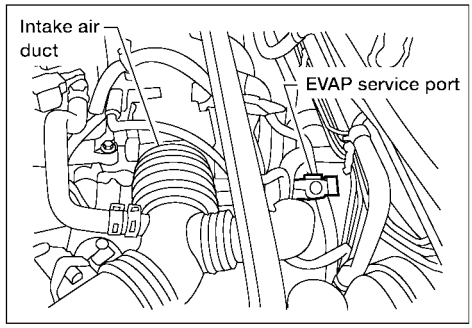

Heated oxygen sensor 1 harness connector
Vehicle front
Rocker cover


Engine front
Camshaft position sensor (PHASE) harness connector
Engine coolant temperature sensor harness connector

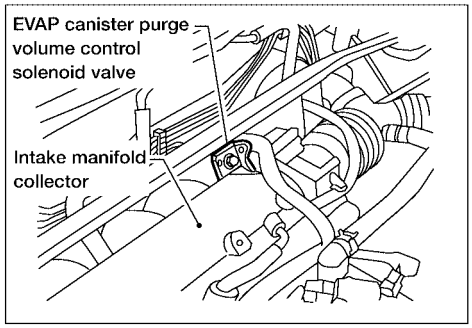

Under vehicle view
Heated oxygen sensor 2 harness connector
Heated oxygen sensor 2

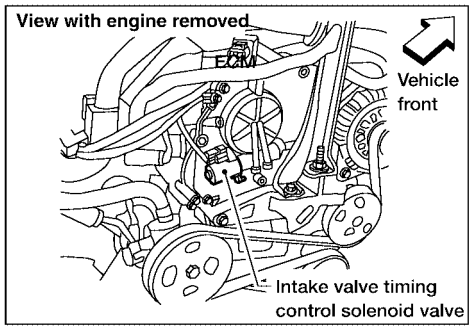

View from under vehicle
Knock sensor harness connector
Drive shaft RH

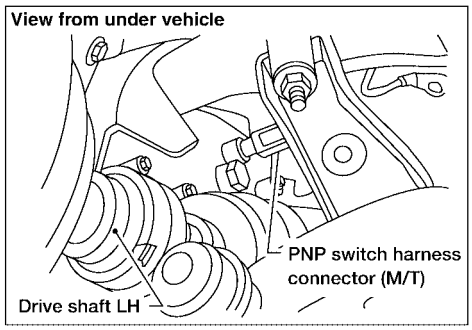

View with engine removed
Engine front
Crankshaft position sensor (POS) harness connector

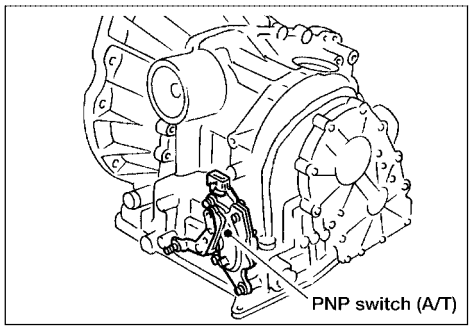

Intake air duct
EVAP service port

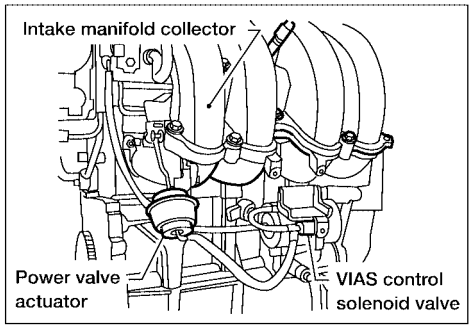
BBIA0285E

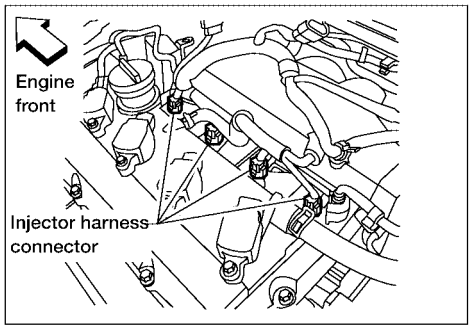

EVAP canister purge volume control solenoid valve
Intake manifold collector

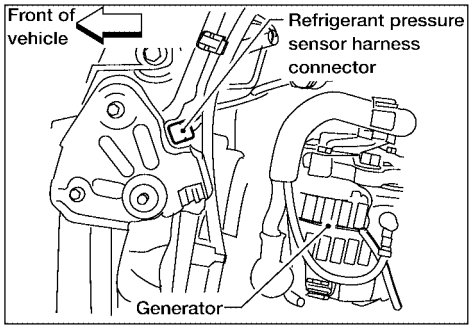

View with engine removed
ECM
Vehicle front
Intake valve timing control solenoid valve

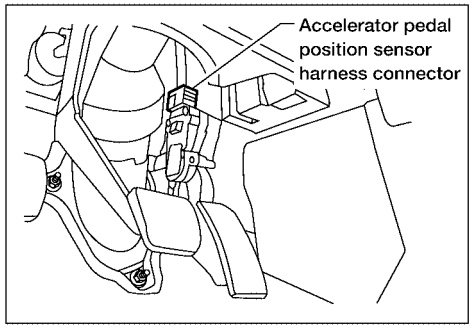

View from under vehicle
PNP switch harness connector (M/T)
Drive shaft LH


PNP switch (A/T)

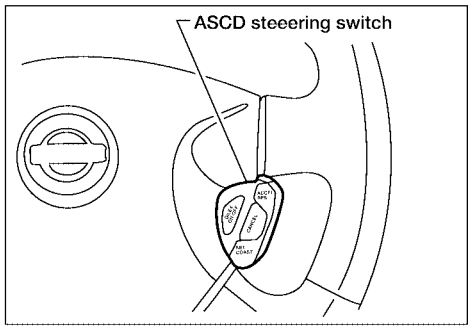

Intake manifold collector
Power valve actuator
VIAS control solenoid valve

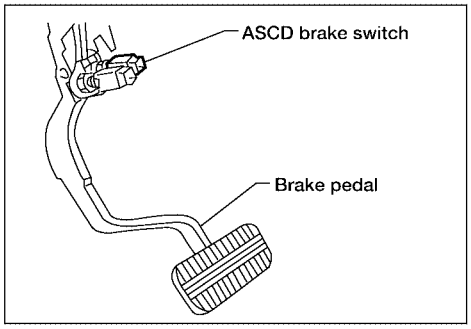

Engine front
Injector harness connector

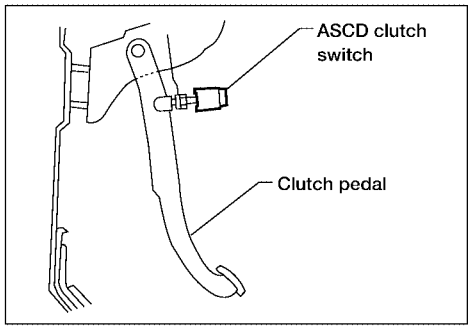

Front of vehicle
Refrigerant pressure sensor harness connector
Generator

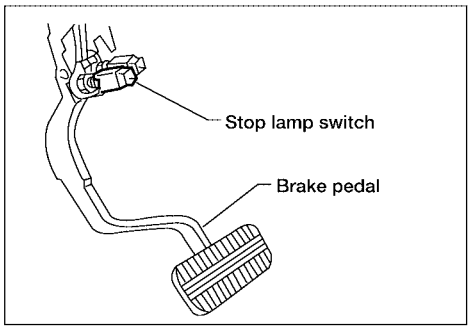

Accelerator pedal position sensor harness connector

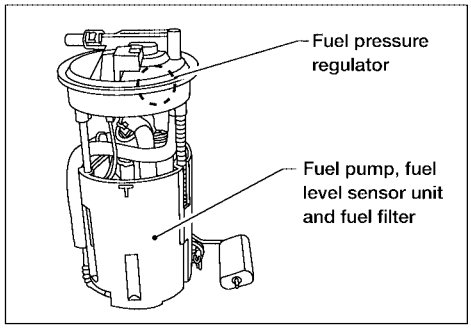
BBIA0128E

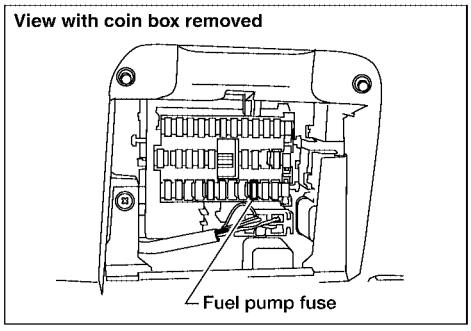

ASCD steeering switch

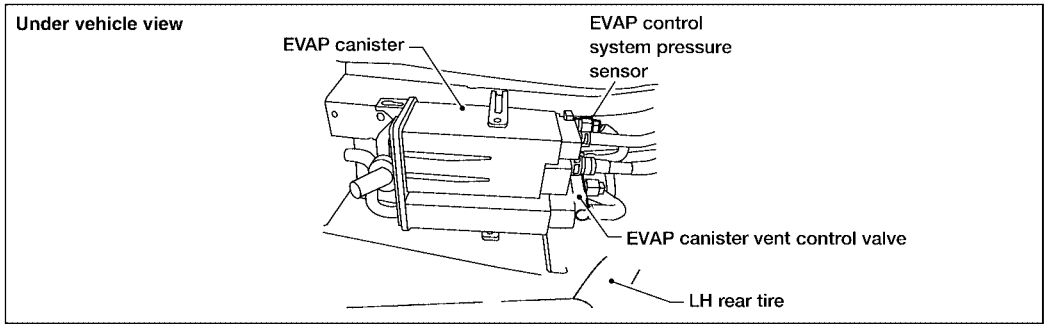

ASCD brake switch
Brake pedal


ASCD clutch switch
Clutch pedal

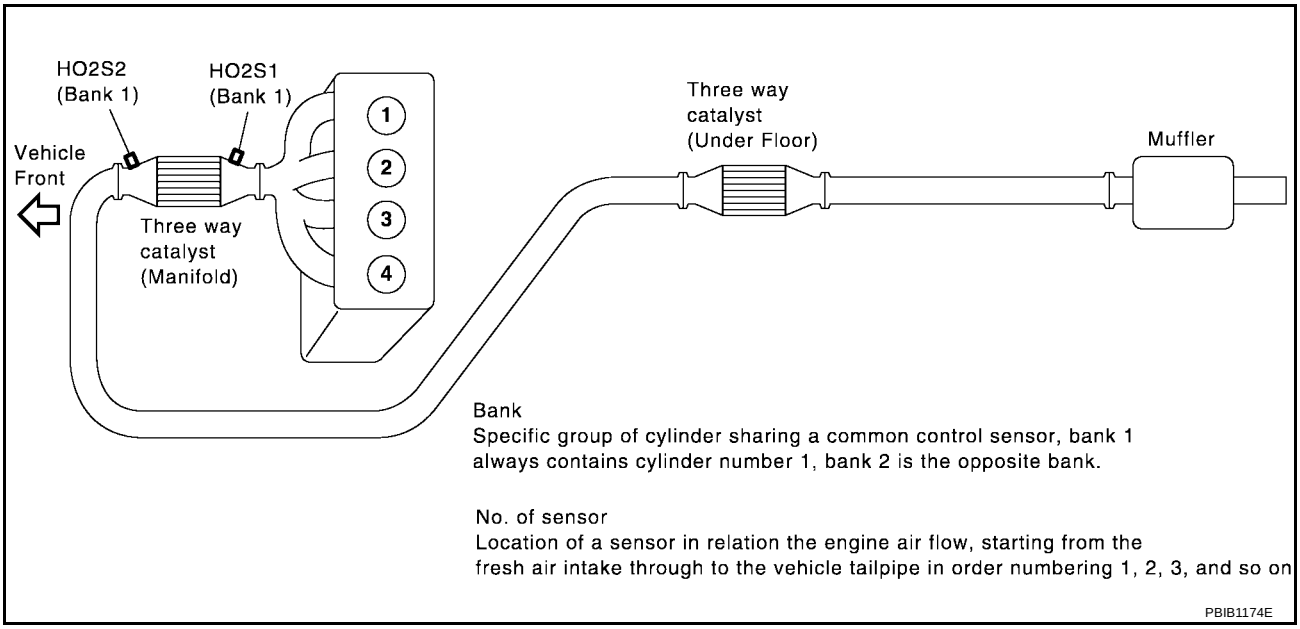

Stop lamp switch
Brake pedal

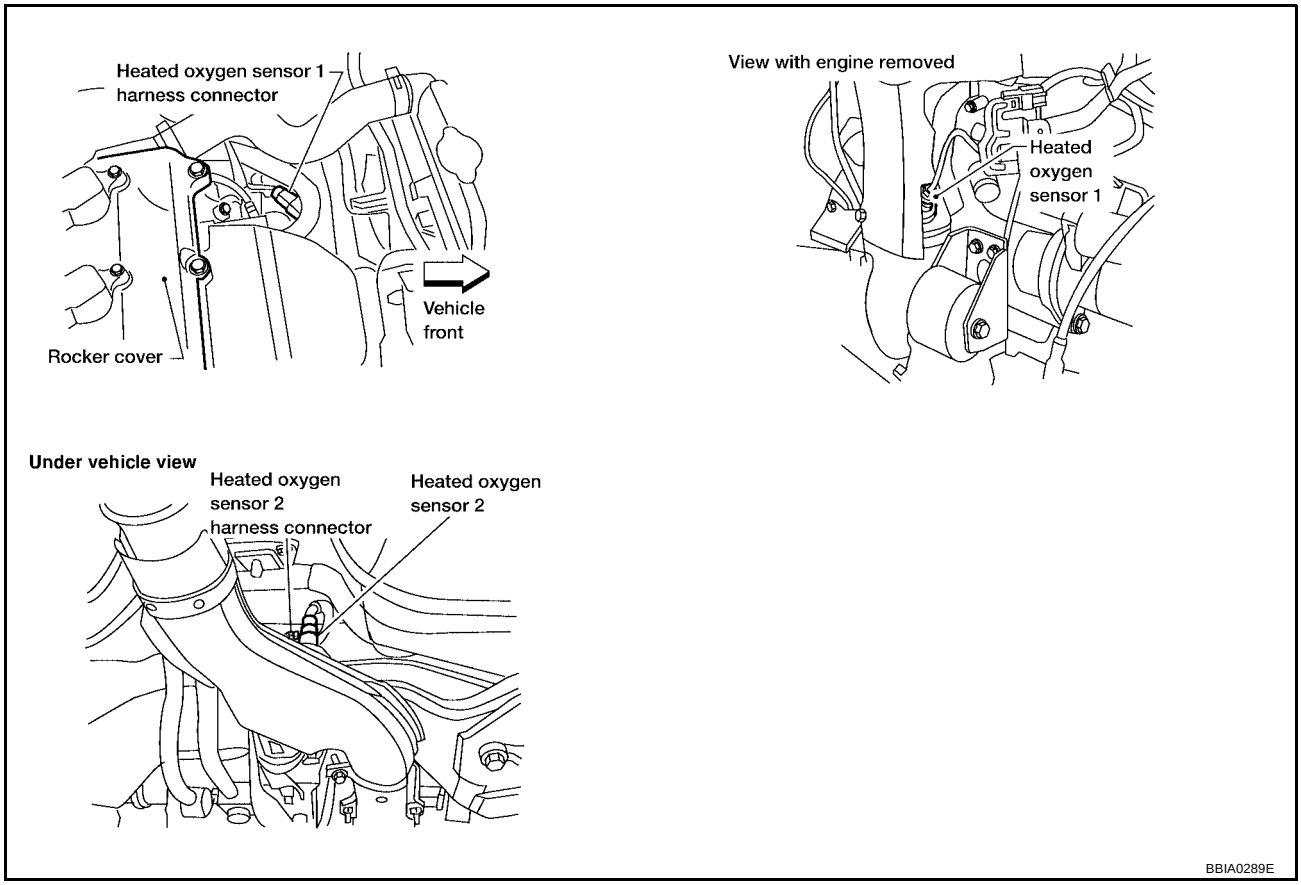

Fuel pressure regulator
Fuel pump, fuel level sensor unit and fuel filter


View with coin box removed
Fuel pump fuse

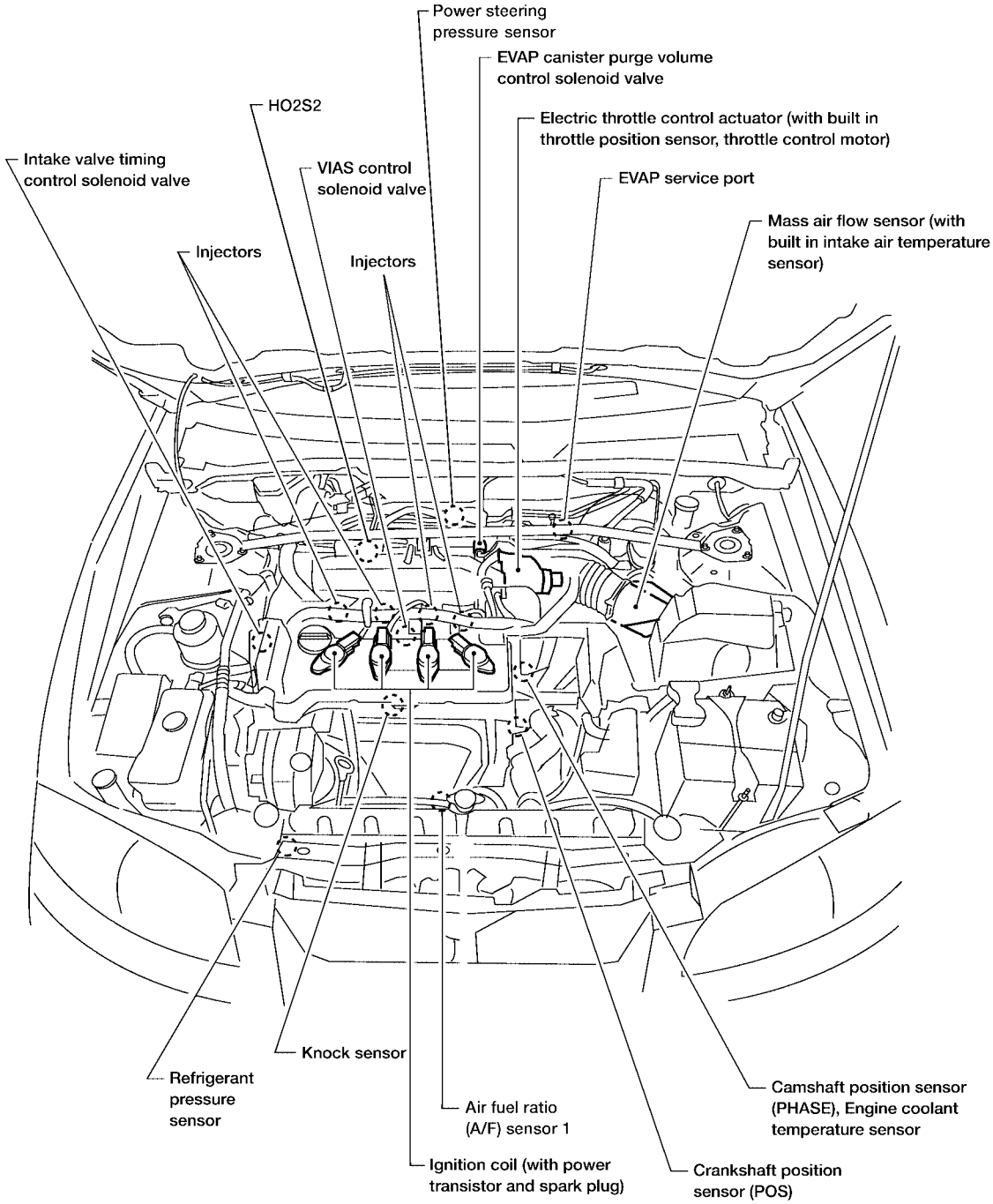

Under vehicle view
EVAP canister
EVAP control system pressure sensor
EVAP canister vent control valve
LH rear tire

BBIA0288E


HO2S2
(Bank 1)
HO2S1
(Bank 1)
Vehicle
Front
Three way
catalyst
(Manifold)
1
2
3
4
Three way
catalyst
(Under Floor)
Muffler
Bank
Specific group of cylinder sharing a common control sensor, bank 1
always contains cylinder number 1, bank 2 is the opposite bank.
No. of sensor
Location of a sensor in relation the engine air flow, starting from the
fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on
PBIB1174E


Heated oxygen sensor 1
harness connector
Vehicle
front
Rocker cover
View with engine removed
Heated
oxygen
sensor 1
Under vehicle view
Heated oxygen
sensor 2
harness connector
Heated oxygen
sensor 2
BBIA0289E

A/T MODELS EXCEPT ULEV



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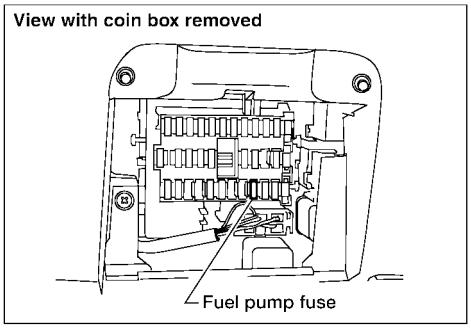
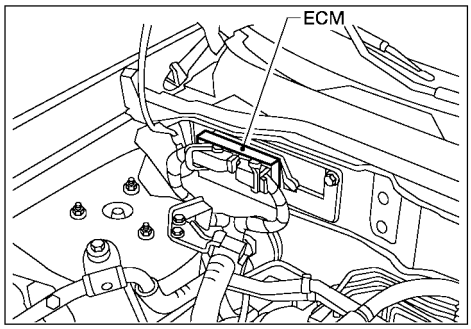
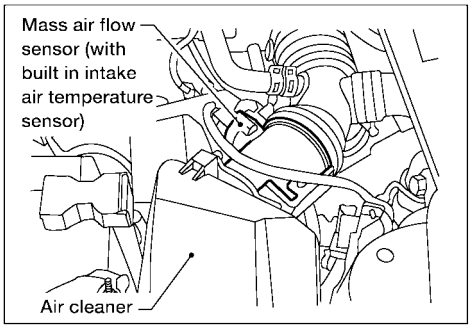
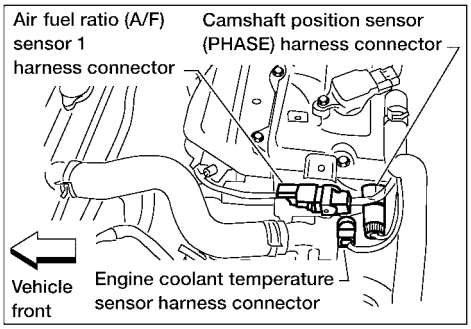
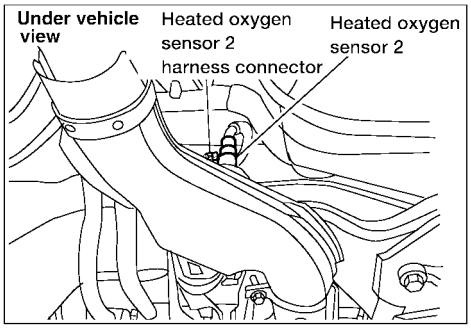
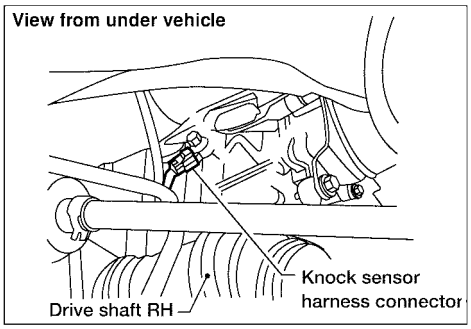

View with coin box removed
Fuel pump fuse

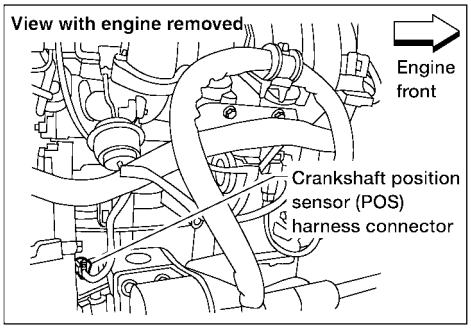

ECM

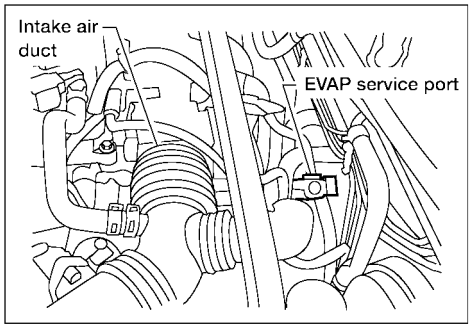

Mass air flow sensor (with built in intake air temperature sensor)
Air cleaner


Air fuel ratio (A/F) sensor 1 harness connector
Camshaft position sensor (PHASE) harness connector
Vehicle front
Engine coolant temperature sensor harness connector

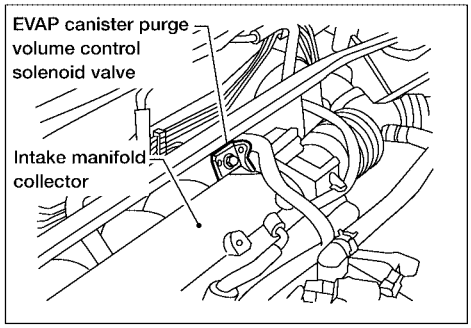

Under vehicle view
Heated oxygen sensor 2 harness connector
Heated oxygen sensor 2

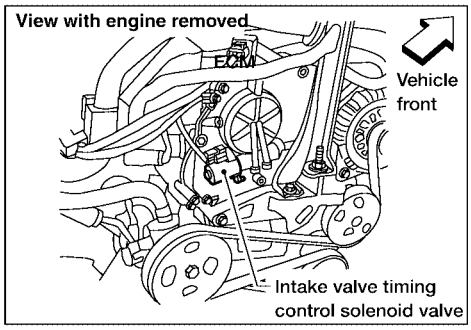

View from under vehicle
Knock sensor harness connector
Drive shaft RH

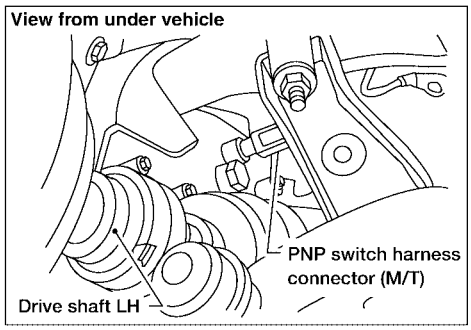

View with engine removed
Engine front
Crankshaft position sensor (POS) harness connector

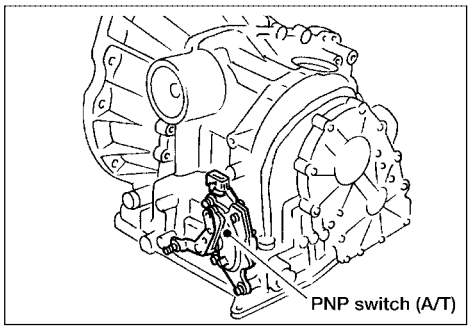

Intake air duct
EVAP service port

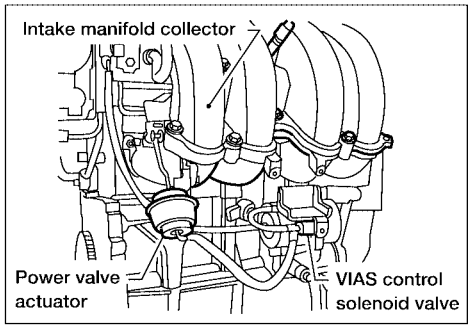
BBIA0303E

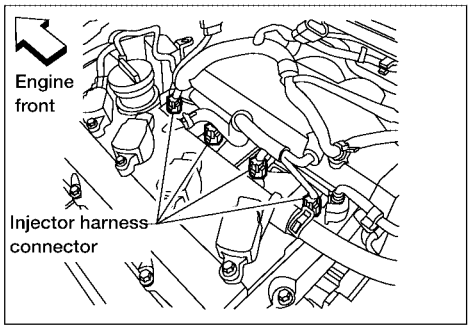

EVAP canister purge volume control solenoid valve
Intake manifold collector

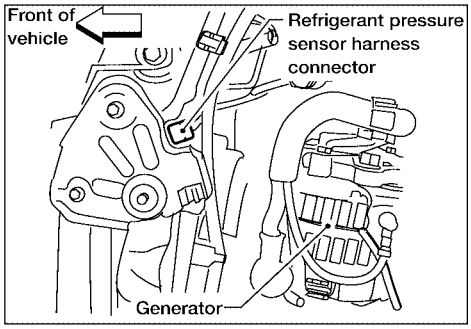

View with engine removed
ECM
Vehicle front
Intake valve timing control solenoid valve

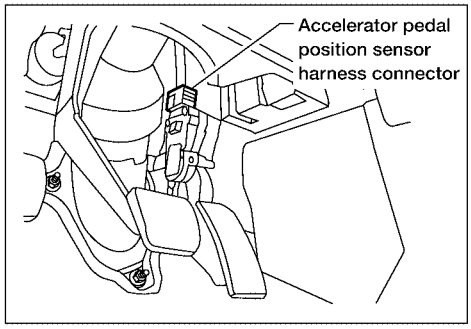

View from under vehicle
PNP switch harness connector (M/T)
Drive shaft LH


PNP switch (A/T)

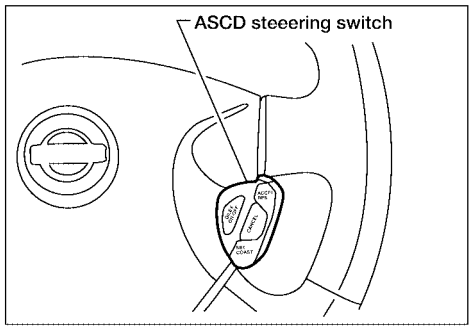

Intake manifold collector
Power valve actuator
VIAS control solenoid valve

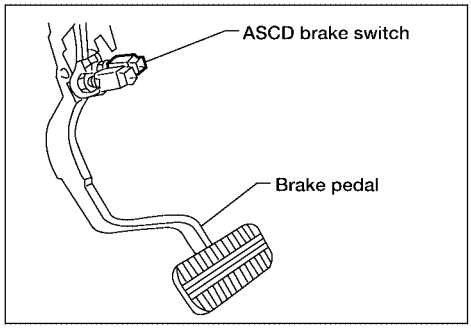

Engine front
Injector harness connector

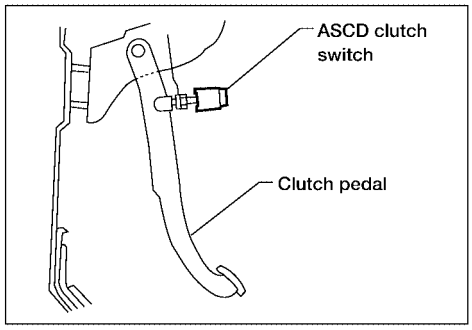

Front of vehicle
Refrigerant pressure sensor harness connector
Generator

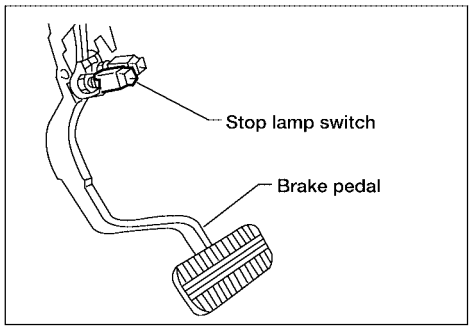

Accelerator pedal position sensor harness connector

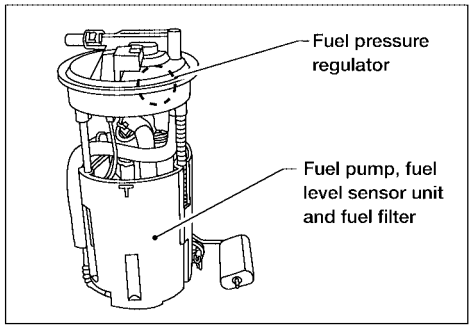
BBIA0128E

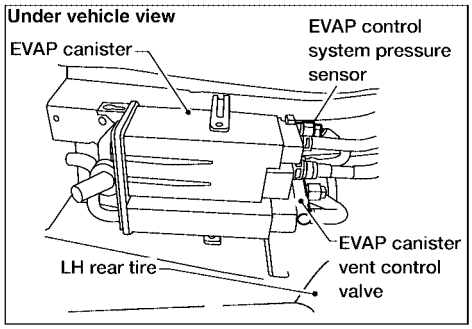

ASCD steeering switch


ASCD brake switch
Brake pedal

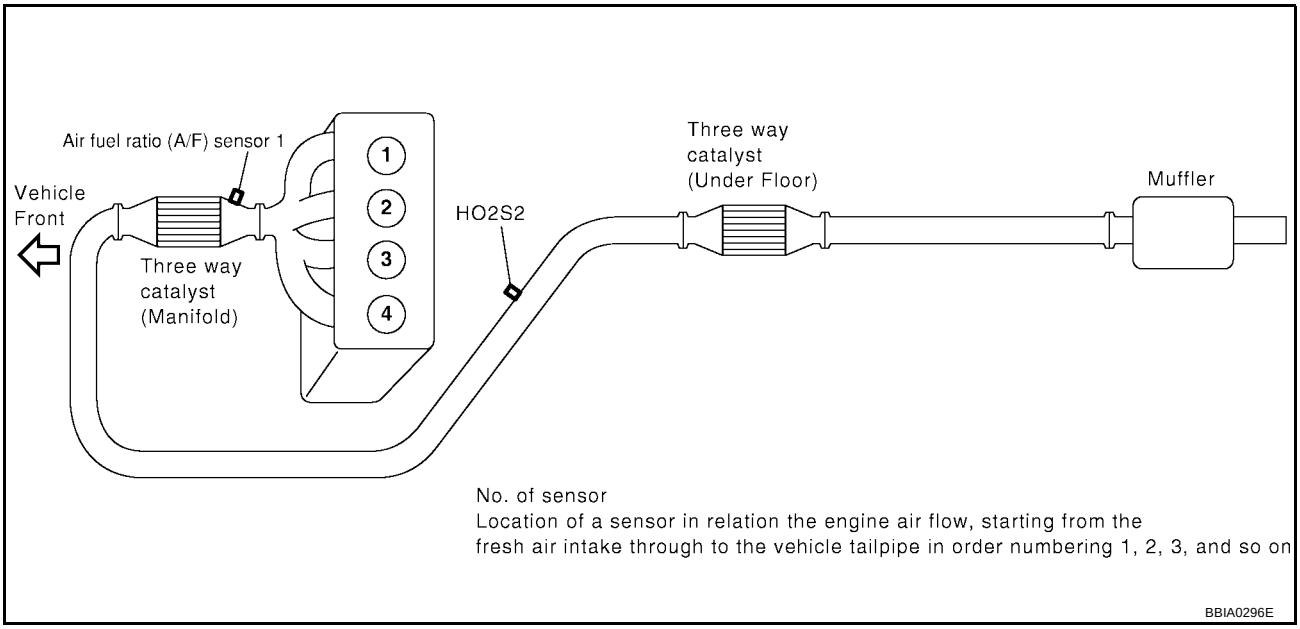

ASCD clutch switch
Clutch pedal

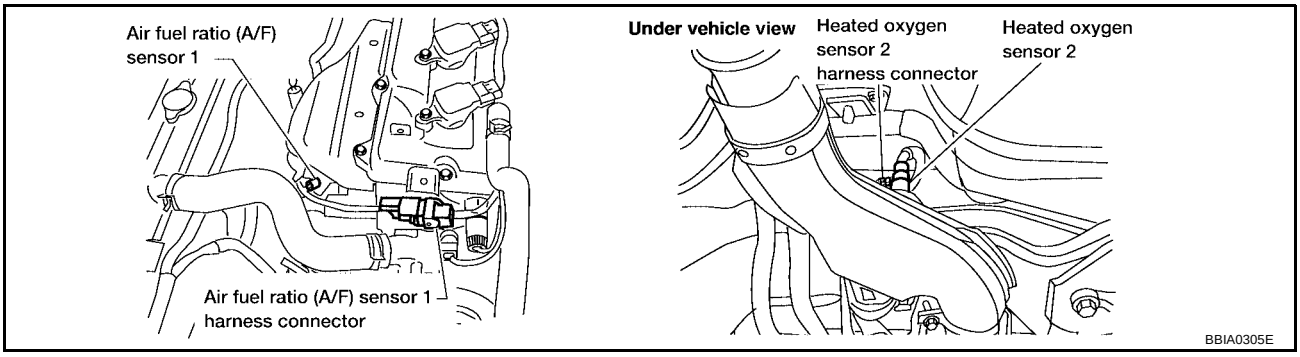

Stop lamp switch
Brake pedal


Fuel pressure regulator
Fuel pump, fuel level sensor unit and fuel filter


Under vehicle view
EVAP canister
EVAP control system pressure sensor
EVAP canister vent control valve
LH rear tire

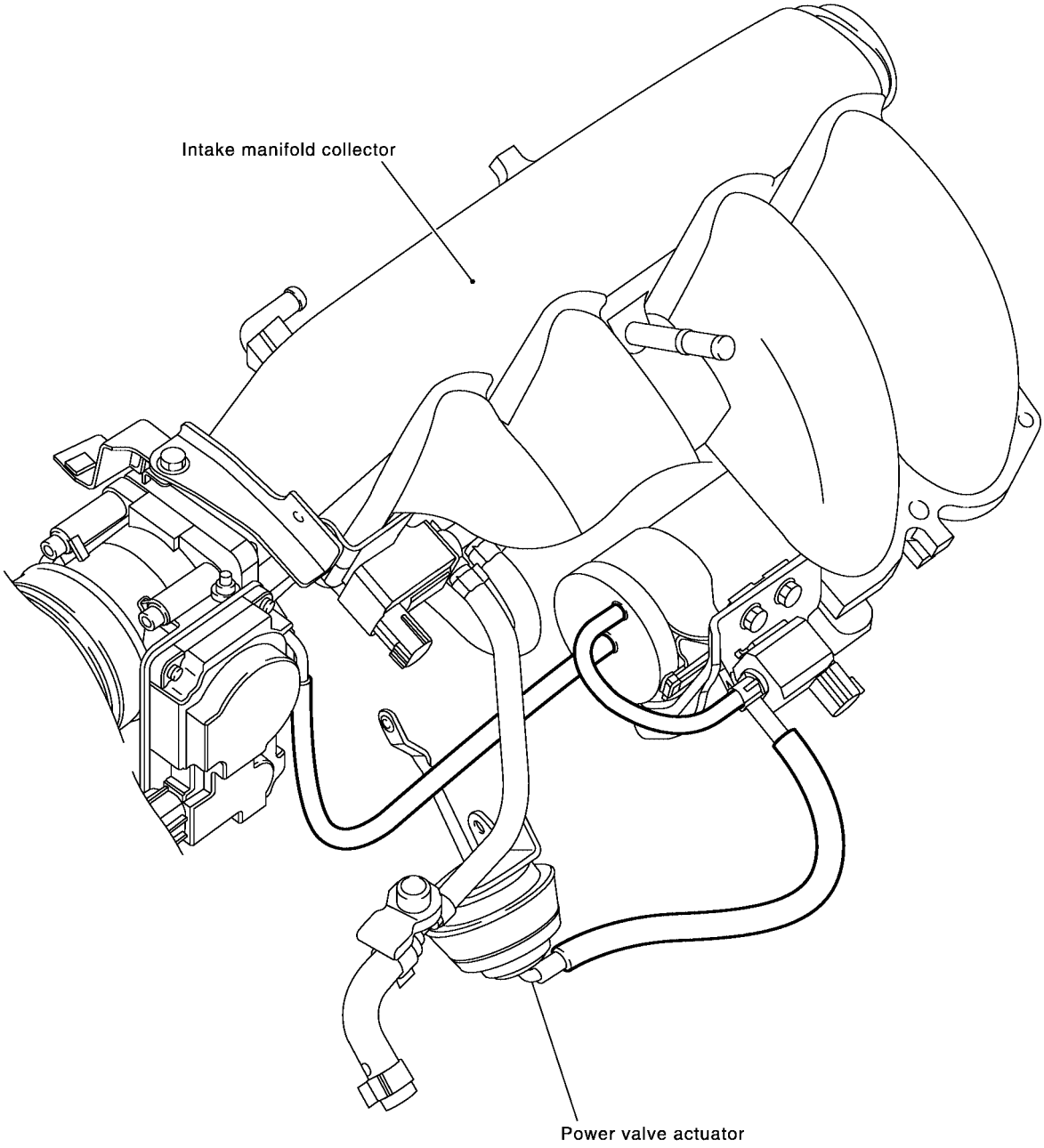
BBIA0342E


Air fuel ratio (A/F) sensor 1
Vehicle Front
Three way catalyst (Manifold)
1
2
3
4
HO2S2
Three way catalyst (Under Floor)
Muffler
No. of sensor
Location of a sensor in relation the engine air flow, starting from the fresh air intake through to the vehicle tailpipe in order numbering 1, 2, 3, and so on
BBIA0296E


Air fuel ratio (A/F) sensor 1
Air fuel ratio (A/F) sensor 1 harness connector
Under vehicle view
Heated oxygen sensor 2 harness connector
Heated oxygen sensor 2
BBIA0305E

Vacuum Hose Drawing

UBS00J9Z



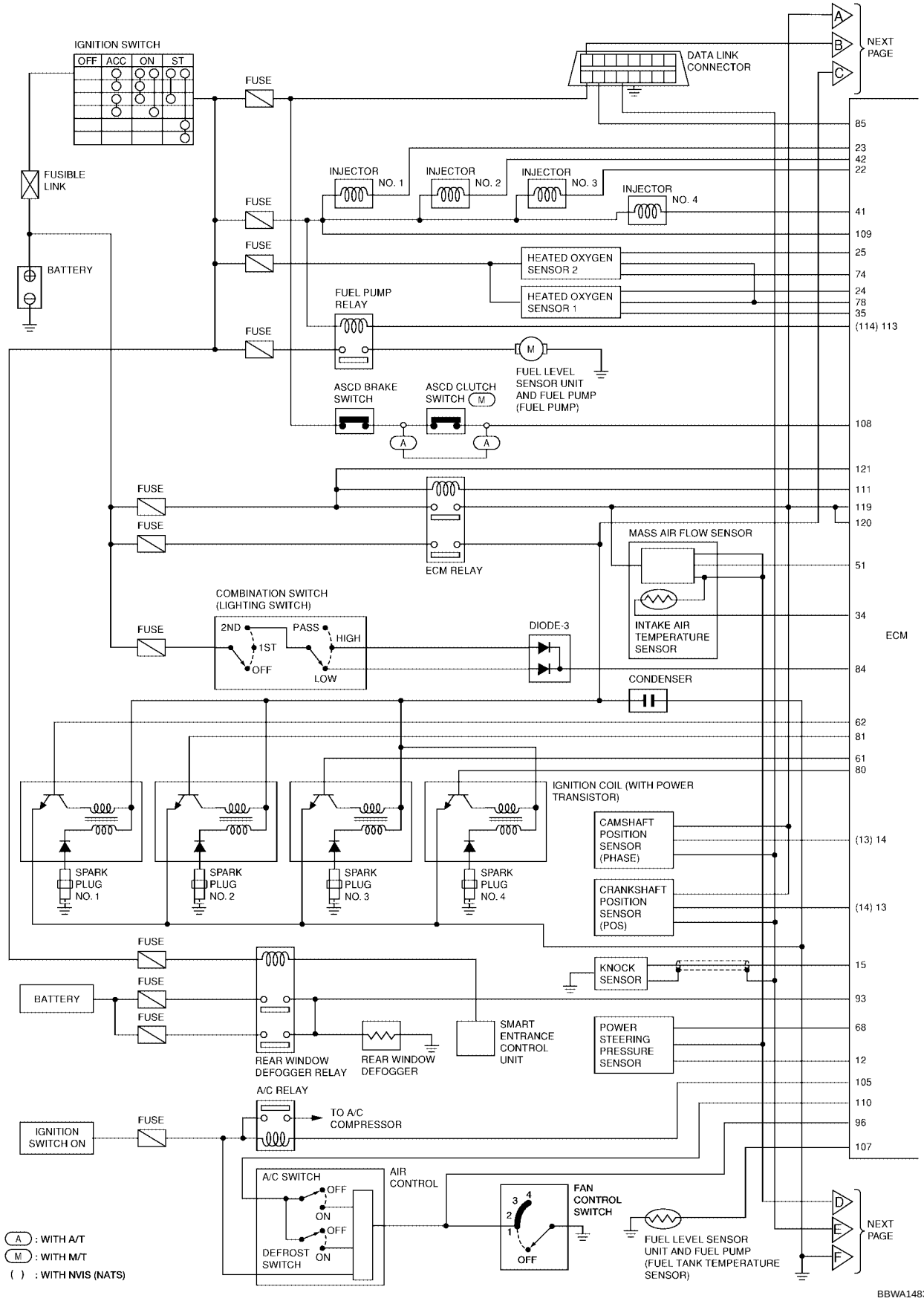
BBIA0286E

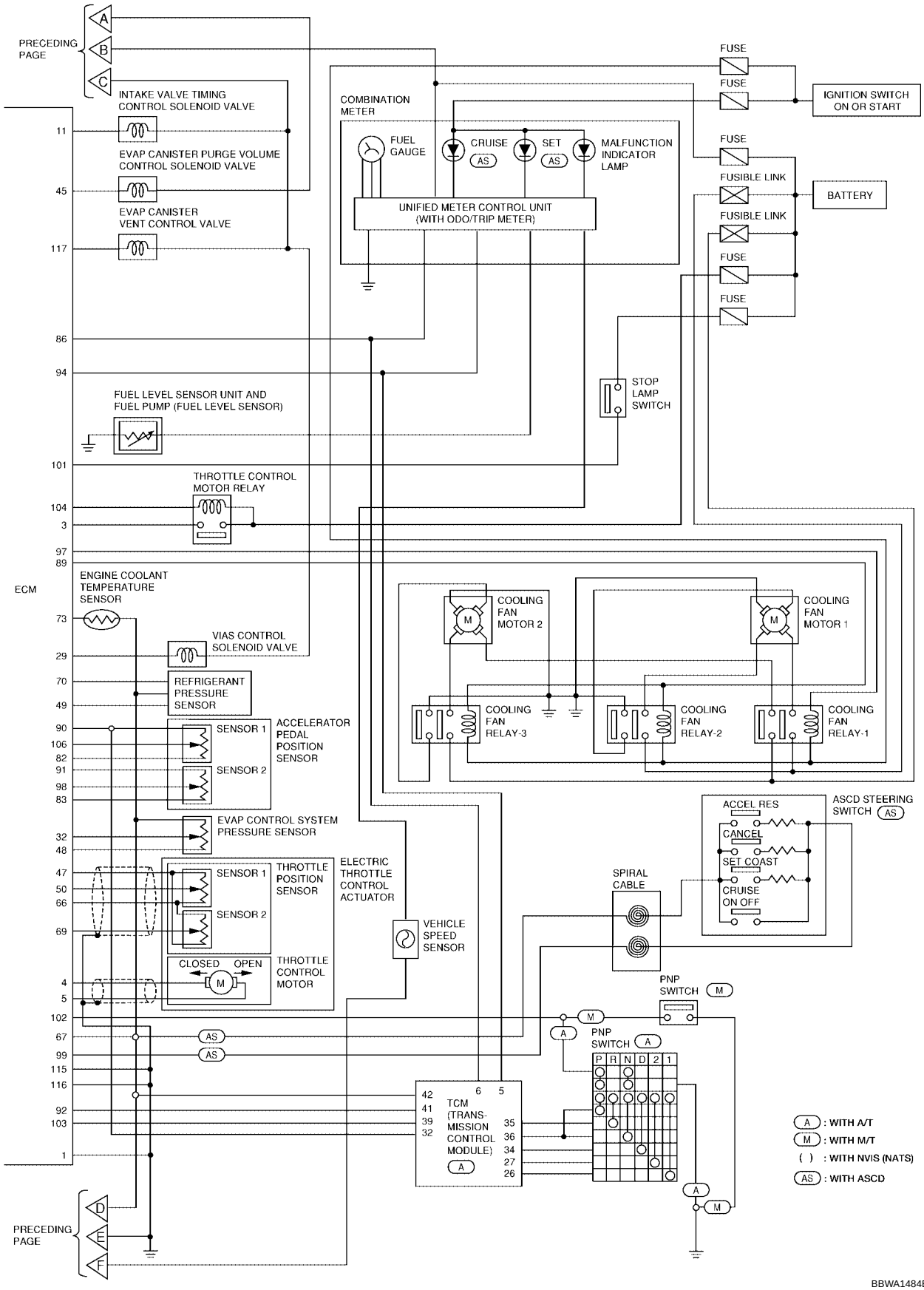
NOTE:
Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.
Refer to EC-670, "System Diagram" for Vacuum Control System.

Circuit Diagram

UBS00JA0

A/T MODELS ULEV AND M/T MODELS




PRECEDING PAGE
A
B
C
INTAKE VALVE TIMING CONTROL SOLENOID VALVE
11
EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE
45
EVAP CANISTER VENT CONTROL VALVE
117
86
94
FUEL LEVEL SENSOR UNIT AND FUEL PUMP (FUEL LEVEL SENSOR)
101
THROTTLE CONTROL MOTOR RELAY
104
3
97
89
ECM
ENGINE COOLANT TEMPERATURE SENSOR
73
VIAS CONTROL SOLENOID VALVE
29
REFRIGERANT PRESSURE SENSOR
70
49
ACCELERATOR PEDAL POSITION SENSOR
SENSOR 1
SENSOR 2
90
106
82
91
98
83
EVAP CONTROL SYSTEM PRESSURE SENSOR
32
48
ELECTRIC THROTTLE CONTROL ACTUATOR
THROTTLE POSITION SENSOR
SENSOR 1
SENSOR 2
47
50
66
69
THROTTLE CONTROL MOTOR
CLOSED
OPEN
4
5
102
VEHICLE SPEED SENSOR
67
AS
99
AS
115
116
92
103
1
TCM (TRANSMISSION CONTROL MODULE)
A
42
41
39
32
6
5
35
36
34
27
26
COMBINATION METER
FUEL GAUGE
CRUISE
AS
SET
AS
MALFUNCTION INDICATOR LAMP
UNIFIED METER CONTROL UNIT (WITH ODO/TRIP METER)
FUSE
FUSE
IGNITION SWITCH ON OR START
FUSE
FUSIBLE LINK
BATTERY
FUSIBLE LINK
FUSE
FUSE
STOP LAMP SWITCH
COOLING FAN MOTOR 2
COOLING FAN MOTOR 1
COOLING FAN RELAY-3
COOLING FAN RELAY-2
COOLING FAN RELAY-1
ACCEL RES
ASCD STEERING SWITCH
AS
CANCEL
SET COAST
CRUISE ON OFF
SPIRAL CABLE
PNP SWITCH
M
A
PNP SWITCH
A
P R N D 2 1
A
M
A : WITH A/T
M : WITH M/T
( ) : WITH NVIS (NATS)
AS : WITH ASCD
PRECEDING PAGE
D
E
F

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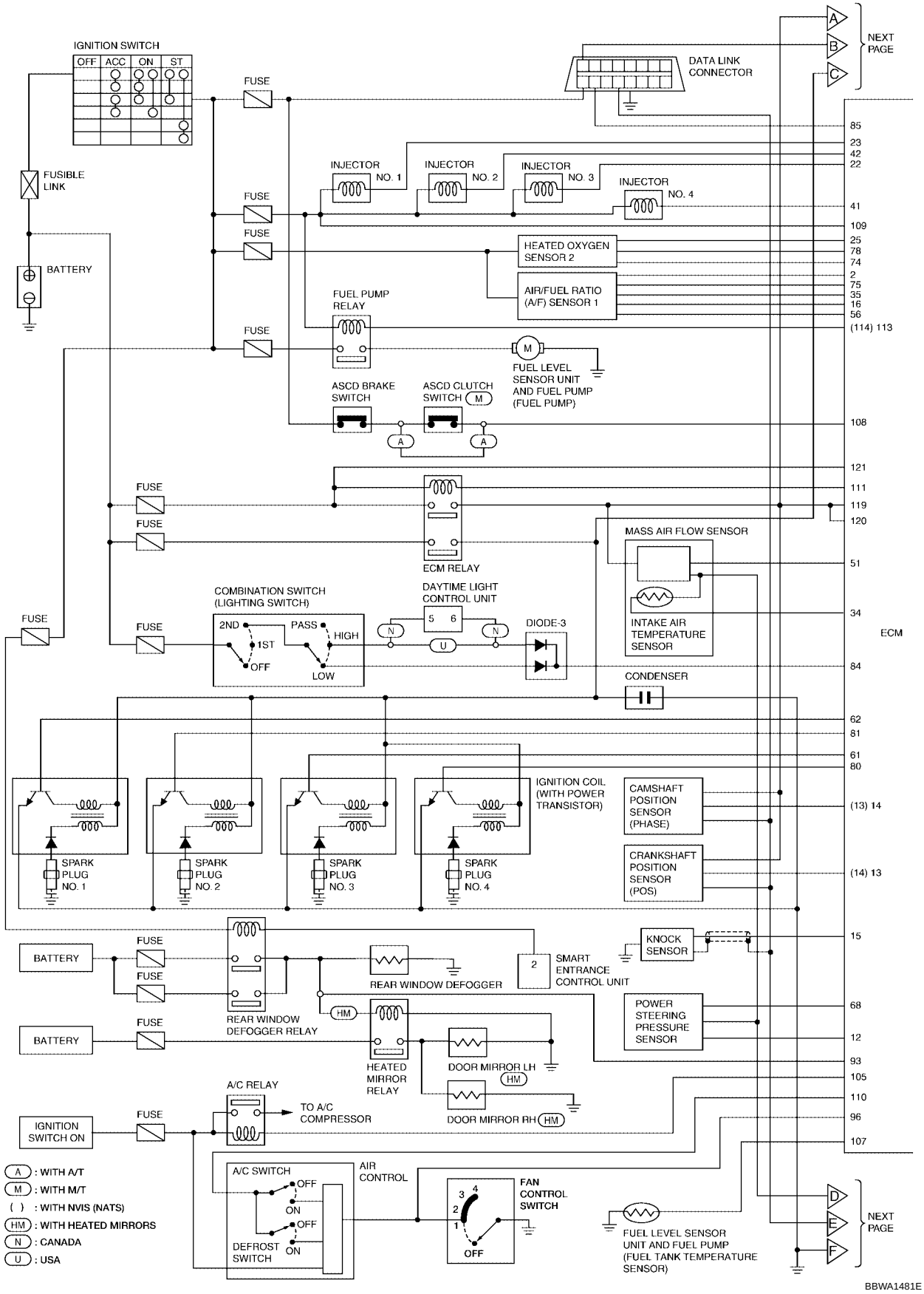
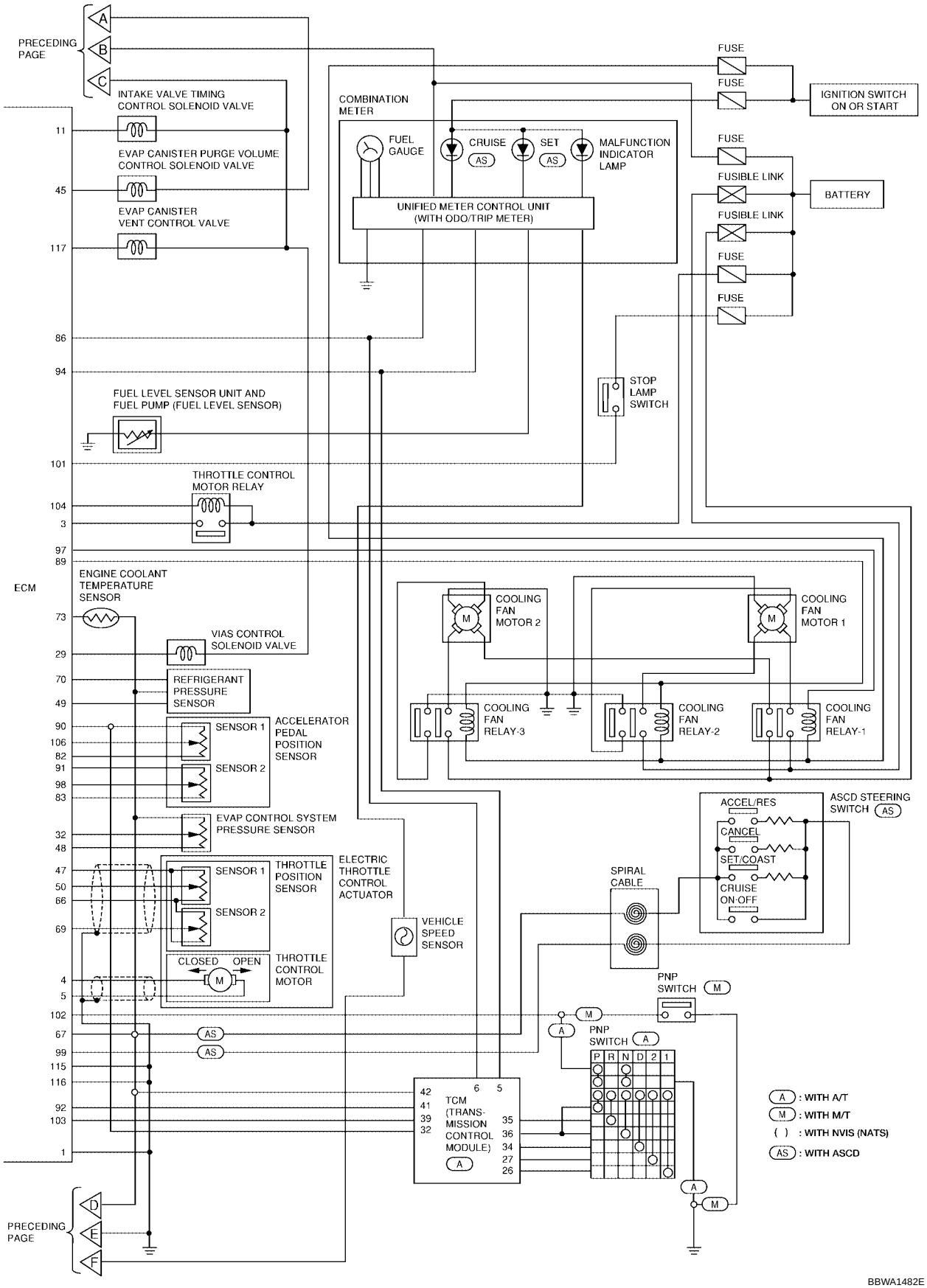
A/T MODELS EXCEPT ULEV




PRECEDING PAGE
A
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INTAKE VALVE TIMING CONTROL SOLENOID VALVE
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COOLING FAN RELAY-2
COOLING FAN RELAY-1
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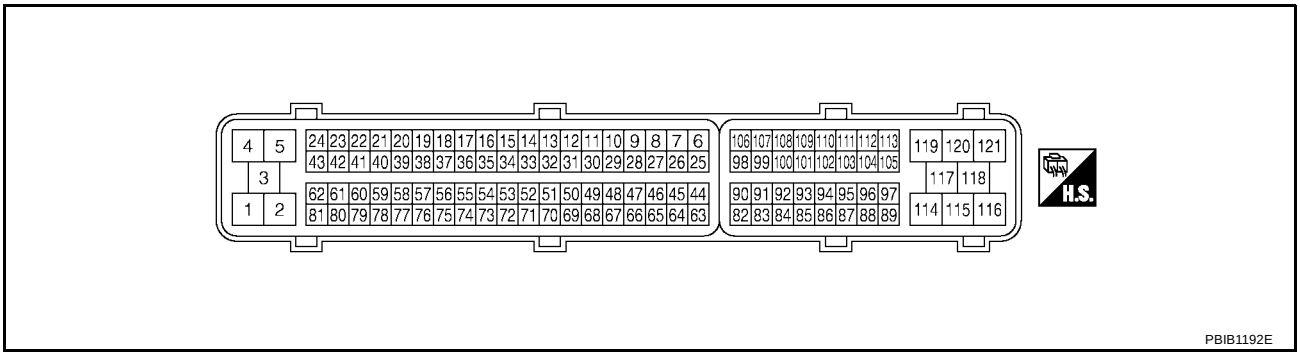
CANCEL
SET/COAST
CRUISE ON-OFF
ASCD STEERING SWITCH
SPIRAL CABLE
PNP SWITCH
P R N D 2 1
TCM (TRANSMISSION CONTROL MODULE)
42
41
39
32
35
36
34
27
26
6
5
: WITH A/T
: WITH M/T
( ) : WITH NVIS (NATS)
: WITH ASCD
PRECEDING PAGE
D
E
F
BBWA1482E

ECM Harness Connector Terminal Layout

UBS00JA1

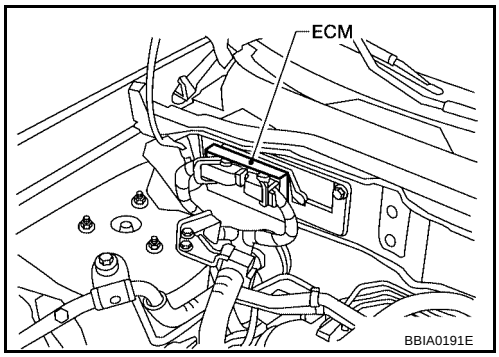


ECM Terminals and Reference Value

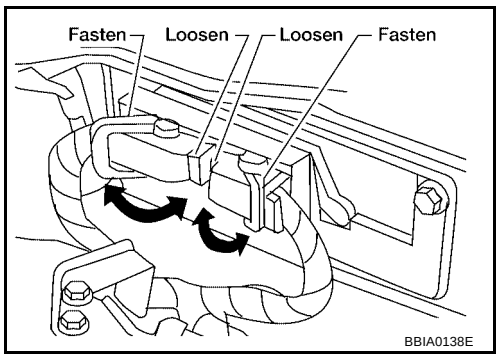
UBS00KJJ

PREPARATION

1. ECM is located in the right side of the cowl top (behind the strut tower).



2. Remove ECM harness protector.
3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown at right.
4. Connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.

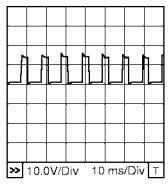


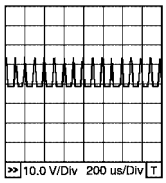
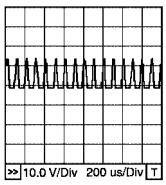
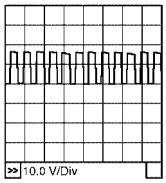
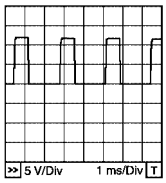
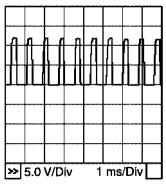
ECM INSPECTION TABLE

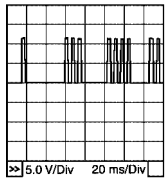
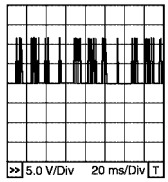
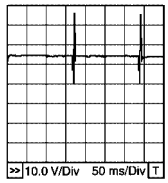
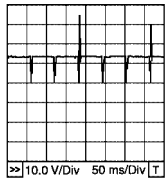
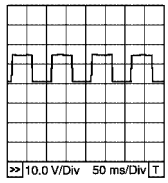
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

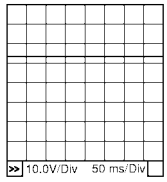
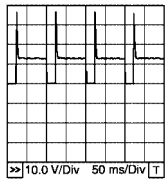
CAUTION:

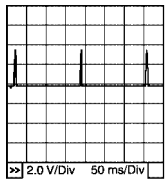
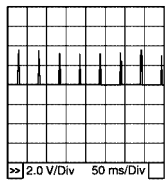
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
2*4	R	A/F sensor 1 heater	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	R/W	Throttle control motor power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	P	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB0534E
5	L	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB0533E
11	G/Y	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed 2,500 rpm	7 - 10V★  PBIB1790E
12	P	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned	0.4 - 0.8V
13*1 (14)*2	Y	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.0V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14*1 (13)*2	W/R	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm.	1.0 - 4.0V★  PBIB0526E
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
16*4	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35*4	B/Y			Approximately 2.6V
56*4	OR			2 - 3V
75*4	W/L			2 - 3V
22 23 41 42	G/B R/B L/B Y/B	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E
24*3	G/W	Heated oxygen sensor 1 heater	**[Engine is running]** ● **Warm-up condition.** ● Engine speed is below 3,600 rpm.	Approximately 7.0V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	W/B	Heated oxygen sensor 2 heater	**[Engine is running]** ● **Warm-up condition** ● Engine speed: Below 3,600 rpm after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under on load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped. **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)
29	Y/R	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm	0 - 1.0V
32	L	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V
34	Y/G	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.
35*3	B/Y	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
45	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed ● Accelerator pedal is not depressed even slightly, after engine starting*4	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E
47	B	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
48	R/W	Sensor power supply (EVAP control system pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
49	R/Y	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
51	L/R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.9 - 1.1V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.5 - 1.8V
61 62 80 81	L/W BR GY/R PU	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E
66	R	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	G/R	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
69	G	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
70	L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are ON (Compressor operates.)	1.0 - 4.0V
73	BR/W	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
74	R/L	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
82	B/Y	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	G	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
84	PU	Electrical load signal (Headlamp signal)	**[Lighting switch: ON]** ● Lighting switch: 2nd position	BATTERY VOLTAGE (11 - 14V)
			[Lighting switch: ON] ● Lighting switch: OFF	Approximately 0V
85	LG	DATA link connector	**[Ignition switch: ON]** ● CONSULT-II or GST is disconnected.	BATTERY VOLTAGE (11 - 14V)
86	Y	CAN communication line	**[Ignition switch: ON]**	Approximately 2.3V
89	LG/B	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is high speed operating	0 - 1.0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	R/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
93	L/W	Electrical load signal (Rear window defogger signal)	**[Ignition switch: ON]** ● Rear window defogger switch: ON	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Rear window defogger switch: OFF	Approximately 0V
94	L	CAN communication line	**[Ignition switch: ON]**	Approximately 2.8V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
96	Y/G	Electrical load signal (Heater fan switch)	**[Engine is running]** ● Heater fan switch: ON	Approximately 0V
			[Engine is running] ● Heater fan switch: OFF	Approximately 5V
97	LG/R	Cooling fan relay (Low)	**[Ignition switch: ON]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Cooling fan is operating	0 - 1.0V
98	R/B	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.28 - 0.48V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 2.0V
99	W/R	ASCD steering switch	**[Ignition switch: ON]** ● ASCD steering switch is OFF.	Approximately 4V
			[Ignition switch: ON] ● MAIN switch is ON.	Approximately 0V
			[Ignition switch: ON] ● CANCEL switch is ON.	Approximately 1V
			[Ignition switch: ON] ● SET/COAST switch is ON.	Approximately 2V
			[Ignition switch: ON] ● RESUME/ACCELERATE switch is ON.	Approximately 3V
101	R/G	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
102	G/OR	PNP switch	**[Ignition switch: ON]** ● Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above position	BATTERY VOLTAGE (11 - 14V)
104	P	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.65 - 0.87V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 4.3V
107	OR	Fuel tank temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with fuel tank temperature.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
108	P/L	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal: Slightly depressed (A/T) ● Brake pedal and/or clutch pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Fully released (A/T) ● Brake pedal and clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
109	B/R	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● A few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
113*1 (114)*2	B/P	Fuel pump relay	**[Ignition switch: ON]** ● For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.0V
			[Ignition switch: ON] ● More than 1 second after turning ignition switch ON.	BATTERY VOLTAGE (11 - 14V)
115 116	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
117	L/Y	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*1: Without NVIS (NATS).
*2: With NVIS (NATS).
*3: A/T models ULEV and M/T models.
*4: A/T models except ULEV.

CONSULT-II Function (ENGINE)

UBS00JA3

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*1
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output of the specification for Basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.

Diagnostic test mode	Function
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECM part number	ECM part number can be read.

*1 The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×	×			
		Camshaft position sensor (PHASE)		×		×	×			
		Mass air flow sensor		×		×	×			
		Engine coolant temperature sensor		×	×	×	×	×		
		Air fuel ratio (A/F) sensor 1*4		×		×			×	×
		Heated oxygen sensor 1*3		×		×	×		×	×
		Heated oxygen sensor 2		×		×	×		×	×
		Vehicle speed sensor		×	×	×	×			
		Accelerator pedal position sensor		×		×	×			
		Throttle position sensor		×		×	×			
		Fuel tank temperature sensor		×		×	×	×		
		EVAP control system pressure sensor		×		×	×			
		Intake air temperature sensor		×		×	×			
		Knock sensor		×						
		Refrigerant pressure sensor				×	×			
		Closed throttle position switch (accelerator pedal position sensor signal)				×	×			
		Air conditioner switch				×	×			
		Park/neutral position (PNP) switch		×		×	×			
		Stop lamp switch		×		×	×			
		Power steering pressure sensor		×		×	×			
		Battery voltage				×	×			
		Load signal				×	×			
		Fuel level sensor		×		×	×			
		ASCD steering switch		×		×	×			
		ASCD brake switch		×		×	×			
		ASCD clutch switch		×		×	×			

Item			DIAGNOSTIC TEST MODE							
			WORK SUP-PORT	SELF-DIAGNOSTIC RESULTS		DATA MONI-TOR	DATA MONI-TOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUP-PORT
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Injector				×	×	×		
		Power transistor (Ignition timing)				×	×	×		
		Throttle control motor relay		×		×	×			
		Throttle control motor		×						
		EVAP canister purge volume control solenoid valve		×		×	×	×		×
		Air conditioner relay				×	×			
		Fuel pump relay	×			×	×	×		
		Cooling fan relay		×		×	×	×		
		Air fuel ratio (A/F) sensor 1 heater*4		×		×	×		×	
		Heated oxygen sensor 1 heater*3		×		×	×		×	
		Heated oxygen sensor 2 heater		×		×	×		×	
		EVAP canister vent control valve	×	×		×	×	×		
		Intake valve timing control solenoid valve		×		×	×	×		
		VIAS control solenoid valve		×		×	×	×		
		Calculated load value			×	×	×			

X: Applicable

*1: This item includes 1st trip DTCs.

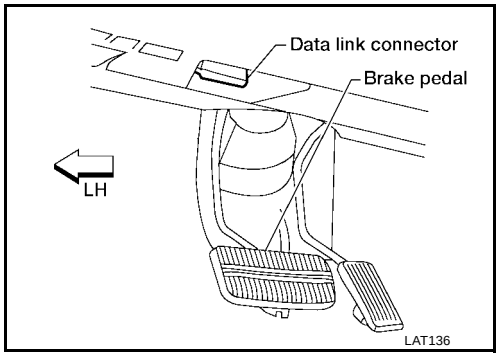
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-701 .

*3: A/T models ULEV and M/T models.

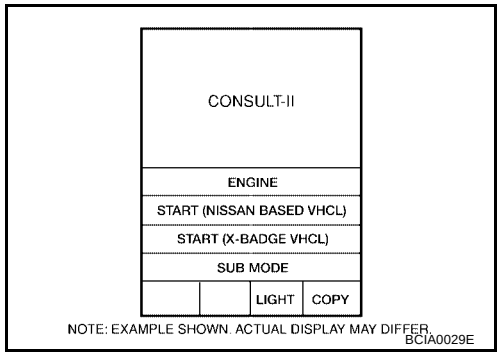
*4: A/T models except ULEV.

INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to data link connector, which is located under LH dash panel.
3. Turn ignition switch ON.

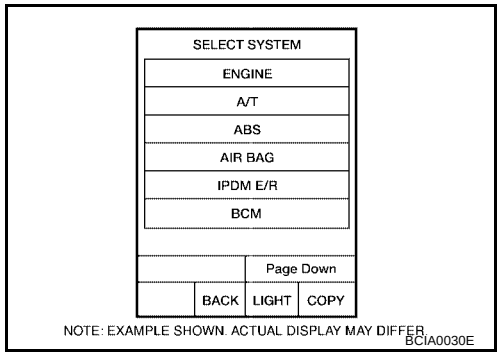


4. Touch “START” (NISSAN BASED VHCL).



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER
BCIA0029E

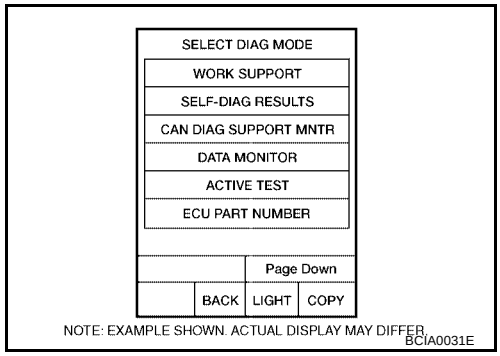
5. Touch “ENGINE”.
If “ENGINE” is not indicated, go to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER
BCIA0030E

6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER
BCIA0031E

WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	● FUEL PUMP WILL STOP BY TOUCHING START DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	● THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing the coefficient of self-learning control value

WORK ITEM	CONDITION	USAGE
EVAP SYSTEM CLOSE	CLOSE THE EVAP CANISTER VENT CONTROL VALVE IN ORDER TO MAKE EVAP SYSTEM CLOSE UNDER THE FOLLOWING CONDITIONS. ● IGN SW ON ● ENGINE NOT RUNNING ● AMBIENT TEMPERATURE IS ABOVE 0°C (32°F). ● NO VACUUM AND NO HIGH PRESSURE IN EVAP SYSTEM ● FUEL TANK TEMP. IS MORE THAN 0°C (32°F). ● WITHIN 10 MINUTES AFTER STARTING “EVAP SYSTEM CLOSE” ● WHEN TRYING TO EXECUTE “EVAP SYSTEM CLOSE” UNDER THE CONDITION EXCEPT ABOVE, CONSULT-II WILL DISCONTINUE IT AND DISPLAY APPROPRIATE INSTRUCTION. **NOTE:** **WHEN STARTING ENGINE, CONSULT-II MAY DISPLAY “BATTERY VOLTAGE IS LOW. CHARGE BATTERY”, EVEN IN USING CHARGED BATTERY.**	When detecting EVAP vapor leak point of EVAP system
VIN REGISTRATION	● IN THIS MODE, VIN IS REGISTERED IN ECM	When registering VIN in ECM
TARGET IDLE RPM ADJ*	● IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	● IDLE CONDITION	When adjusting target ignition timing

*: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of “DTC and 1st trip DTC”, refer to EC-697, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" .

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*[1]	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to EC-657, "INDEX FOR DTC" .)
FUEL SYS-B1	● “Fuel injection system status” at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. “Mode 2”: Open loop due to detected system malfunction “Mode 3”: Open loop due to driving conditions (power enrichment, deceleration enleanment) “Mode 4”: Closed loop - using oxygen sensor(s) as feedback for fuel control “Mode 5”: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	● “Long-term fuel trim” at the moment a malfunction is detected is displayed. ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	● “Short-term fuel trim” at the moment a malfunction is detected is displayed. ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.

Freeze frame data item*1	Description
B/FUEL SCHDL [msec]	● The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	● The intake air temperature at the moment a malfunction is detected is displayed.

*1: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE
Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the signals of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	● Accuracy becomes poor if engine speed drops below the idle rpm. ● If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor is displayed.	● When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]		×	● "Base fuel schedule" indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When the engine is stopped, a certain value is indicated. ● This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S [°C] or [°F]	×	×	● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	● When the engine coolant temperature sensor is open or short-circulated, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
A/F SEN1 (B1) [V]*2	×	×	● The A/F signal computed from the input signal of the A/F sensor 1 is displayed.	
HO2S1 (B1) [V]*1	×	×	● The signal voltage of the heated oxygen sensor 1 is displayed.	
HO2S2 (B1) [V]	×		● The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S1 MNTR (B1) [RICH/LEAN]*1	×	×	● Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH: Means the mixture became rich, and control is being affected toward a leaner mixture. LEAN: Means the mixture became lean, and control is being affected toward a rich mixture.	● After turning ON the ignition switch, "RICH" is displayed until air-fuel mixture ratio feedback control begins. ● When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S2 MNTR (B1) [RICH/LEAN]	×		● Display of heated oxygen sensor 2 signal: RICH... means the amount of oxygen after three way catalyst is relatively small. LEAN... means the amount of oxygen after three way catalyst is relatively large.	● When the engine is stopped, a certain value is indicated.

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
VHCL SPEED SE [km/h] or [mph]	×	×	● The vehicle speed computed from the vehicle speed signal sent from combination meter is displayed.	
BATTERY VOLT [V]	×	×	● The power supply voltage of ECM is displayed.	
ACCEL SEN 1 [V]	×	×	● The accelerator pedal position sensor signal voltage is displayed.	● ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2 [V]	×			
THRTL SEN 1 [V]	×	×	● The throttle position sensor signal voltage is displayed.	● THRTL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
THRTL SEN 2 [V]	×			
FUEL T/TEMP SE [°C] or [°F]	×		● The fuel temperature (determined by the signal voltage of the fuel tank temperature sensor) is displayed.	
VEHICLE SPEED [km/h] or [MPH]	×	×	● Indicates the vehicle speed computed from the revolution sensor signal.	
INT/A TEMP SE [°C] or [°F]	×	×	● The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
EVAP SYS PRES [V]	×		● The signal voltage of EVAP control system pressure sensor is displayed.	
FUEL LEVEL SE [V]	×		● The signal voltage of the fuel level sensor is displayed.	
START SIGNAL [ON/OFF]	×	×	● Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	● After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	×	×	● Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG [ON/OFF]	×	×	● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	×	×	● [ON/OFF] condition of the power steering system (determined by the power steering pressure sensor) signal voltage of the is indicated.	
LOAD SIGNAL [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the electrical load signal. ON... Rear window defogger switch is ON and/or lighting switch is in 2nd position. OFF... Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from ignition switch.	
HEATER FAN SW [ON/OFF]	×		● Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW [ON/OFF]	×		● Indicates [ON/OFF] condition from the stop lamp switch signal.	

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
INJ PULSE-B1 [msec]		×	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	● When the engine is stopped, a certain computed value is indicated.
IGN TIMING [BTDC]		×	● Indicates the ignition timing computed by ECM according to the input signals.	● When the engine is stopped, a certain value is indicated.
CAL/LD VALUE [%]			● “Calculated load value” indicates the value of the current airflow divided by peak airflow.	
MASS AIRFLOW [g·m/s]			● Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V [%]			● Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
INT/V TIM (B1) [°CA]			● Indicates [°CA] of intake camshaft advanced angle.	
INT/V SOL (B1) [%]			● The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signal) is indicated. ● The advance angle becomes larger as the value increases.	
VIAS S/V [ON/OFF]			● The control condition of the VIAS control solenoid valve (determined by ECM according to the input signals) is indicated. ON... VIAS control solenoid valve is operating. OFF... VIAS control solenoid valve is not operating.	
AIR COND RLY [ON/OFF]		×	● The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY [ON/OFF]		×	● Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
VENT CONT/V [ON/OFF]			● The control condition of the EVAP canister vent control valve (determined by ECM according to the input signals) is indicated. ON... Closed OFF... Open	
THRTL RELAY [ON/OFF]		×	● Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN [HI/LOW/OFF]			● Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI... High speed operation LOW... Low speed operation OFF... Stop	

Monitored item [Unit]	ECM INPUT SIG-NALS	MAIN SIG-NALS	Description	Remarks
HO2S1 HTR (B1) [ON/OFF]*1			● Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.	
HO2S2 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
IDL A/V LEARN [YET/ CMPLT]			● Display the condition of idle air volume learning YET... Idle Air Volume Learning has not been performed yet. CMPLT... Idle Air Volume Learning has already been performed successfully.	
TRVL AFTER MIL [km] or [mile]			● Distance traveled while MIL is activated.	
O2SEN HTR DTY [%]*1			● Indicates the heated oxygen sensor 1 heater control value computed by the ECM according to the input signals.	
A/F S1 HTR (B1) [%]*2			● Indicates A/F sensor 1 heater control value computed by ECM according to the input signals. ● The current flow to the heater becomes larger as the value increases.	
AC PRESS SEN [V]	×		● The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE [km/h] or [mph]			● The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
SET VHCL SPD [km/h] or [mph]			● The preset vehicle speed is displayed.	
MAIN SW [ON/OFF]			● Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW [ON/OFF]			● Indicates [ON/OFF] condition from CAN-CEL switch signal.	
RESUME/ACC SW [ON/OFF]			● Indicates [ON/OFF] condition from RESUME/ACCEL switch signal.	
SET SW [ON/OFF]			● Indicates [ON/OFF] condition from SET/ COAST switch signal.	
BRAKE SW1 [ON/OFF]			● Indicates [ON/OFF] condition from ASCD brake switch signal, and ASCD clutch switch signal (M/T models).	
BRAKE SW2 [ON/OFF]			● Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT [NON/CUT]			● Indicates the vehicle cruise condition. NON... Vehicle speed is maintained at the ASCD set speed. CUT...Vehicle speed increased to excessively high compared with the ASCD set speed, and ASCD operation is cut off.	

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
LO SPEED CUT [NON/CUT]			● Indicates the vehicle cruise condition. NON... Vehicle speed is maintained at the ASCD set speed. CUT...Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
AT OD MONITOR [ON/OFF]			● Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM.	● For M/T models always “OFF” is displayed.
AT OD CANCEL [ON/OFF]			● Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM.	● For M/T models always “OFF” is displayed.
CRUISE LAMP [ON/OFF]			● Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP [ON/OFF]			● Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
Voltage [V]			● Voltage, frequency, duty cycle or pulse width measured by the probe.	● Only “#” is displayed if item is unable to be measured. ● Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequency [msec], [Hz] or [%]				
DUTY-HI				
DUTY-LOW				
PLS WIDTH-HI				
PLS WIDTH-LOW				

*1: A/T models ULEV and M/T models.
*2: A/T models except ULEV.

DATA MONITOR (SPEC) MODE
Monitored Item

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
ENG SPEED [rpm]	×		● Indicates the engine speed computed from the signal of the crankshaft position sensor (POS).	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor specification is displayed.	● When engine is running specification range is indicated.
B/FUEL SCHDL [msec]			● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	● When engine is running specification range is indicated.
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When engine is running specification range is indicated. ● This data also includes the data for the air-fuel ratio learning control.

NOTE:
- Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	● Engine: Return to the original trouble condition ● Change the amount of fuel injection using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Fuel injector ● Heated oxygen sensor 1*1 ● Air fuel ratio (A/F) sensor 1*2
IGNITION TIMING	● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Perform Idle Air Volume Learning.
POWER BALANCE	● Engine: After warming up, idle the engine. ● A/C switch OFF ● Shift lever P or N (A/T), Neutral (M/T) ● Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injector ● Power transistor ● Spark plug ● Ignition coil
COOLING FAN	● Ignition switch: ON ● Turn the cooling fan “LOW”, “HI” and “OFF” with CONSULT-II.	Cooling fan moves and stops.	● Harness and connectors ● Cooling fan relay ● Cooling fan motor
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injector
FUEL PUMP RELAY	● Ignition switch: ON (Engine stopped) ● Turn the fuel pump relay ON and OFF using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	● Harness and connectors ● Fuel pump relay
VIAS SOL VALVE	● Ignition switch: ON ● Turn solenoid valve ON and OFF with CONSULT-II and listen for operating sound.	Solenoid valve makes an operating sound.	● Harness and connectors ● Solenoid valve
PURG VOL CONT/V	● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connectors ● Solenoid valve
FUEL/T TEMP SEN	● Change the fuel tank temperature using CONSULT-II.		
VENT CONTROL/V	● Ignition switch: ON (Engine stopped) ● Turn solenoid valve “ON” and “OFF” with the CONSULT-II and listen to operating sound.	Solenoid valve makes an operating sound.	● Harness and connectors ● Solenoid valve
V/T ASSIGN ANGLE	● Engine: Return to the original trouble condition ● Change intake valve timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Intake valve timing control solenoid valve

*1: A/T models ULEV and M/T models.
*2: A/T models except ULEV.

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to EC-701, "SYSTEM READINESS TEST (SRT) CODE" .

SRT WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC WORK SUPPORT Mode

Test mode	Test item	Condition	Reference page
EVAPORATIVE SYSTEM	PURGE FLOW P0441	Refer to corresponding trouble diagnosis for DTC.	EC-1014
	EVAP SML LEAK P0442/P1442*1		EC-1020
	EVAP V/S SML LEAK P0456/P1456*1		EC-1067
	PURG VOL CN/V P1444		EC-1232
HO2S1*2	HO2S1 (B1) P0133		EC-910
	HO2S1 (B1) P0134		EC-920
	HO2S1 (B1) P1143		EC-1129
	HO2S1 (B1) P1144		EC-1135
A/F SEN1*3	A/F SEN1 (B1) P1276		EC-1207
	A/F SEN1 (B1) P1278		EC-1214
	A/F SEN1 (B1) P1279		EC-1223
HO2S2	HO2S2 (B1) P0139		EC-933
	HO2S2 (B1) P1146		EC-1141
	HO2S2 (B1) P1147		EC-1149

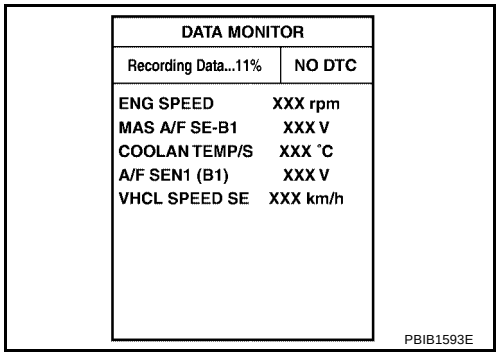
*1: DTC P1442 and P1456 does not apply to B15 models but appears in DTC WORK SUPPORT Mode screens.
*2: A/T models ULEV and M/T models.
*3: A/T models except ULEV.

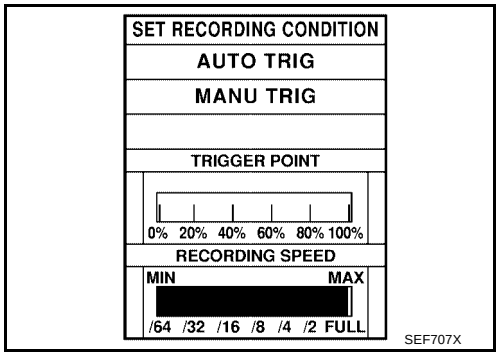
REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

Description

CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

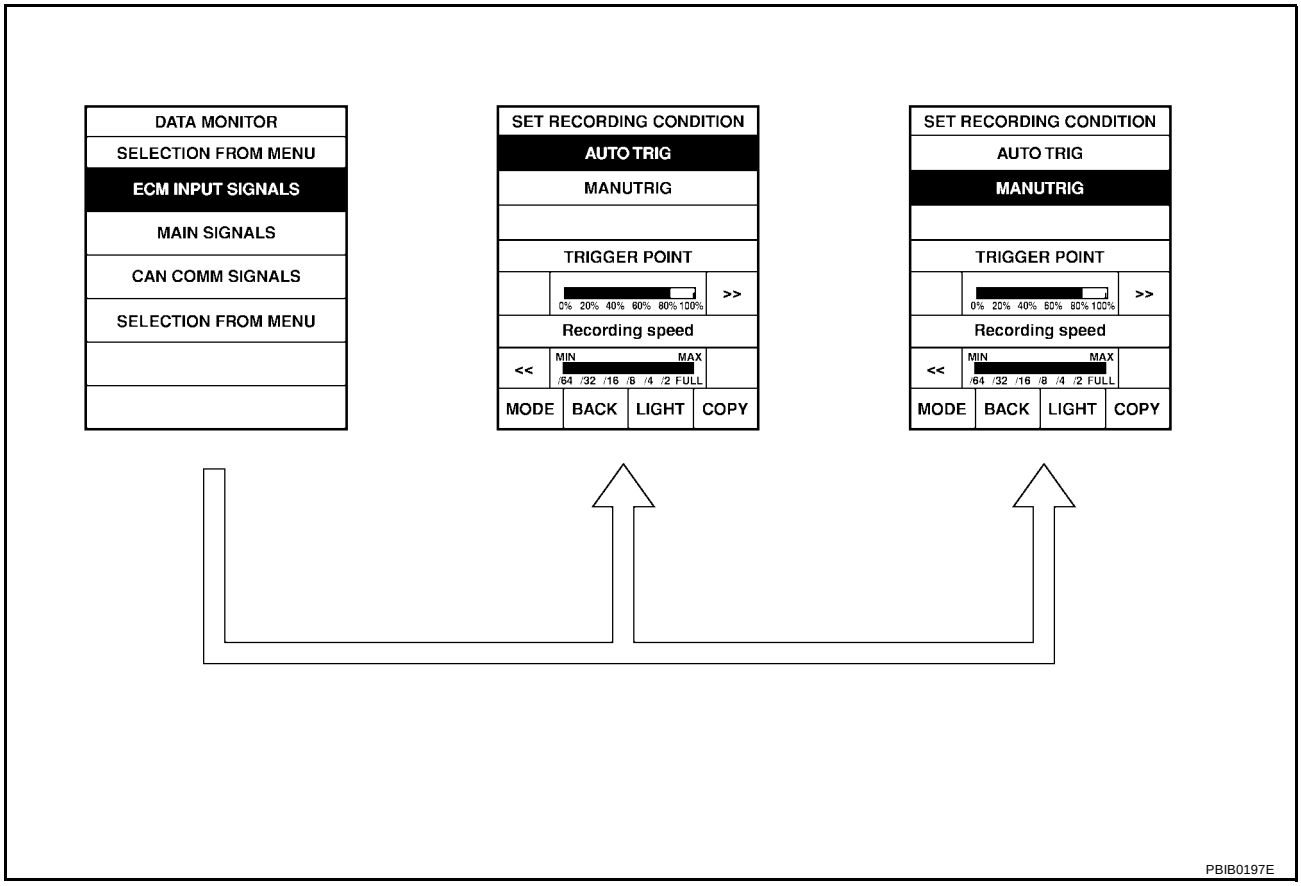
1. “AUTO TRIG” (Automatic trigger):
   - The malfunction will be identified on the CONSULT-II screen in real time.
     In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
     At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown at right, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed.
     The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II Operation Manual.
2. “MANU TRIG” (Manual trigger):
   - DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
     DATA MONITOR can be performed continuously even though a malfunction is detected.





Operation

1. “AUTO TRIG”
   - While trying to detect the DTC/1st trip DTC by performing the DTC Confirmation Procedure, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.
   - While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.
     When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the DTC Confirmation Procedure, the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to “Incident Simulation Tests” in GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" .)
2. “MANU TRIG”
   - If the malfunction is displayed as soon as “DATA MONITOR” is selected, reset CONSULT-II to “MANU TRIG”. By selecting “MANU TRIG” you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.



Generic Scan Tool (GST) Function

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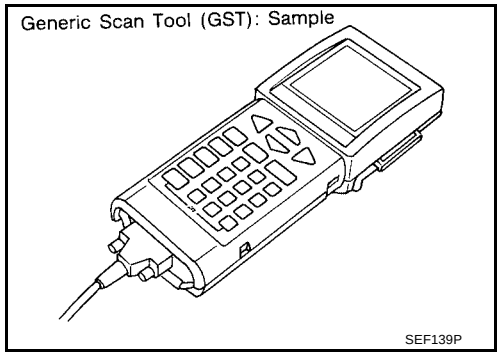
DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with SAE J1978 has 8 different functions explained below.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



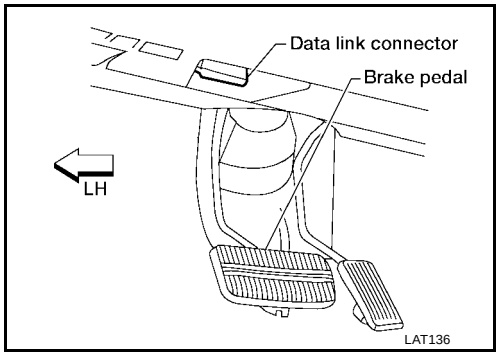
FUNCTION

Diagnostic service		Function
Service $01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service $02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-701, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .
Service $03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.

Diagnostic service		Function
Service $04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (Service $01) ● Clear diagnostic trouble codes (Service $03) ● Clear trouble code for freeze frame data (Service $01) ● Clear freeze frame data (Service $02) ● Reset status of system monitoring test (Service $01) ● Clear on board monitoring test results (Service $06 and $07)
Service $06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service $07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service $08	—	This diagnostic service can close EVAP system in ignition switch ON position (Engine stopped). When this diagnostic service is performed, EVAP canister vent control valve can be closed. In the following conditions, this diagnostic service cannot function. ● Low ambient temperature ● Low battery voltage ● Engine running ● Ignition switch OFF ● Low fuel temperature ● Too much pressure is applied to EVAP system
Service $09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

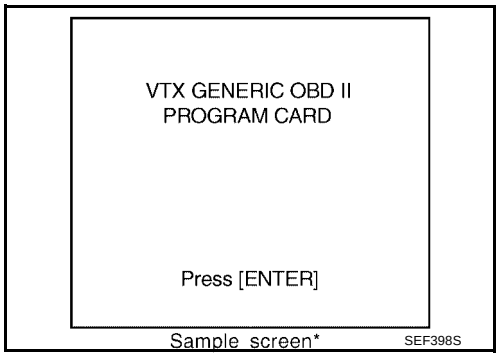
INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect GST to data link connector, which is located under LH dash panel near the fuse box cover.
3. Turn ignition switch ON.



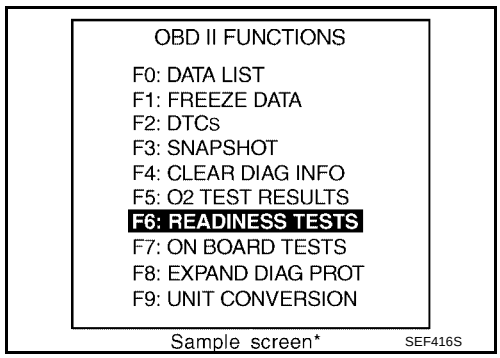
4. Enter the program according to instruction on the screen or in the operation manual.

(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic service according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.



CONSULT-II Reference Value in Data Monitor Mode

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Remarks:
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
  * Specification data may not be directly related to their components signals/values/operations.
  i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	● Run engine and compare the CONSULT-II value with tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	● See EC-813, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
B/FUEL SCHDL	● See EC-813, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
A/F ALPHA-B1	● See EC-813, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1)*2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
A/F SEN1 (B1)*3	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V
HO2S2 (B1)	● Warm-up condition ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	Revving engine from idle to 3,000 rpm quickly.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)*2	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.
HO2S2 MNTR (B1)	● Engine: After warming up ● After keeping engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	Revving engine from idle to 3,000 rpm quickly.	LEAN ←→ RICH
VEH SPEED SE	● Turn drive wheels and compare the CONSULT-II value with speedometer indication.		Almost the same speed as the speedometer indication.
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1ST (M/T)	Accelerator pedal: Fully released	0.65 - 0.87V
		Accelerator pedal: Fully depressed	More than 4.3V
ACCEL SEN 2*1	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1ST (M/T)	Accelerator pedal: Fully released	0.56 - 0.96V
		Accelerator pedal: Fully depressed	More than 4.0V
THRTL SEN 1 THRTL SEN 2*1	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1ST (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V
EVAP SYS PRES	● Ignition switch: ON		1.8 - 4.8V

MONITOR ITEM	CONDITION		SPECIFICATION
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above position	OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is not being turned. (Forward direction)	OFF
		Steering wheel is being turned.	ON
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd.	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF
IGNITION SW	● Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	● Engine: After warming up, idle the engine	Heater fan is operating.	ON
		Heater fan is not operating	OFF
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	10° - 20° BTDC
		2,000 rpm	25° - 45° BTDC
CAL/LD VALUE	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s
PURG VOL C/V	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)*3	0%
		2,000 rpm	20 - 30%
INT/V TIM (B1)	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 20°CA

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		2,000 rpm	Approx. 25% - 60%
AIR COND RLY	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
VIAS S/V	● Engine: After warming up	Idle	OFF
		More than 5,000 rpm	ON
FUEL PUMP RLY	● For 1 seconds after turning ignition switch ON ● Engine running or cranking		ON
	● Except above conditions		OFF
VENT CONT/V	● Ignition switch: ON		OFF
THRTL RELAY	● Ignition switch: ON		ON
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH
HO2S1 HTR (B1)*2	● Engine: After warming up ● Engine speed: Below 3,600 rpm		ON
	● Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1)	● Engine speed: Below 3,600 rpm after the following conditions are met ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.		ON
	● Engine speed: Above 3,600 rpm		OFF
TRVL AFTER MIL	● Ignition switch: ON	Vehicle has traveled after MIL has turned ON.	0 - 65,535 km (0 - 40,723 mile)
A/F S1 HTR (B1)*3	● Engine: After warming up, idle the engine		0 - 100%
O2SEN HTR DTY*2	● Engine coolant temperature when engine started: More than 80°C (176°F) ● Engine speed: Below 3,600 rpm		Approx. 50%
AC PRESS SEN	● Ignition switch: ON (Engine stopped)		Approx. 0V
	● Engine: Idle ● Air conditioner switch: OFF		1.0 - 4.0V
VEH SPEED SE	● Turn drive wheels and compare the CONSULT-II value with speedometer indication.		Almost the same speed as the speedometer indication.
SET VHCL SPD	● Engine: Running	ASCD: Operating	The preset vehicle speed is displayed.
MAIN SW	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	● Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF

MONITOR ITEM	CONDITION		SPECIFICATION
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	● Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1 (ASCD brake switch)	● Ignition switch: ON	Clutch pedal (M/T) and brake pedal: Fully released	ON
		Clutch pedal and/or brake pedal: Slightly depressed	OFF
BRAKE SW2 (STOP lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
CRUISE LAMP	● Ignition switch: ON	MAIN switch is pressed at 1st time → 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● When vehicle is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD is operating	ON
		ASCD is not operating	OFF

*1: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.
*2: A/T models ULEV and M/T models.
*3: A/T models except ULEV.

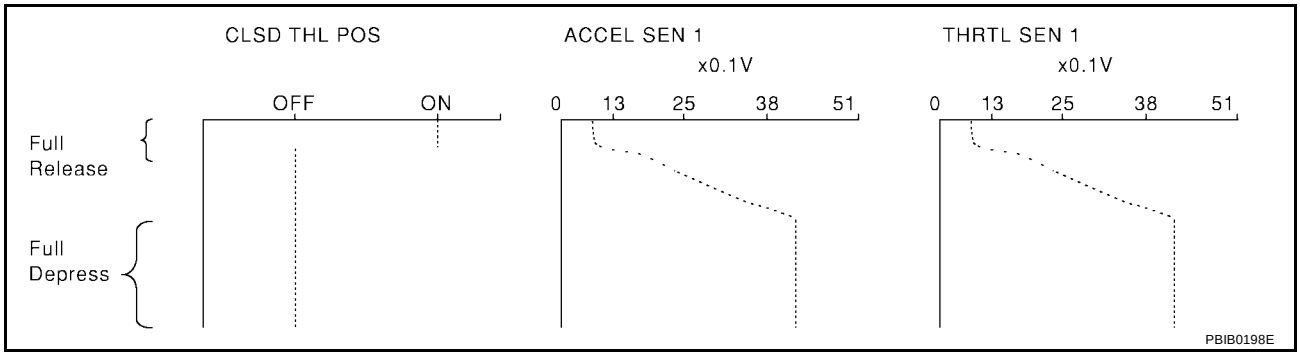
Major Sensor Reference Graph in Data Monitor Mode

UBS00KJL

The following are the major sensor reference graphs in “DATA MONITOR” mode.

CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

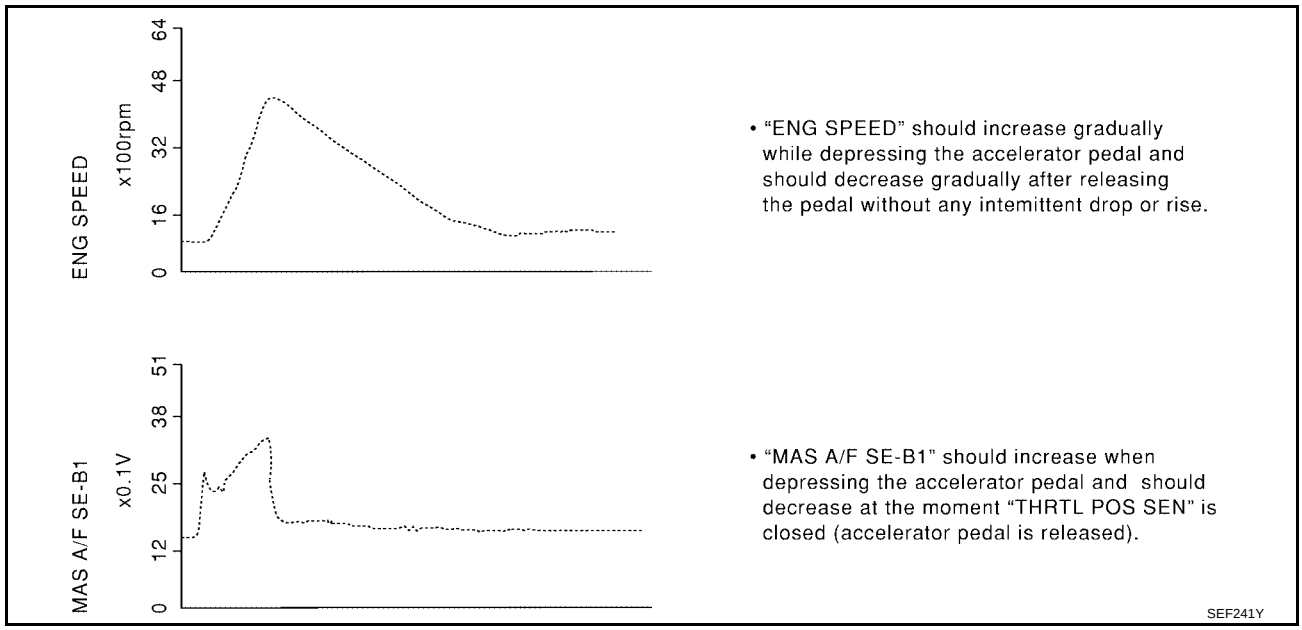
Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch ON and with shift lever in D position (A/T), 1st position (M/T).
The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from “ON” to “OFF”.

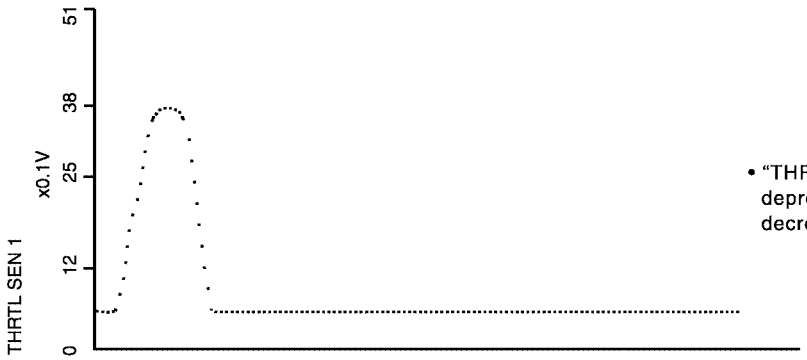


ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1(A/T MODELS ULEV AND M/T MODELS)

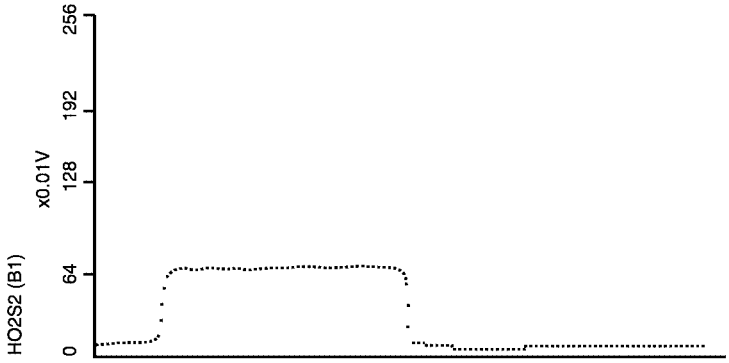
Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL SEN 1”, “HO2S2 (B1)”, “HO2S1 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.

Each value is for reference, the exact value may vary.

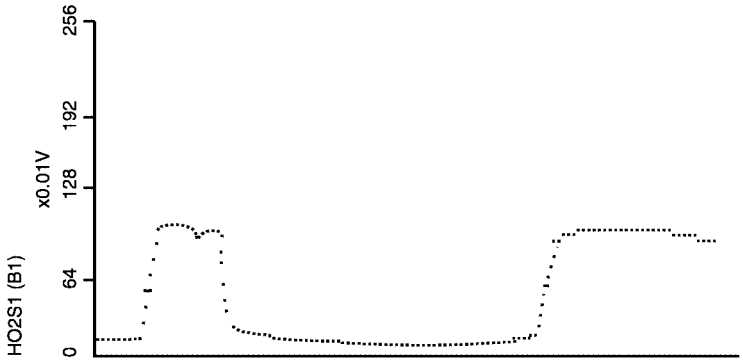




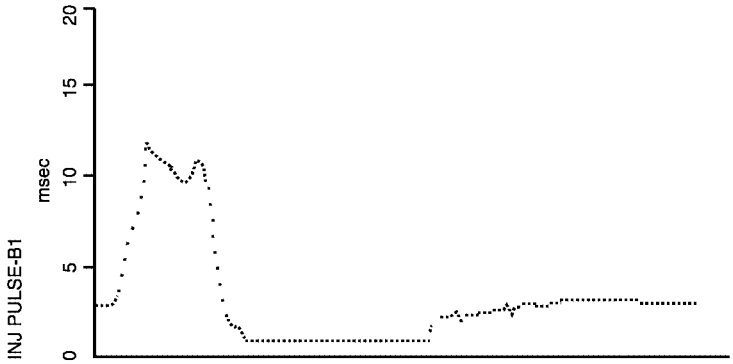
- "THRTL SEN 1" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

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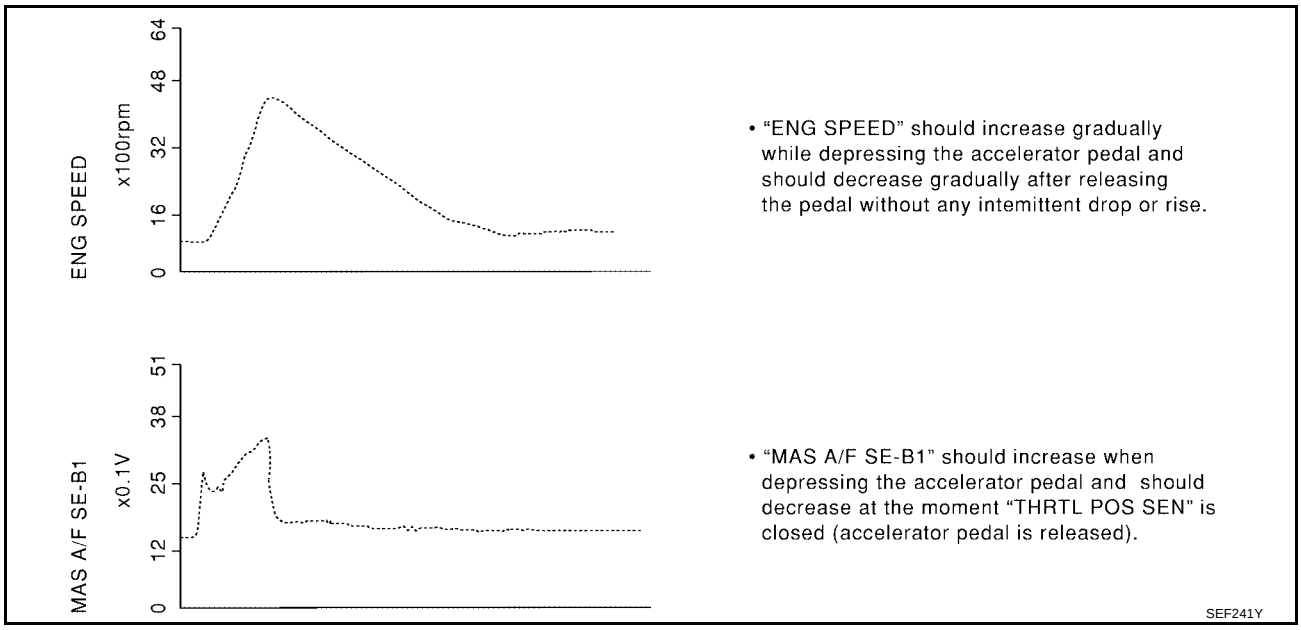
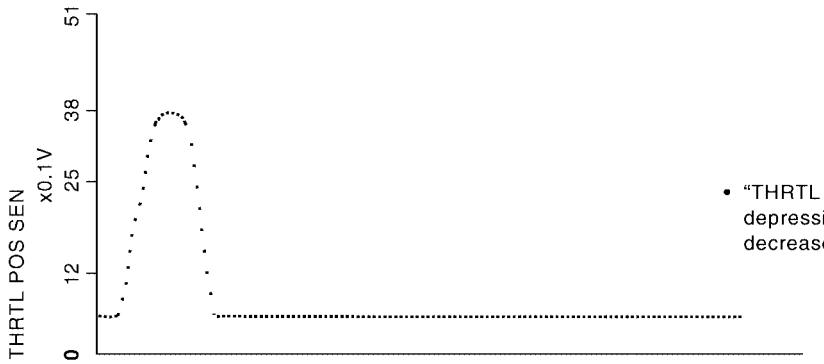
ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), INJ PULSE-B1(A/T MODELS EXCEPT ULEV)

Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL SEN 1”, “HO2S2 (B1)”, “HO2S1 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.

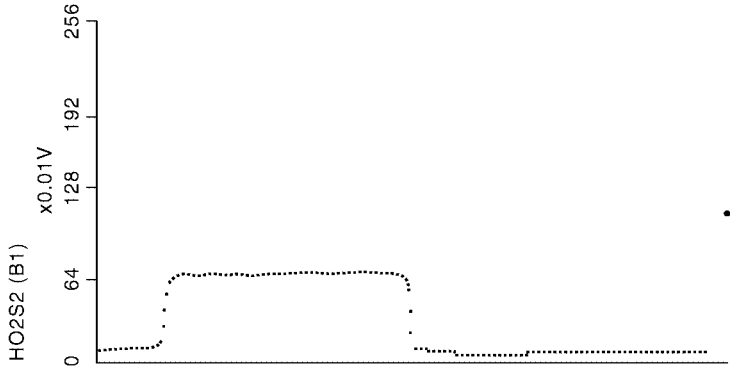
Each value is for reference, the exact value may vary.



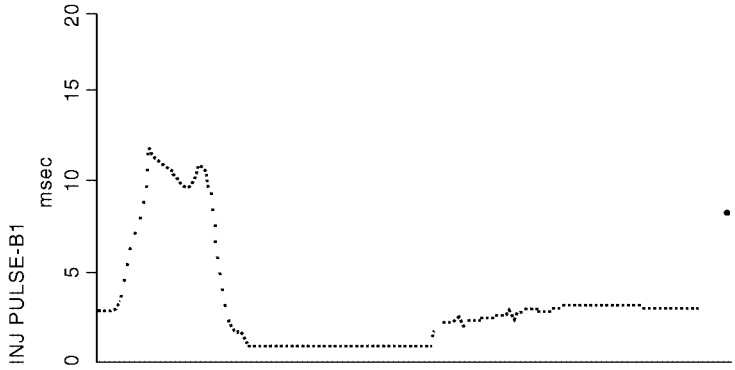
- “ENG SPEED” should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intemittent drop or rise.
- “MAS A/F SE-B1” should increase when depressing the accelerator pedal and should decrease at the moment “THRTL POS SEN” is closed (accelerator pedal is released).



- "THRTL SEN1" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

PBIB1594E

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

UBS00JA7

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.
The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

UBS00JA8

- Vehicle driven distance: More than 5,000 km (3,017 miles)
- Barometric pressure: 98.3 - 104.3 kPa (1.003 - 1.064 kg/cm^2 , 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Transmission: Warmed-up*1
- Electrical load: Not applied*2
- Engine speed: Idle

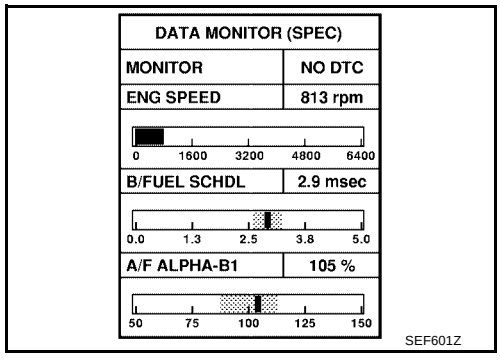
*1: For A/T models, after the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
For M/T models, after the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
*2: Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

Inspection Procedure

UBS00JA9

NOTE:
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

1. Perform EC-721, "Basic Inspection" .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-814, "Diagnostic Procedure (A/T Models ULEV and M/T Models)" , EC-823, "Diagnostic Procedure (A/T Models except ULEV)" .

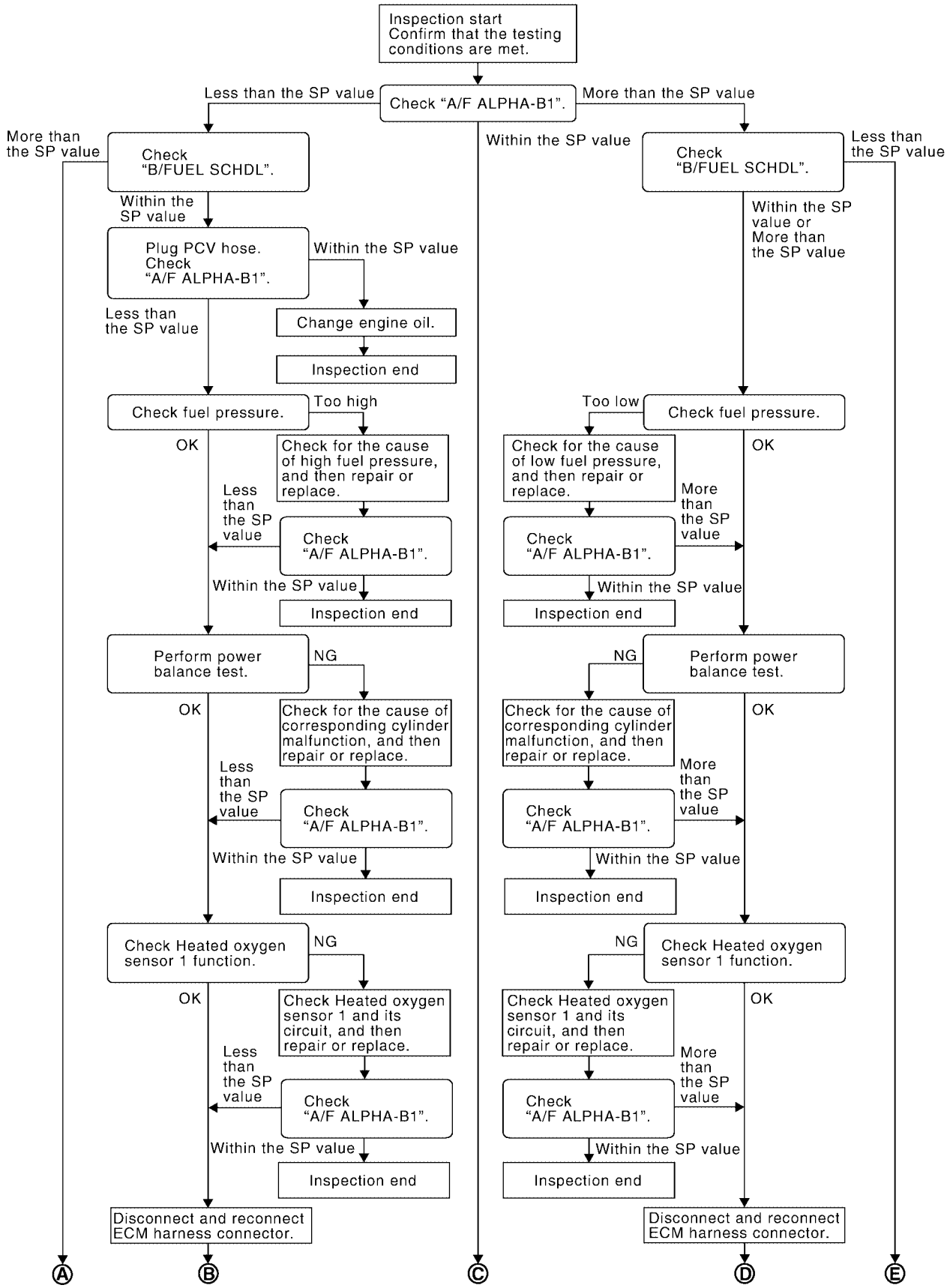


SEF601Z

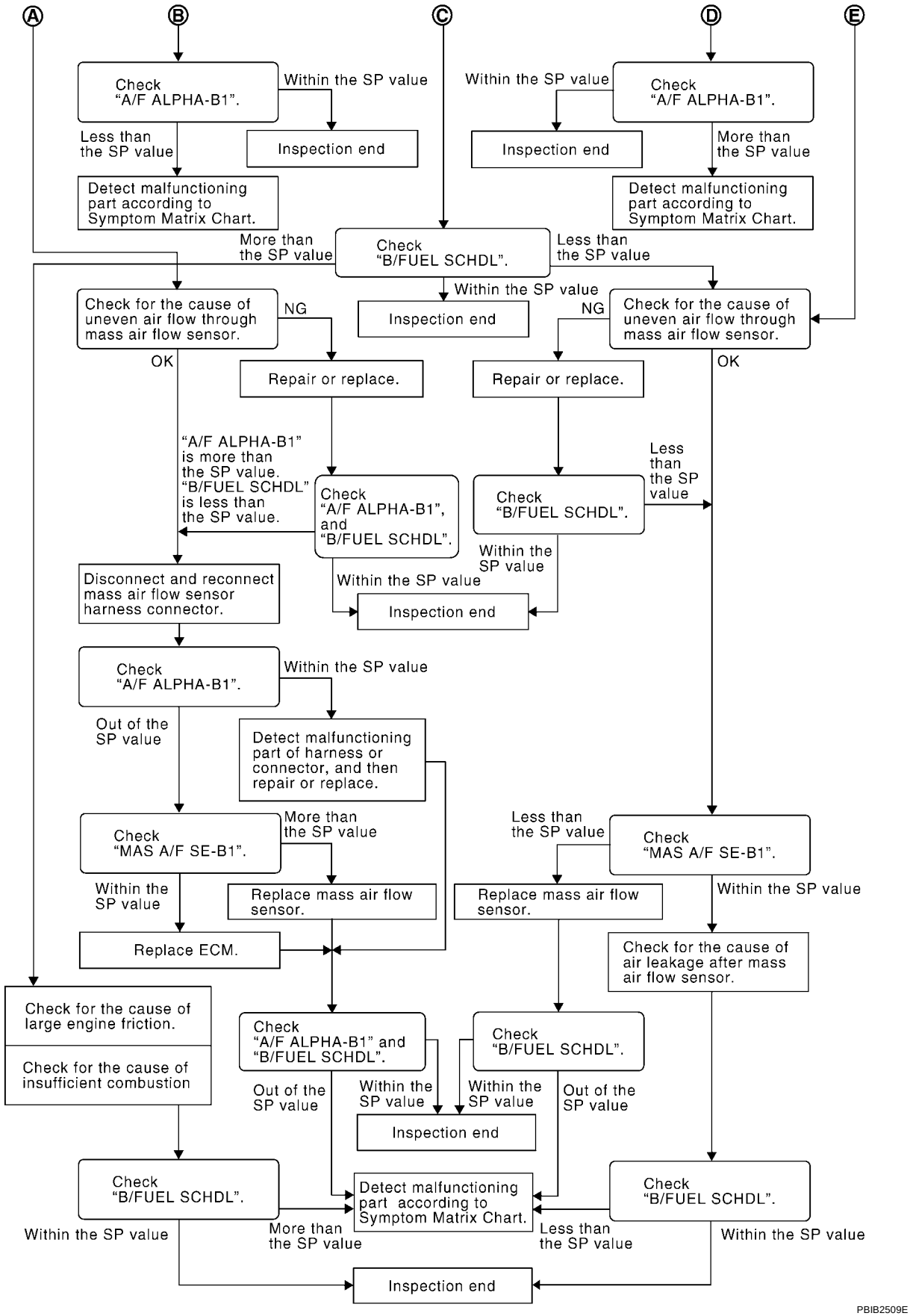
Diagnostic Procedure (A/T Models ULEV and M/T Models)

UBS00JAA

OVERALL SEQUENCE



PBIB2384E

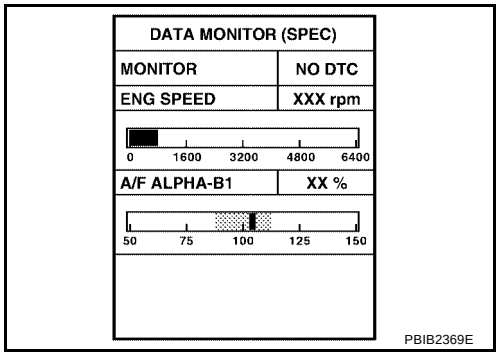

Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Check "A/F ALPHA-B1".
Within the SP value
Less than the SP value
Inspection end
Detect malfunctioning part according to Symptom Matrix Chart.
Within the SP value
Check "A/F ALPHA-B1".
Inspection end
More than the SP value
Detect malfunctioning part according to Symptom Matrix Chart.
More than the SP value
Check "B/FUEL SCHDL".
Less than the SP value
Within the SP value
Inspection end
Check for the cause of uneven air flow through mass air flow sensor.
NG
OK
Repair or replace.
NG
Check for the cause of uneven air flow through mass air flow sensor.
OK
Repair or replace.
"A/F ALPHA-B1" is more than the SP value. "B/FUEL SCHDL" is less than the SP value.
Check "A/F ALPHA-B1", and "B/FUEL SCHDL".
Check "B/FUEL SCHDL".
Less than the SP value
Within the SP value
Within the SP value
Inspection end
Disconnect and reconnect mass air flow sensor harness connector.
Check "A/F ALPHA-B1".
Within the SP value
Out of the SP value
Detect malfunctioning part of harness or connector, and then repair or replace.
Check "MAS A/F SE-B1".
More than the SP value
Within the SP value
Replace mass air flow sensor.
Replace ECM.
Less than the SP value
Check "MAS A/F SE-B1".
Replace mass air flow sensor.
Within the SP value
Check for the cause of air leakage after mass air flow sensor.
Check for the cause of large engine friction.
Check for the cause of insufficient combustion
Check "A/F ALPHA-B1" and "B/FUEL SCHDL".
Out of the SP value
Within the SP value
Within the SP value
Check "B/FUEL SCHDL".
Out of the SP value
Inspection end
Check "B/FUEL SCHDL".
Within the SP value
More than the SP value
Detect malfunctioning part according to Symptom Matrix Chart.
Less than the SP value
Check "B/FUEL SCHDL".
Within the SP value
Inspection end
PBIB2509E

DETAILED PROCEDURE

1. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-813, "Testing Condition" .
3. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

   NOTE:
   Check “A/F ALPHA-B1” for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

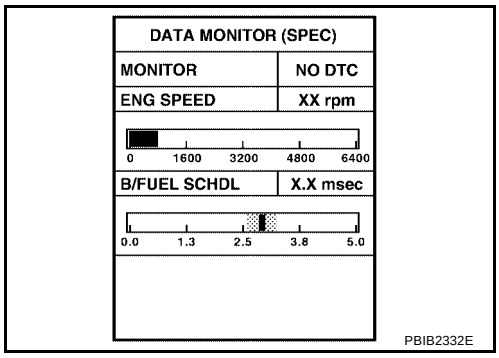


OK or NG

OK >> GO TO 17.
NG (Less than the SP value)>>GO TO 2.
NG (More than the SP value)>>GO TO 3.

2. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

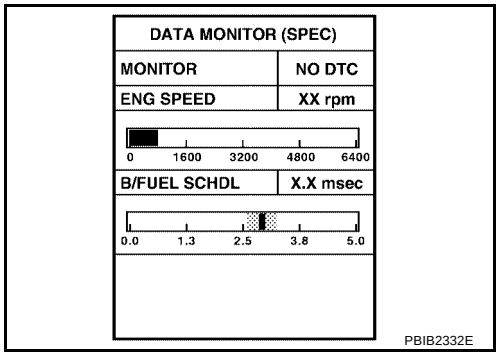


OK or NG

OK >> GO TO 4.
NG (More than the SP value)>>GO TO 19.

3. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.



OK or NG

OK >> GO TO 6.
NG (More than the SP value)>>GO TO 6.
NG (Less than the SP value)>>GO TO 25.

4. CHECK “A/F ALPHA-B1”

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 5.
NG >> GO TO 6.

5. CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil.

NOTE:
This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> **INSPECTION END**

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-752, "FUEL PRESSURE CHECK" .)

OK or NG

OK >> GO TO 9.
NG (Fuel pressure is too high)>>Replace fuel pressure regulator, refer to EC-752 . GO TO 8.
NG (Fuel pressure is too low)>>GO TO 7.

7. DETECT MALFUNCTIONING PART

1. Check the following.

- Clogged and bent fuel hose and fuel tube
- Clogged fuel filter
- Fuel pump and its circuit (Refer to EC-1340, "FUEL PUMP CIRCUIT" .)

2. If NG, repair or replace the malfunctioning part. (Refer to EC-752 .)
If OK, replace fuel pressure regulator.

>> GO TO 8.

8. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 9.

9. PERFORM POWER BALANCE TEST

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Make sure that the each cylinder produces a momentary engine speed drop.

OK or NG

OK >> GO TO 12.
NG >> GO TO 10.

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

10. DETECT MALFUNCTIONING PART

1. Check the following.
- Ignition coil and its circuit (Refer to EC-1312, "IGNITION SIGNAL" .)
- Fuel injector and its circuit (Refer to EC-1334, "INJECTOR CIRCUIT" .)
- Intake air leakage
- Low compression pressure (Refer to EM-148, "CHECKING COMPRESSION PRESSURE" .)
2. If NG, repair or replace the malfunctioning part.
   If OK, replace fuel injector. (It may be caused by leakage from fuel injector or clogging.)

>> GO TO 11.

11. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

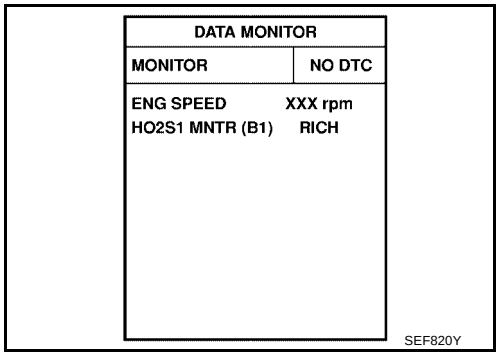
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 12.

12. CHECK HEATED OXYGEN SENSOR 1 FUNCTION

1. Run engine at about 2,000 rpm for about 2 minutes under no-load.
2. Select “HO2S1 MNTR (B1)”, in “DATA MONITOR” mode.
3. Running engine at 2,000 rpm under no-load (The engine is warmed up to normal operating temperature.), check that the monitor fluctuates between LEAN and RICH more than 5 times during 10 seconds.

1 time : RICH → LEAN → RICH
2 times : RICH → LEAN → RICH → LEAN → RICH



OK or NG

OK >> GO TO 15.
NG >> GO TO 13.

13. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT

Check heated oxygen sensor 1 and its circuit. Refer to EC-903, "DTC P0132 HO2S1"

>> GO TO 14.

14. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

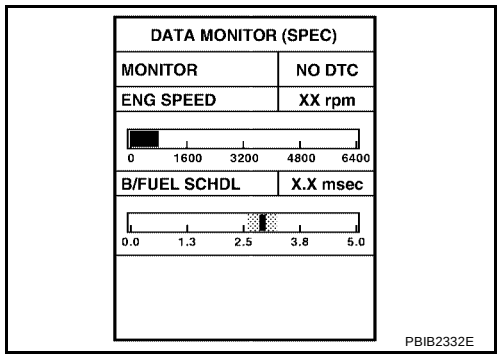
OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-763, "Symptom Matrix Chart" .

17. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG (More than the SP value)>>GO TO 18.
NG (Less than the SP value)>>GO TO 25.



18. DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of power steering, alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.
2. Check for the cause of insufficient combustion. Refer to the following.
- Valve clearance malfunction
- Intake valve timing control function malfunction
- Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

OK >> GO TO 21.
NG >> Repair or replace malfunctioning part, and then GO TO 20.

20. CHECK “A/F ALPHA-B1”, AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG (“B/FUEL SCHDL” is more, “A/F ALPHA-B1” is less than the SP value)>>GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

22. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> 1. Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-868, "DTC P0102, P0103 MAF SENSOR" .
2. GO TO 29.

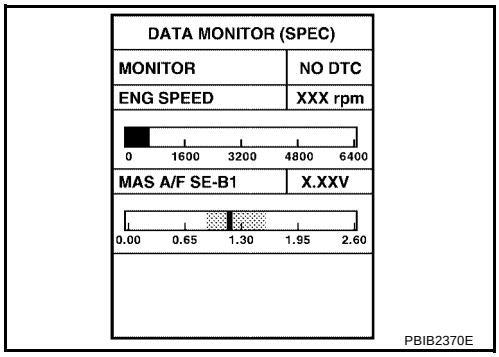
NG >> GO TO 23.

23. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 24.
NG (More than the SP value)>>Replace mass air flow sensor, and then GO TO 29.



24. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .
3. Perform EC-748, "VIN Registration" .
4. Perform EC-748, "Accelerator Pedal Released Position Learning" .
5. Perform EC-748, "Throttle Valve Closed Position Learning" .
6. Perform EC-749, "Idle Air Volume Learning" .

>> GO TO 29.

25. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

OK >> GO TO 27.
NG >> Repair or replace malfunctioning part, and then GO TO 26.

26. CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

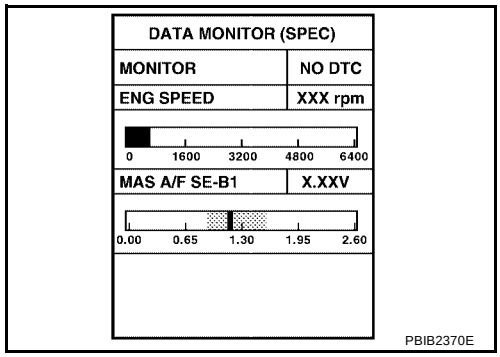
OK >> **INSPECTION END**
NG (Less than the SP value)>>GO TO 27.

27. CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 28.
NG (Less than the SP value)>>Replace mass air flow sensor, and then GO TO 30.



28. CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.

- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

29. CHECK "A/F ALPHA-B1" AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-763, "Symptom Matrix Chart" .

30. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and then make sure that the indication is within the SP value.

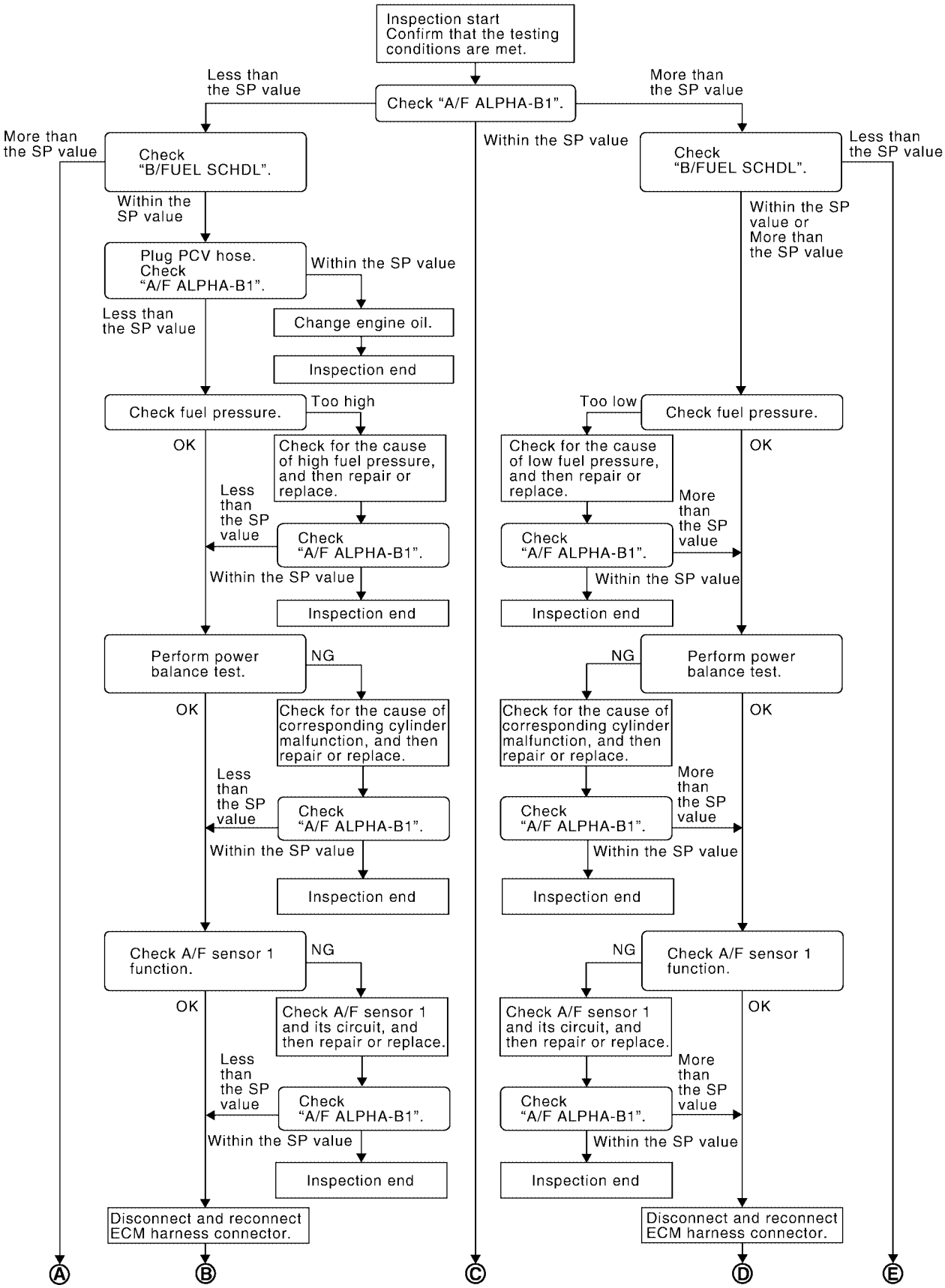
OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-763, "Symptom Matrix Chart" .

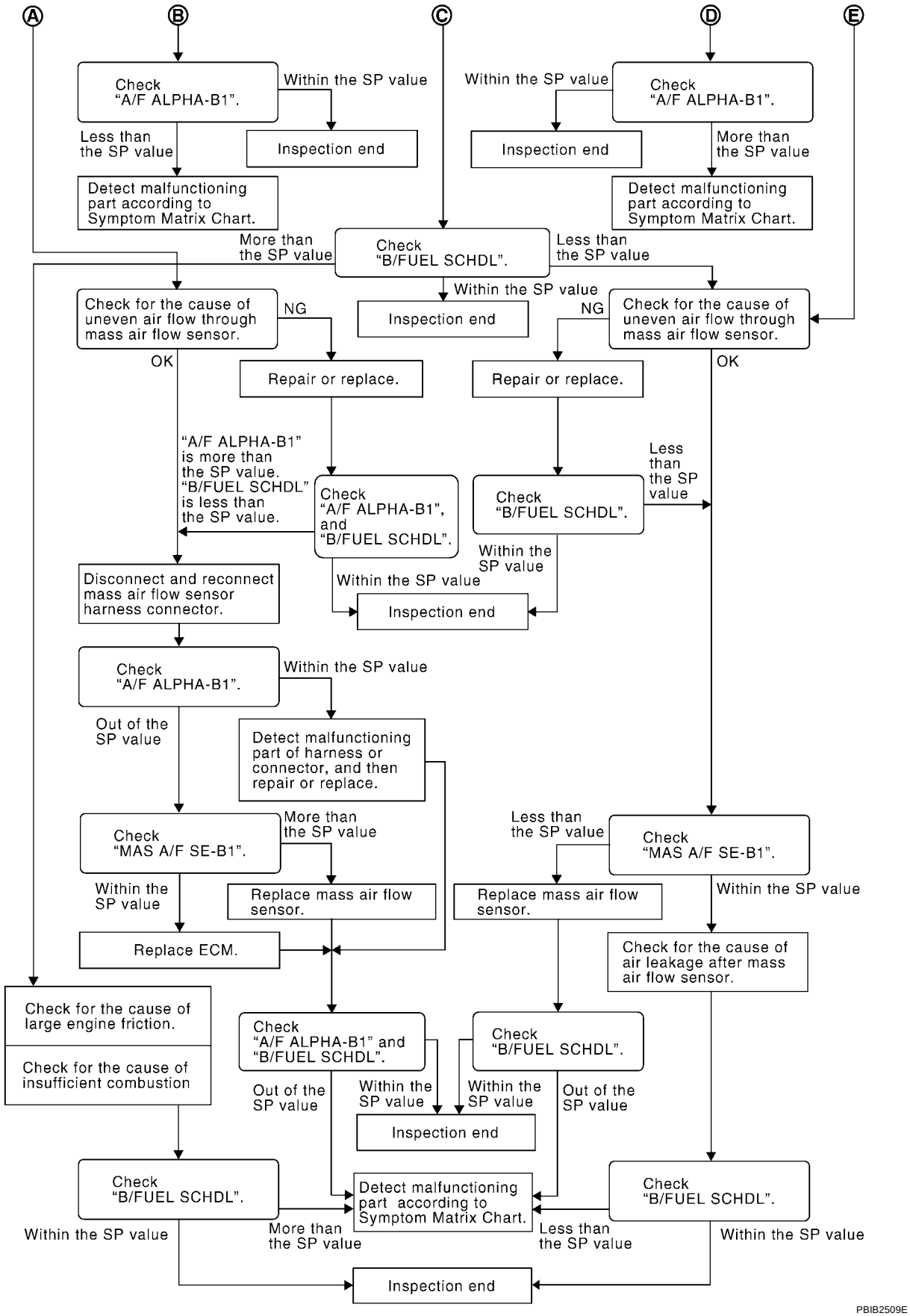
Diagnostic Procedure (A/T Models except ULEV)

UBS00KK3

OVERALL SEQUENCE



PBIB2318E

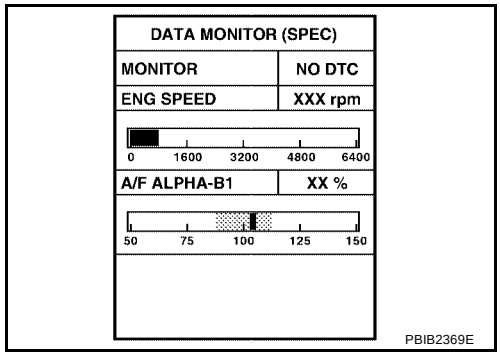

Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Check "A/F ALPHA-B1".
Within the SP value
Less than the SP value
Inspection end
Detect malfunctioning part according to Symptom Matrix Chart.
Within the SP value
Check "A/F ALPHA-B1".
Inspection end
More than the SP value
Detect malfunctioning part according to Symptom Matrix Chart.
More than the SP value
Check "B/FUEL SCHDL".
Less than the SP value
Within the SP value
Inspection end
Check for the cause of uneven air flow through mass air flow sensor.
NG
OK
Repair or replace.
NG
Check for the cause of uneven air flow through mass air flow sensor.
OK
Repair or replace.
"A/F ALPHA-B1" is more than the SP value. "B/FUEL SCHDL" is less than the SP value.
Check "A/F ALPHA-B1", and "B/FUEL SCHDL".
Check "B/FUEL SCHDL".
Less than the SP value
Within the SP value
Within the SP value
Inspection end
Disconnect and reconnect mass air flow sensor harness connector.
Check "A/F ALPHA-B1".
Within the SP value
Out of the SP value
Detect malfunctioning part of harness or connector, and then repair or replace.
Check "MAS A/F SE-B1".
More than the SP value
Within the SP value
Replace mass air flow sensor.
Replace ECM.
Less than the SP value
Check "MAS A/F SE-B1".
Within the SP value
Replace mass air flow sensor.
Check for the cause of air leakage after mass air flow sensor.
Check for the cause of large engine friction.
Check for the cause of insufficient combustion
Check "A/F ALPHA-B1" and "B/FUEL SCHDL".
Out of the SP value
Within the SP value
Check "B/FUEL SCHDL".
Within the SP value
Out of the SP value
Inspection end
Check "B/FUEL SCHDL".
Within the SP value
Detect malfunctioning part according to Symptom Matrix Chart.
More than the SP value
Less than the SP value
Check "B/FUEL SCHDL".
Within the SP value
Inspection end
PBIB2509E

DETAILED PROCEDURE

1. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Confirm that the testing conditions are met. Refer to EC-813, "Testing Condition" .
3. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

   NOTE:
   Check “A/F ALPHA-B1” for approximately 1 minute because they may fluctuate. It is NG if the indication is out of the SP value even a little.

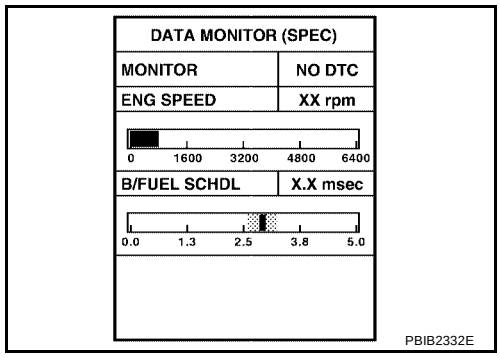


OK or NG

OK >> GO TO 17.
NG (Less than the SP value)>>GO TO 2.
NG (More than the SP value)>>GO TO 3.

2. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

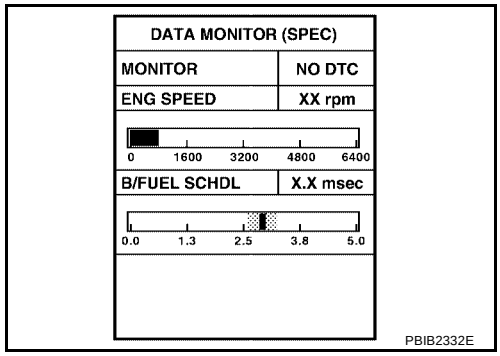


OK or NG

OK >> GO TO 4.
NG (More than the SP value)>>GO TO 19.

3. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.



OK or NG

OK >> GO TO 6.
NG (More than the SP value)>>GO TO 6.
NG (Less than the SP value)>>GO TO 25.

4. CHECK “A/F ALPHA-B1”

1. Stop the engine.
2. Disconnect PCV hose, and then plug it.
3. Start engine.
4. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 5.
NG >> GO TO 6.

5. CHANGE ENGINE OIL

1. Stop the engine.
2. Change engine oil.

NOTE:
This symptom may occur when a large amount of gasoline is mixed with engine oil because of driving conditions (such as when engine oil temperature does not rise enough since a journey distance is too short during winter). The symptom will not be detected after changing engine oil or changing driving condition.

>> **INSPECTION END**

6. CHECK FUEL PRESSURE

Check fuel pressure. (Refer to EC-751, "Fuel Pressure Check" .)

OK or NG

OK >> GO TO 9.
NG (Fuel pressure is too high)>>Replace fuel pressure regulator, refer to EC-751 . GO TO 8.
NG (Fuel pressure is too low)>>GO TO 7.

7. DETECT MALFUNCTIONING PART

1. Check the following.

- Clogged and bent fuel hose and fuel tube
- Clogged fuel filter
- Fuel pump and its circuit (Refer to EC-1340, "FUEL PUMP CIRCUIT" .)

2. If NG, repair or replace the malfunctioning part. (Refer to EC-751 .)
   If OK, replace fuel pressure regulator.

>> GO TO 8.

8. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

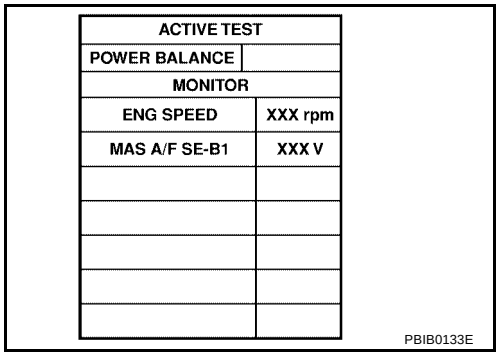
OK >> **INSPECTION END**
NG >> GO TO 9.

9. PERFORM POWER BALANCE TEST

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Make sure that the each cylinder produces a momentary engine speed drop.

OK or NG

OK >> GO TO 12.
NG >> GO TO 10.



10. DETECT MALFUNCTIONING PART

1. Check the following.
- Ignition coil and its circuit (Refer to EC-1312, "IGNITION SIGNAL" .)
- Fuel injector and its circuit (Refer to EC-1334, "INJECTOR CIRCUIT" .)
- Intake air leakage
- Low compression pressure (Refer to EM-148, "CHECKING COMPRESSION PRESSURE" .)
2. If NG, repair or replace the malfunctioning part.
If OK, replace fuel injector. (It may be caused by leakage from fuel injector or clogging.)

>> GO TO 11.

11. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 12.

12. CHECK A/F SENSOR 1 FUNCTION

Perform all DTC Confirmation Procedure related with A/F sensor 1.

- For DTC P1271, refer to EC-1181, "DTC Confirmation Procedure" .
- For DTC P1272, refer to EC-1187, "DTC Confirmation Procedure" .
- For DTC P1273, refer to EC-1193, "DTC Confirmation Procedure" .
- For DTC P1274, refer to EC-1200, "DTC Confirmation Procedure" .
- For DTC P1276, refer to EC-1207, "DTC Confirmation Procedure" .
- For DTC P1278, refer to EC-1215, "DTC Confirmation Procedure" .
- For DTC P1279, refer to EC-1224, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 15.
NG >> GO TO 13.

13. CHECK A/F SENSOR 1 CIRCUIT

Perform Diagnostic Procedure according to corresponding DTC.

>> GO TO 14.

14. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 15.

15. DISCONNECT AND RECONNECT ECM HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect ECM harness connector. Check pin terminal and connector for damage, and then reconnect it.

>> GO TO 16.

16. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

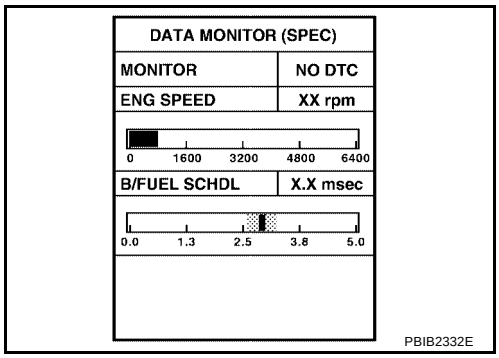
OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-105, "Symptom Matrix Chart" .

17. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG (More than the SP value)>>GO TO 18.
NG (Less than the SP value)>>GO TO 25.



18. DETECT MALFUNCTIONING PART

1. Check for the cause of large engine friction. Refer to the following.
- Engine oil level is too high
- Engine oil viscosity
- Belt tension of power steering, alternator, A/C compressor, etc. is excessive
- Noise from engine
- Noise from transmission, etc.
2. Check for the cause of insufficient combustion. Refer to the following.
- Valve clearance malfunction
- Intake valve timing control function malfunction
- Camshaft sprocket installation malfunction, etc.

>> Repair or replace malfunctioning part, and then GO TO 30.

19. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

OK >> GO TO 21.
NG >> Repair or replace malfunctioning part, and then GO TO 20.

20. CHECK “A/F ALPHA-B1” AND “B/FUEL SCHDL”

Select “A/F ALPHA-B1” and “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**

NG (“B/FUEL SCHDL” is more, “A/F ALPHA-B1” is less than the SP value)>>GO TO 21.

21. DISCONNECT AND RECONNECT MASS AIR FLOW SENSOR HARNESS CONNECTOR

1. Stop the engine.
2. Disconnect mass air flow sensor harness connector. Check pin terminal and connector for damage and then reconnect it again.

>> GO TO 22.

22. CHECK “A/F ALPHA-B1”

1. Start engine.
2. Select “A/F ALPHA-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> 1. Detect malfunctioning part of mass air flow sensor circuit and repair it. Refer to EC-868 .
2. GO TO 29.

NG >> GO TO 23.

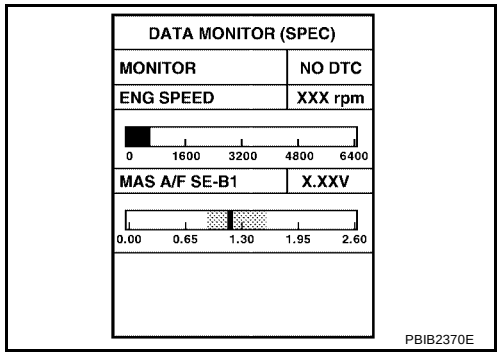
23. CHECK “MAS A/F SE-B1”

Select “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 24.

NG (More than the SP value)>>Replace mass air flow sensor, and then GO TO 29.



24. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS(NATS) system and registration of all NVIS(NATS) ignition key IDs. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .
3. Perform EC-748, "VIN Registration" .
4. Perform EC-748, "Accelerator Pedal Released Position Learning" .
5. Perform EC-748, "Throttle Valve Closed Position Learning" .
6. Perform EC-749, "Idle Air Volume Learning" .

>> GO TO 29.

25. CHECK INTAKE SYSTEM

Check for the cause of uneven air flow through mass air flow sensor. Refer to the following.

- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system

OK or NG

OK >> GO TO 27.
NG >> Repair or replace malfunctioning part, and then GO TO 26.

26. CHECK "B/FUEL SCHDL"

Select "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

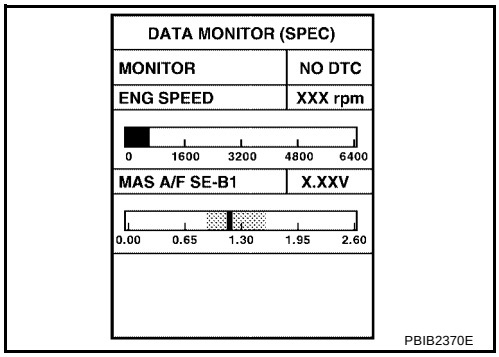
OK >> **INSPECTION END**
NG (Less than the SP value)>>GO TO 27.

27. CHECK "MAS A/F SE-B1"

Select "MAS A/F SE-B1" in "DATA MONITOR (SPEC)" mode, and make sure that the indication is within the SP value.

OK or NG

OK >> GO TO 28.
NG (Less than the SP value)>>Replace mass air flow sensor, and then GO TO 30.



28. CHECK INTAKE SYSTEM

Check for the cause of air leak after the mass air flow sensor. Refer to the following.

- Disconnection, looseness, and cracks in air duct
- Looseness of oil filler cap
- Disconnection of oil level gauge
- Open stuck, breakage, hose disconnection, or cracks of PCV valve
- Disconnection or cracks of EVAP purge hose, open stuck of EVAP canister purge volume control solenoid valve
- Malfunctioning seal of rocker cover gasket
- Disconnection, looseness, or cracks of hoses, such as vacuum hose, connecting to intake air system parts
- Malfunctioning seal of intake air system, etc.

>> GO TO 30.

29. CHECK "A/F ALPHA-B1" AND "B/FUEL SCHDL"

Select "A/F ALPHA-B1" and "B/FUEL SCHDL" in "DATA MONITOR (SPEC)" mode, and make sure that the each indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-105, "Symptom Matrix Chart" .

30. CHECK “B/FUEL SCHDL”

Select “B/FUEL SCHDL” in “DATA MONITOR (SPEC)” mode, and then make sure that the indication is within the SP value.

OK or NG

OK >> **INSPECTION END**
NG >> Detect malfunctioning part according to EC-105, "Symptom Matrix Chart" .

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

UBS00JAB

Intermittent incidents may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of I/I occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common Intermittent Incidents Report Situations

STEP in Work Flow	Situation
2	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than 0 or [1t].
3 or 4	The symptom described by the customer does not recur.
5	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
10	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.

Diagnostic Procedure

UBS00JAC

1. INSPECTION START

Erase (1st trip) DTCs. Refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to EC-839, "Ground Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" , “INCIDENT SIMULATION TESTS”.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK CONNECTOR TERMINALS

Refer to GI-23, "How to Check Terminal" , “HOW TO PROBE CONNECTORS”, “How to Check Enlarged Contact Spring of Terminal”.

OK or NG

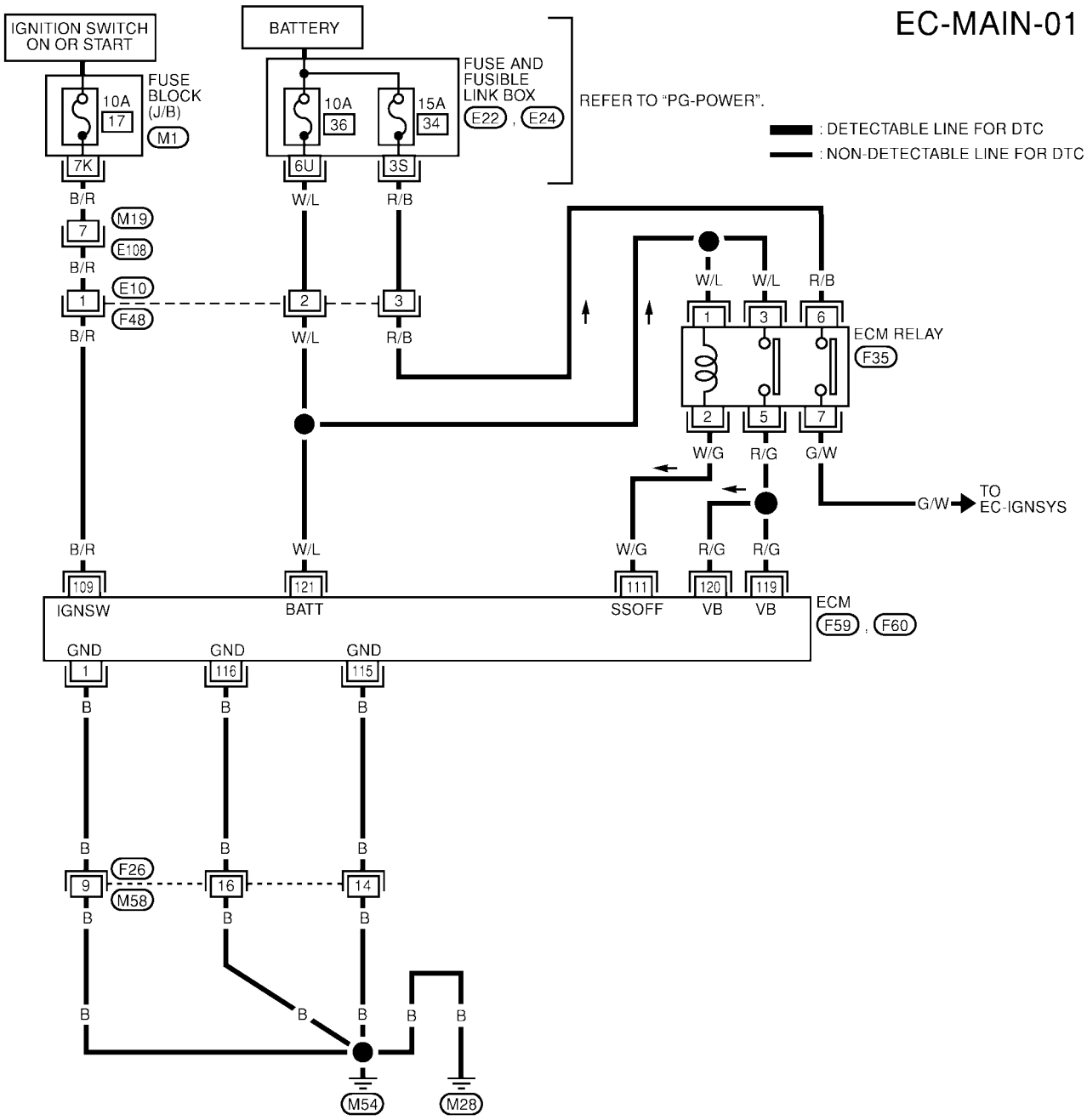
OK >> **INSPECTION END**
NG >> Repair or replace connector.

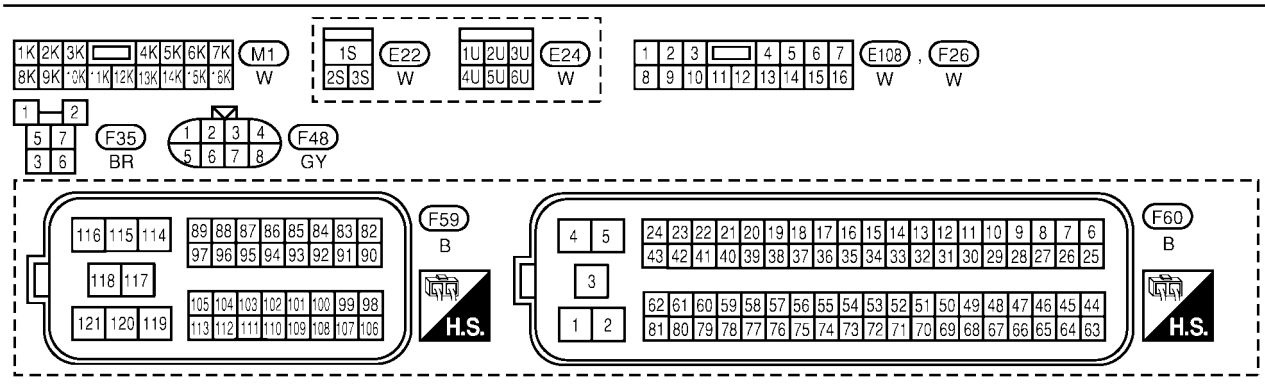
POWER SUPPLY AND GROUND CIRCUIT

PFP:24110

Wiring Diagram

UBS00JAD





BBWA1387E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
109	B/R	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● A few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
115 116	B	ECM ground	**[Engine is running]** ● Idle speed	Engine ground
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00JAE

1. INSPECTION START

Start engine.

Is engine running?

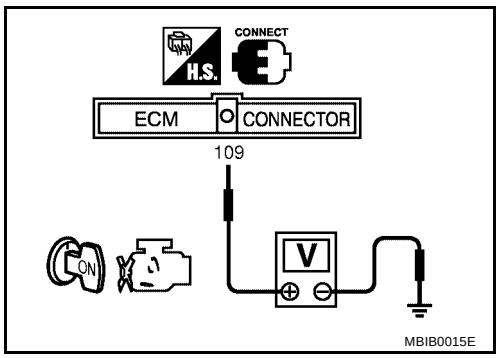
Yes or No

Yes >> GO TO 10.
No >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check voltage between ECM terminal 109 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

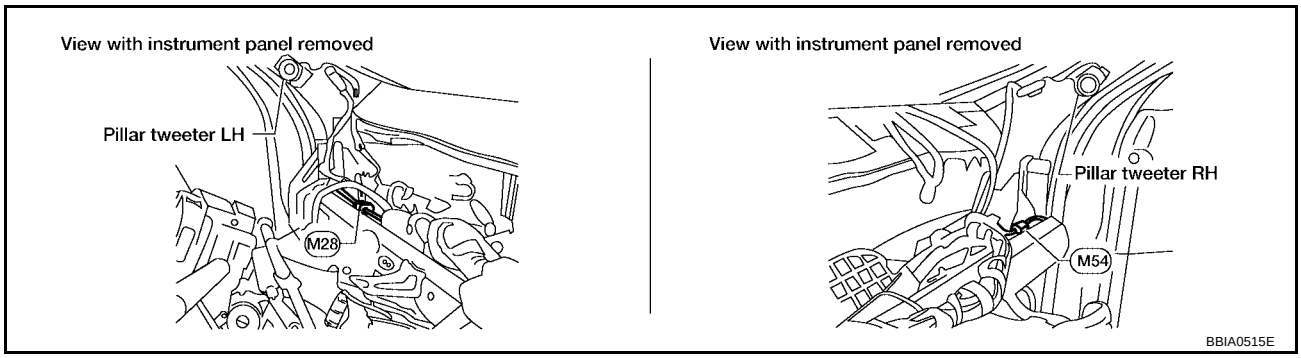
Check the following.

- Fuse block (J/B) connector M1
- 10A fuse
- Harness connectors M19, E108
- Harness connectors E10, F48
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.
   Refer to EC-839, "Ground Inspection" .



OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 1, 115, 116 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

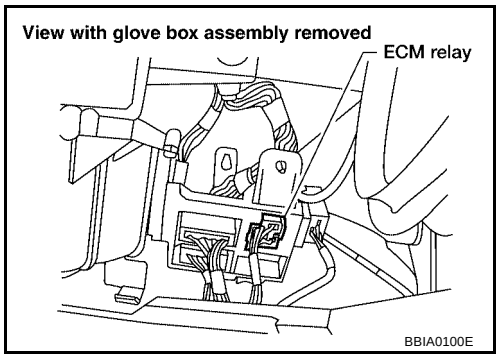
3. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

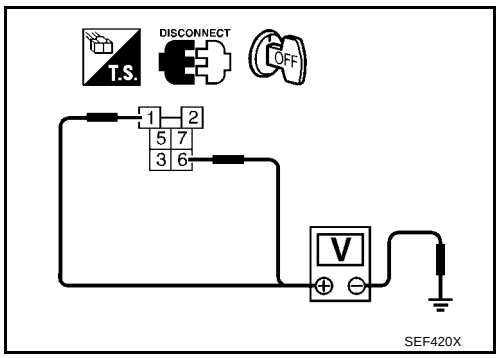
6. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Disconnect ECM relay.



2. Check voltage between ECM relay terminals 1, 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- 10A fuse
- 15A fuse
- Harness for open or short between ECM relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 111 and ECM relay terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ECM RELAY

Refer to EC-839, "Component Inspection" .

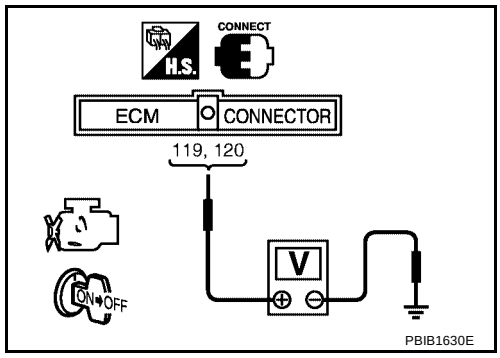
OK or NG

OK >> Go to EC-1312, "IGNITION SIGNAL" .
NG >> Replace ECM relay.

10. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Stop engine and wait at least 10 seconds.
2. Turn ignition switch ON and then OFF.
3. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.

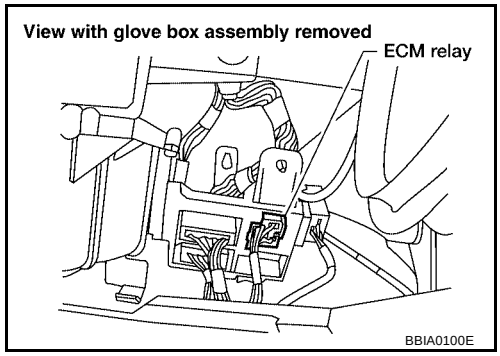


OK or NG

OK >> GO TO 15.
NG (Battery voltage does not exist.)>>GO TO 11.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 13.

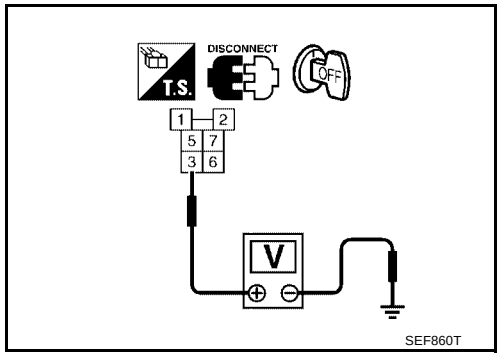
11. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM relay.



2. Check voltage between ECM relay terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- 10A fuse
- Harness for open or short between ECM relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 119, 120 and ECM relay terminal 5. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK ECM RELAY

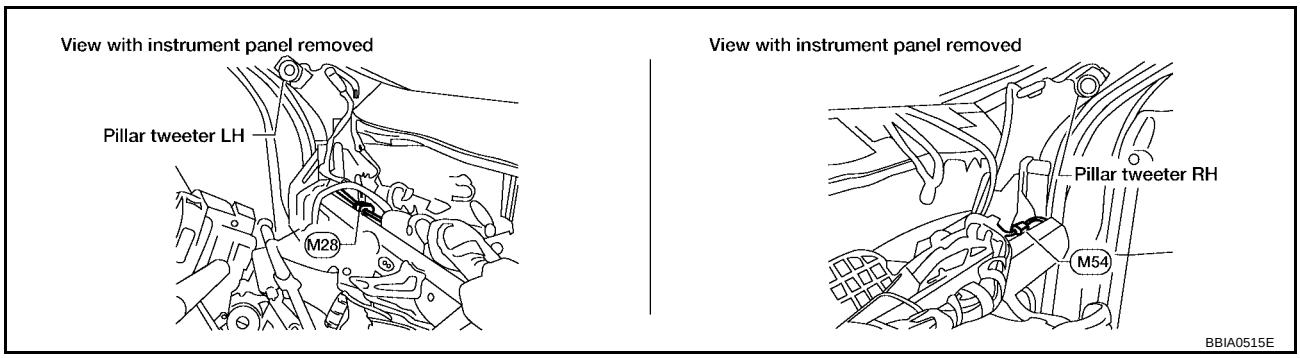
Refer to EC-839, "Component Inspection" .

OK or NG

OK >> GO TO 15.
NG >> Replace ECM relay.

15. CHECK GROUND CONNECTIONS

1. Loosen and retighten two ground screws on the body. Refer to EC-839, "Ground Inspection" .



OK or NG

OK >> GO TO 16.
NG >> Repair or replace ground connections.

16. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 1, 115, 116 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 17.
NG >> Repair open circuit or short to power in harness or connectors.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

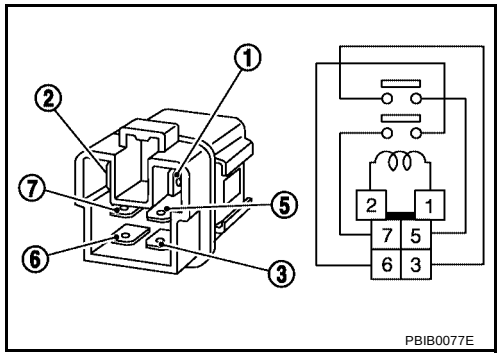
UBS00KK5

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.



Ground Inspection

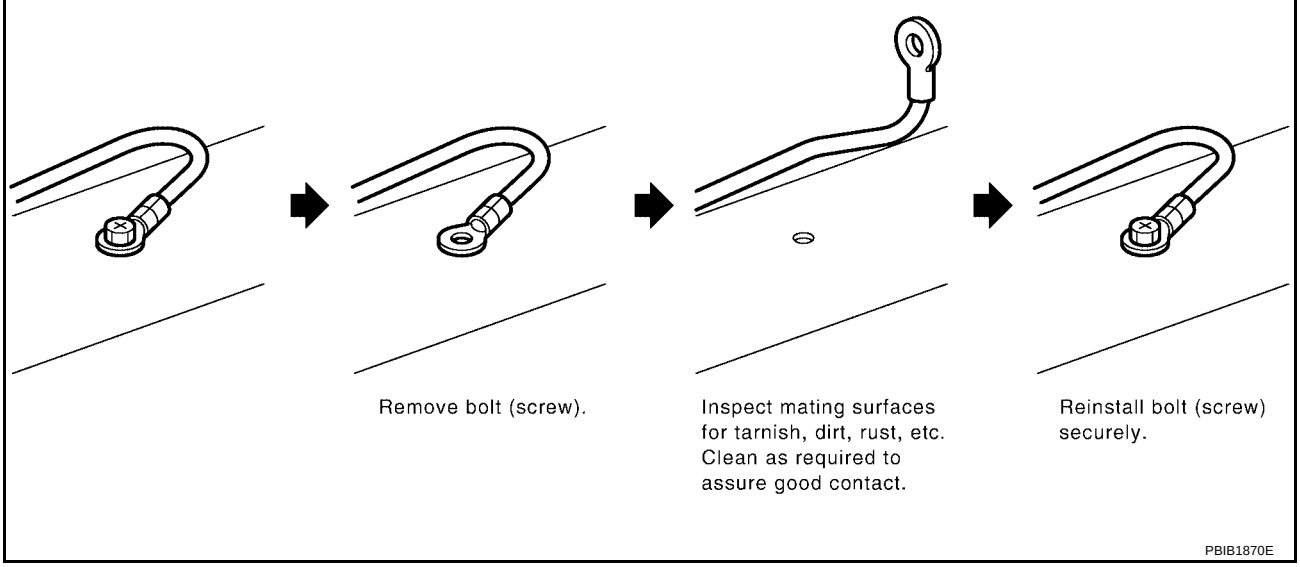
UBS00JAF

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to PG-13, "Ground Distribution" .

Ground Inspection



DTC U1000, U1001 CAN COMMUNICATION LINE

PFP:23710

Description

UBS00JAG

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

UBS00JAH

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000*1 1000*1	CAN communication line	● ECM cannot communicate to other control units. ● ECM cannot communicate for more than the specified time.	● Harness or connectors (CAN communication line is open or shorted)
U1001*2 1001*2			

*1: **This self-diagnosis has the one trip detection logic. (A/T models)**
The MIL will not light up for this diagnosis. (M/T models)
*2: **The MIL will not light up for this diagnosis.**

DTC Confirmation Procedure

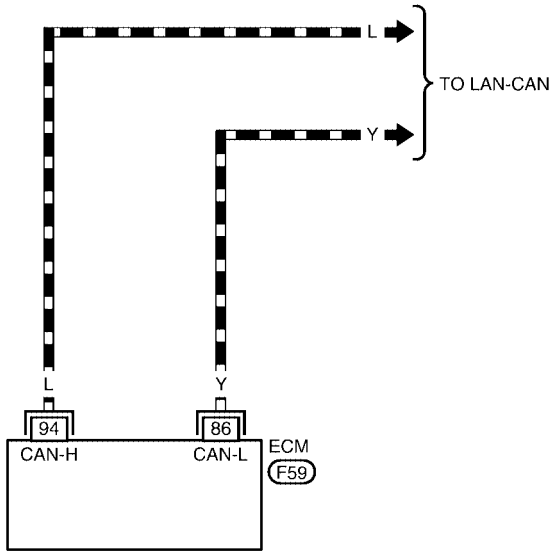
UBS00JAI

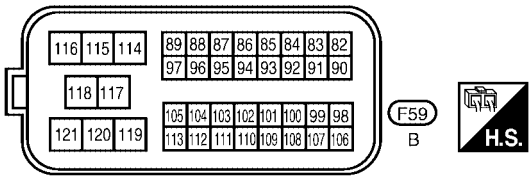
1. Turn ignition switch ON and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-842, "Diagnostic Procedure" .

Wiring Diagram

UBS00JAJ

EC-CAN-01





BBWA0274E

Diagnostic Procedure

UBS00JAK

Go to LAN-4, "CAN COMMUNICATION" .

DTC P0011 IVT CONTROL

PFP:23796

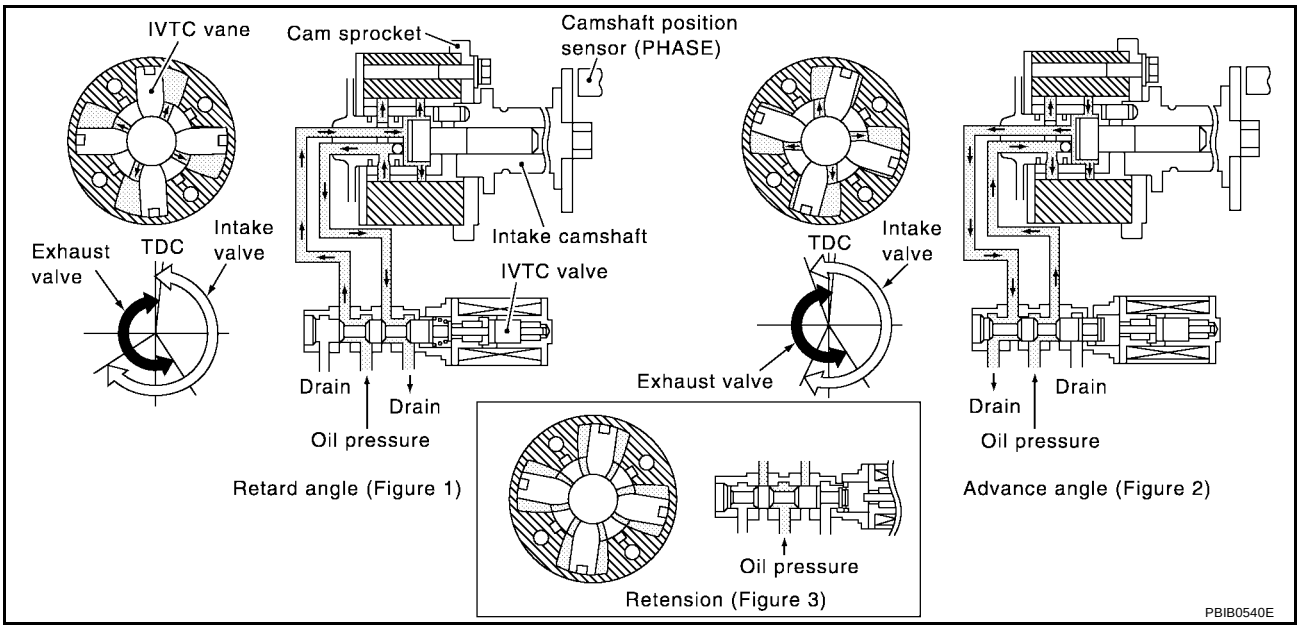
Description

UBS00JAL

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed	Intake valve timing control	Intake valve timing control solenoid valve
Camshaft position sensor (PHASE)			
Engine coolant temperature sensor	Engine coolant temperature		
Vehicle speed sensor*	Vehicle speed		

*: This signal is sent to ECM through CAN communication line.



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

CONSULT-II Reference Value in Data Monitor Mode

UBS00JAM

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1)	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 20°CA
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		2,000 rpm	Approx. 25% - 60%

On Board Diagnosis Logic

UBS00JAN

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011 0011	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	● Crankshaft position sensor (POS) ● Camshaft position sensor (PHASE) ● Intake valve control solenoid valve ● Accumulation of debris to the signal pick-up portion of the camshaft ● Timing chain installation ● Foreign matter caught in the oil groove for intake valve timing control

FAIL-SAFE MODE

ECM enters fail-safe mode when the malfunction is detected.

Detected items	Engine operating condition in fail-safe mode
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function

DTC Confirmation Procedure

UBS00JAO

CAUTION:
Always drive at a safe speed.

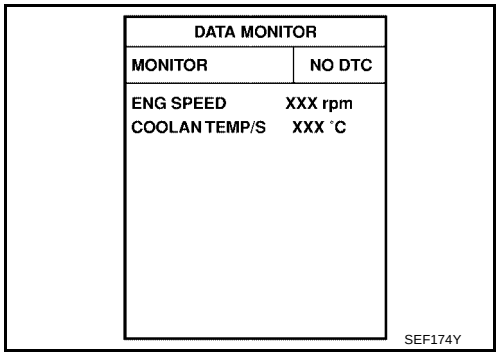
NOTE:

- **If DTC P0011 is displayed with DTC P1111, first perform trouble diagnosis for DTC P1111. See EC-1106 .**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds.
   Hold the accelerator pedal as steady as possible.



ENG SPEED	500 - 2,000 rpm (A constant rotation is maintained.)
COOLANT TEMPS	70 - 120°C (158 - 248°F)
B/FUEL SCHDL	More than 4 msec
Selector lever	P or N position

4. Let engine idle for 10 seconds.
5. If the 1st trip DTC is detected, go to EC-845, "Diagnostic Procedure" .
   If the 1st trip DTC is not detected, go to next step.
6. Maintain the following conditions for at least 6 consecutive seconds.

ENG SPEED	1,800 - 3,175 rpm (A constant rotation is maintained.)
COOLANT TEMPS	70 - 105°C (158 - 221°F)
Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

7. If the 1st trip DTC is detected, go to EC-845, "Diagnostic Procedure" .

WITH GST

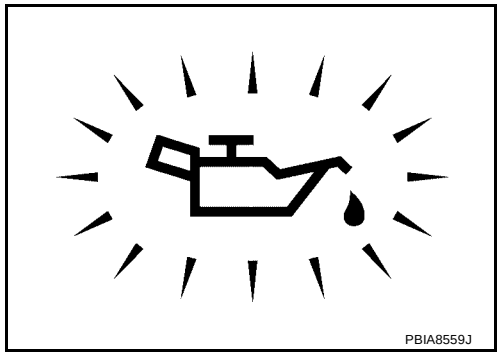
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00JAP

1. CHECK OIL PRESSURE WARNING LAMP

1. Start engine.
2. Check oil pressure warning lamp and confirm it is not illuminated.



OK or NG

OK >> GO TO 2.
KG >> Go to LU-16, "OIL PRESSURE CHECK" .

2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-846, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace intake valve timing control solenoid valve.

3. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-995, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace crankshaft position sensor (POS).

4. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-1002, "Component Inspection" .

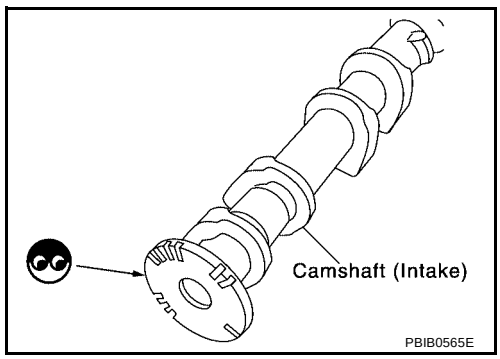
OK or NG

OK >> GO TO 5.
NG >> Replace camshaft position sensor (PHASE).

5. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end



OK or NG

OK >> GO TO 6.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.

6. CHECK TIMING CHAIN INSTALLATION

Check service records for any recent repairs that may cause timing chain misaligned.

OK or NG

OK >> Check timing chain installation. Refer to EM-136, "TIMING CHAIN" .
NG >> GO TO 7.

7. CHECK LUBRICATION CIRCUIT

Refer to EM-133, "INSPECTION OF CAMSHAFT SPROCKET (INT) OIL GROOVE" .

OK or NG

OK >> GO TO 8.
NG >> Clean lubrication line.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For Wiring Diagram, refer to EC-992 for CKP sensor (POS) and EC-999 for CMP sensor (PHASE).

>> **INSPECTION END**

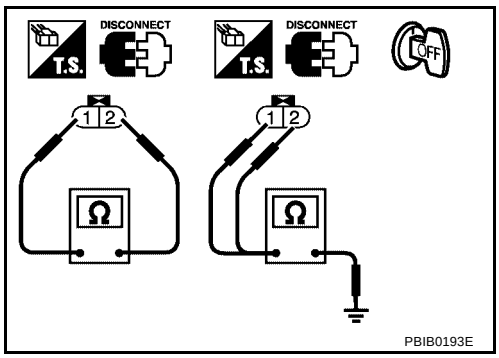
Component Inspection

UBS00JAQ

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

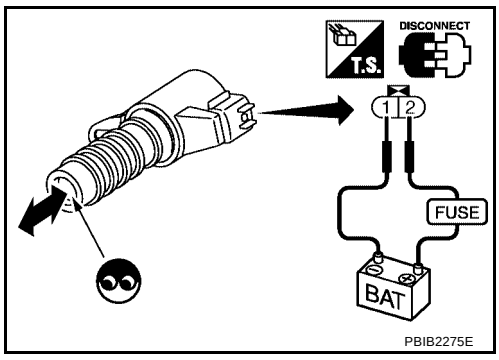
1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.

Terminal	Resistance
1 and 2	8Ω [at 20°C (68°F)]
1 or 2 and ground	(Continuity should not exist.)



If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.

3. Remove intake valve timing control solenoid valve.
4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. Make sure that the plunger moves as shown in the figure.



CAUTION:
Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
If NG, replace intake valve timing control solenoid valve.

NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.

Removal and Installation

UBS00JAR

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-136, "TIMING CHAIN" .

DTC P0031, P0032 HO2S1 HEATER

PFP:22690

Description

UBS00JTC

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Engine coolant temperature sensor	Engine coolant temperature		

The ECM performs ON/OFF duty control of the heated oxygen sensor 1 heater corresponding to the engine speed and engine coolant temperature. The duty percent varies with engine coolant temperature when engine is started.

OPERATION

Engine speed rpm	Heated oxygen sensor 1 heater
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

UBS00JTD

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	● Engine: After warming up ● Engine speed: Below 3,600 rpm	ON
	● Engine speed: Above 3,600 rpm	OFF
O2SEN HTR DTY	● Engine coolant temperature when engine started: More than 80°C (176°F) ● Engine speed: Below 3,600 rpm	Approx. 50%

On Board Diagnosis Logic

UBS00JTE

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031 0031	Heated oxygen sensor 1 heater control circuit low	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.) ● Heater oxygen sensor 1 heater
P0032 0032	Heated oxygen sensor 1 heater control circuit high	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is shorted.) ● Heater oxygen sensor 1 heater

DTC Confirmation Procedure

UBS00JTF

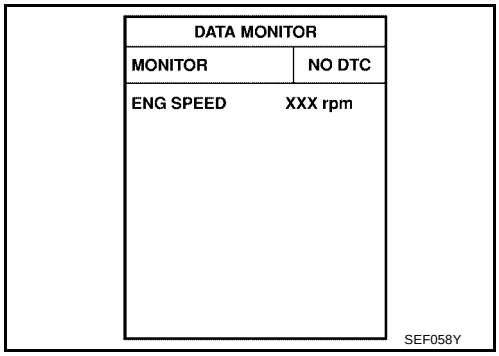
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

3. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and run it for at least 6 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-850, "Diagnostic Procedure" .



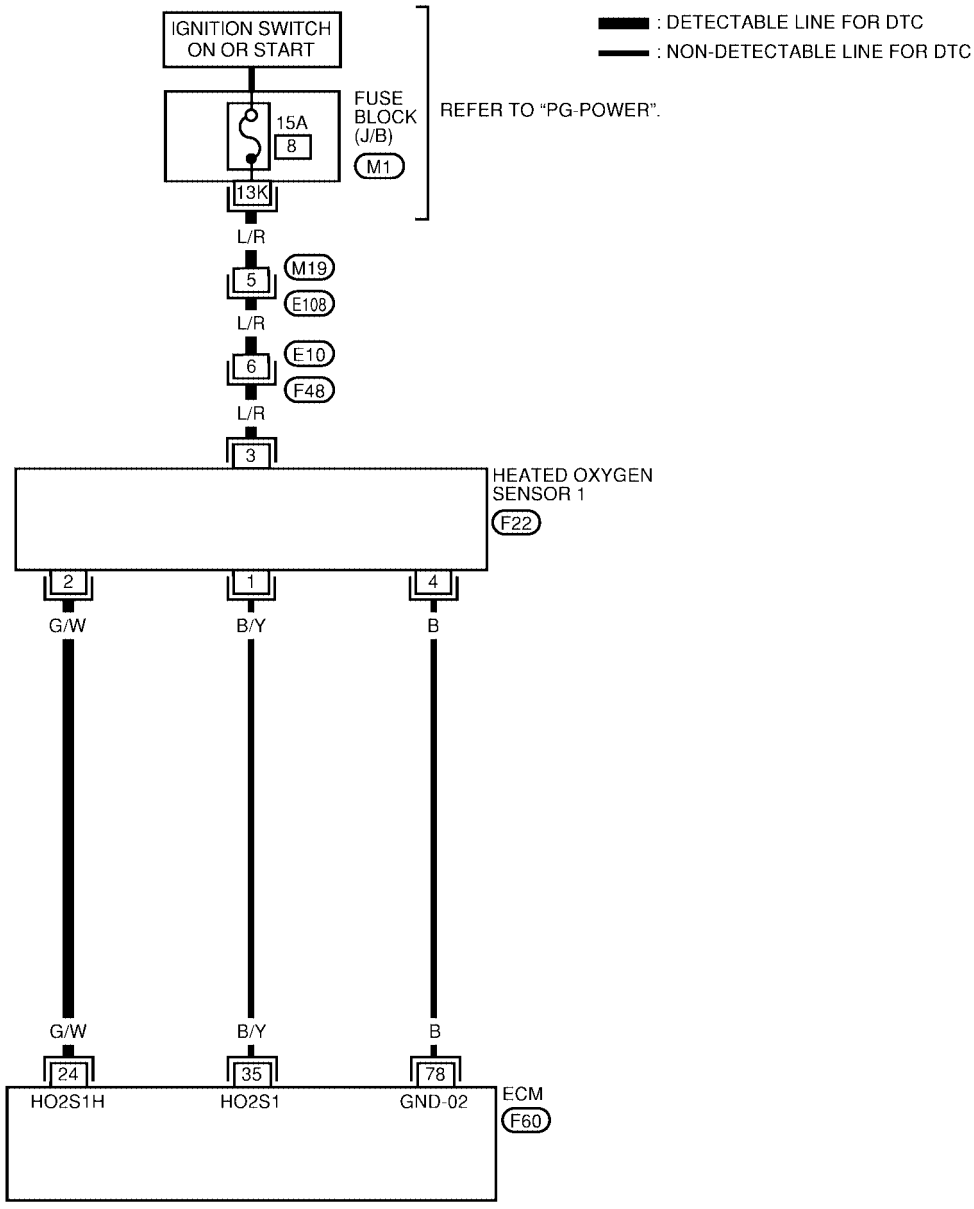
WITH GST

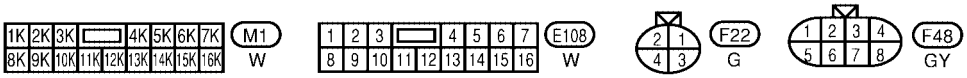
Follow the procedure “WITH CONSULT-II” above

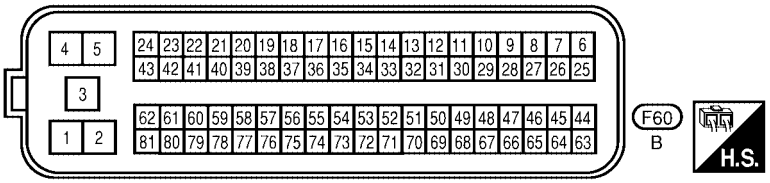
Wiring Diagram

UBS00JTG

EC-HO2S1H-01





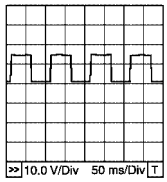


BBWA1388E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G/W	Heated oxygen sensor 1 heater	**[Engine is running]** ● **Warm-up condition.** ● Engine speed is below 3,600 rpm.	Approximately 7.0V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

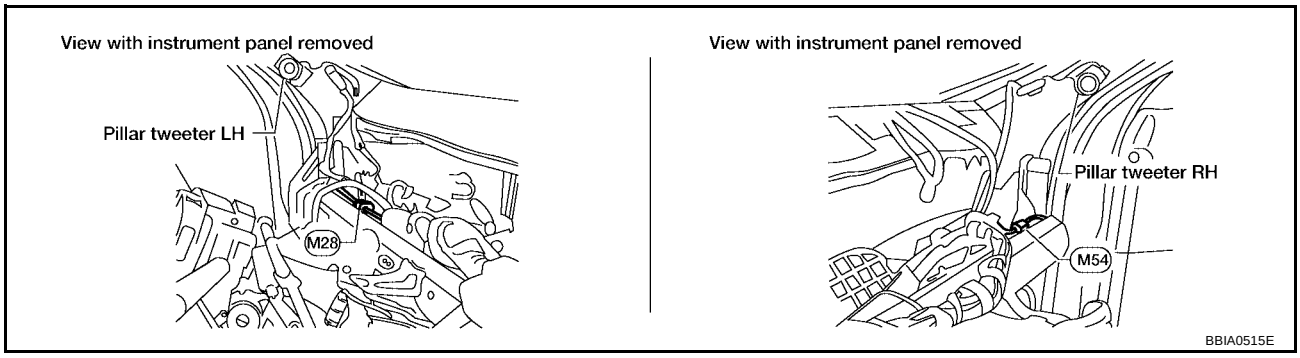
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00JTH

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.
   Refer to EC-839, "Ground Inspection" .

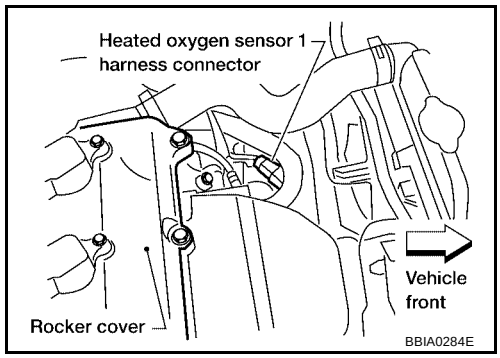


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

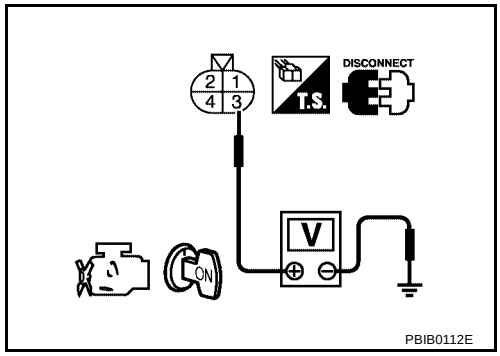
2. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Turn ignition switch ON.



3. Check voltage between HO2S1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E10, F48
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 24 and HO2S1 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-852, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

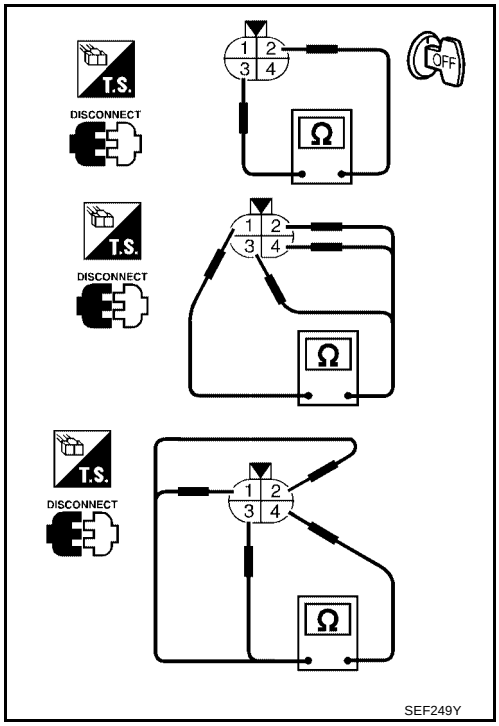
Component Inspection

UBS00JTI

HEATED OXYGEN SENSOR 1 HEATER

1. Check resistance between HO2S1 terminals as follows.

Terminal No.	Resistance
2 and 3	3.3 - 4.0 Ω [at 25°C (77°F)]
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	



2. If NG, replace heated oxygen sensor 1.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00JTJ

HEATED OXYGEN SENSOR 1

Refer to EM-113, "Removal and Installation" .

DTC P0037, P0038 HO2S2 HEATER

PFP:226A0

Description

UBS00JTK

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Camshaft position sensor (PHASE)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Crankshaft position sensor (POS)			
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

CONSULT-II Reference Value in Data Monitor Mode

UBS00JTL

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	● Engine speed: Below 3,600 rpm after the following conditions are met ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	ON
	● Engine speed: Above 3,600 rpm	OFF

On Board Diagnosis Logic

UBS00JTM

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037 0037	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) ● Heater oxygen sensor 2 heater
P0038 0038	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) ● Heater oxygen sensor 2 heater

DTC Confirmation Procedure

UBS00JTN

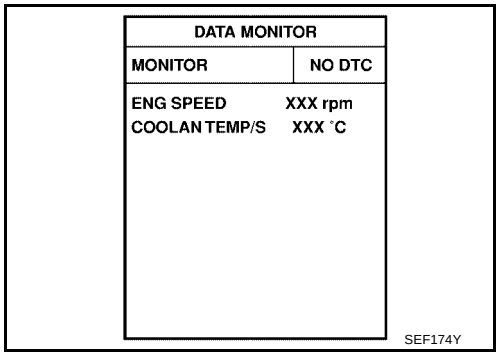
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.

4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. If 1st trip DTC is detected, go to EC-856, "Diagnostic Procedure" .



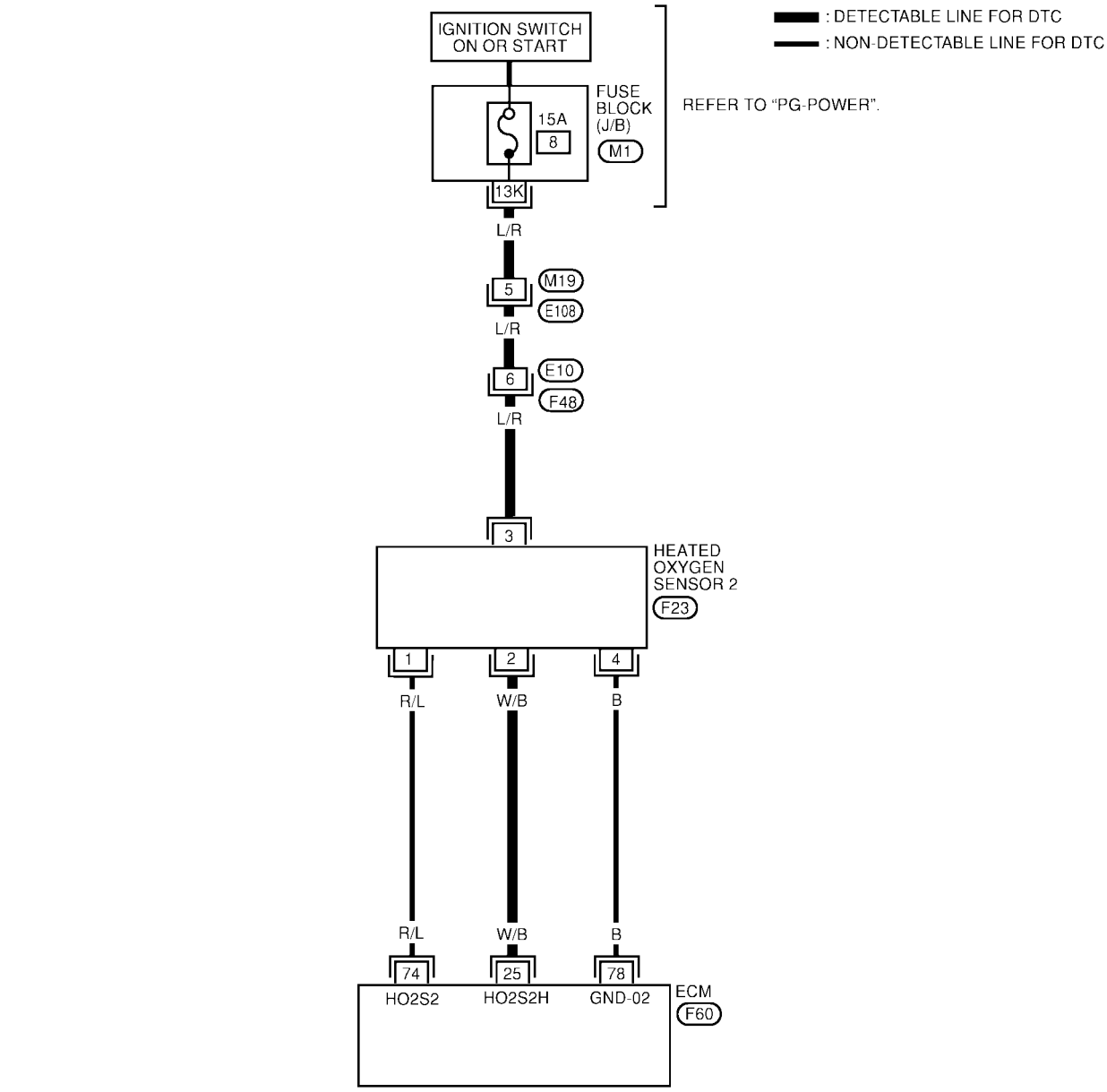
WITH GST

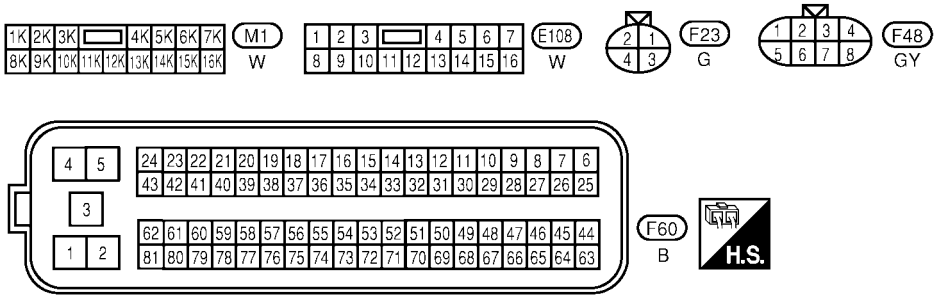
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JTO

EC-HO2S2H-01





BBWA1389E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

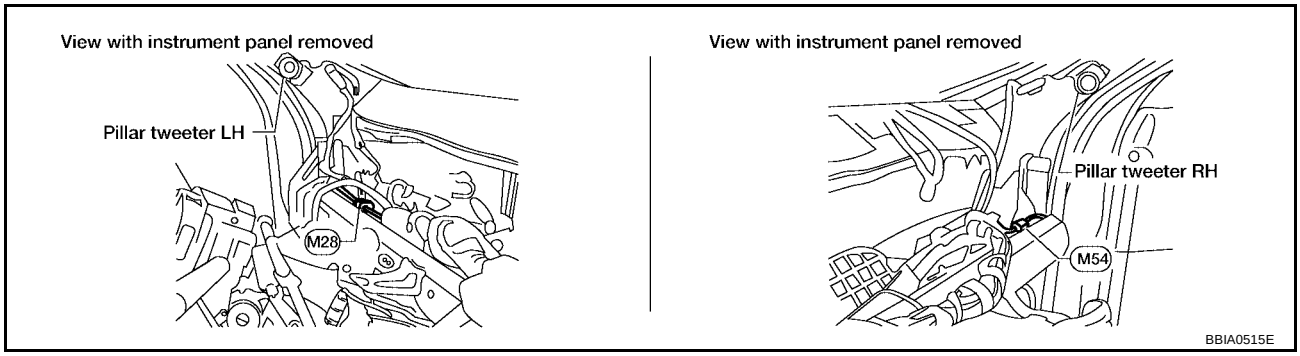
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
25	W/B	Heated oxygen sensor 2 heater	**[Engine is running]** ● **Warm-up condition** ● Engine speed: Below 3,600 rpm after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under on load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped. **[Engine is running]** ● Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00JTP

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.
   Refer to EC-839, "Ground Inspection" .

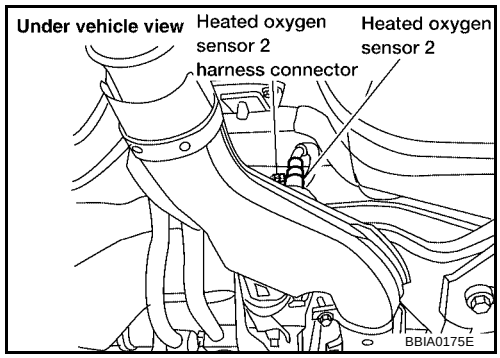


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

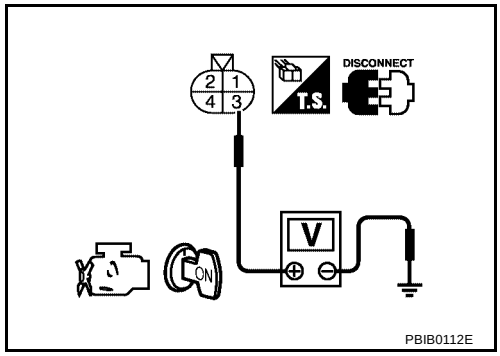
2. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Turn ignition switch ON.



3. Check voltage between HO2S2 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E10, F48
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 25 and HO2S2 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-858, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

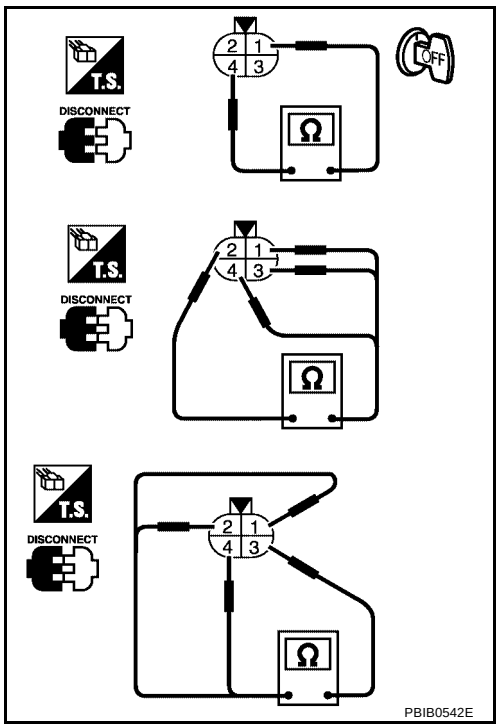
Component Inspection

UBS00JTQ

HEATED OXYGEN SENSOR 2 HEATER

1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
2 and 3	5.0 - 7.0 Ω [at 25°C (77°F)]
1 and 2, 3, 4	∞ Ω (Continuity should not exist)
4 and 1, 2, 3	



2. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00JTR

HEATED OXYGEN SENSOR 2

Refer to EM-113, "Removal and Installation" .

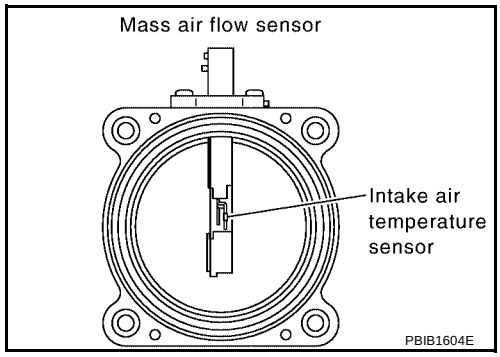
DTC P0101 MAF SENSOR

PFP:22680

Component Description

UBS00JB0

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JB1

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● See EC-813, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
CAL/LD VALUE	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s

On Board Diagnosis Logic

UBS00JB2

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0101 0101	Mass air flow sensor circuit range/performance problem	A)	A high voltage from the sensor is sent to ECM under light load driving condition.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor ● EVAP control system pressure sensor ● Intake air temperature sensor
		B)	A low voltage from the sensor is sent to ECM under heavy load driving condition.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor ● EVAP control system pressure sensor ● Intake air temperature sensor

DTC Confirmation Procedure

UBS00JB3

Perform PROCEDURE FOR MALFUNCTION A first.
If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B.

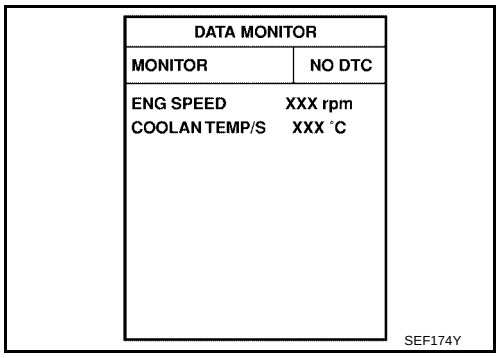
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

NOTE:
If engine will not start or stops soon, wait at least 10 seconds with engine stopped (Ignition switch ON) instead of running engine at idle speed.

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and warm it up to normal operating temperature.
4. Run engine for at least 10 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-863, "Diagnostic Procedure" .



With GST

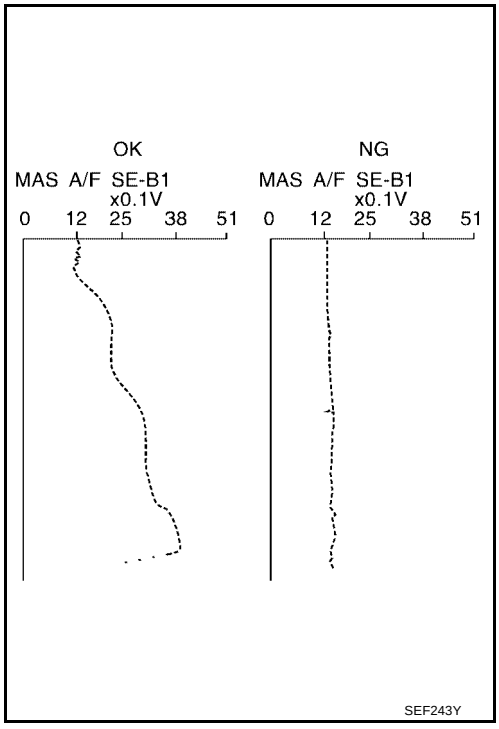
Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

CAUTION:
Always drive vehicle at a safe speed.

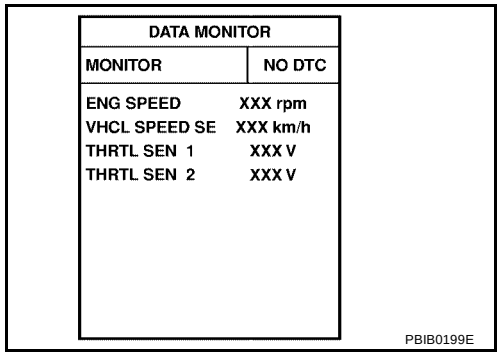
With CONSULT-II

1. Turn ignition switch ON.
2. Start engine and warm it up to normal operating temperature.
   If engine cannot be started, go to EC-863, "Diagnostic Procedure" .
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Check the voltage of “MAS A/F SE-B1” with “DATA MONITOR”.
5. Increases engine speed to about 4,000 rpm.
6. Monitor the linear voltage rise in response to engine speed increases.
   If NG, go to EC-863, "Diagnostic Procedure" .
   If OK, go to following step.



7. Maintain the following conditions for at least 10 consecutive seconds.

ENG SPEED	More than 2,000 rpm
THRTL SEN 1	More than 3V
THRTL SEN 2	More than 3V
Shift lever	Suitable position
Driving location	Driving vehicle uphill (Increased engine load) will help maintain the driving conditions required for this test.



8. If 1st trip DTC is detected, go to EC-863, "Diagnostic Procedure" .

Overall Function Check

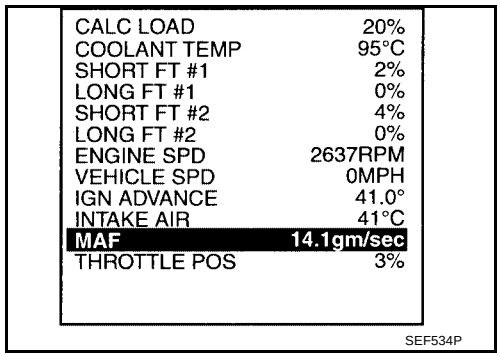
UBS00JB4

PROCEDURE FOR MALFUNCTION B

Use this procedure to check the overall function of the mass air flow sensor circuit. During this check, a 1st DTC might not be confirmed.

With GST

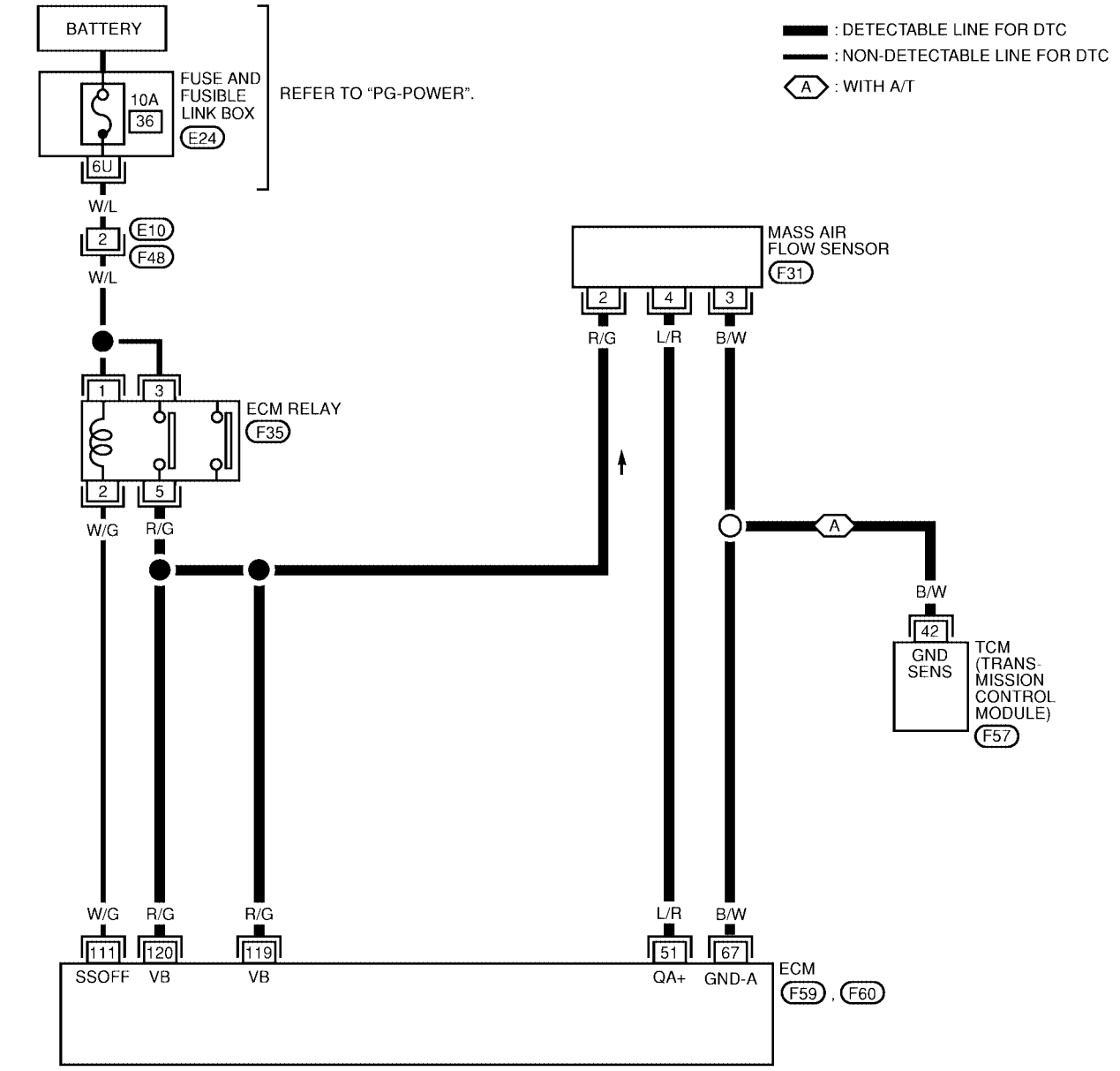
1. Start engine and warm it up to normal operating temperature.
2. Select Service $01 with GST.
3. Check the mass air flow sensor signal with Service $01.
4. Check for linear mass air flow sensor signal value rise in response to increases to about 4,000 rpm in engine speed.
5. If NG, go to EC-863, "Diagnostic Procedure" .

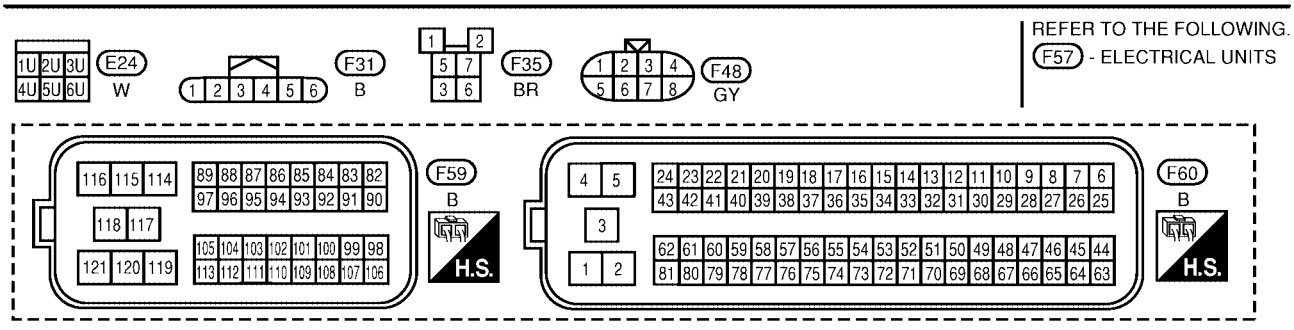


Wiring Diagram

UBS00JB5

EC-MAFS-01





BBWA1390E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	L/R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.9 - 1.1V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.5 - 1.8V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● A few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00JB6

1. INSPECTION START

Which malfunction (A or B) is duplicated?

A or B

A >> GO TO 3.
B >> GO TO 2.

2. CHECK INTAKE AIR LEAK

Check the following for connections.

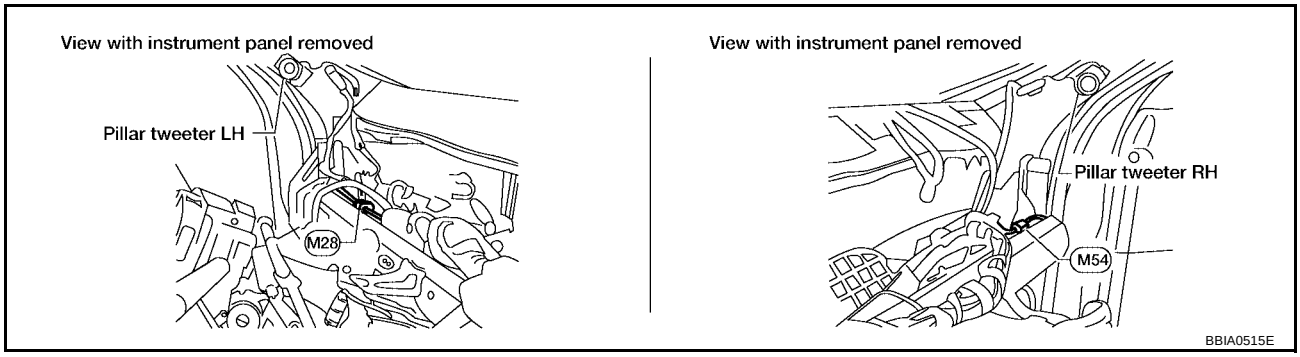
- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.
   Refer to EC-839, "Ground Inspection" .

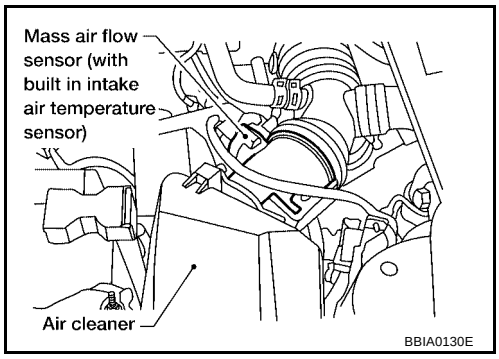


OK or NG

OK >> GO TO 4.
NG >> Repair or replace ground connections.

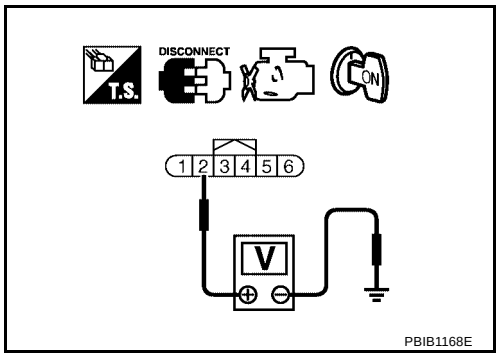
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between mass air flow sensor and ECM relay
- Harness for open or short between mass air flow sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector (A/T models).
4. Check harness continuity between the following;
   MAF sensor terminal 3 and ECM terminal 67,
   MAF sensor terminal 3 and TCM terminal 42 (A/T models).
   Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between mass air flow sensor and ECM.
- Harness for open or short between mass air flow sensor and TCM (A/T models).

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 51.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-880, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace intake air temperature sensor.

10. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1045, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP control system pressure sensor.

11. CHECK MASS AIR FLOW SENSOR

Refer to EC-866, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace mass air flow sensor.

12. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

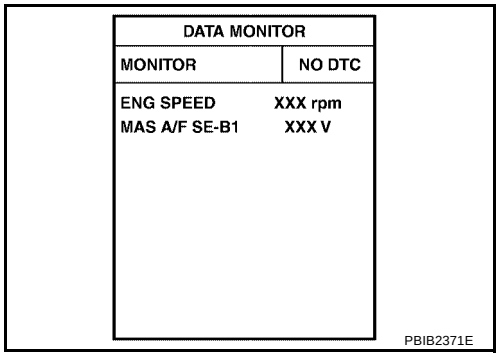
Component Inspection

UBS00JB7

MASS AIR FLOW SENSOR

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-II and select “DATA MONITOR” mode.
4. Select “MAS A/F SE-B1” and check indication under the following conditions.



Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8
Idle to about 4,000 rpm*	0.9 - 1.1 to 2.4

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.

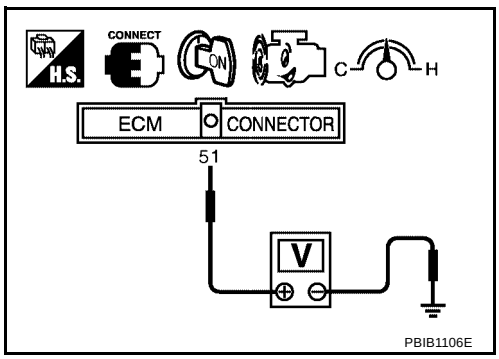
a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 51 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8
Idle to about 4,000 rpm*	0.9 - 1.1 to 2.4

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

UBS00JB8

MASS AIR FLOW SENSOR

Refer to EM-106, "AIR CLEANER AND AIR DUCT" .

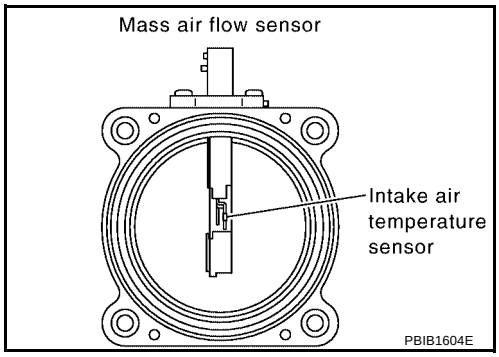
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

UBS00JB9

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JBA

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	● See EC-813, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
CAL/LD VALUE	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s

On Board Diagnosis Logic

UBS00JBB

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

UBS00JBC

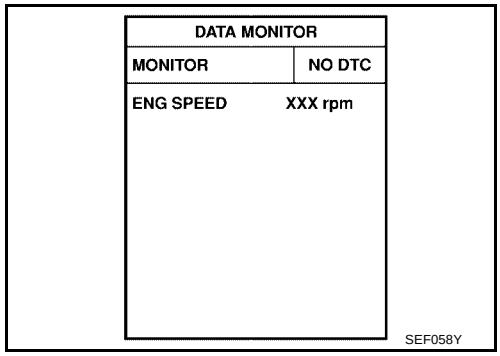
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P0102

With CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If DTC is detected, go to EC-871, "Diagnostic Procedure" .



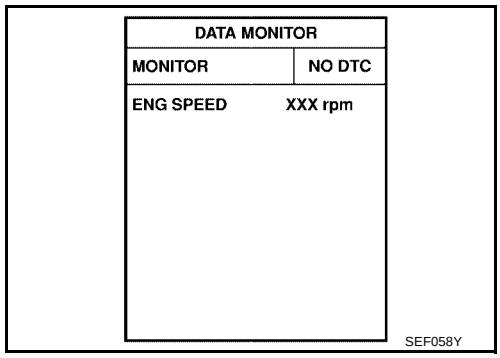
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR DTC P0103

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-871, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Start engine and wait at least 5 seconds.
6. If DTC is detected, go to EC-871, "Diagnostic Procedure" .



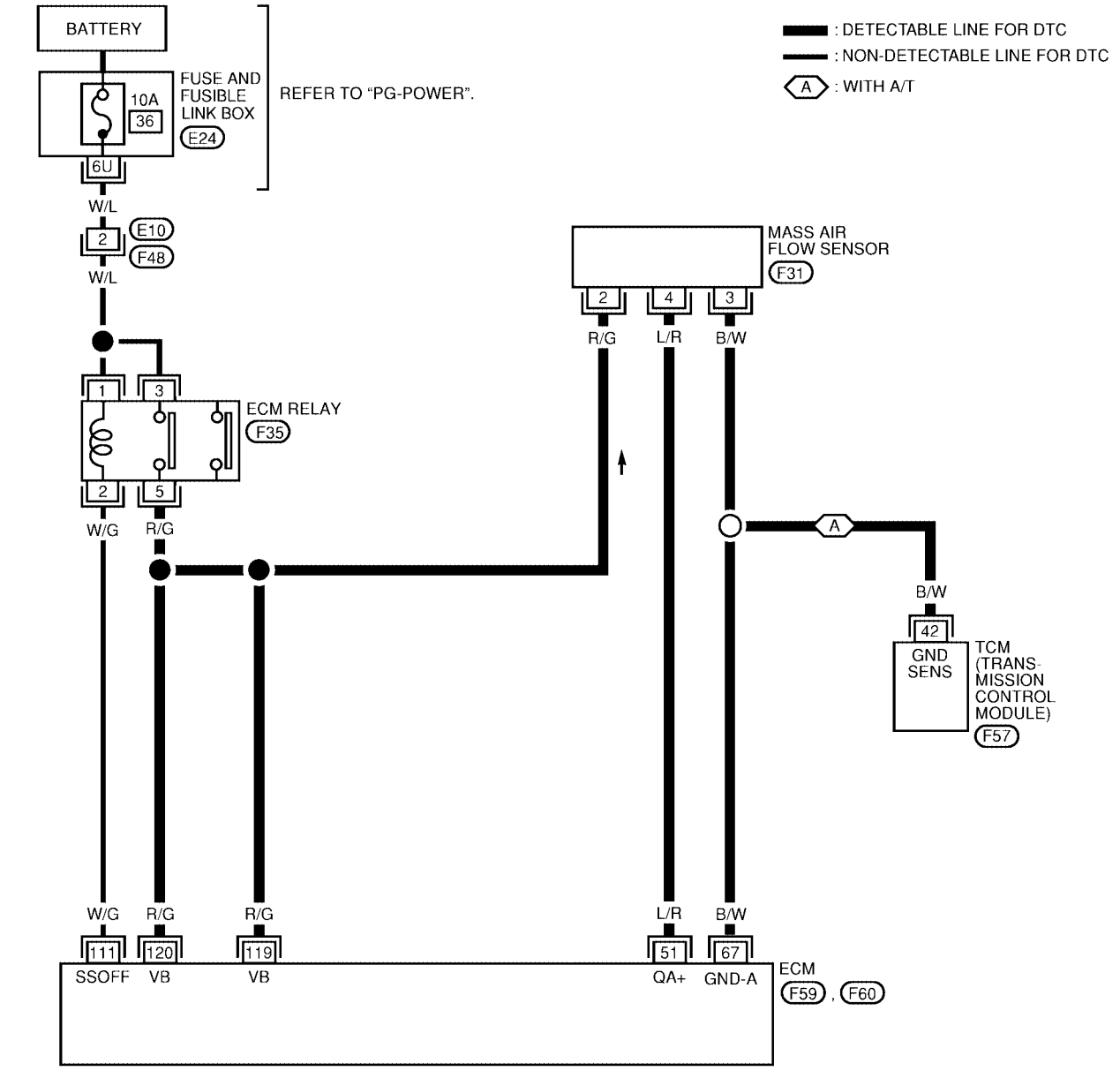
With GST

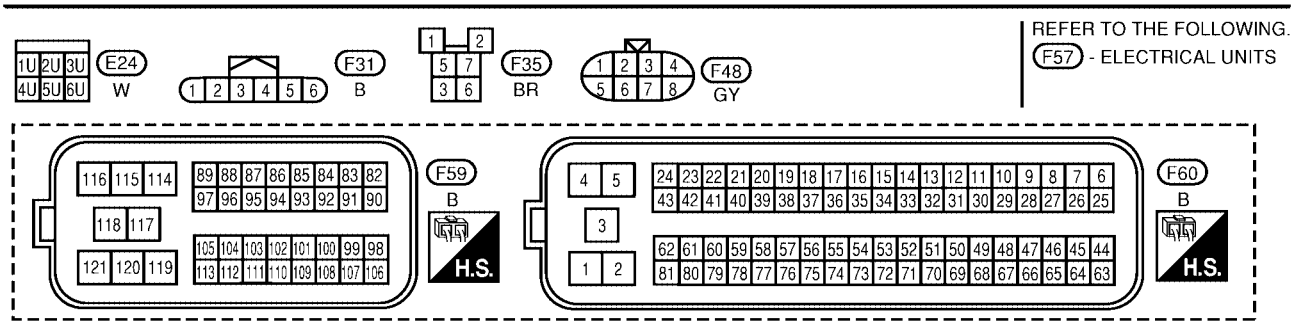
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00JBD

EC-MAFS-01





BBWA1390E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
51	L/R	Mass air flow sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.9 - 1.1V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,500 rpm.	1.5 - 1.8V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● A few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00JBE

1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connections.

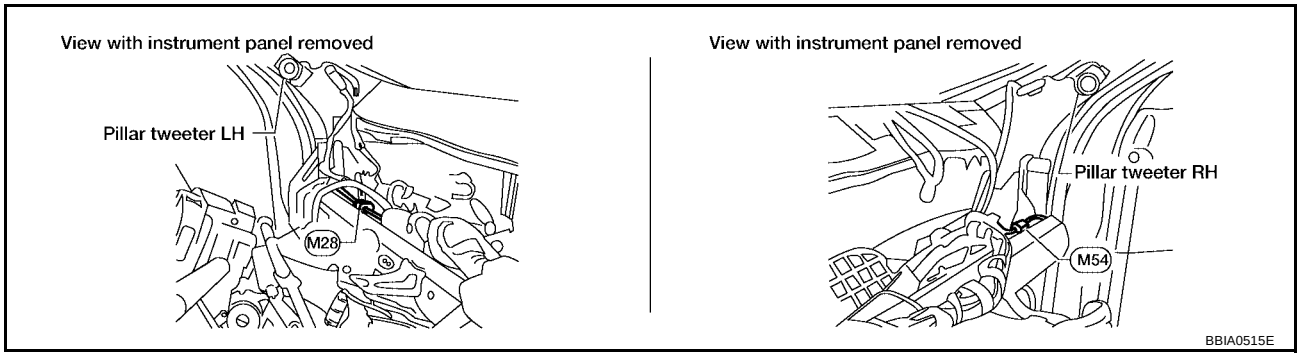
- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.
   Refer to EC-839, "Ground Inspection" .

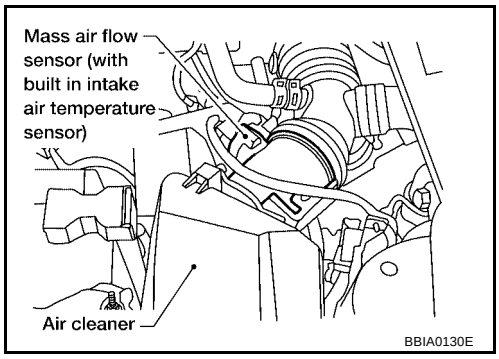


OK or NG

OK >> GO TO 4.
NG >> Repair or replace ground connections.

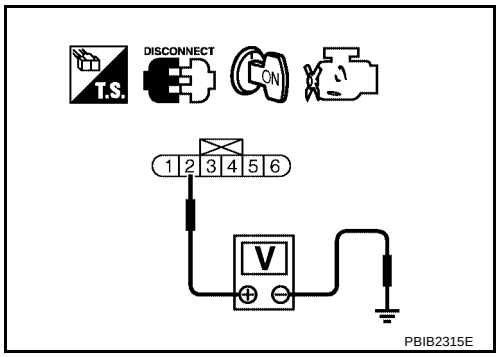
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow (MAF) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector (A/T models).
4. Check harness continuity between the following;
   MAF sensor terminal 3 and ECM terminal 67,
   MAF sensor terminal 3 and TCM terminal 42 (A/T models).
   Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR POEN AND SHORT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 51.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK MASS AIR FLOW SENSOR

Refer to EC-873, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace mass air flow sensor.

10. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

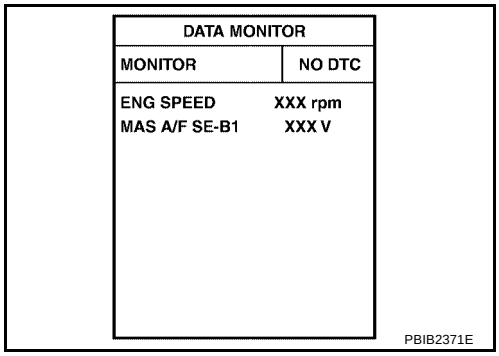
UBS00JBF

MASS AIR FLOW SENSOR

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-II and select “DATA MONITOR” mode.

4. Select “MAS A/F SE-B1” and check indication under the following conditions.



Condition	MAS A/F SE-B1 (V)
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8
Idle to about 4,000 rpm*	0.9 - 1.1 to 2.4

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

5. If the voltage is out of specification, proceed the following.

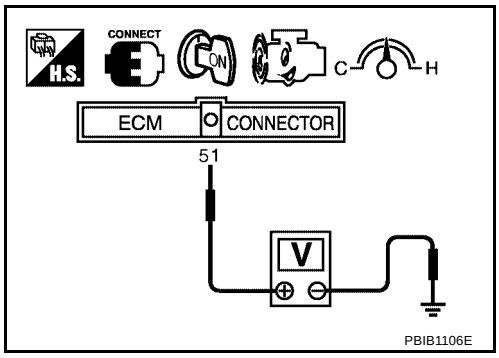
a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 51 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.9 - 1.1
2,500 rpm (Engine is warmed-up to normal operating temperature.)	1.5 - 1.8
Idle to about 4,000 rpm*	0.9 - 1.1 to 2.4

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

UBS00JBG

MASS AIR FLOW SENSOR

Refer to EM-106, "AIR CLEANER AND AIR DUCT" .

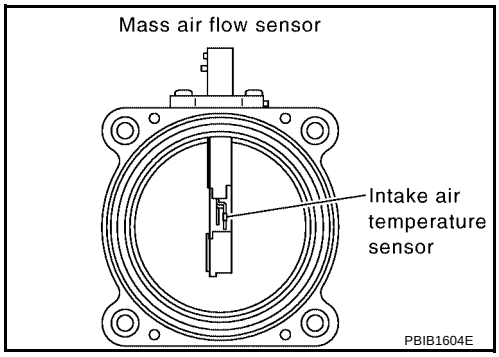
DTC P0112, P0113 IAT SENSOR

PFP:22630

Component Description

UBS00JBH

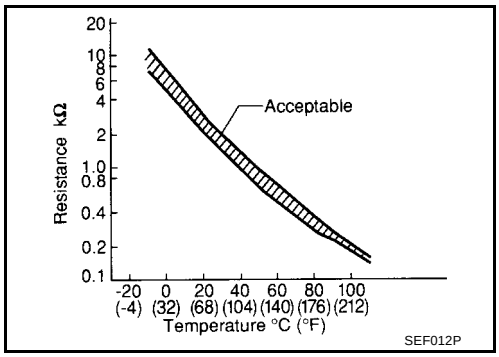
The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	3.32	1.94 - 2.06
80 (176)	1.23	0.295 - 0.349

*: This data is reference value and is measured between ECM terminal 34 (Intake air temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

UBS00JBI

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112 0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor
P0113 0113	Intake air temperature sensor circuit high input	An excessively low voltage from the sensor is sent to ECM.	

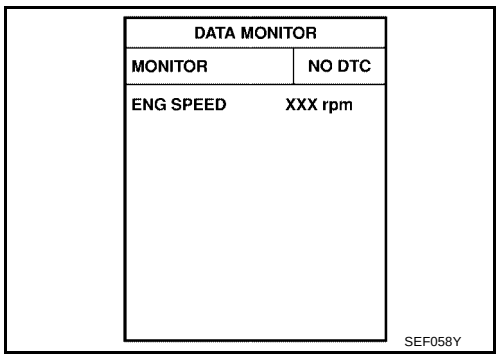
DTC Confirmation Procedure

UBS00JBJ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-879, "Diagnostic Procedure"
.



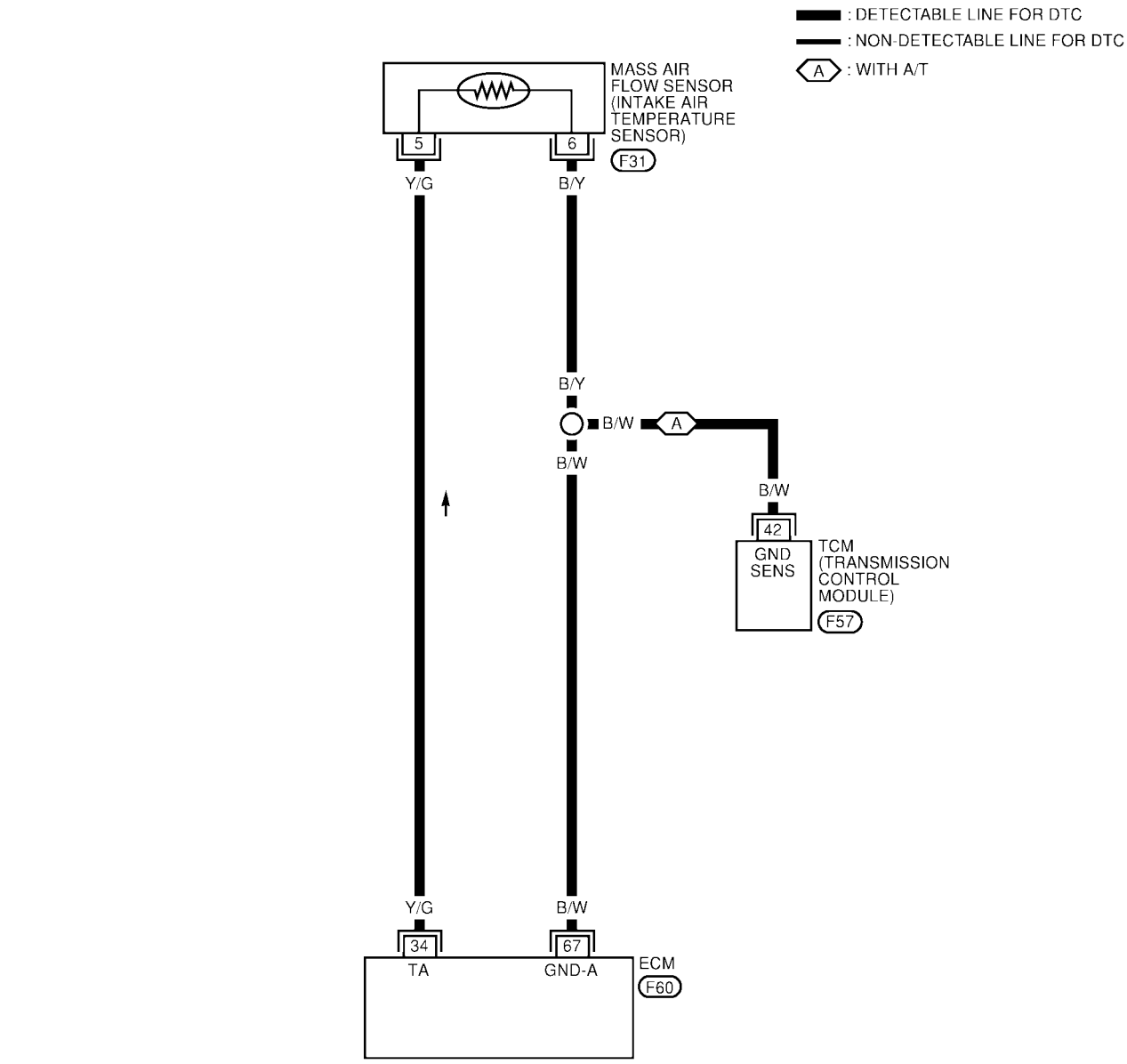
WITH GST

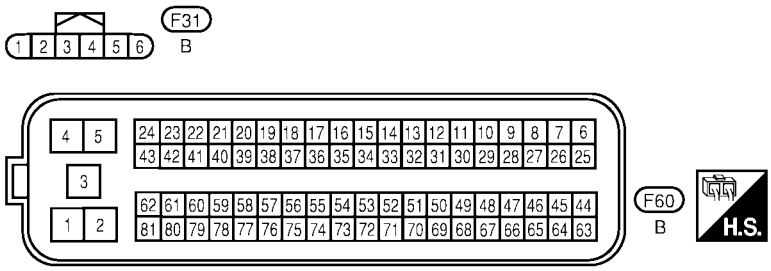
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JBK

EC-IATS-01





REFER TO THE FOLLOWING.
F57 - ELECTRICAL UNITS

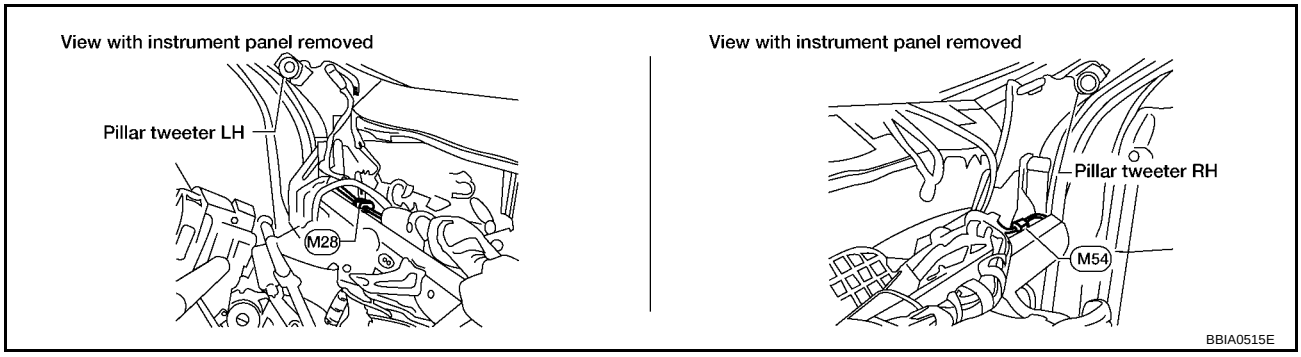
BBWA1391E

Diagnostic Procedure

UBS00JBL

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body.
   Refer to EC-839, "Ground Inspection" .

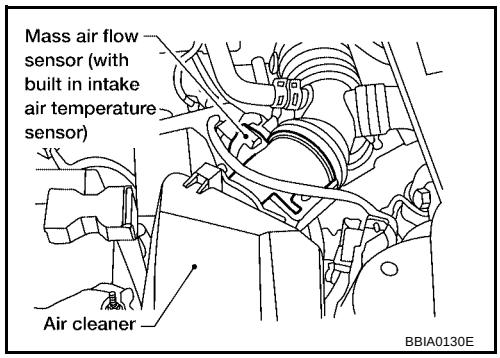


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

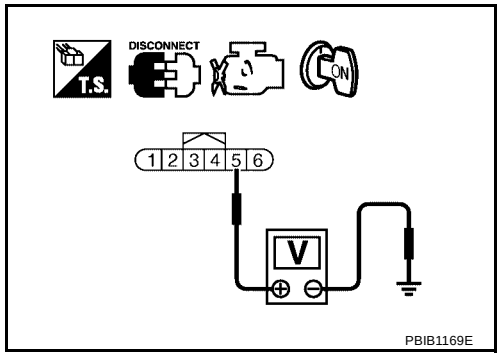
2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY

1. Disconnect mass air flow sensor (intake air temperature sensor is built-into) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminal 5 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector (A/T models).
4. Check harness continuity between mass air flow sensor terminal 6 and ECM terminal 67, TCM terminal 42 (A/T models).
   Refer to wiring diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between TCM and MAF sensor (A/T models).
- Harness for open or short between ECM and MAF sensor.

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-880, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace mass air flow sensor (with intake temperature sensor).

6. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

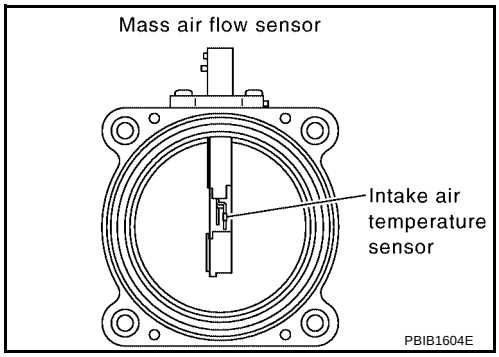
UBS00JBM

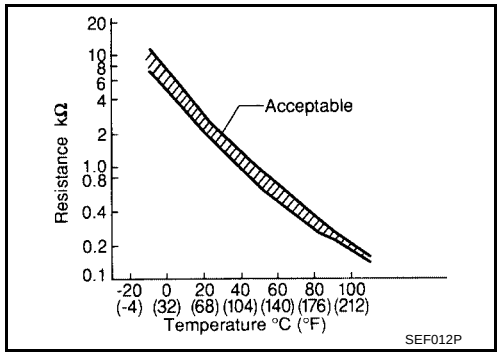
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between intake air temperature sensor terminals 5 and 6 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.96 - 2.06

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

UBS00JBN

MASS AIR FLOW SENSOR

Refer to EM-106, "AIR CLEANER AND AIR DUCT" .

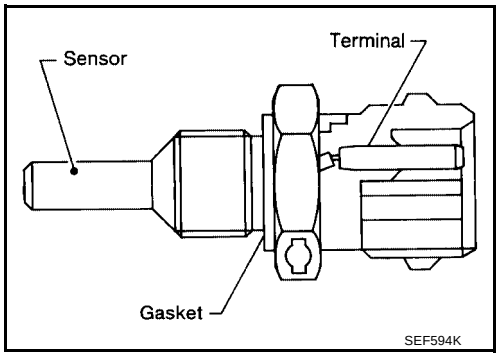
DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

UBS00JBO

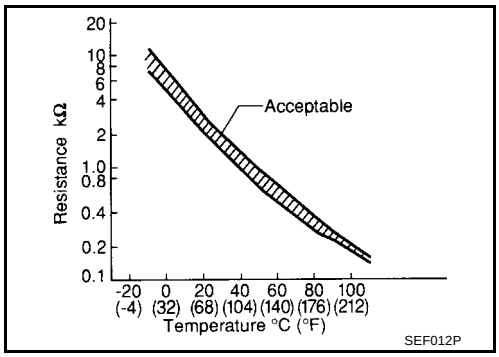
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 73 (Engine coolant temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

UBS00JBP

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

When this malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

<table>
<tr><th>Detected items</th><th colspan="2">Engine operating condition in fail-safe mode</th></tr>
<tr><td rowspan="6">Engine coolant temperature sensor circuit</td><td colspan="2">Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START.
CONSULT-II displays the engine coolant temperature decided by ECM.</td></tr>
<tr><td>Condition</td><td>Engine coolant temperature decided
(CONSULT-II display)</td></tr>
<tr><td>Just as ignition switch is turned ON or START</td><td>40°C (104°F)</td></tr>
<tr><td>More than approx. 4 minutes after ignition ON or START</td><td>80°C (176°F)</td></tr>
<tr><td>Except as shown above</td><td>40 - 80°C (104 - 176°F)
(Depends on the time)</td></tr>
<tr><td colspan="2">When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.</td></tr>
</table>

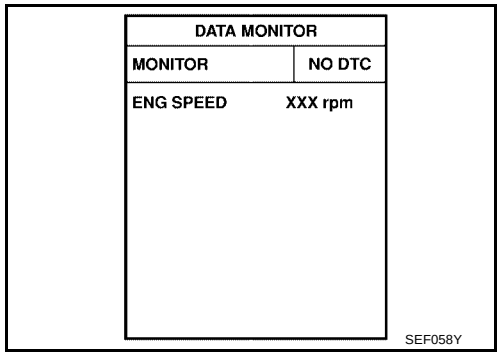
DTC Confirmation Procedure

UBS00JBQ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-885, "Diagnostic Procedure" .



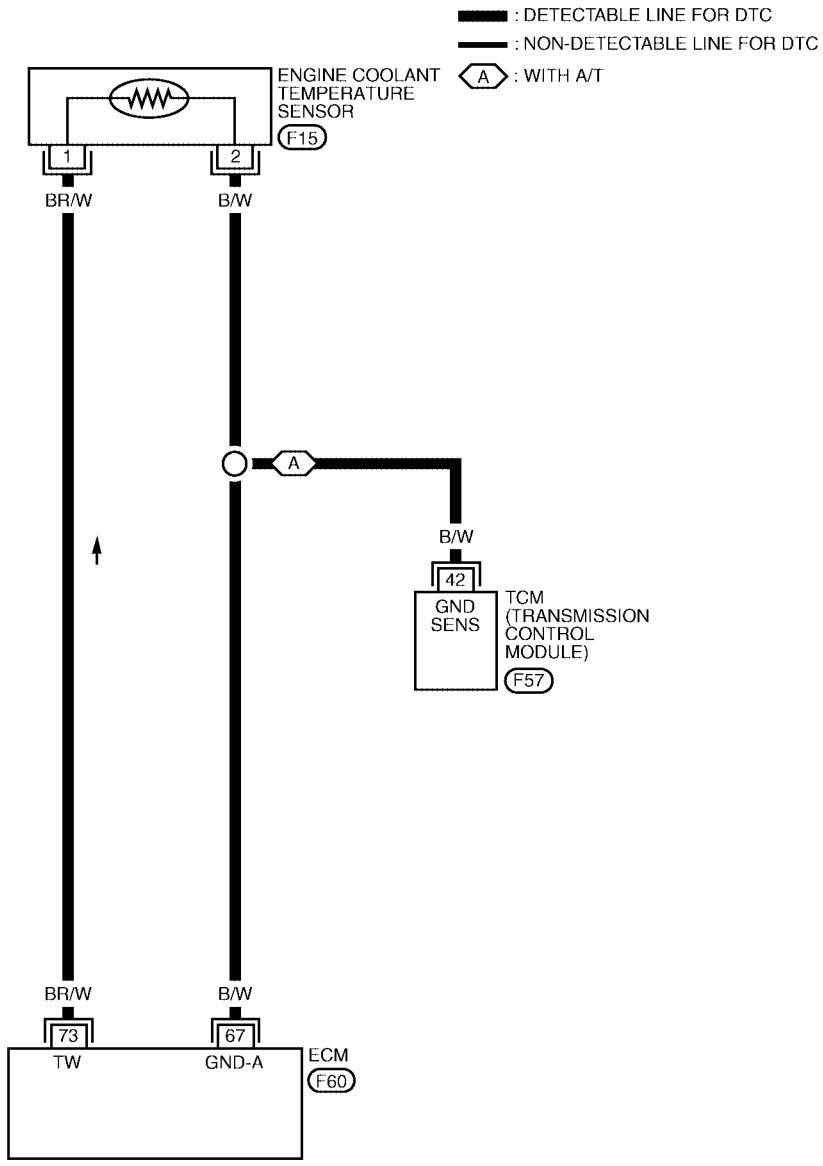
WITH GST

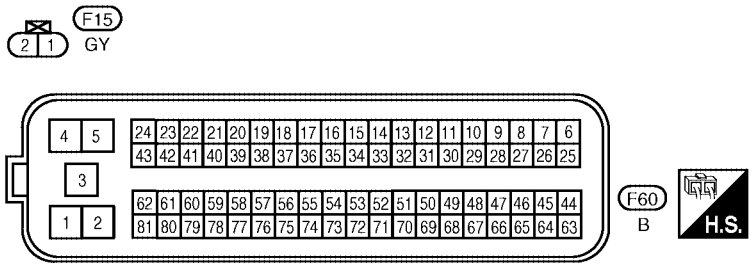
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JBR

EC-ECTS-01





REFER TO THE FOLLOWING.
F57 - ELECTRICAL UNITS

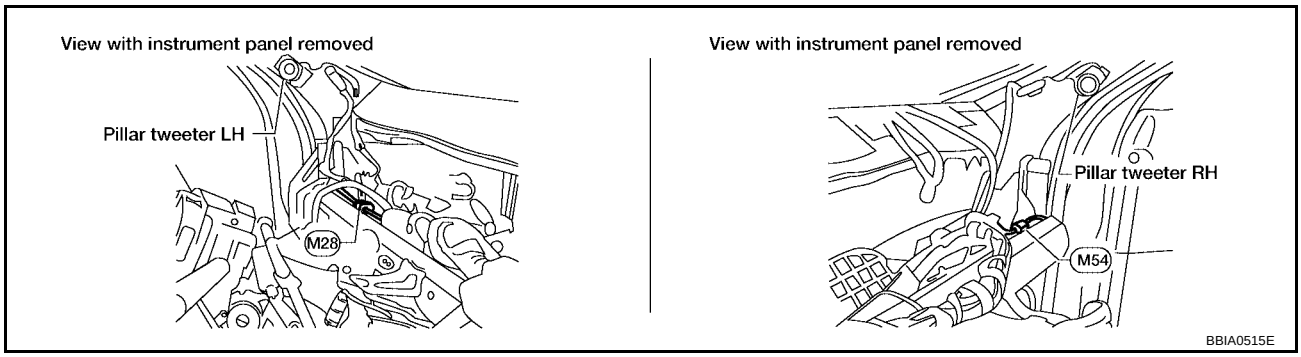
BBWA1426E

Diagnostic Procedure

UBS00JBS

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-839, "Ground Inspection" .

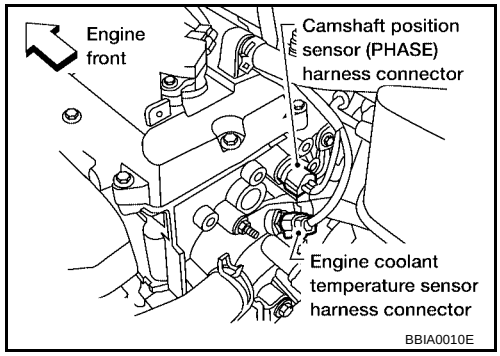


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

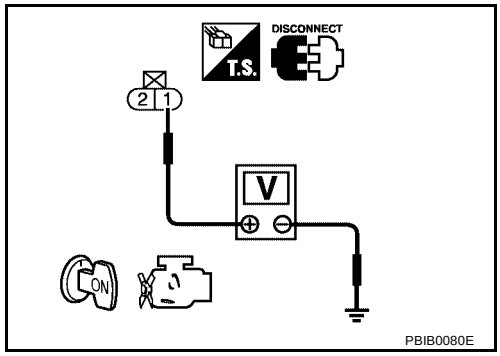
2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector (A/T models).
4. Check harness continuity between ECT sensor terminal 2 and ECM terminal 67, TCM terminal 42 (A/T models).
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between TCM and engine coolant temperature sensor (A/T models).
- Harness for open or short between ECM and engine coolant temperature sensor.

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to CO-30, "THERMOSTAT AND THERMOSTAT HOUSING" .

OK or NG

OK >> GO TO 6.
NG >> Replace engine coolant temperature sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

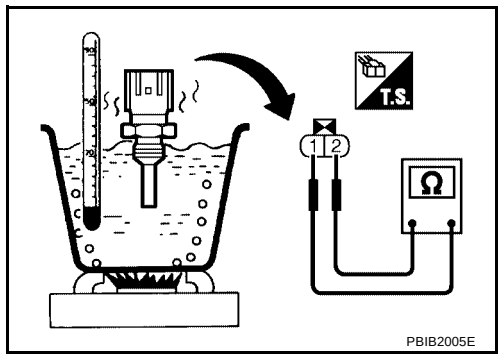
>> **INSPECTION END**

Component Inspection

UBS00JBT

ENGINE COOLANT TEMPERATURE SENSOR

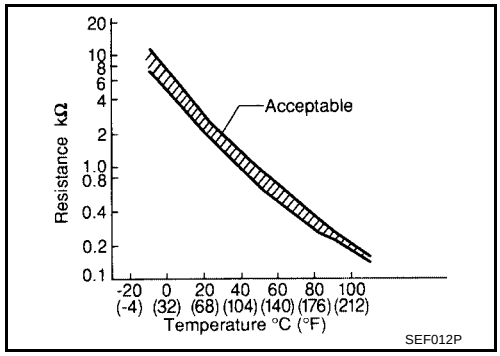
1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

2. If NG, replace engine coolant temperature sensor.



UBS00JBU

Removal and Installation

ENGINE COOLANT TEMPERATURE SENSOR

Refer to CO-30, "THERMOSTAT AND THERMOSTAT HOUSING" .

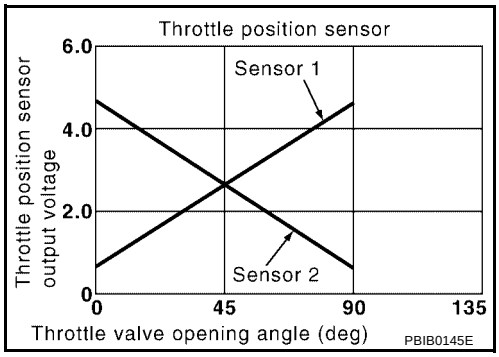
DTC P0122, P0123 TP SENSOR

PFP:16119

Component Description

UBS00JBV

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JBW

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	● Shift lever: D (A/T), 1ST (M/T)	Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. thus it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

UBS00JBX

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	● Harness or connectors (The TP sensor 2 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 2) ● Accelerator pedal position sensor (APP sensor 2)
P0123 0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

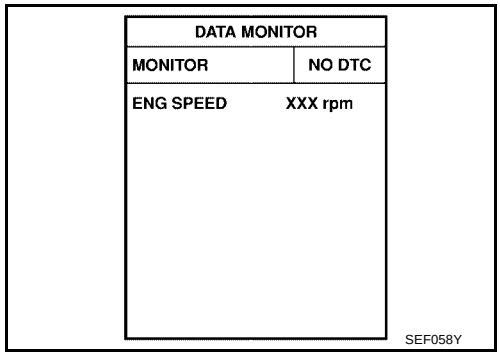
UBS00JBY

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-891, "Diagnostic Procedure" .



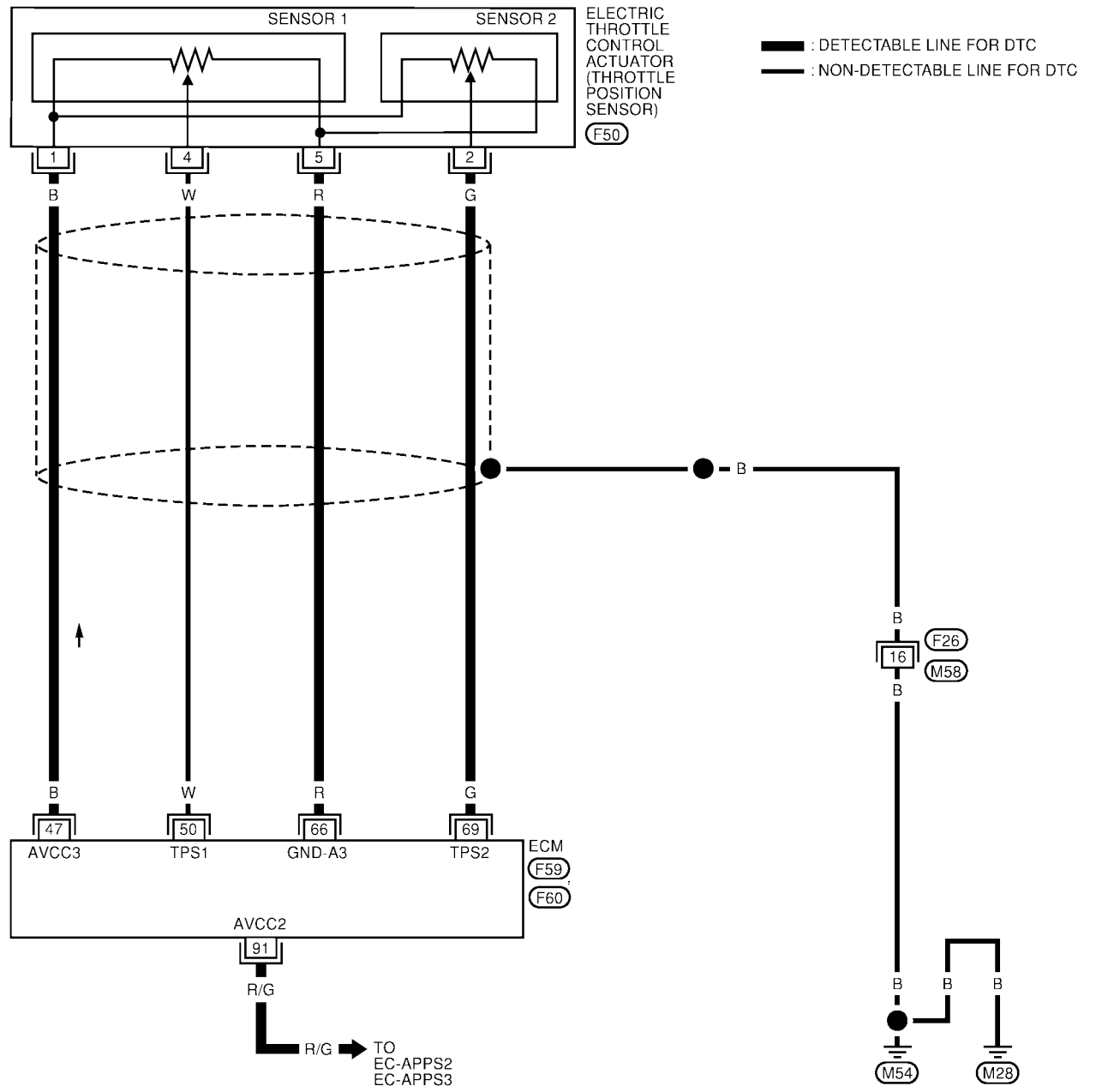
WITH GST

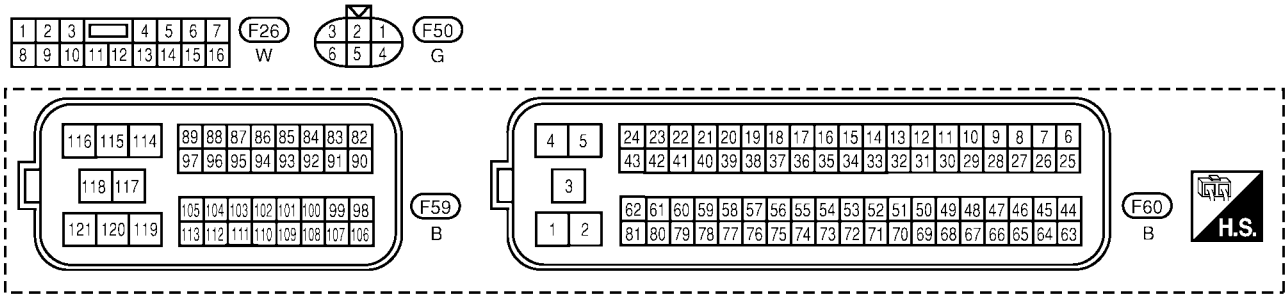
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JBZ

EC-TPS2-01





BBWA1395E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

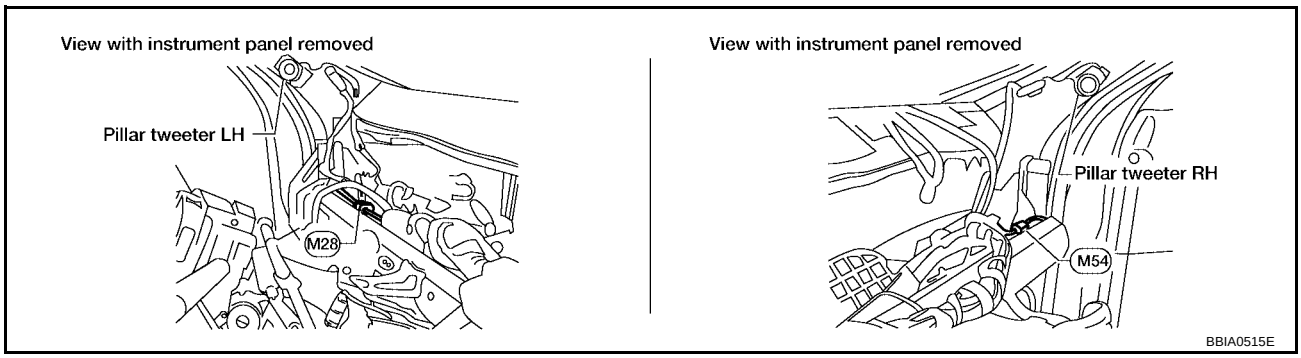
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	B	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
66	R	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
69	G	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
91	R/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

UBS00JC0

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-839, "Ground Inspection" .

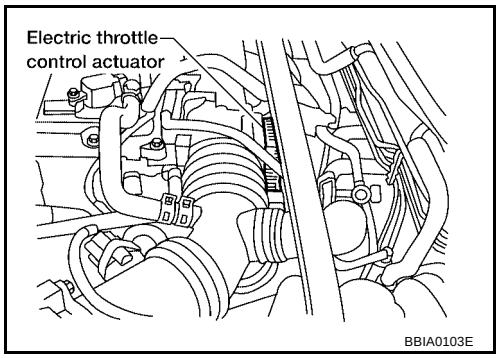


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

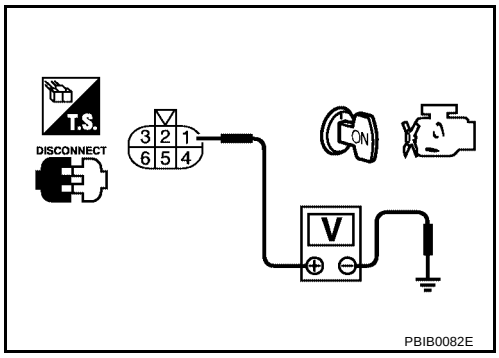


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 7.
NG >> GO TO 3.



3. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace open circuit.

4. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check the following.

- Harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 1	EC-890
91	APP sensor terminal 1	EC-1282

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1287, "Component Inspection"

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-748, "Accelerator Pedal Released Position Learning" .
3. Perform EC-748, "Throttle Valve Closed Position Learning" .
4. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 66 and electric throttle control actuator terminal 5. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 69 and electric throttle control actuator terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-894, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-748, "Throttle Valve Closed Position Learning" .
3. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

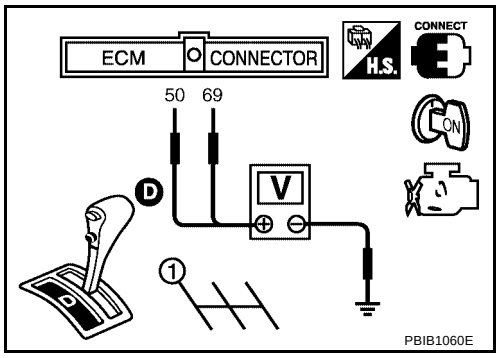
Component Inspection

UBS00JC1

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-748, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set shift lever to D position (A/T models) or 1st position (M/T models).
5. Check voltage between ECM terminals 50 (TP sensor 1), 69 (TP sensor 2) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-748, "Throttle Valve Closed Position Learning" .
8. Perform EC-749, "Idle Air Volume Learning" .

Remove and Installation

UBS00JC2

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-108, "INTAKE MANIFOLD" .

DTC P0125 ECT SENSOR

PFP:22630

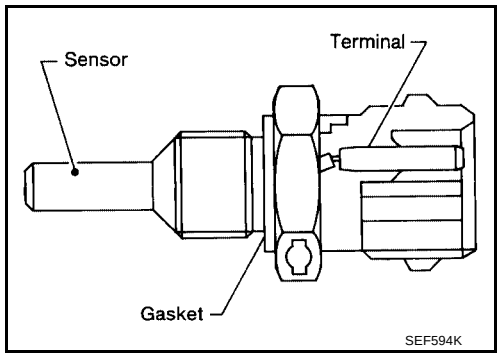
Description

UBS00JC3

NOTE:
If DTC P0125 is displayed with P0117 or P0118, first perform the trouble diagnosis for DTC P0117 or P0118. Refer to EC-882 .

COMPONENT DESCRIPTION

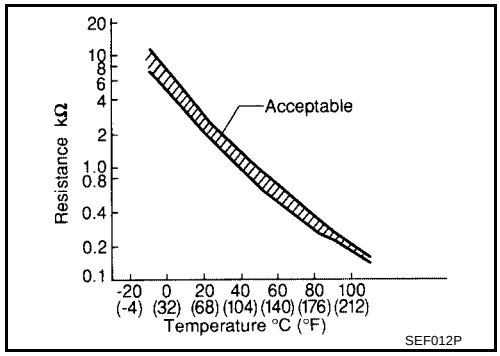
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



< Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: This data is reference value and is measured between ECM terminal 73 (Engine coolant temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

UBS00JC4

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0125 0125	Insufficient engine coolant temperature for closed loop fuel control	● Voltage sent to ECM from the sensor is not practical, even when some time has passed after starting the engine. ● Engine coolant temperature is insufficient for closed loop fuel control.	● Harness or connectors (High resistance in the circuit) ● Engine coolant temperature sensor ● Thermostat

DTC Confirmation Procedure

UBS00JC5

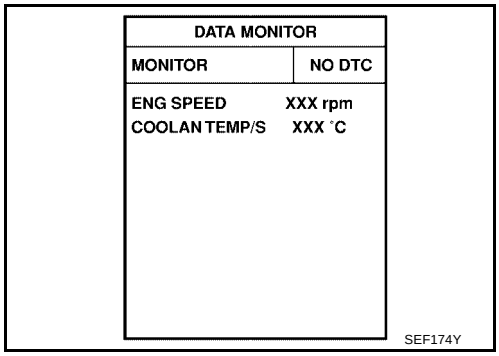
CAUTION:
Be careful not to overheat engine.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Check that “COOLAN TEMP/S” is above 10°C (50°F).
   If it is above 10°C (50°F), the test result will be OK.
   If it is below 10°C (50°F), go to following step.
4. Start engine and run it for 65 minutes at idle speed.
   If “COOLAN TEMP/S” increases to more than 10°C (50°F) within 65 minutes, stop engine because the test result will be OK.
5. If DTC is detected, go to EC-896, "Diagnostic Procedure" .



WITH GST

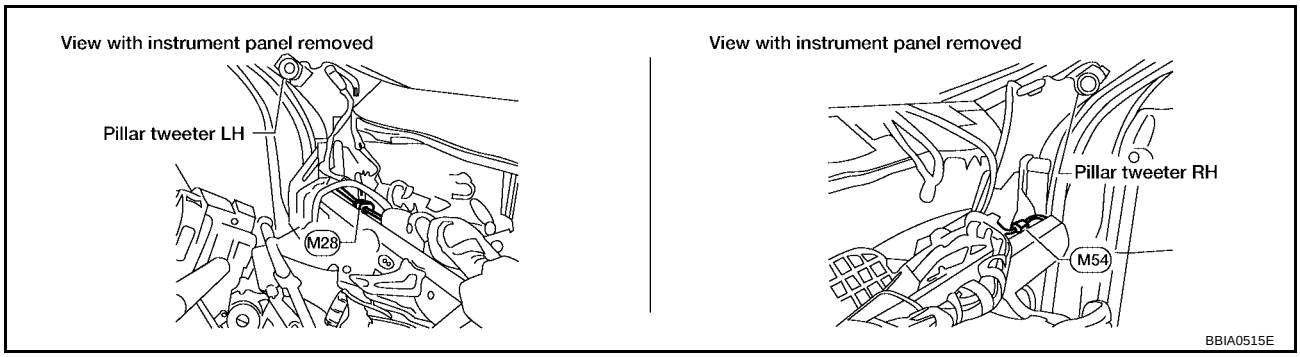
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00JC6

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-839, "Ground Inspection" .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-897, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace engine coolant temperature sensor.

3. CHECK THERMOSTAT OPERATION

When the engine is cold [lower than 70°C (158°F)] condition, grasp lower radiator hose and confirm the engine coolant does not flow.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace thermostat. Refer to CO-30, "THERMOSTAT AND THERMOSTAT HOUSING" .

4. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

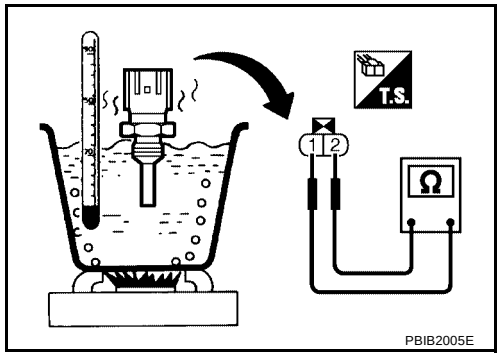
>> **INSPECTION END**

Component Inspection

UBS00JC7

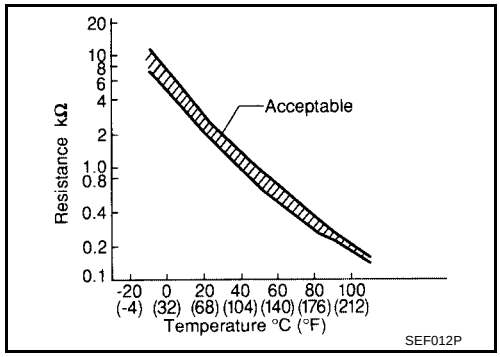
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

UBS00JC8

ENGINE COOLANT TEMPERATURE SENSOR

Refer to CO-30, "THERMOSTAT AND THERMOSTAT HOUSING"

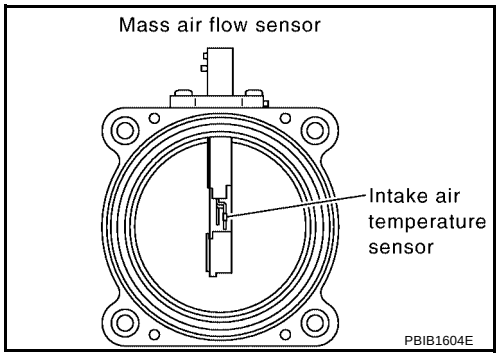
DTC P0127 IAT SENSOR

PFP:22630

Component Description

UBS00JC9

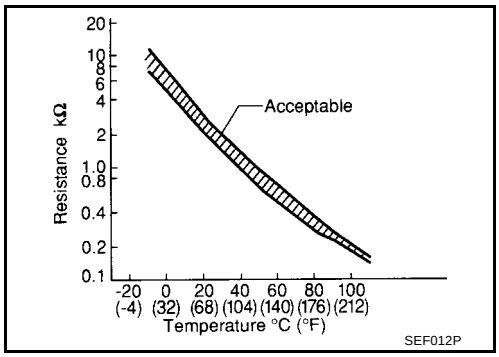
The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	3.32	1.94 - 2.06
80 (176)	1.23	0.295 - 0.349

*: This data is reference value and is measured between ECM terminal 34 (Intake air temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

UBS00JCA

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0127 0127	Intake air temperature too high	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signal from engine coolant temperature sensor.	● Harness or connectors (The sensor circuit is open or shorted) ● Intake air temperature sensor

DTC Confirmation Procedure

UBS00JCB

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

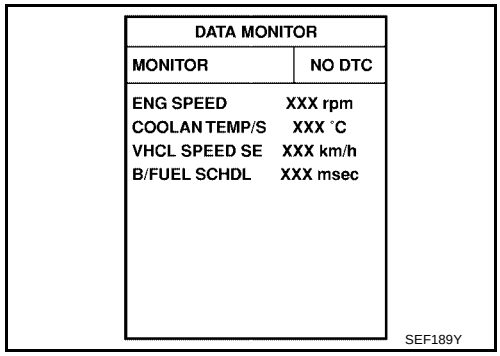
TESTING CONDITION:
This test may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Wait until engine coolant temperature is less than 90°C (194°F)

a. Turn ignition switch ON.

b. Select “DATA MONITOR” mode with CONSULT-II.
c. Check the engine coolant temperature.
d. If the engine coolant temperature is not less than 90°C (194°F), turn ignition switch OFF and cool down engine.
   - Perform the following steps before engine coolant temperature is above 90°C (194°F).
2. Turn ignition switch ON.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine.
5. Hold vehicle speed at more than 70 km/h (43 MPH) for 100 consecutive seconds.
6. If 1st trip DTC is detected, go to EC-899, "Diagnostic Procedure" .



WITH GST

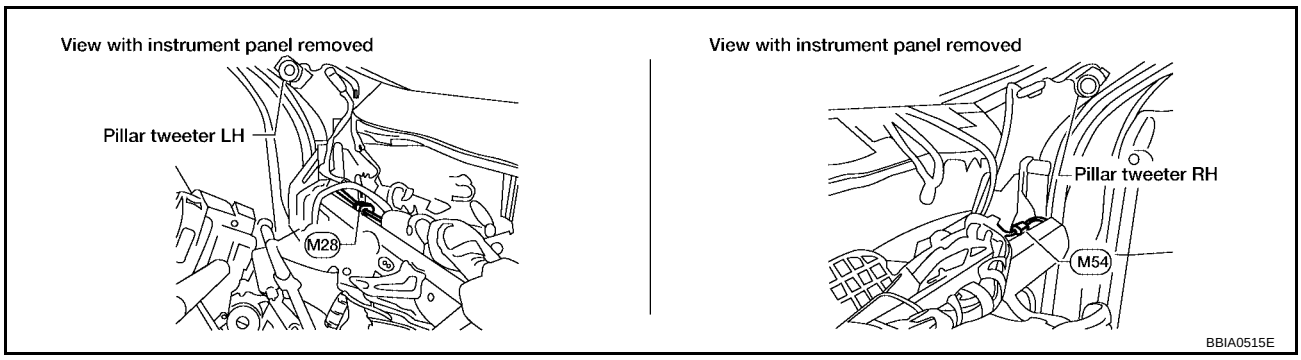
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00JCC

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-839, "Ground Inspection" .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-900, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

3. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
Refer to EC-878, "Wiring Diagram" .

>> **INSPECTION END**

Component Inspection

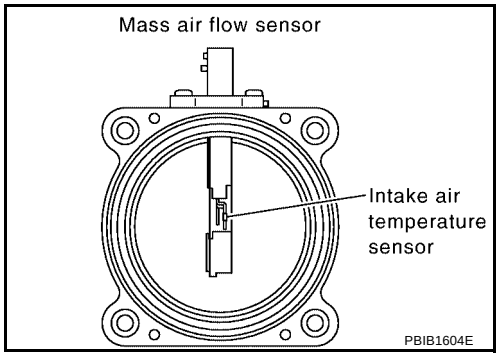
UBS00JCD

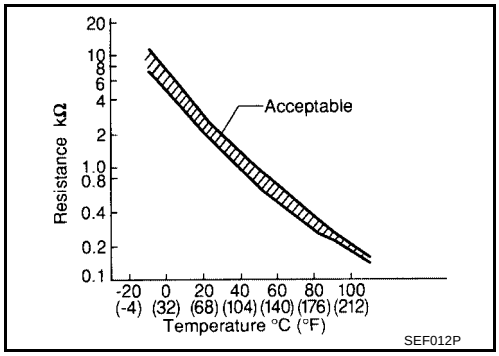
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between intake air temperature sensor terminals 5 and 6 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.96 - 2.06

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

UBS00JCE

MASS AIR FLOW SENSOR

Refer to EM-106, "AIR CLEANER AND AIR DUCT" .

DTC P0128 THERMOSTAT FUNCTION

PFP:21200

On Board Diagnosis Logic

UBS00JCF

Engine coolant temperature has not risen enough to open the thermostat even though the engine has run long enough.
This is due to a leak in the seal or the thermostat stuck open.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0128 0128	Thermostat function	The engine coolant temperature does not reach to specified temperature even though the engine has run long enough.	● Thermostat ● Leakage from sealing portion of thermostat ● Engine coolant temperature sensor

DTC Confirmation Procedure

UBS00JCG

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:

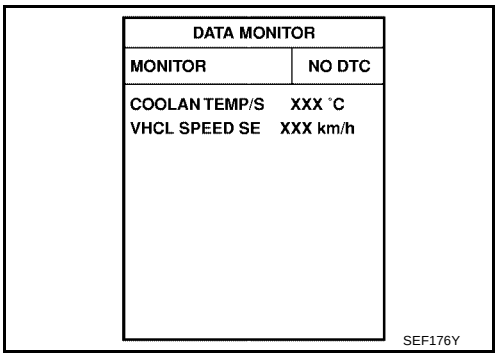
- **For best results, perform at ambient temperature of –10°C (14°F) or higher.**
- **For best results, perform at engine coolant temperature of –10°C (14°F) to 68°C (154°F).**

WITH CONSULT-II

1. Replace thermostat with new one. Refer to CO-30, "THERMOSTAT AND THERMOSTAT HOUSING" . Use only a genuine NISSAN thermostat as a replacement. If an incorrect thermostat is used, the MIL may come on.
2. Turn ignition switch ON.
3. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
4. Check that the “COOLAN TEMP/S” is above 68°C (154°F).
   If it is below 68°C (154°F), go to following step.
   If it is above 68°C (154°F), stop engine and cool down the engine to less than 68°C (154°F), then retry from step 1.
5. Drive vehicle for 10 consecutive minutes under the following conditions.

VHCL SPEED SE	80 - 120 km/h (50 - 75 MPH)

If 1st trip DTC is detected, go to EC-901, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00JCH

1. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-902, "Component Inspection" .

OK or NG

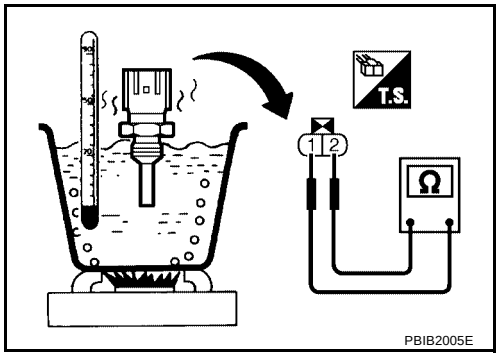
OK >> **INSPECTION END**
NG >> Replace engine coolant temperature sensor.

Component Inspection

UBS00JCI

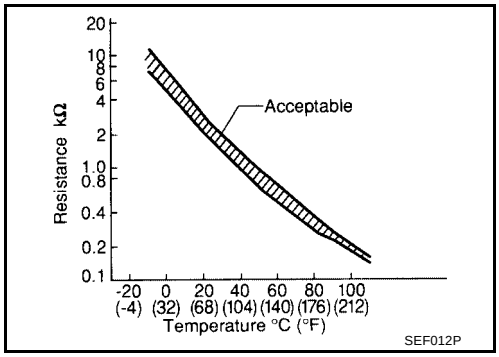
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

UBS00JCJ

ENGINE COOLANT TEMPERATURE SENSOR

Refer to CO-30, "THERMOSTAT AND THERMOSTAT HOUSING" .

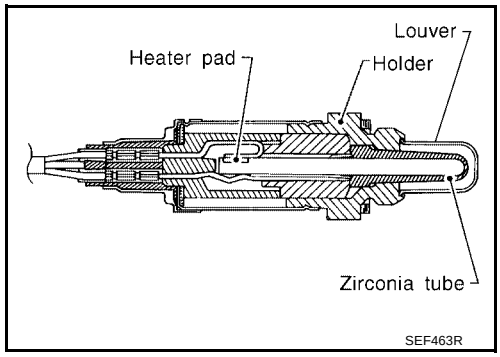
DTC P0132 HO2S1

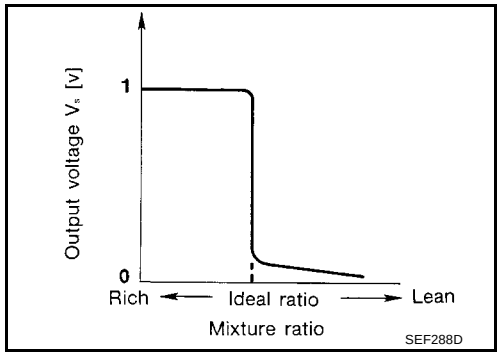
PFP:22690

Component Description

UBS00JTS

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

UBS00JTT

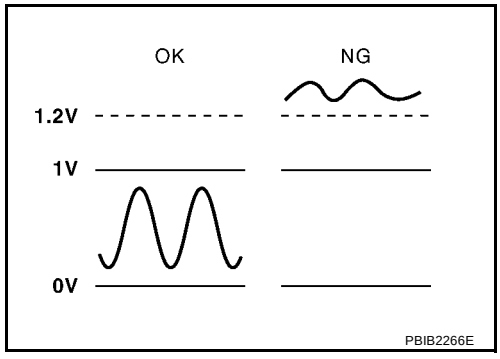
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

UBS00JTU

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0132 0132	Heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 1

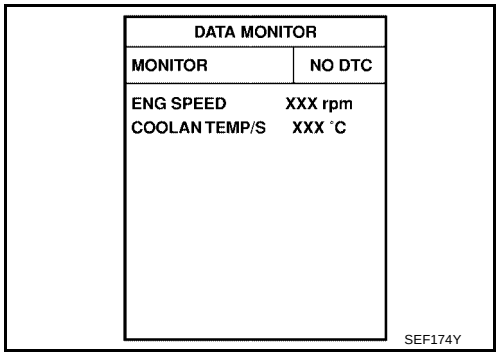
DTC Confirmation Procedure

UBS00JTV

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Restart engine and let it idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-906, "Diagnostic Procedure"
.



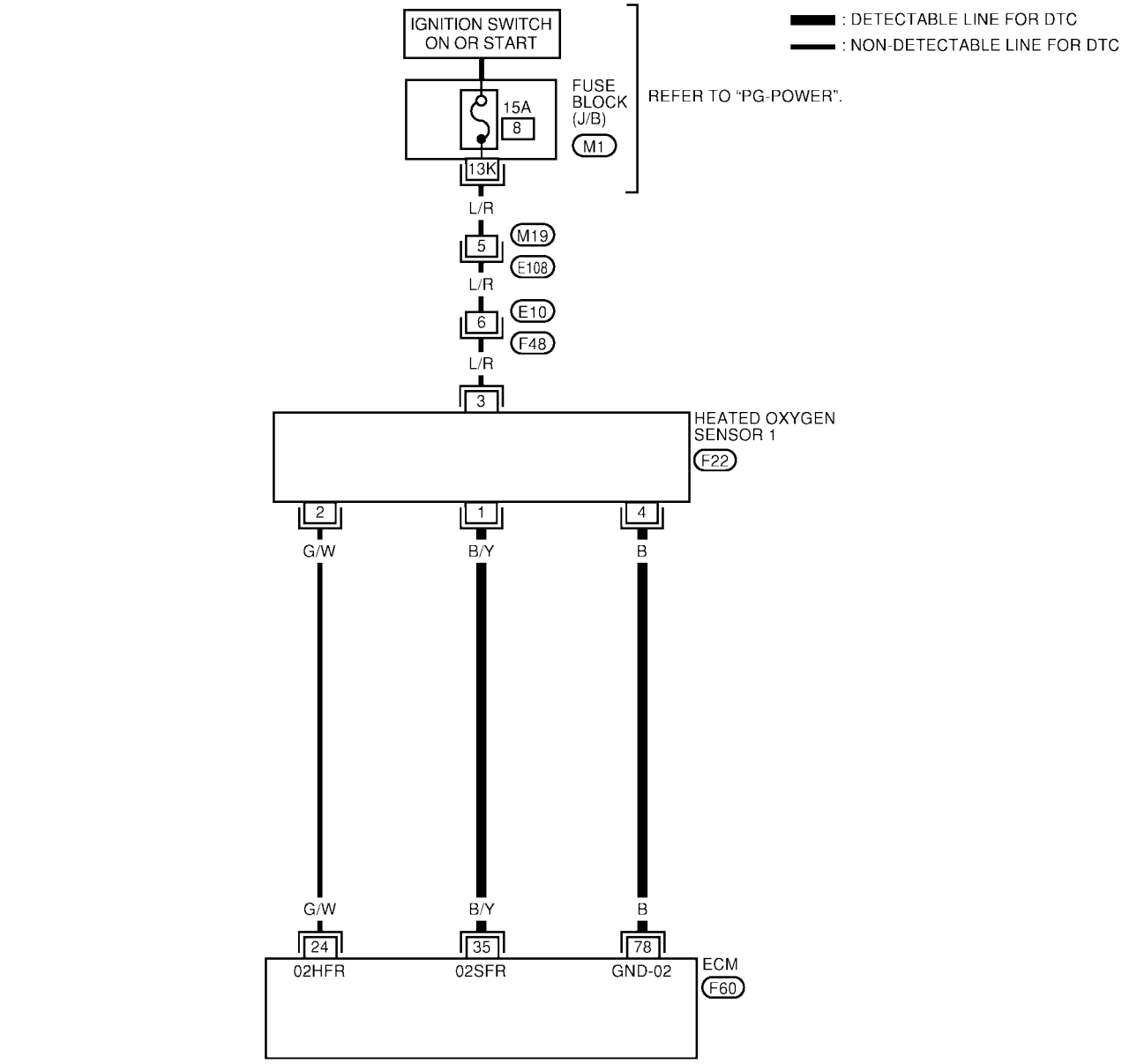
WITH GST

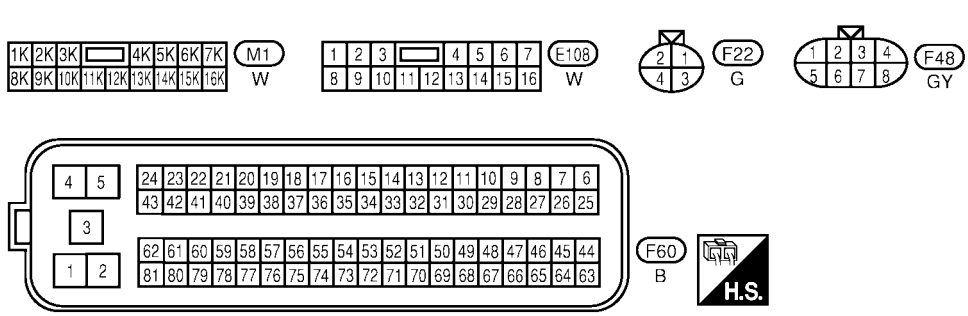
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JTW

EC-HO2S1-01





BBWA1393E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

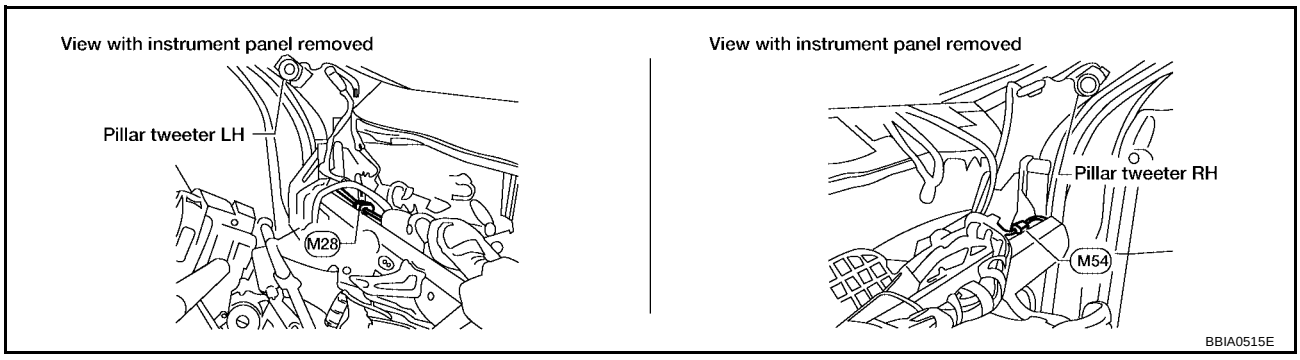
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	B/Y	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
78	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00JTX

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground two screws on the body.
   Refer to EC-839, "Ground Inspection" .



OK or NG

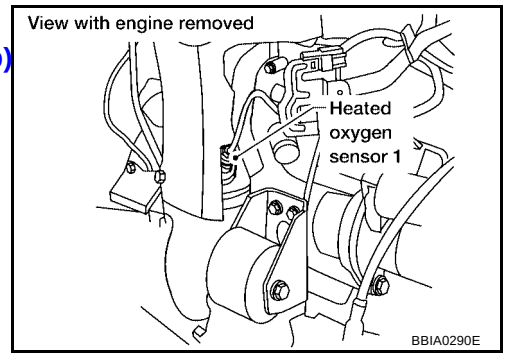
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.

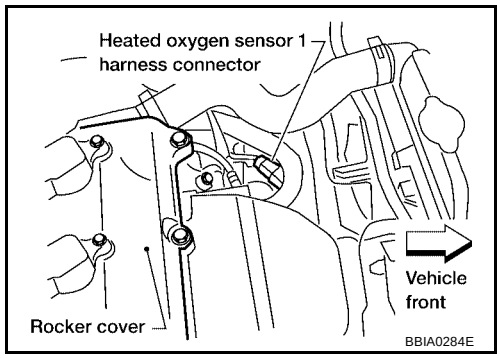


3. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 terminal 4 and ECM terminal 78.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 terminal 1 and ECM terminal 35.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HO2S1 CONNECTOR FOR WATER

Check heated oxygen sensor 1 connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-908, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace heated oxygen sensor 1.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00JTY

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

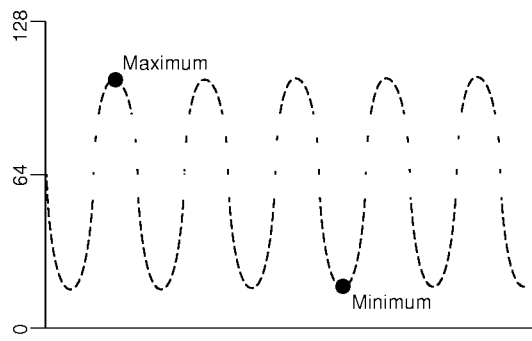
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

CAUTION:

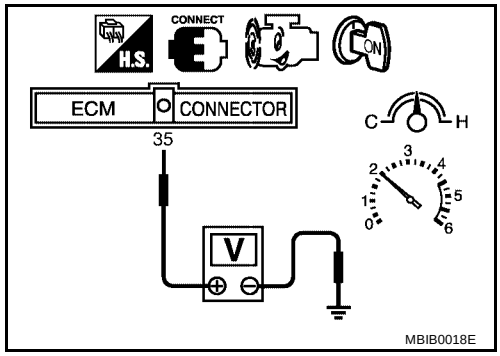
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] and ground.

3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least 1 time.
   - The minimum voltage is below 0.3V at least 1 time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V



CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
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Removal and Installation

UBS00JTZ

HEATED OXYGEN SENSOR 1

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

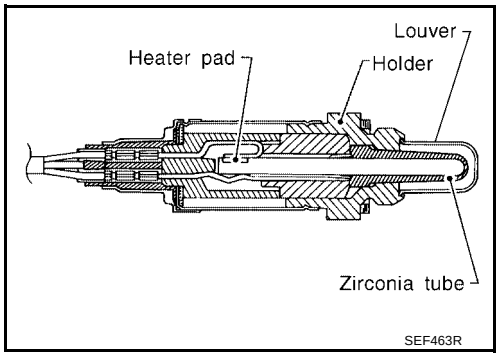
DTC P0133 HO2S1

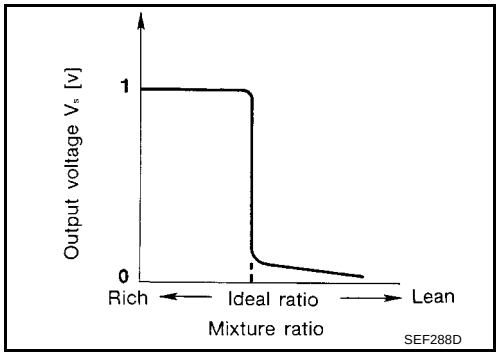
PFP:22690

Component Description

UBS00JU0

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

UBS00JU1

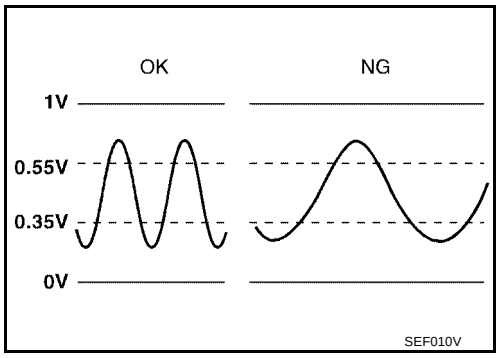
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

UBS00JU2

To judge the malfunction of heated oxygen sensor 1, this diagnosis measures response time of heated oxygen sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 temperature index. Judgment is based on whether the compensated time (heated oxygen sensor 1 cycling time index) is inordinately long or not.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0133 0133	Heated oxygen sensor 1 circuit slow response	The response of the voltage signal from the sensor takes more than the specified time.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 1 ● Fuel pressure ● Fuel injector ● Intake air leaks ● Exhaust gas leaks ● PCV valve ● Mass air flow sensor

DTC Confirmation Procedure

UBS00JU3

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

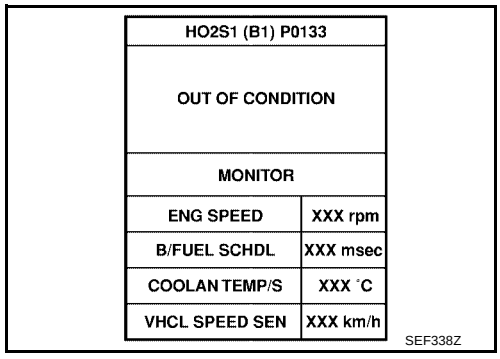
TESTING CONDITION:

- **Always perform at a temperature above –10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P0133” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

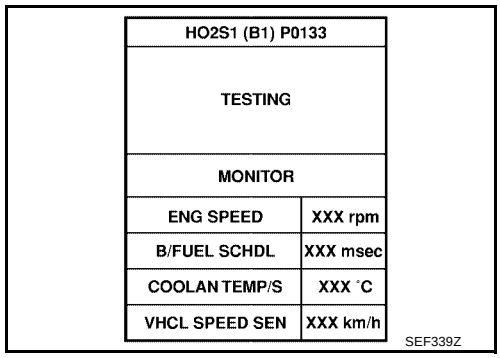
   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.



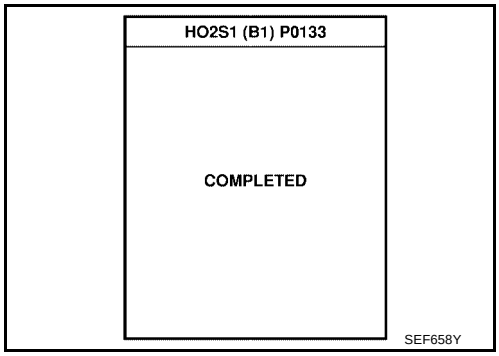
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 20 to 50 seconds.)

ENG SPEED	1,200 - 3,200 rpm
Vehicle speed	More than 80 km/h (50 MPH)
B/FUEL SCHDL	1.9 - 13.0 msec
Shift lever	Suitable position

If “TESTING” is not displayed after 5 minutes, retry from step 2.



7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-914, "Diagnostic Procedure" .



Overall Function Check

UBS00JU4

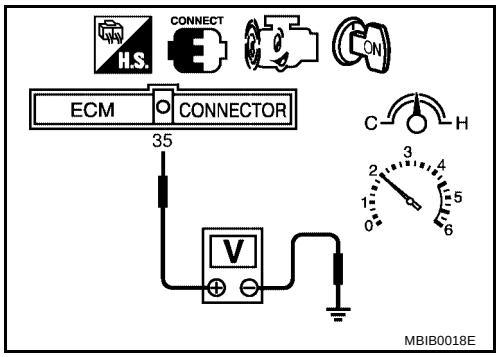
Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1(B1) signal] and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.

   1 time : 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

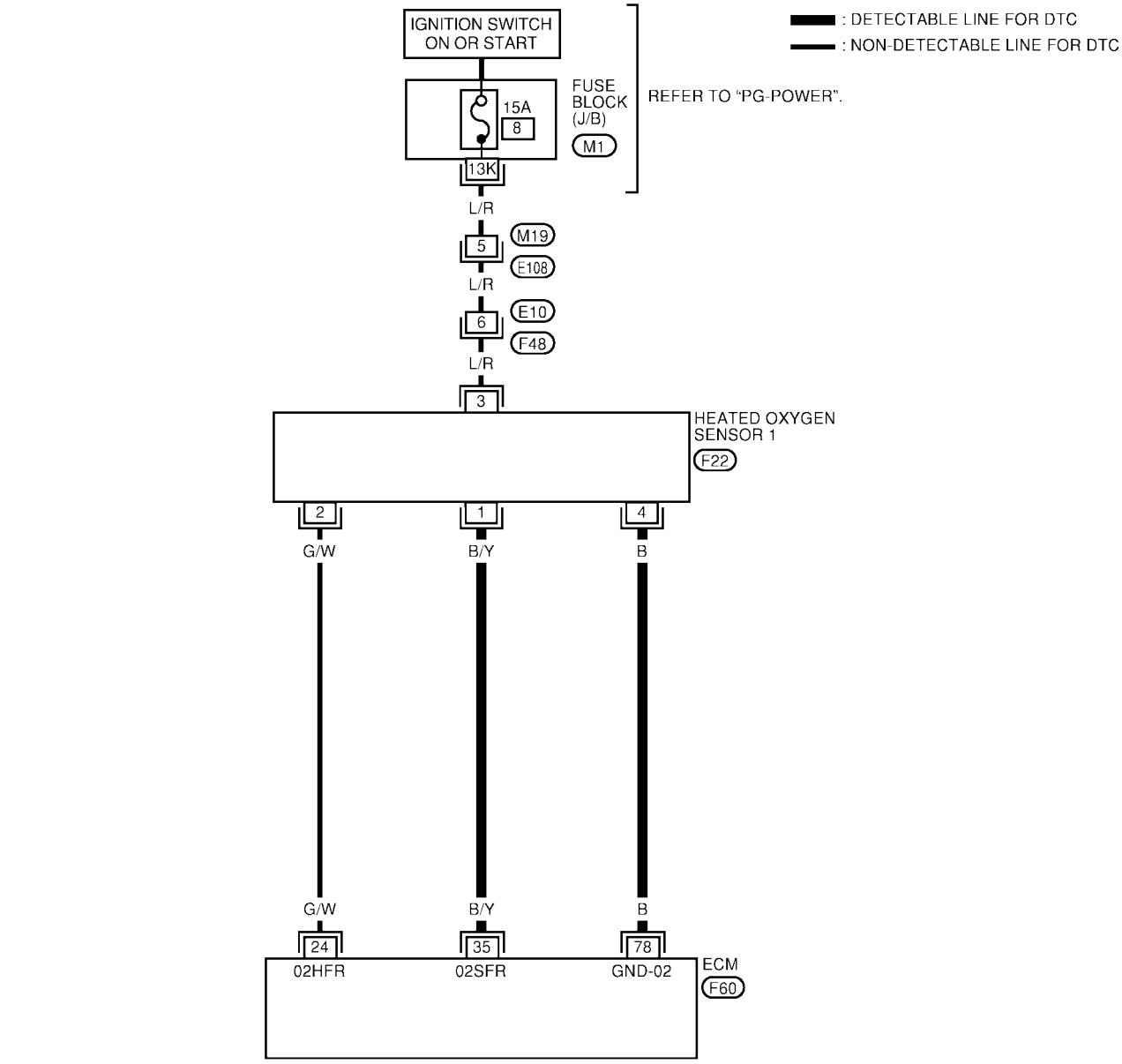
   2 times : 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
4. If NG, go to EC-914, "Diagnostic Procedure" .

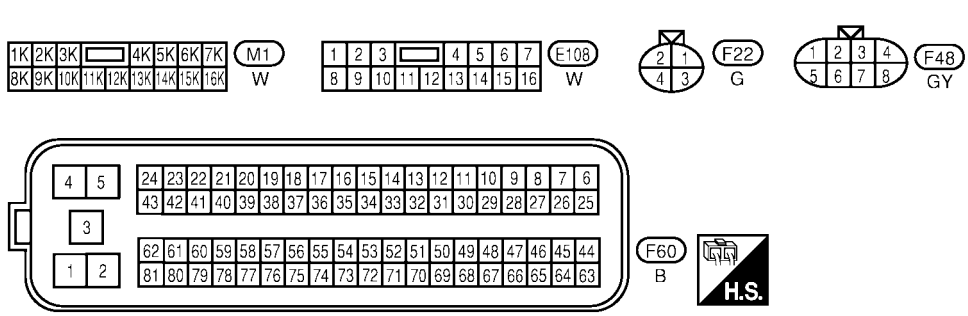


Wiring Diagram

UBS00JU5

EC-HO2S1-01





BBWA1393E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

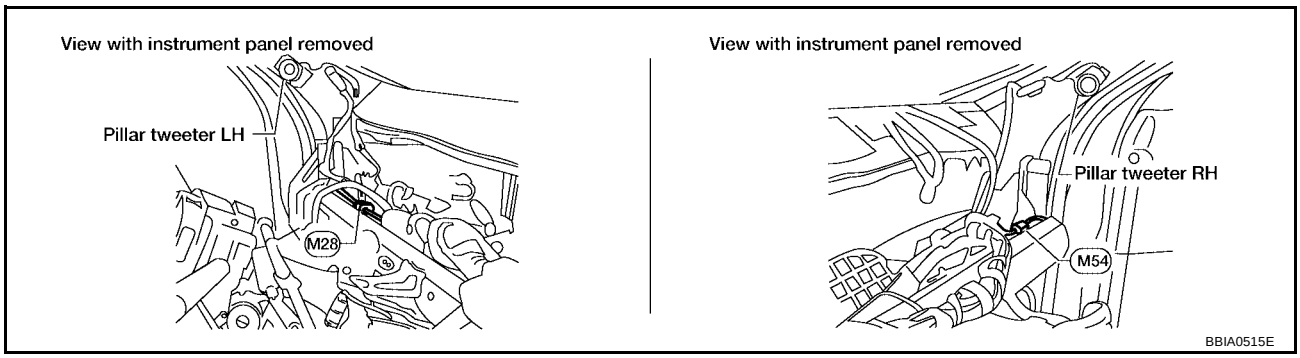
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	B/Y	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
78	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00JU6

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .



OK or NG

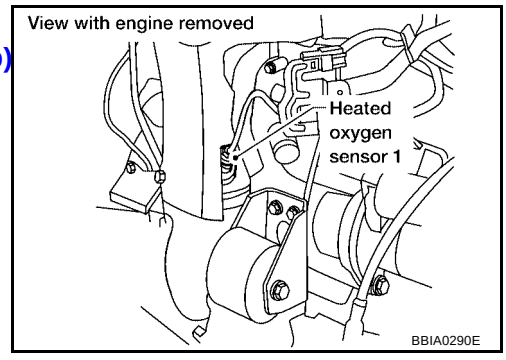
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

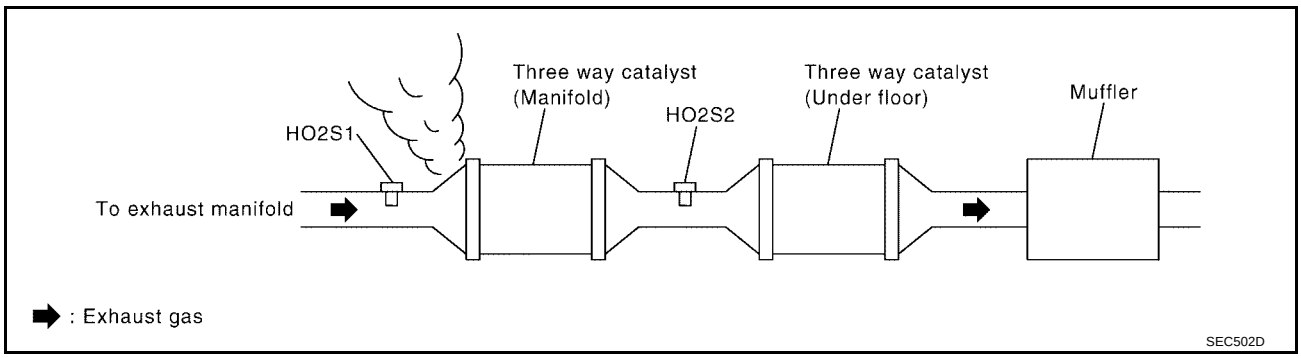
Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.



3. CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (Manifold).



OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

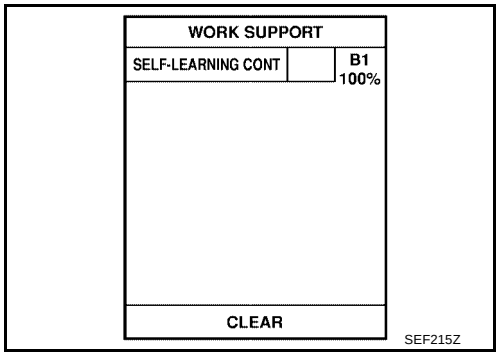
OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. CLEAR THE SELF-LEARNING DATA

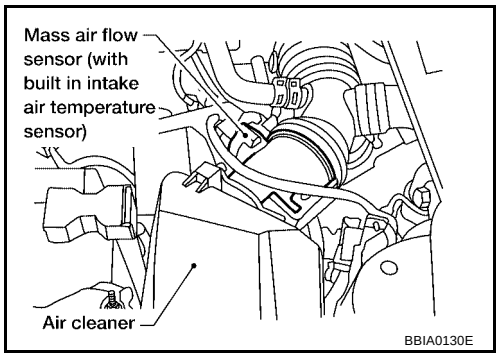
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171 or DTC P0172 (Refer to EC-941 or EC-952).
No >> GO TO 6.

6. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

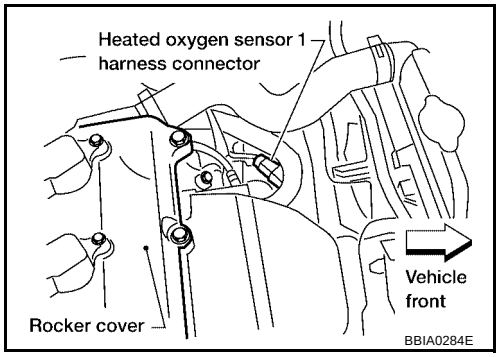
1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 78 and HO2S1 terminal 4.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground short to power in harness or connectors.



7. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 35 and HO2S1 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-866, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK PCV VALVE

Refer to EC-693, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace PCV valve.

10. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-918, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace heated oxygen sensor 1.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00JU7

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

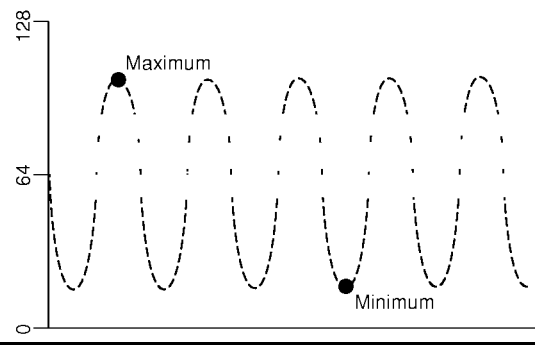
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown in the figure.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

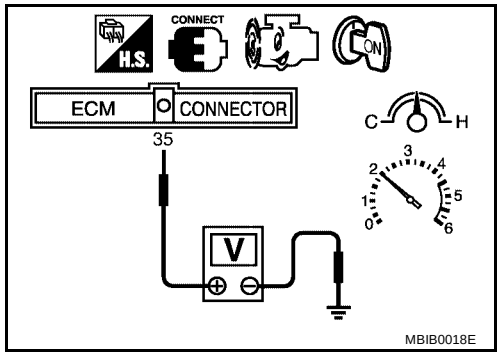
Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] and ground.

3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least 1 time.
   - The minimum voltage is below 0.3V at least 1 time.
   - The voltage never exceeds 1.0V.

   1 time : 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V

   2 times : 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V →0.6 - 1.0V → 0 - 0.3V



CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00JU8

HEATED OXYGEN SENSOR 1

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

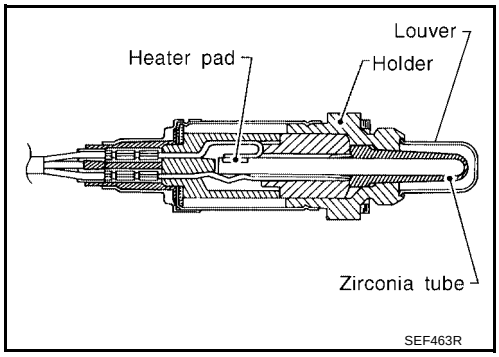
DTC P0134 HO2S1

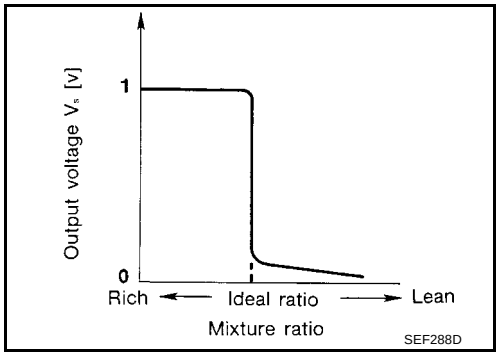
PFP:22690

Component Description

UBS00JU9

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

UBS00JUA

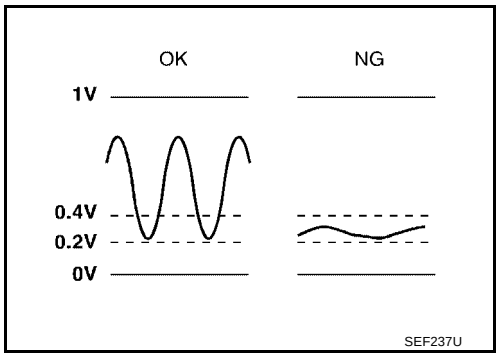
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

UBS00JUB

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0134 0134	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	● Harness or connectors (The sensor circuit is open or shorted) ● Heated oxygen sensor 1

DTC Confirmation Procedure

UBS00JUC

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

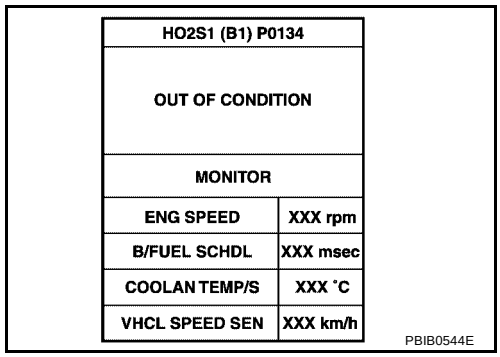
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “HO2S1 (B1) P0134” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
3. Touch “START”.
4. Let it idle for at least 3 minutes.

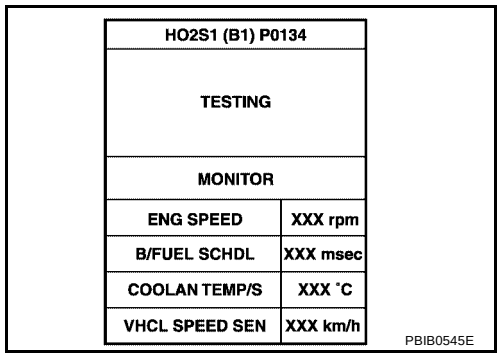
   NOTE:

   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 4.



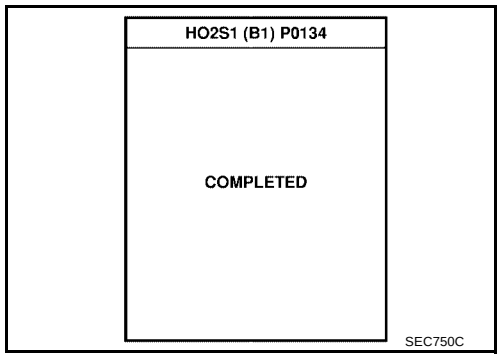
5. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 10 to 60 seconds.)

ENG SPEED	1,200 - 3,200 rpm
Vehicle speed	More than 64 km/h (40 MPH)
B/FUEL SCHDL	1.9 - 13.0 msec
Shift lever	Suitable position



   If “TESTING” is not displayed after 5 minutes, retry from step 2.

6. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-924, "Diagnostic Procedure" .



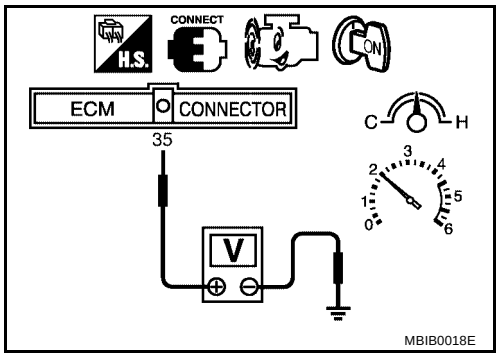
Overall Function Check

UBS00JUD

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

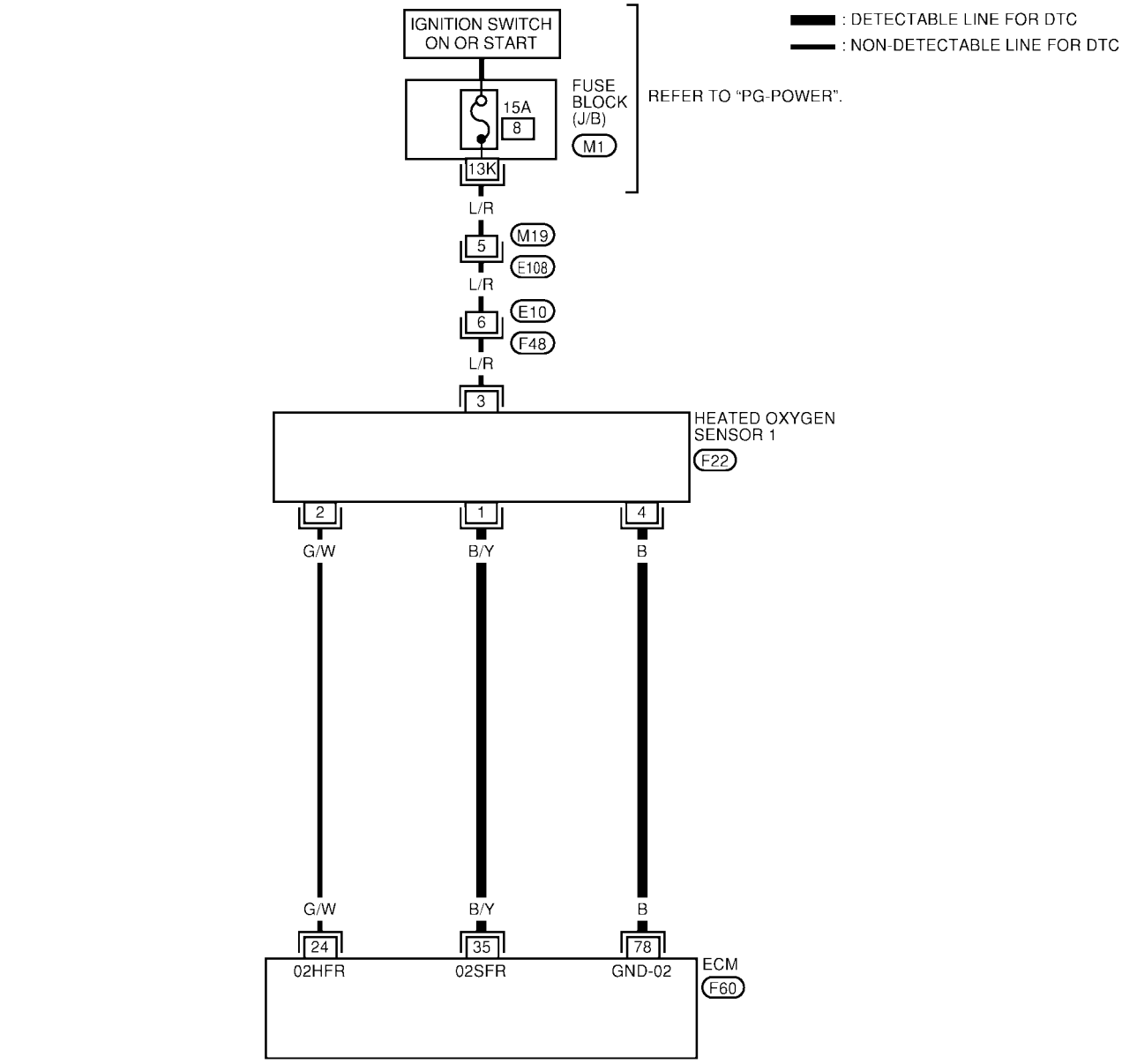
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage does not remain in the range of 0.2 to 0.4V.
4. If NG, go to EC-924, "Diagnostic Procedure" .

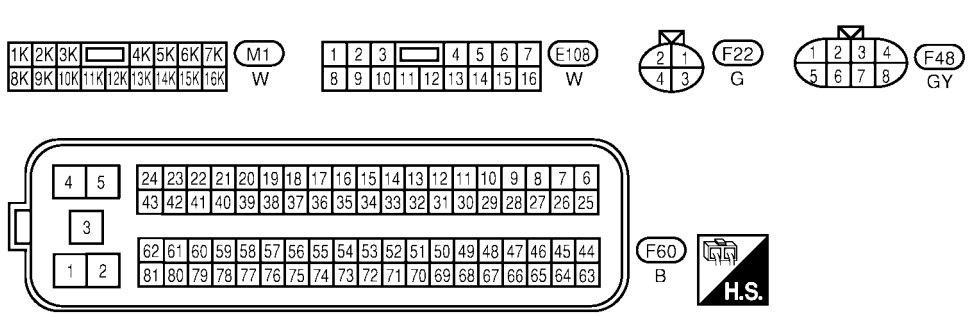


Wiring Diagram

UBS00JUE

EC-HO2S1-01





BBWA1393E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

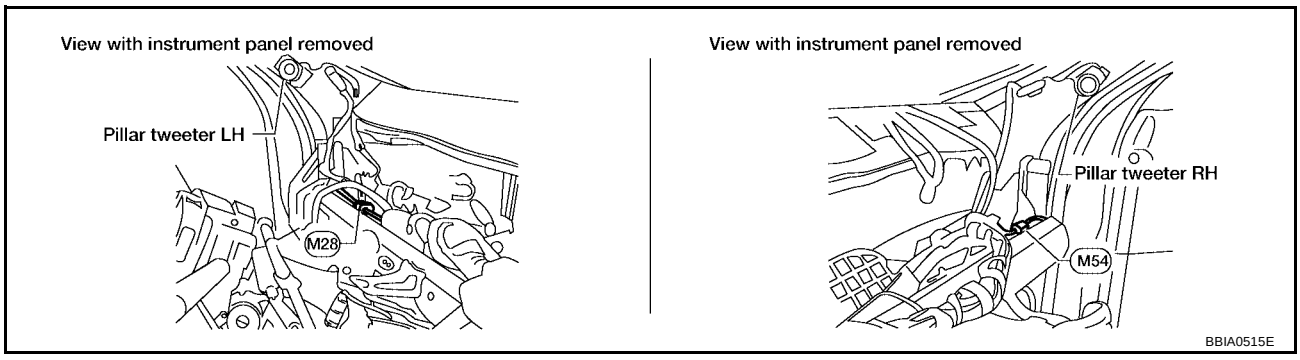
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	B/Y	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - Approximately 1.0V (Periodically change)
78	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00JUF

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .



OK or NG

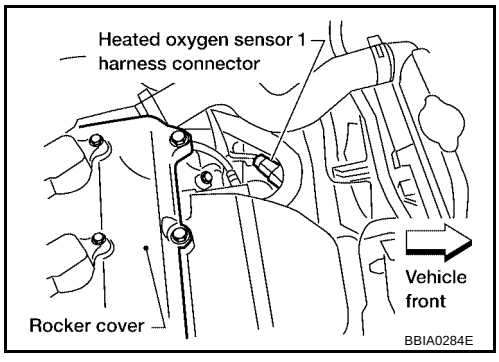
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 78 and HO2S1 terminal 4.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 35 and HO2S1 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 35, HO2S1 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-925, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

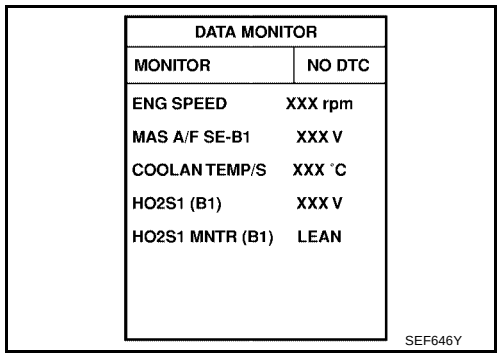
Component Inspection

UBS00JUG

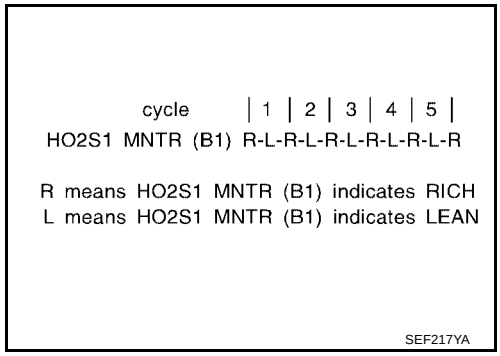
HEATED OXYGEN SENSOR 1

With CONSULT-II

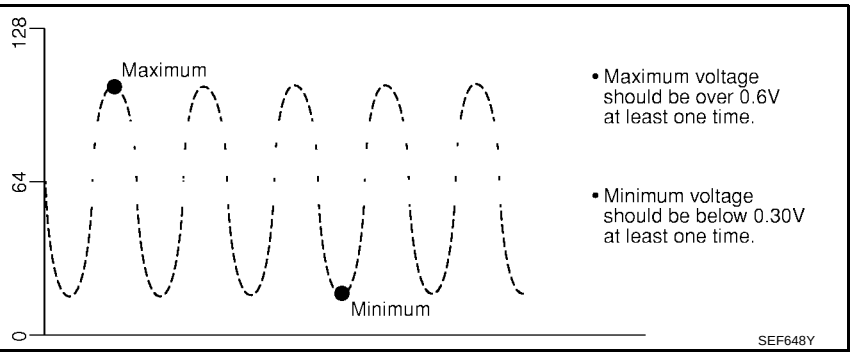
1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.



6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.



Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



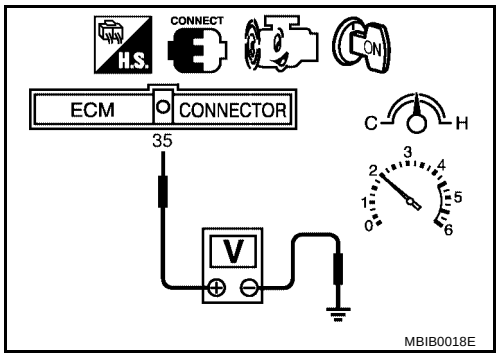
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least 1 time.
   - The minimum voltage is below 0.3V at least 1 time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00JUH

HEATED OXYGEN SENSOR 1

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

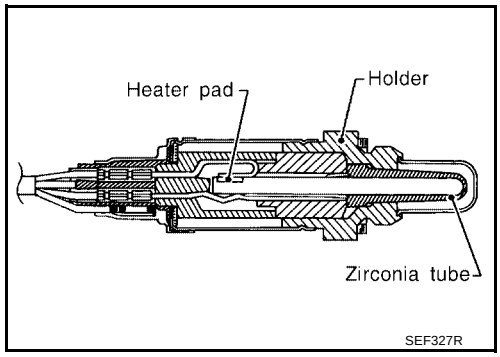
DTC P0138 HO2S2

PFP:226A0

Component Description

UBS00JUI

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 (A/T models ULEV and M/T models) or air fuel ratio (A/F) sensor 1 (A/T models except ULEV) are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JUJ

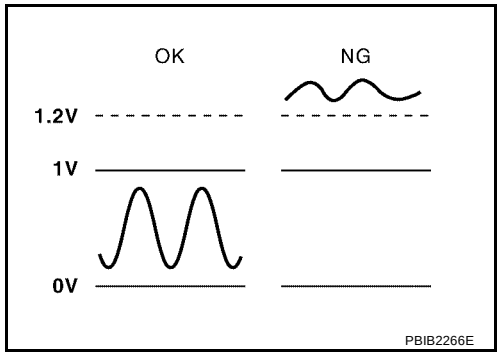
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ←→ 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS00JUK

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1 (A/T models ULEV and M/T models) or the air fuel ratio (A/F) sensor 1 (A/T models except ULEV). The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of rear heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0138 0138	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2

DTC Confirmation Procedure

UBS00JUL

CAUTION:

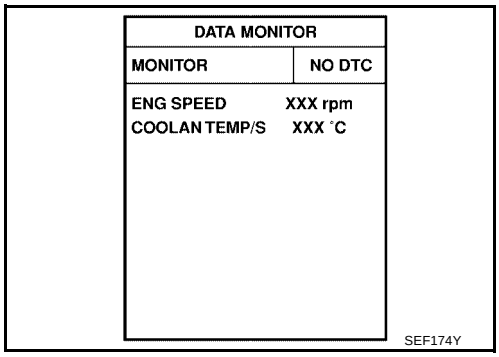
Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-930, "Diagnostic Procedure" .



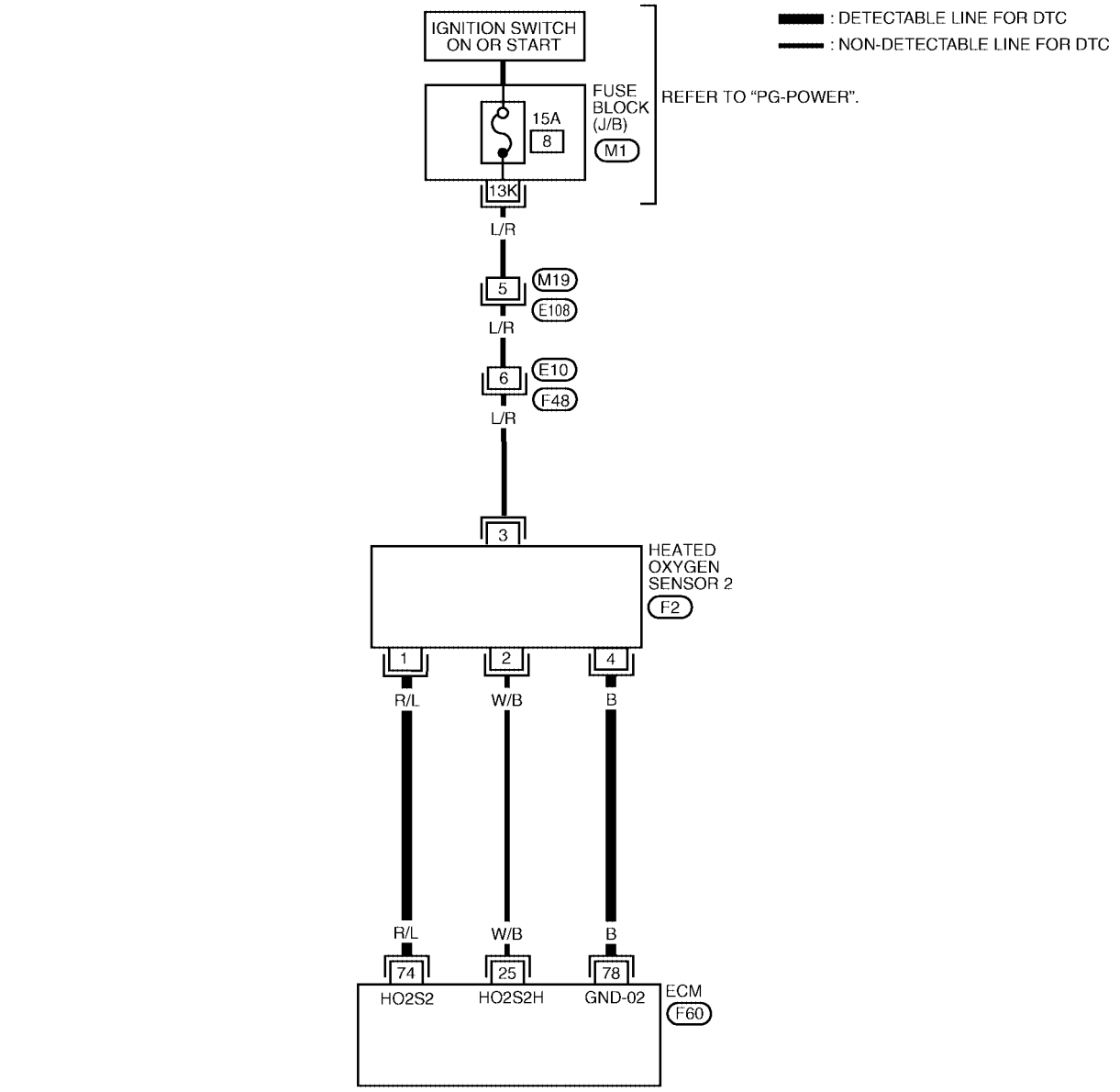
WITH GST

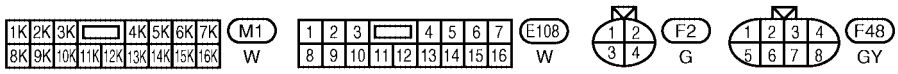
Follow the procedure “WITH CONSULT-II” above.

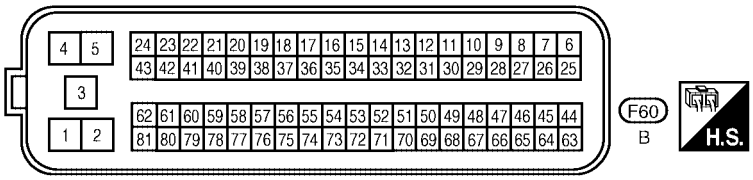
Wiring Diagram

UBS00JUM

EC-HO2S2-01







BBWA1427E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

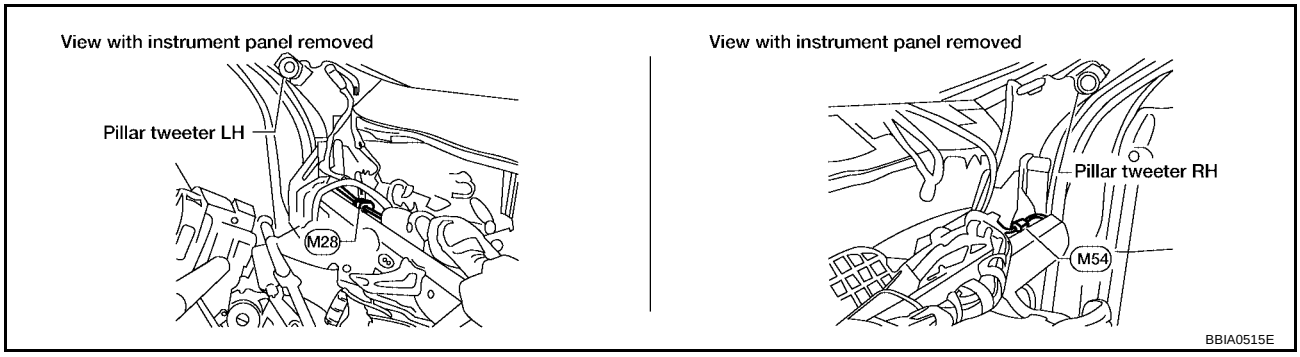
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	R/L	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00JUN

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .



OK or NG

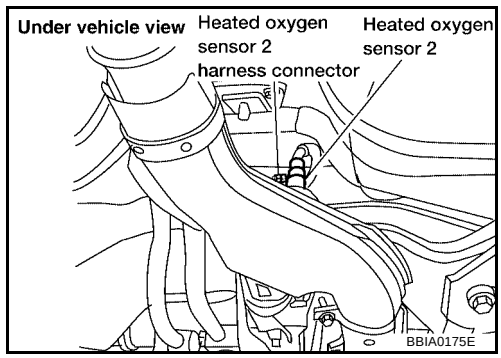
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 78 and HO2S2 terminal 4.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 74 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 74 or HO2S2 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 CONNECTOR FOR WATER

Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-908, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00JUO

HEATED OXYGEN SENSOR 2

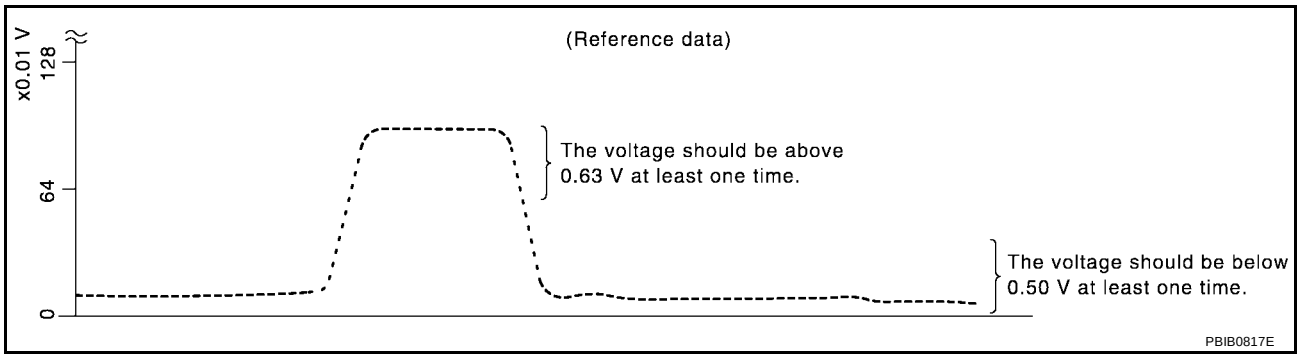
With CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S2 (B1)	XXX V

PBIB1783E

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



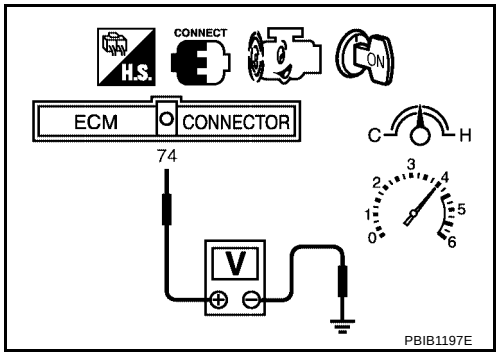
“HO2S2 (B1)” should be above 0.63V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is –25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed at between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.63V at least once during this procedure.
   If the voltage is above 0.63V at step 6, step 7 is not necessary.



7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T models) 3rd gear position (M/T models).
   The voltage should be below 0.50V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00JUP

HEATED OXYGEN SENSOR 2

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

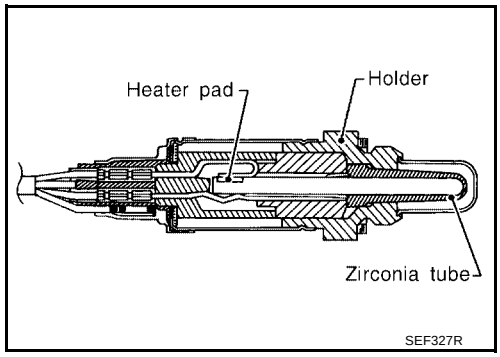
DTC P0139 HO2S2

PFP:226A0

Component Description

UBS00JUQ

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 (A/T models ULEV and M/T models) or the air fuel ratio (A/F) sensor 1 (A/T models except ULEV) are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JUR

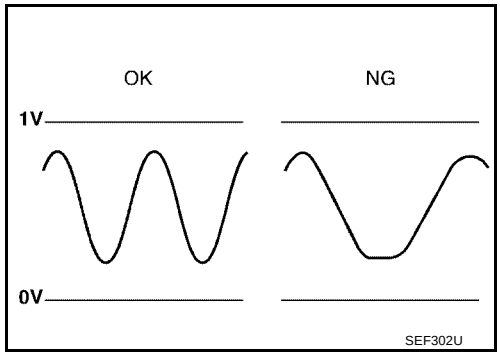
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ←→ 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS00JUS

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1 (A/T models ULEV and M/T models) or the air fuel ratio (A/F) sensor 1 (A/T models except ULEV). The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139 0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector ● Intake air leaks

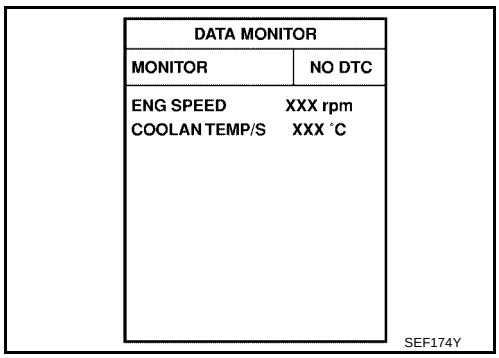
DTC Confirmation Procedure

UBS00JUT

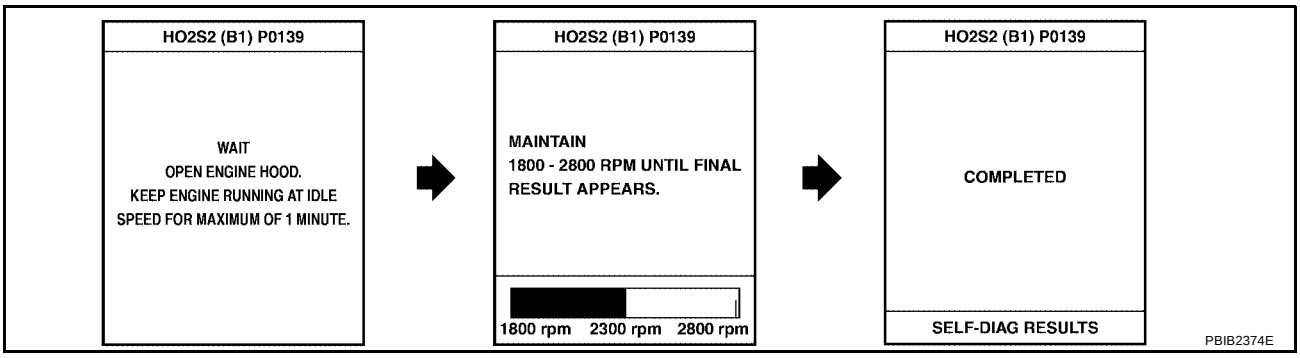
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
For the best results, perform “DTC WORK SUPPORT” at a temperature of 0 to 30°C (32 to 86°F).

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at lest 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).



7. Select “HO2S2 (B1) P0139” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II and follow the instruction of CONSULT-II.



NOTE:
It will take at most 10 minutes until “COMPLETED” is displayed.

8. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-937, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Return to step 1.

Overall Function Check

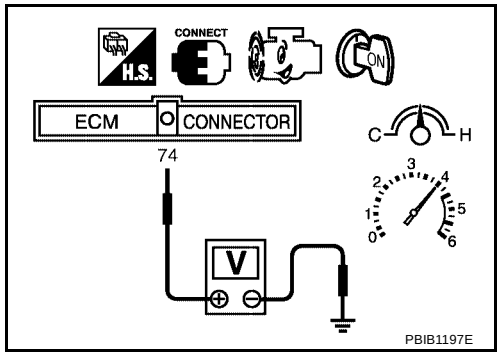
UBS00JUU

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 signal) and ground.

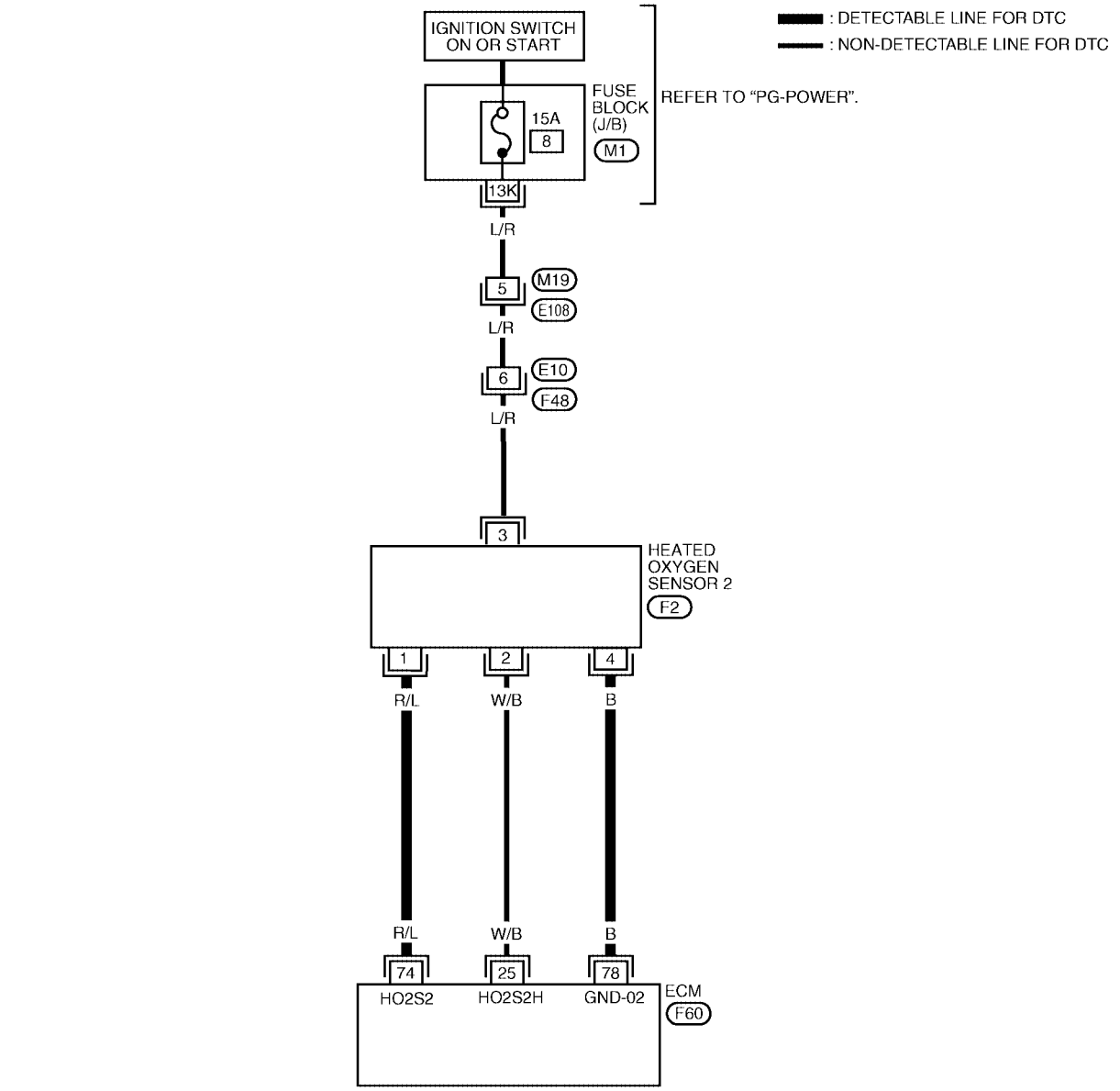
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   A change of voltage should be more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T models) 3rd gear position (M/T models).
   A change of voltage should be more than 0.06V for 1 second during this procedure.
8. If NG, go to EC-937, "Diagnostic Procedure" .

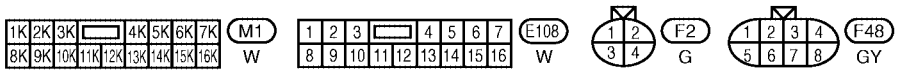


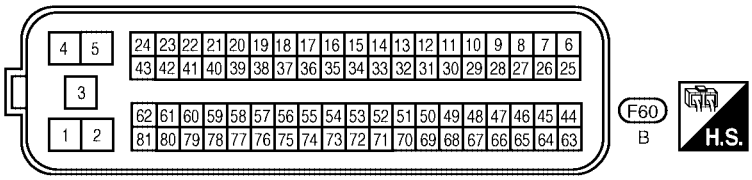
Wiring Diagram

UBS00JUV

EC-HO2S2-01







BBWA1427E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

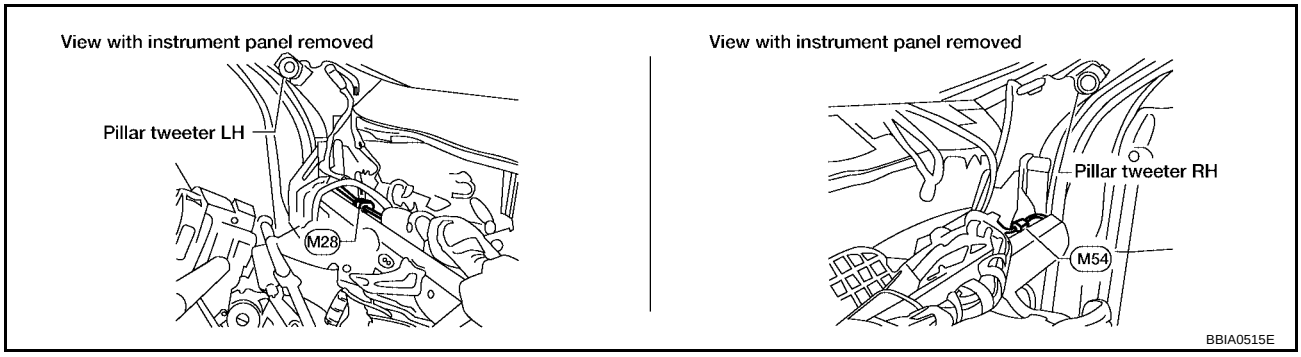
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	R/L	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00JUW

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .



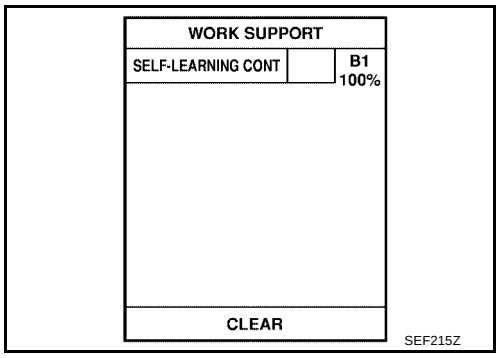
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

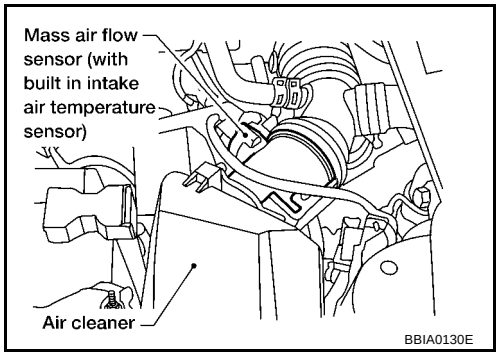
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-941 or EC-952 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

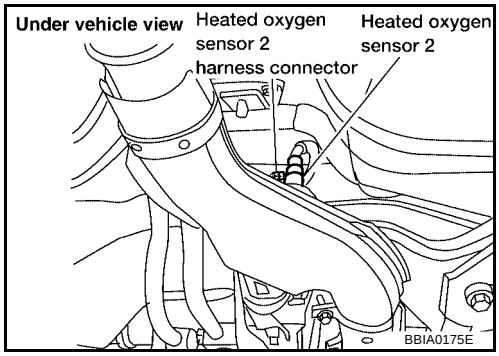
1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 78 and HO2S2 terminal 4.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 74 and HO2S2 terminal 1. Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 74 or HO2S2 terminal 1 and ground. Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-939, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00JUX

HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX °C

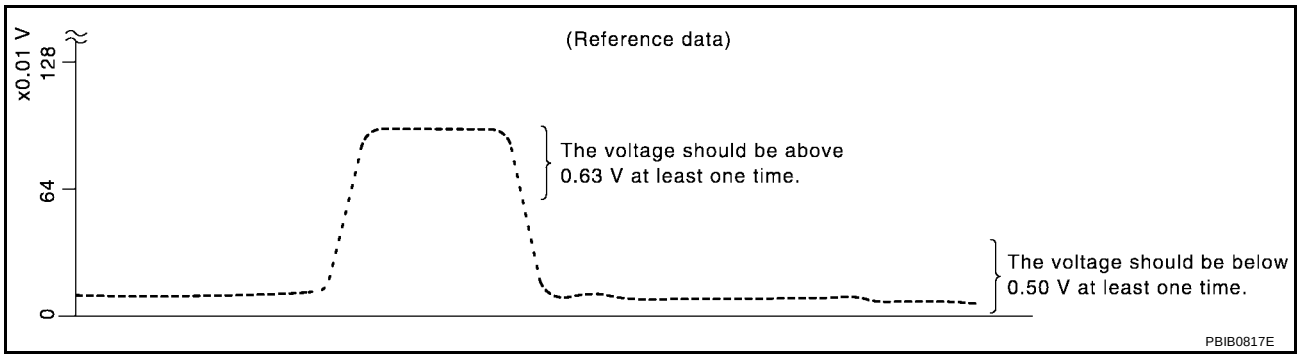
SEF174Y

6. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S2 (B1)	XXX V

PBIB1783E

7. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



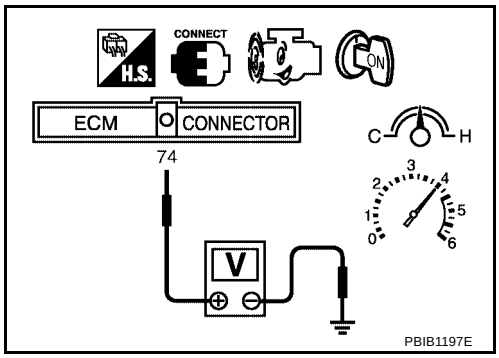
“HO2S2 (B1)” should be above 0.63V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is –25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.63V at least once during this procedure.
   If the voltage is above 0.63V at step 6, step 7 is not necessary.



7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in 3rd gear position.
   The voltage should be below 0.50V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00JUY

HEATED OXYGEN SENSOR 2

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS00JUZ

With the Air-Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1 (A/T models ULEV and M/T models) or the air fuel ratio (A/F) sensor 1 (A/T models except ULEV). The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensor 1*1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector
Air fuel ratio (A/F) sensor 1*2			

*1: A/T models ULEV and M/T models.
*2: A/T models except ULEV.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0171 0171	Fuel injection system too lean	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	● Intake air leaks ● Heated oxygen sensor 1*1 ● Air fuel ratio (A/F) sensor 1*2 ● Fuel injector ● Exhaust gas leaks ● Incorrect fuel pressure ● Lack of fuel ● Mass air flow sensor ● Incorrect PCV hose connection

*1: A/T models ULEV and M/T models
*2: A/T models except ULEV

DTC Confirmation Procedure

UBS00JV0

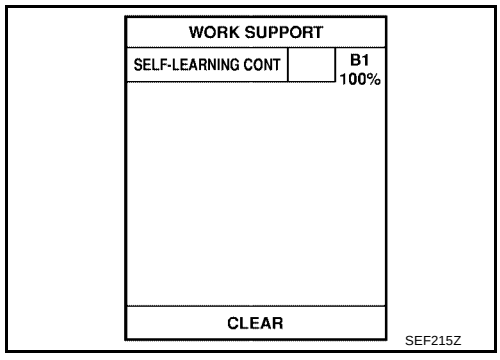
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-945, "Diagnostic Procedure" .

   NOTE:
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
   Hold the accelerator pedal as steady as possible.



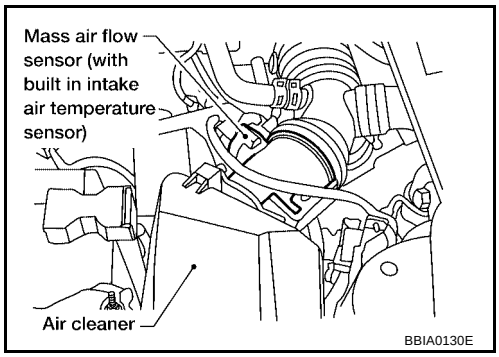
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-945, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST. Make sure DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine again and let it idle for at least 10 minutes.
9. Select Service $07 with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-945, "Diagnostic Procedure" .



NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

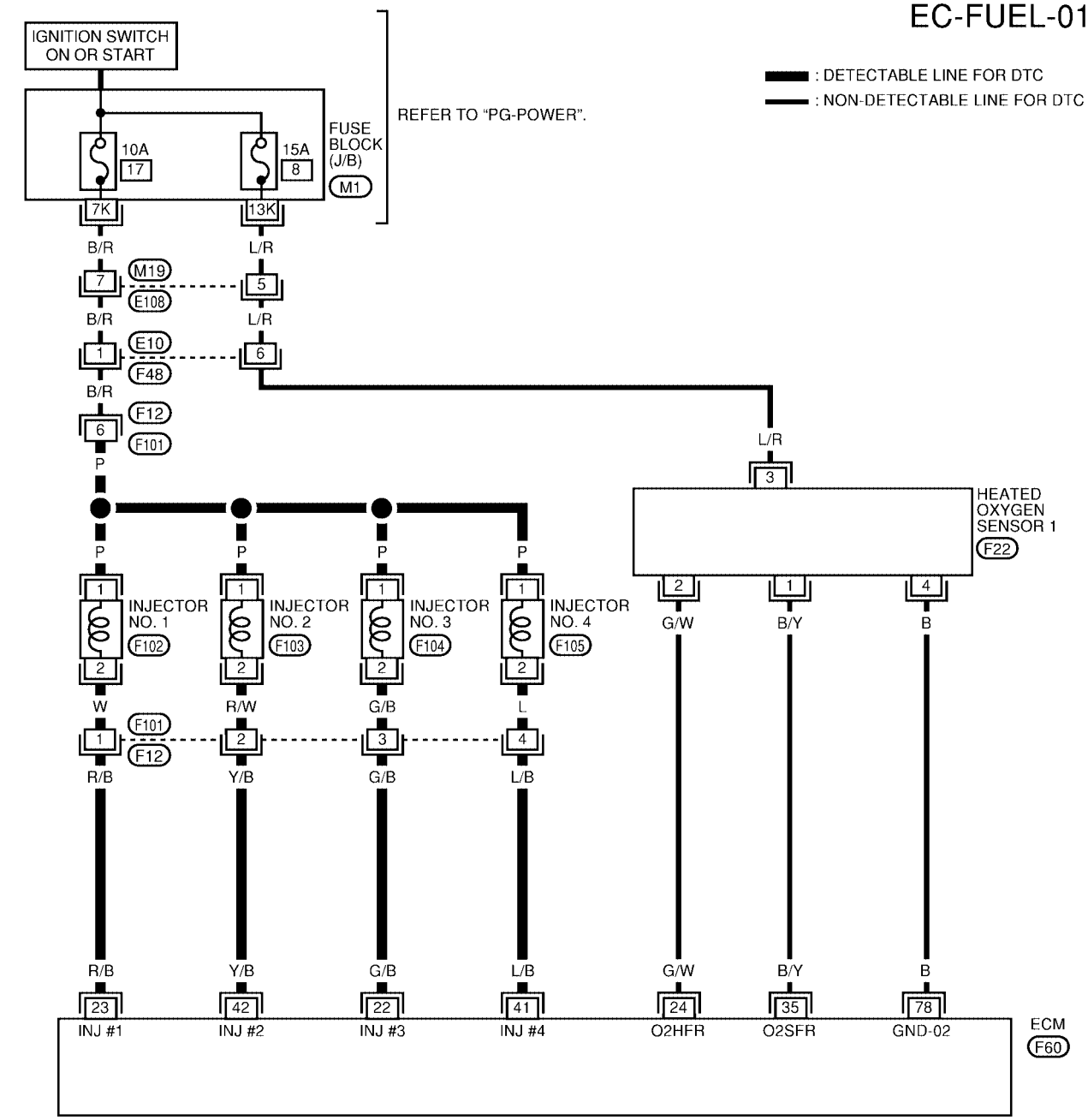
Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

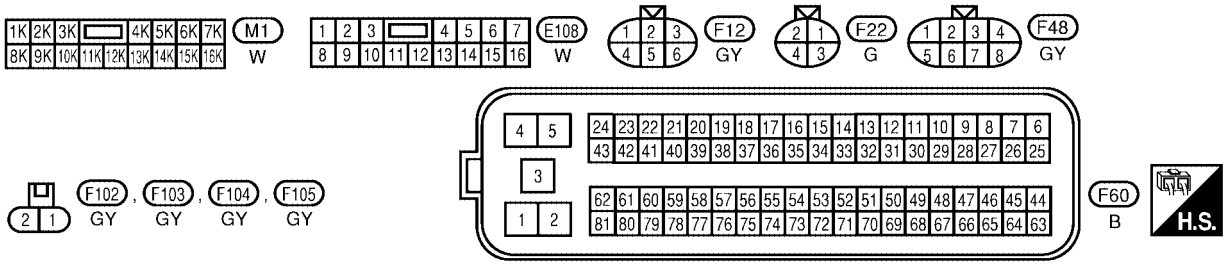
10. If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
11. Crank engine while depressing accelerator pedal. If engine starts, go to EC-945, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.

Wiring Diagram

UBS00JV1

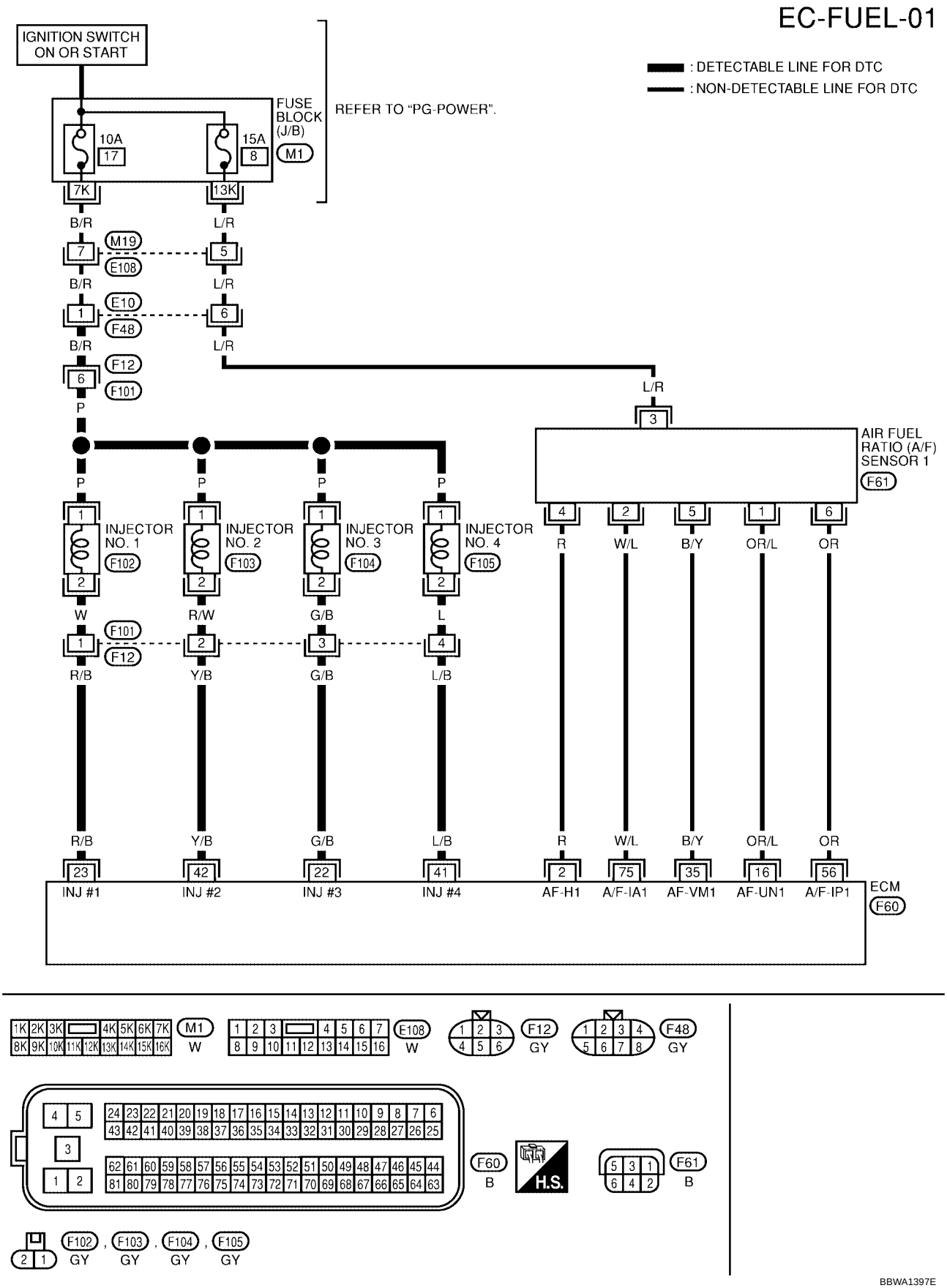
A/T MODELS ULEV AND M/T MODELS





BBWA1396E

A/T MODELS EXCEPT ULEV



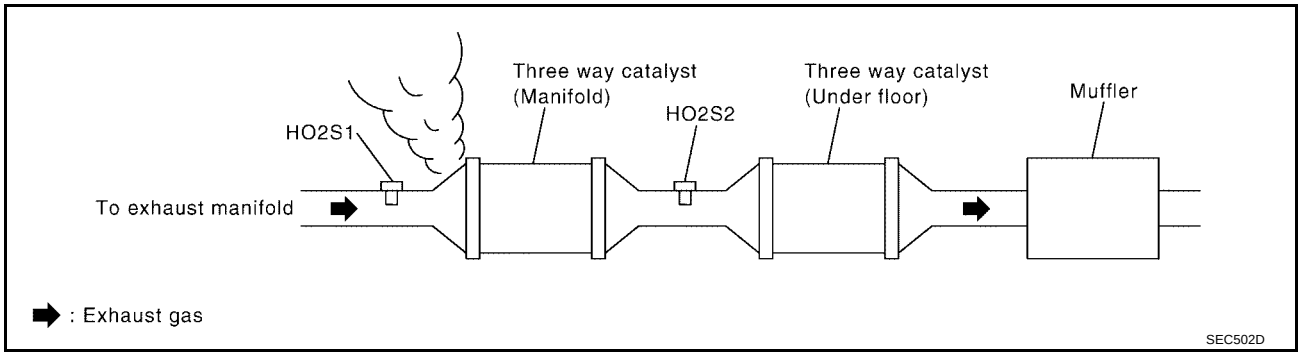
Diagnostic Procedure

UBS00JV2

A/T MODELS ULEV AND M/T MODELS

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

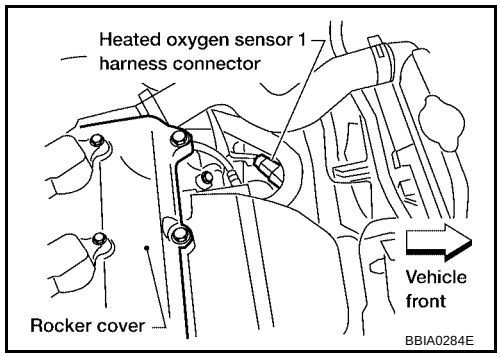
3. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 (HO2S1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 35 and HO2S1 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Check harness continuity between ECM terminal 35 or HO2S1 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-751, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-752, "FUEL PRESSURE CHECK" .

At idling: Approximately 350 kPa (3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-1340, "FUEL PUMP CIRCUIT" .)
- Fuel pressure regulator (Refer to EC-751, "Fuel Pressure Check" .)
- Fuel lines (Refer to EM-121, "FUEL INJECTOR AND FUEL TUBE" .)
- Fuel filter for clogging

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

1.4 - 4.0 g·m/sec: at idling
4.0 - 10 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

1.4 - 4.0 g·m/sec: at idling
4.0 - 10 g·m/sec: at 2,500 rpm

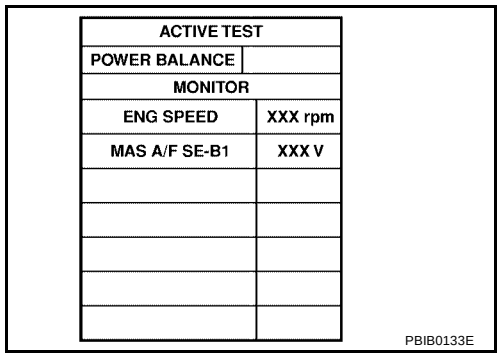
OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-859, "DTC P0101 MAF SENSOR" .

7. CHECK FUNCTION OF INJECTORS

With CONSULT-II

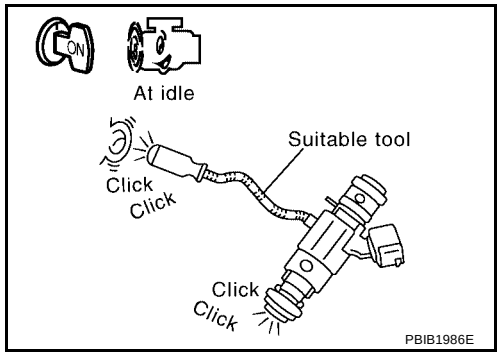
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.



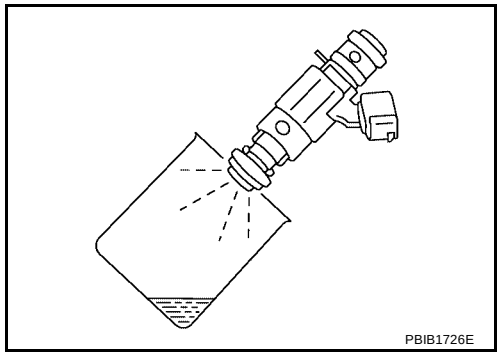
OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for EC-1334, "INJECTOR CIRCUIT" .

8. CHECK INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Disconnect injector harness connectors.
4. Remove injector gallery assembly. Refer to EM-121, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
   The injector harness connectors should remain connected.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each injector.
7. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.

Fuel should be sprayed evenly for each injector.



OK or NG

OK >> GO TO 9.
NG >> Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

9. CHECK INTERMITTENT INCIDENT

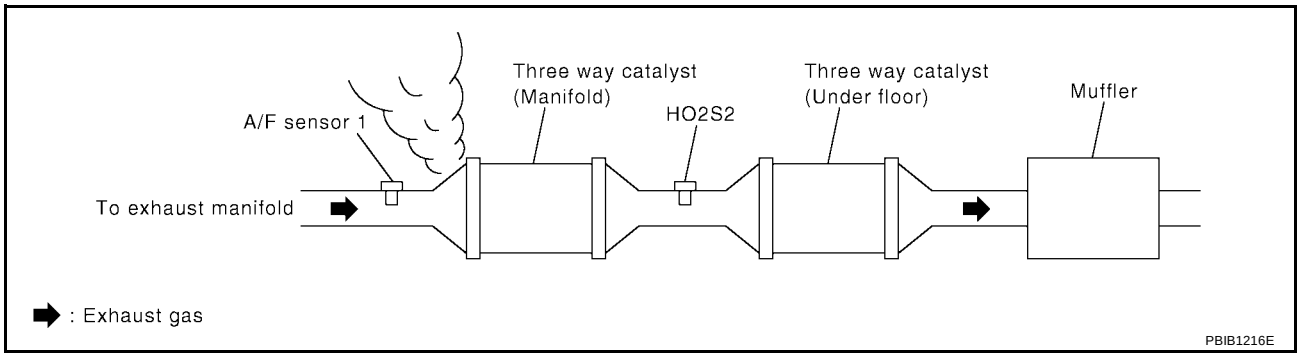
Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

A/T MODELS EXCEPT ULEV

1. CHECK EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

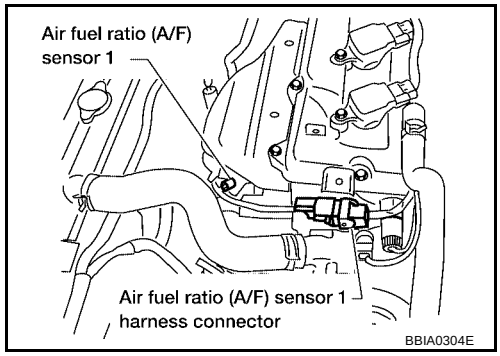
1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK AIR FUEL RATIO (A/F) SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector and ECM harness connector.
3. Check harness continuity between ECM terminals and A/F sensor 1 terminals as follows.
   Refer to Wiring Diagram.



ECM terminal	A/F sensor 1
16	1
35	5
56	6
75	2

Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 and ground, or A/F sensor 1 terminals 1, 2, 5, 6 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-751, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-752, "FUEL PRESSURE CHECK" .

At idling: Approximately 350 kPa (3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-1340, "FUEL PUMP CIRCUIT" .)
- Fuel pressure regulator (Refer to EC-751, "Fuel Pressure Check" .)
- Fuel lines (Refer to EM-121, "FUEL INJECTOR AND FUEL TUBE" .)
- Fuel filter for clogging

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

at idling: 1.4 - 4.0 g·m/sec
at 2,500 rpm: 4.0 - 10.0 g·m/sec

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

at idling: 1.4 - 4.0 g·m/sec
at 2,500 rpm: 4.0 - 10.0 g·m/sec

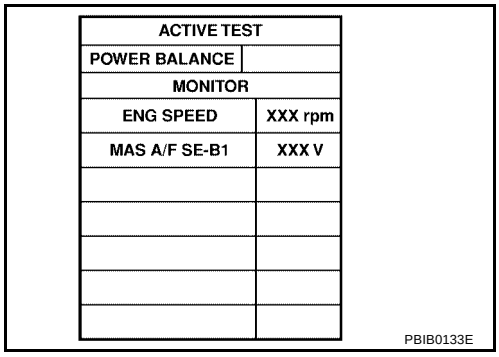
OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-859, "DTC P0101 MAF SENSOR" .

7. CHECK FUNCTION OF INJECTORS

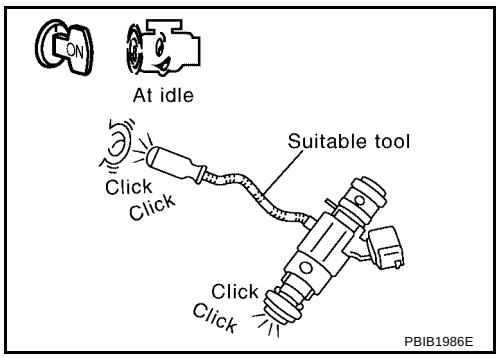
With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
Clicking noise should be heard.



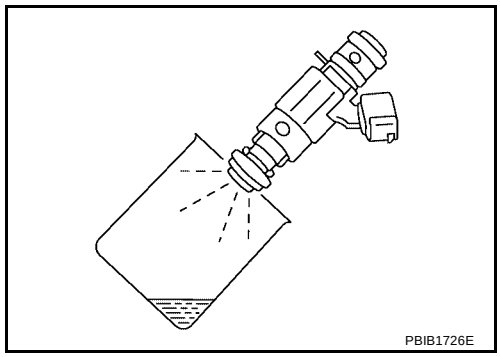
OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for EC-1334, "INJECTOR CIRCUIT" .

8. CHECK INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Disconnect all injector harness connectors.
4. Remove injector gallery assembly. Refer to EM-121, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
   The injector harness connectors should remain connected.
5. Disconnect all ignition coil harness connectors.
6. Prepare pans or saucers under each injector.
7. Crank engine for about 3 seconds.Make sure that fuel sprays out from injectors.

Fuel should be sprayed evenly for each injector.



OK or NG

OK >> GO TO 9.
NG >> Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.

9. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

UBS00JV3

With the Air-Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1 (A/T models ULEV and M/T models) or the air fuel ratio (A/F) sensor 1 (A/T models except ULEV). The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MIL (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensor 1*1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector
Air fuel ratio (A/F) sensor 1*2			

*1: A/T models ULEV and M/T models
*2: A/T models except ULEV

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0172 0172	Fuel injection system too rich	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	● Heated oxygen sensor 1*1 ● Air fuel ratio (A/F) sensor 1*2 ● Fuel injector ● Exhaust gas leaks ● Incorrect fuel pressure ● Mass air flow sensor

*1: A/T models ULEV and M/T models.
*2: A/T models except ULEV.

DTC Confirmation Procedure

UBS00JV4

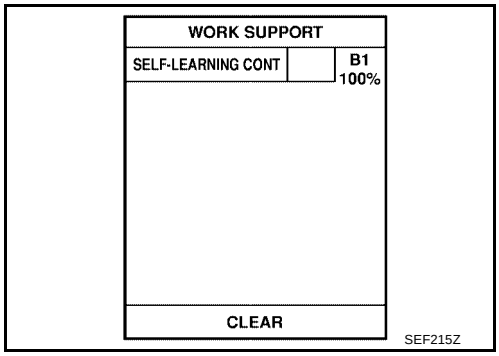
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-956, "Diagnostic Procedure" .

   NOTE:
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
   Hold the accelerator pedal as steady as possible.



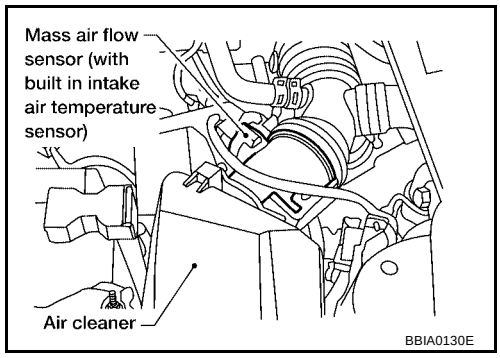
The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal.
   If engine starts, go to EC-956, "Diagnostic Procedure" . If engine does not start, remove spark plugs and check for fouling, etc.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector. Then restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Select Service $03 with GST. Make sure DTC P0102 is detected.
6. Select Service $04 with GST and erase the DTC P0102.
7. Start engine again and let it idle for at least 10 minutes.
8. Select Service $07 with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-956, "Diagnostic Procedure" .



NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
   Hold the accelerator pedal as steady as possible.

   The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

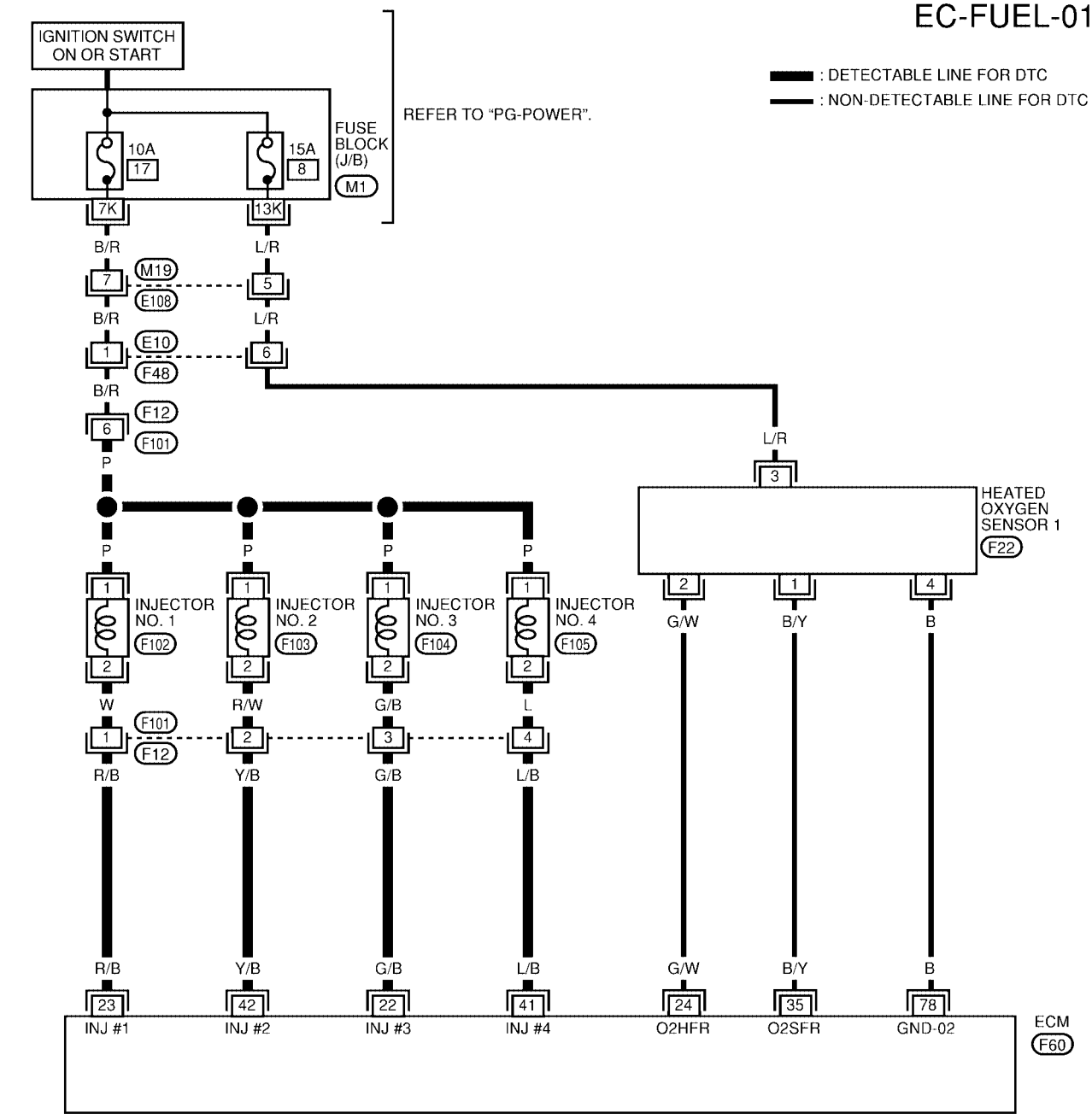
Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

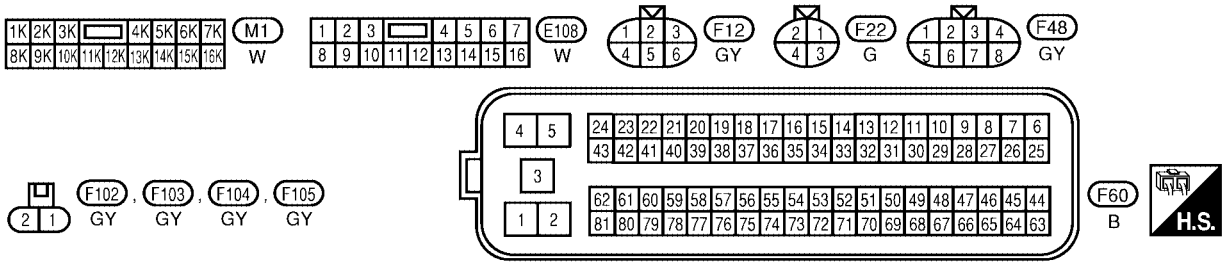
9. If it is difficult to start engine at step 7, the fuel injection system has a malfunction.
10. Crank engine while depressing accelerator pedal.
    If engine starts, go to EC-956, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram

UBS00JV5

A/T MODELS ULEV AND M/T MODELS





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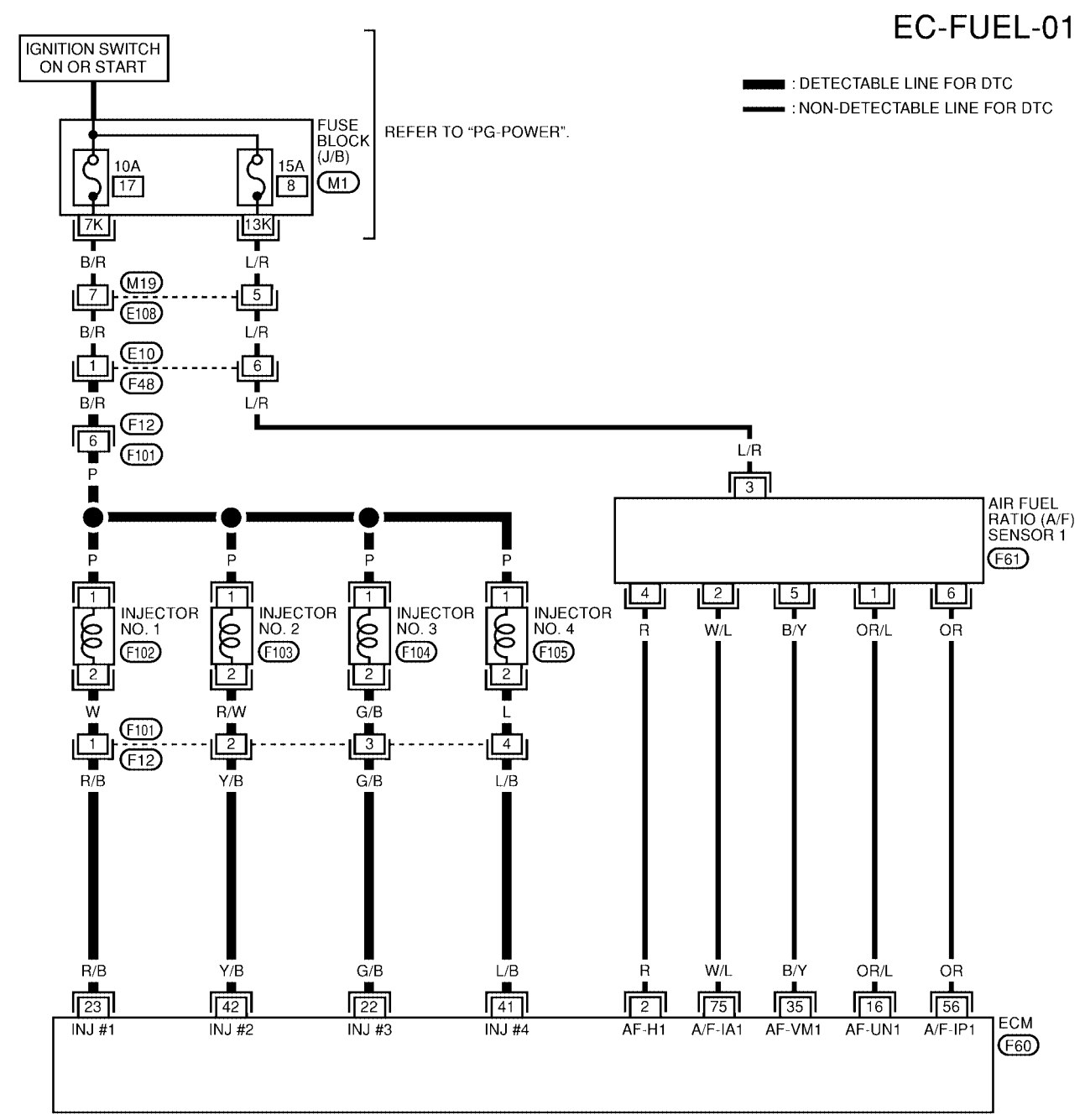
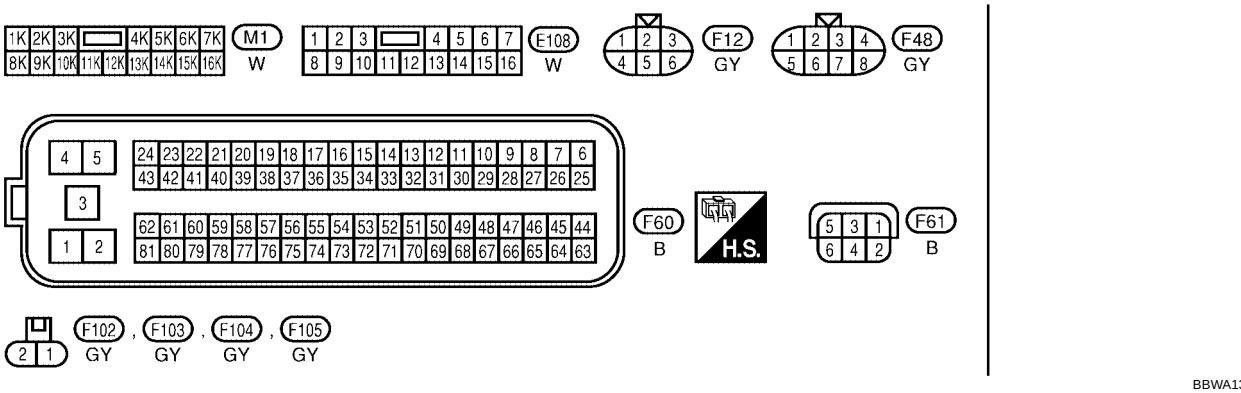
A/T MODELS EXCEPT ULEV





BBWA1397E

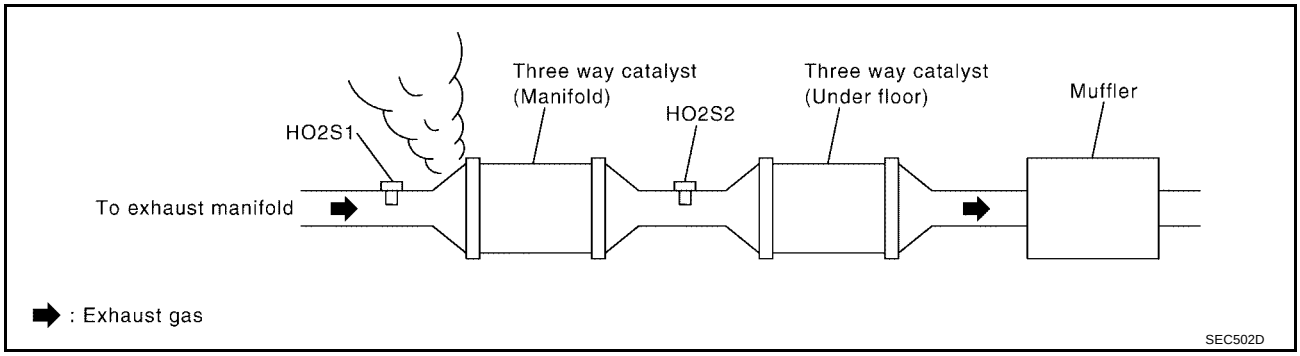
Diagnostic Procedure

UBS00JV6

A/T MODELS ULEV AND M/T MODELS

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

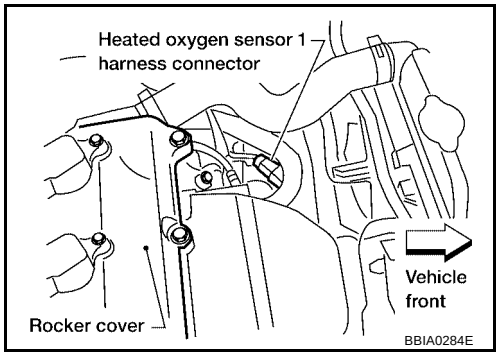
3. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 (HO2S1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 35 and HO2S1 terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Check harness continuity between ECM terminal 35 or HO2S1 terminal 1 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-751, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-752, "FUEL PRESSURE CHECK" .

At idling: Approximately 350 kPa (3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-1340, "FUEL PUMP CIRCUIT" .)
- Fuel pressure regulator (Refer to EC-752, "FUEL PRESSURE CHECK" .)
- Fuel lines (Refer to EM-121, "FUEL INJECTOR AND FUEL TUBE" .)
- Fuel filter for clogging

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

1.4 - 4.0 g·m/sec: at idling
4.0 - 10 g·m/sec: at 2,500 rpm

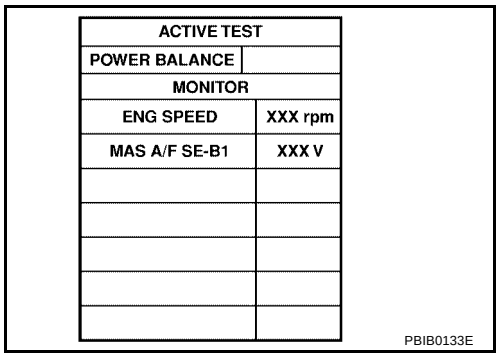
OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-859, "DTC P0101 MAF SENSOR" .

7. CHECK FUNCTION OF INJECTORS

With CONSULT-II

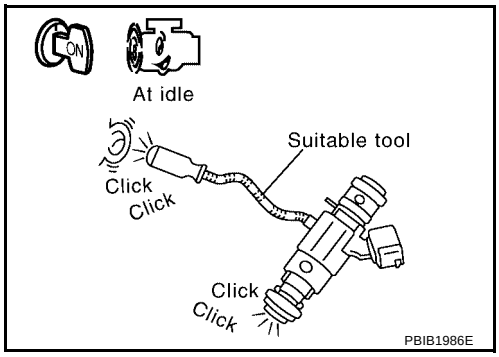
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.



OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for EC-1334, "INJECTOR CIRCUIT" .

8. CHECK INJECTOR

1. Remove injector assembly. Refer to EM-121, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect injector harness connectors.
   The injector harness connectors should remain connected.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 9.
NG (Drips.)>>Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

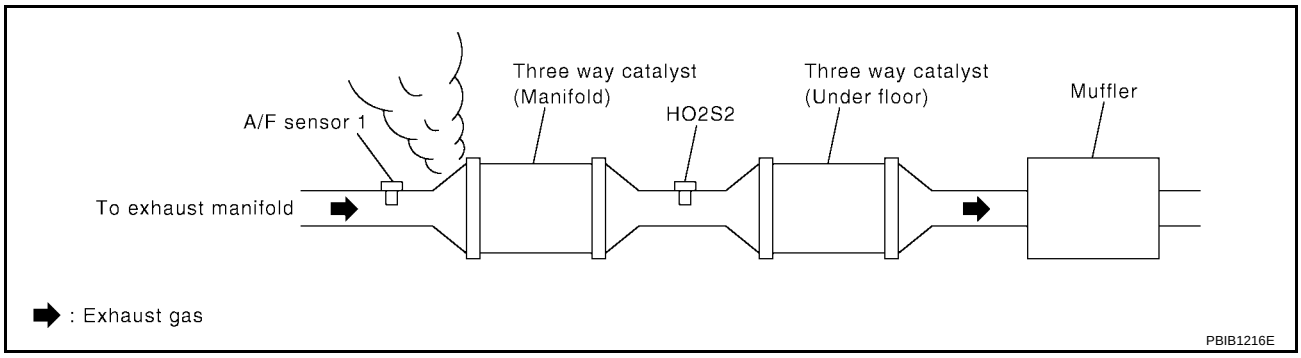
Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

A/T MODELS EXCEPT ULEV

1. CHECK FOR EXHAUST AIR LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust air leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK

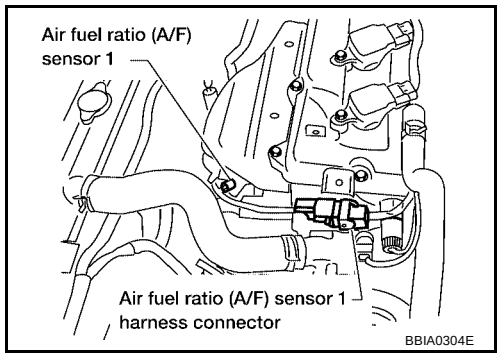
Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK AIR FUEL RATIO (A/F) SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector and ECM harness connector.
3. Check harness continuity between ECM terminals and A/F sensor 1 terminals as follows.
   Refer to Wiring Diagram.



ECM terminal	A/F sensor 1
16	1
35	5
56	6
75	2

Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 and ground, or A/F sensor 1 terminals 1, 2, 5, 6 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero.
   Refer to EC-751, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure.

At idling: Approximately 350 kPa (3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-1340, "FUEL PUMP CIRCUIT" .)
- Fuel pressure regulator (Refer to EC-752, "FUEL PRESSURE CHECK" .)
- Fuel lines (Refer to EM-121, "FUEL INJECTOR AND FUEL TUBE" .)
- Fuel filter for clogging

>> Repair or replace.

6. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

at idling : 1.4 - 4.0 g·m/sec
at 2,500 rpm : 5.0 - 10.0 g·m/sec

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

at idling : 1.4 - 4.0 g·m/sec
at 2,500 rpm : 5.0 - 10.0 g·m/sec

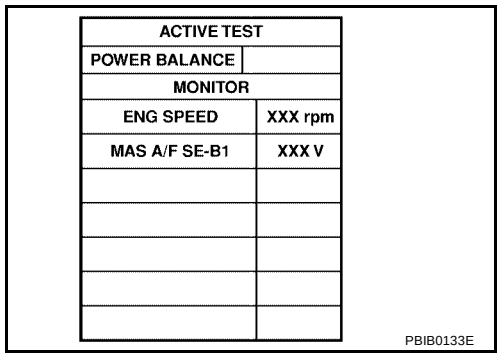
OK or NG

OK >> GO TO 7.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-859, "DTC P0101 MAF SENSOR" .

7. CHECK FUNCTION OF INJECTORS

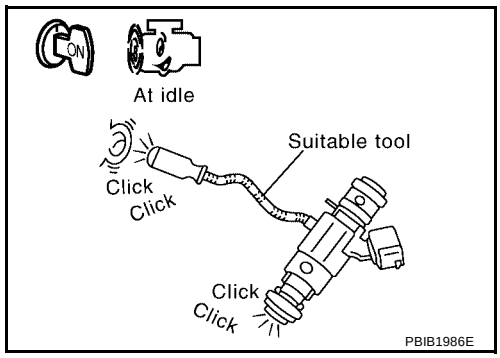
With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.



OK or NG

OK >> GO TO 8.
NG >> Perform trouble diagnosis for EC-1334, "INJECTOR CIRCUIT" .

8. CHECK INJECTOR

1. Remove injector assembly. Refer to EM-121, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect all injector harness connectors.
   The injector harness connectors should remain connected.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 9.
NG (Drips.)>>Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

9. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

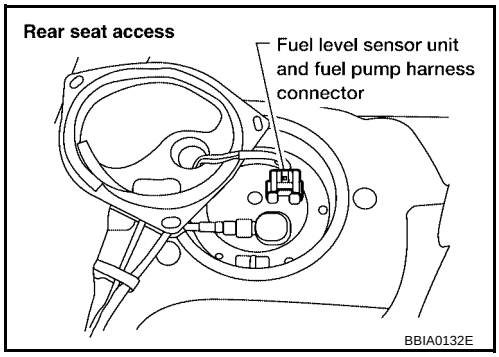
DTC P0181 FTT SENSOR

PFP:22630

Component Description

UBS00JV7

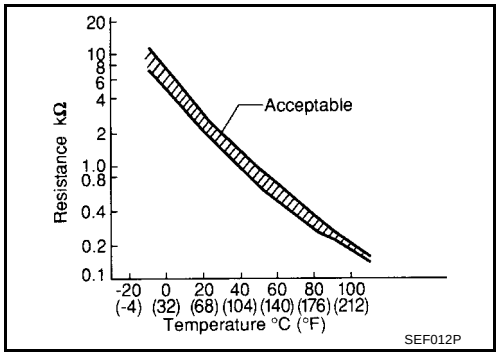
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: This data is reference value and is measured between ECM terminal 107 (Fuel tank temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use ground other than ECM, such as ground.

On Board Diagnosis Logic

UBS00JV8

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0181 0181	Fuel tank temperature sensor circuit range/ performance	Rationally incorrect voltage from the sensor is sent to ECM, compared with the voltage signals from engine coolant temperature sensor and intake air temperature sensor.	● Harness or connectors (The sensor circuit is open or shorted) ● Fuel tank temperature sensor

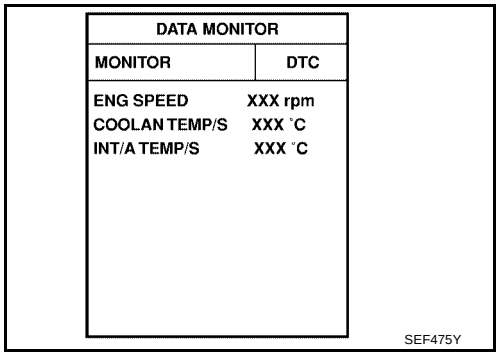
DTC Confirmation Procedure

UBS00JV9

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
   If the result is NG, go to EC-965, "Diagnostic Procedure" .
   If the result is OK, go to following step.
4. Check “COOLAN TEMP/S” value.
   If the “COOLANT TEMP/S” is less than 60°C (140°F), the result will be OK.
   If the “COOLANT TEMP/S” is above 60°C (140°F), go to the following step.
5. Cool engine down until “COOLAN TEMP/S” signal is less than 60°C (140°F).
6. Wait at least 10 seconds.
7. If 1st trip DTC is detected, go to EC-965, "Diagnostic Procedure" .



WITH GST

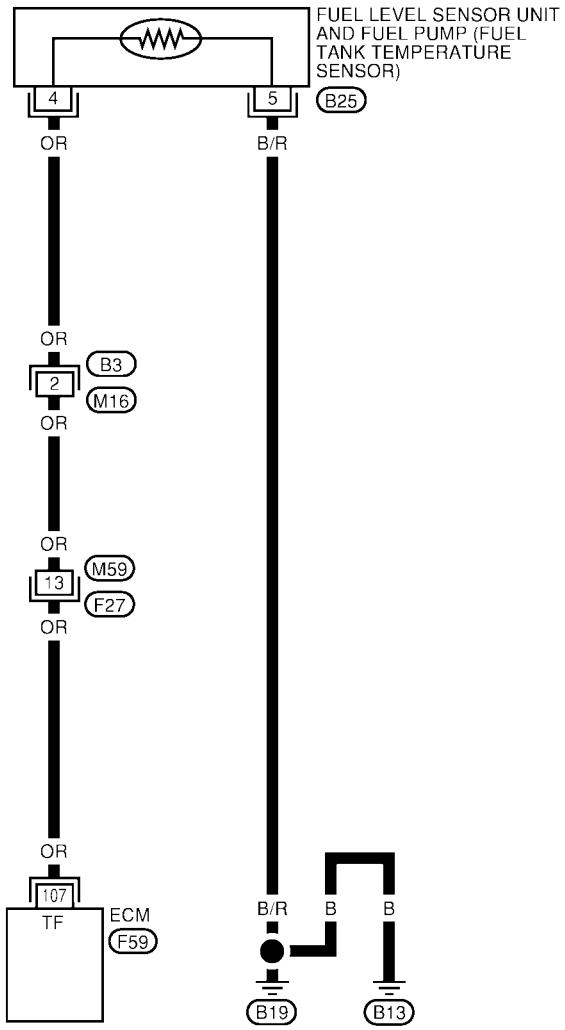
Follow the procedure “WITH CONSULT-II” above.

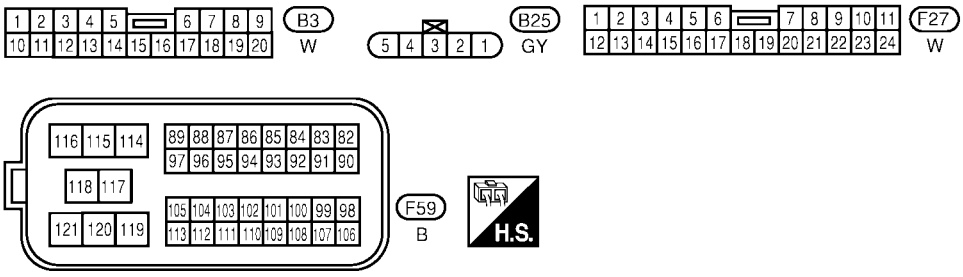
Wiring Diagram

UBS00JVA

EC-FTTS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





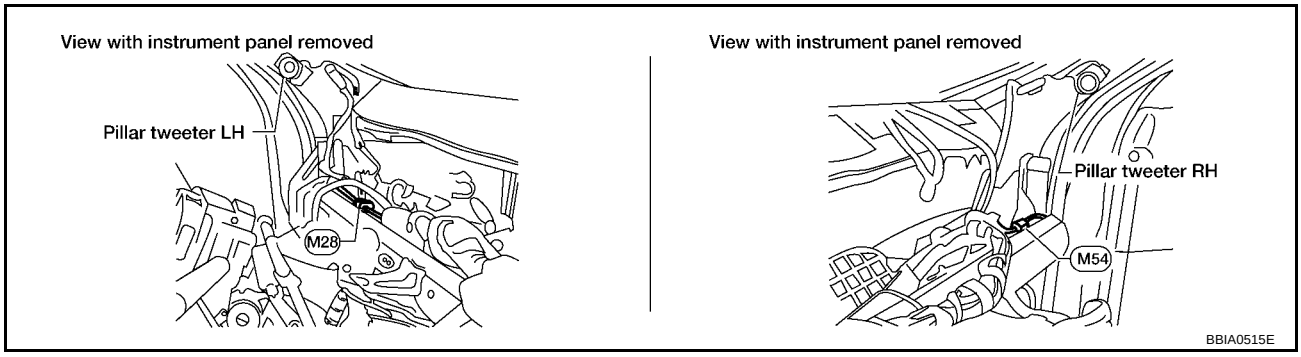
BBWA1398E

Diagnostic Procedure

UBS00JVB

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .

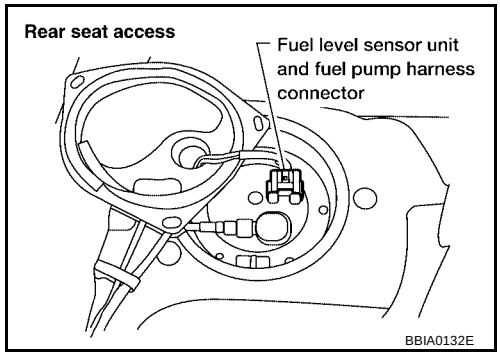


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

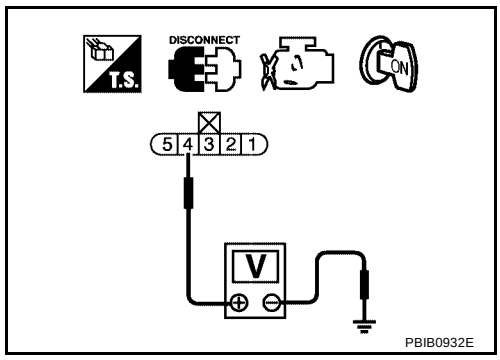
2. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Turn ignition switch ON.



4. Check voltage between “fuel level sensor unit and fuel pump” terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness connectors B3, M16
- Harness for open or short between ECM and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to ground or short to power in harness or connector.

4. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 5 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to power in harness or connectors.

5. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to, EC-966, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace fuel level sensor unit.

6. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

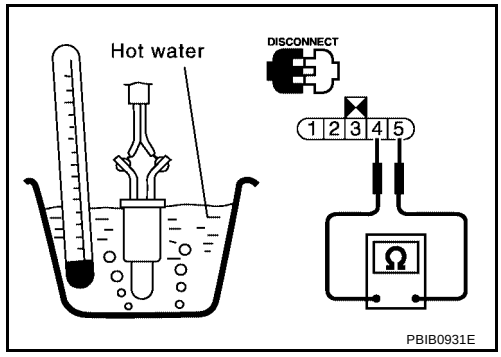
Component Inspection

UBS00JVC

FUEL TANK TEMPERATURE SENSOR

Check resistance by heating with hot water or heat gun as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90



Removal and Installation

UBS00JVD

FUEL TANK TEMPERATURE SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

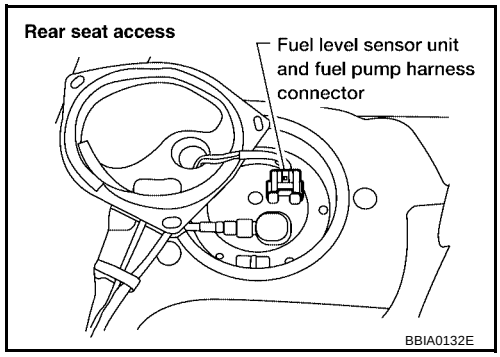
DTC P0182, P0183 FTT SENSOR

PFP:22630

Component Description

UBS00JVE

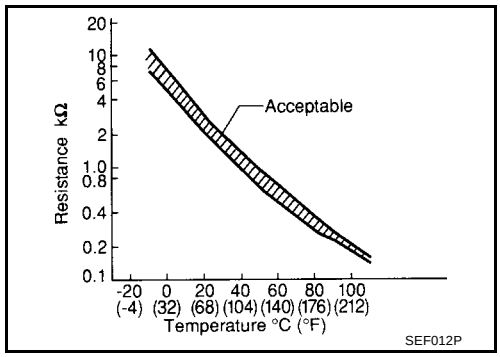
The fuel tank temperature sensor is used to detect the fuel temperature inside the fuel tank. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the fuel temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Fluid temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	3.5	2.3 - 2.7
50 (122)	2.2	0.79 - 0.90

*: This data is reference value and is measured between ECM terminal 107 (Fuel tank temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use ground other than ECM, such as ground.

On Board Diagnosis Logic

UBS00JVF

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182 0182	Fuel tank temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Fuel tank temperature sensor
P0183 0183	Fuel tank temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

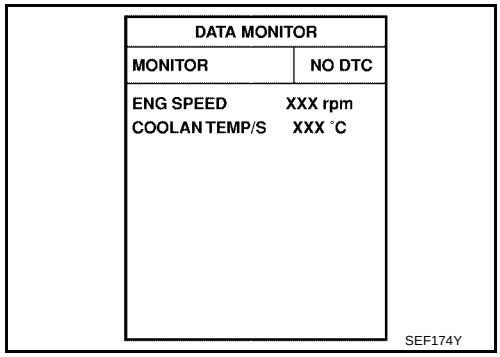
UBS00JVG

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-969, "Diagnostic Procedure"
.



WITH GST

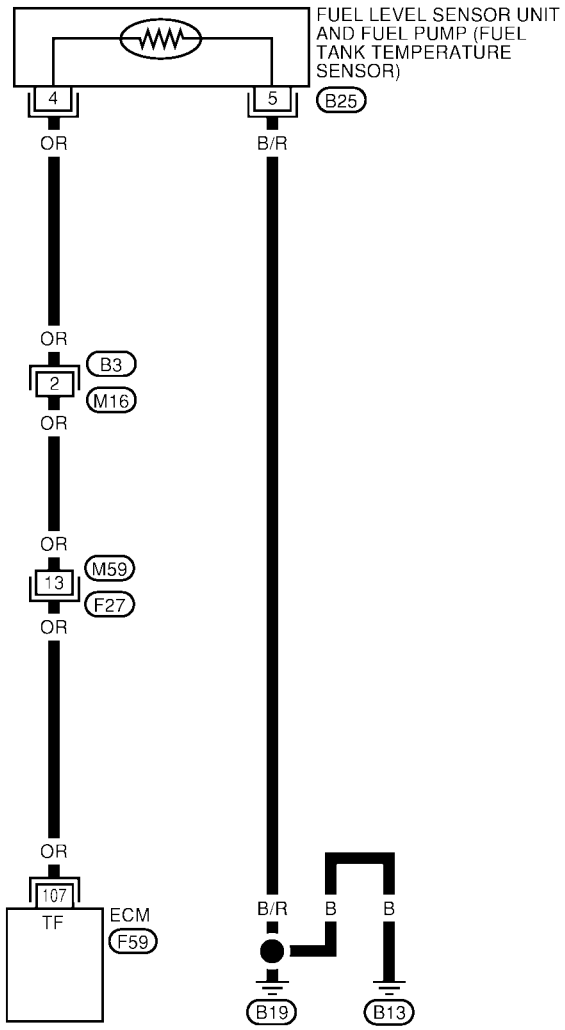
Follow the procedure “WITH CONSULT-II” above.

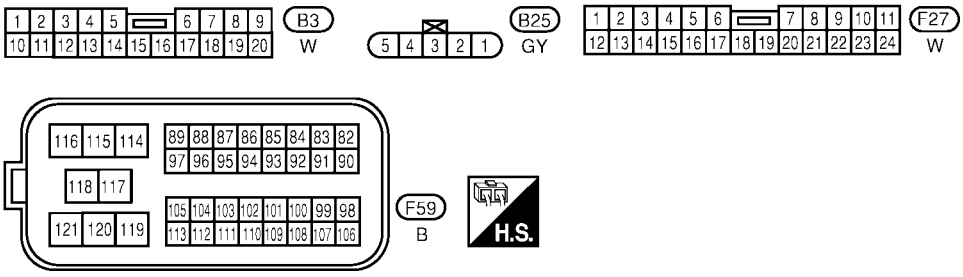
Wiring Diagram

UBS00JVH

EC-FTTS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





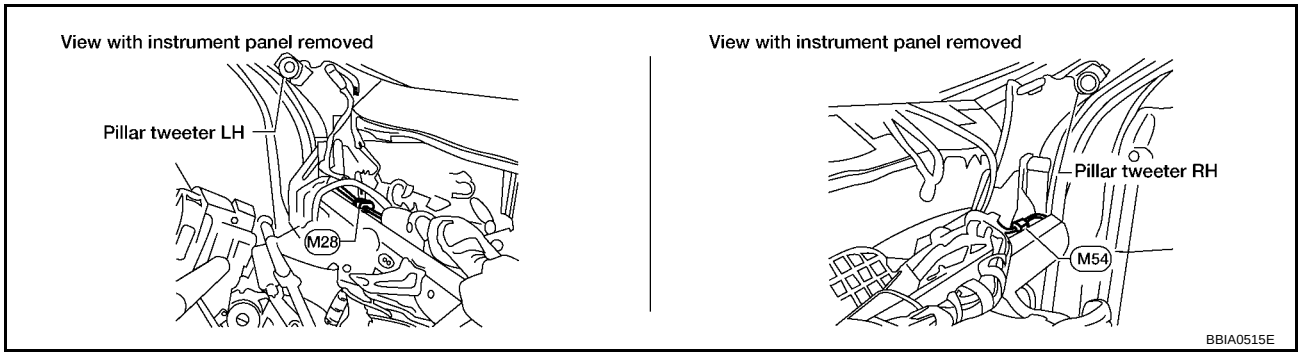
BBWA1398E

Diagnostic Procedure

UBS00JVI

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .

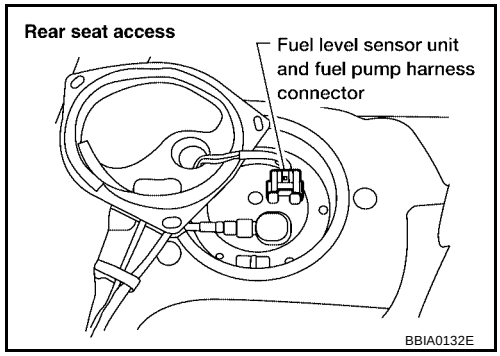


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

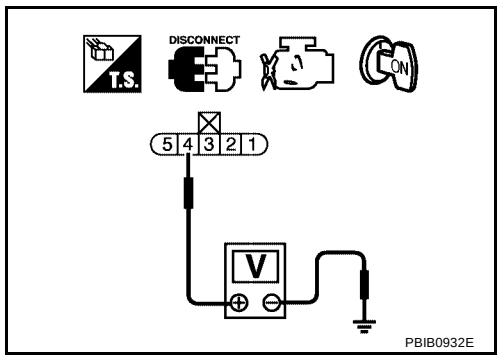
2. CHECK FUEL TANK TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Turn ignition switch ON.



4. Check voltage between “fuel level sensor unit and fuel pump” terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness connectors B3, M16
- Harness for open or short between ECM and “fuel level sensor unit and fuel pump”

>> Repair open circuit or short to ground or short to power in harness or connector.

4. CHECK FUEL TANK TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between “fuel level sensor unit and fuel pump” terminal 5 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to power in harness or connectors.

5. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to, EC-970, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace “fuel level sensor unit and fuel pump”.

6. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

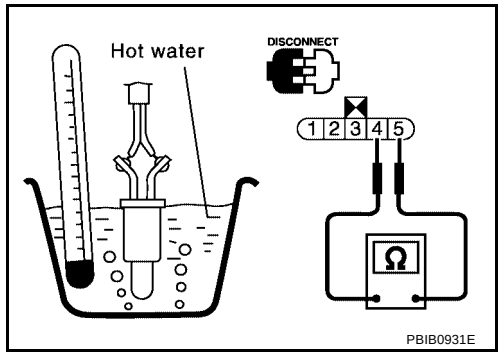
UBS00JVJ

FUEL TANK TEMPERATURE SENSOR

Check resistance by heating with hot water or heat gun as shown in the figure.

Temperature °C (°F)	Resistance kΩ
20 (68)	2.3 - 2.7
50 (122)	0.79 - 0.90

If NG, replace “fuel level sensor unit and fuel pump”.



Removal and Installation

UBS00JVK

FUEL TANK TEMPERATURE SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

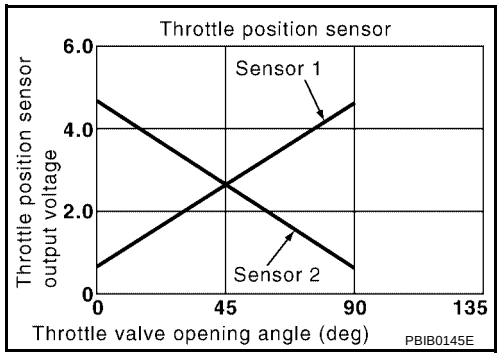
DTC P0222, P0223 TP SENSOR

PFP:16119

Component Description

UBS00JDN

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JDO

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1ST (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal are converted by ECM internally. Thus, it differ from ECM terminals voltage signal.

On Board Diagnosis Logic

UBS00JDP

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	● Harness or connectors (The TP sensor 1 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 1) ● Accelerator pedal position sensor (APP sensor 2)
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

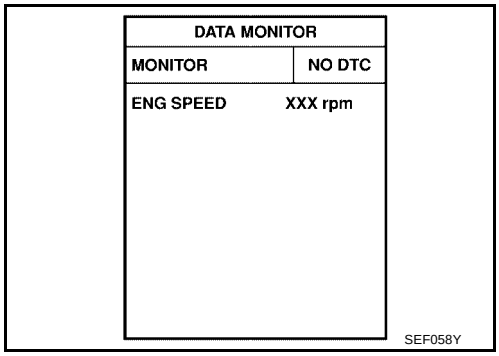
UBS00JDQ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-974, "Diagnostic Procedure" .



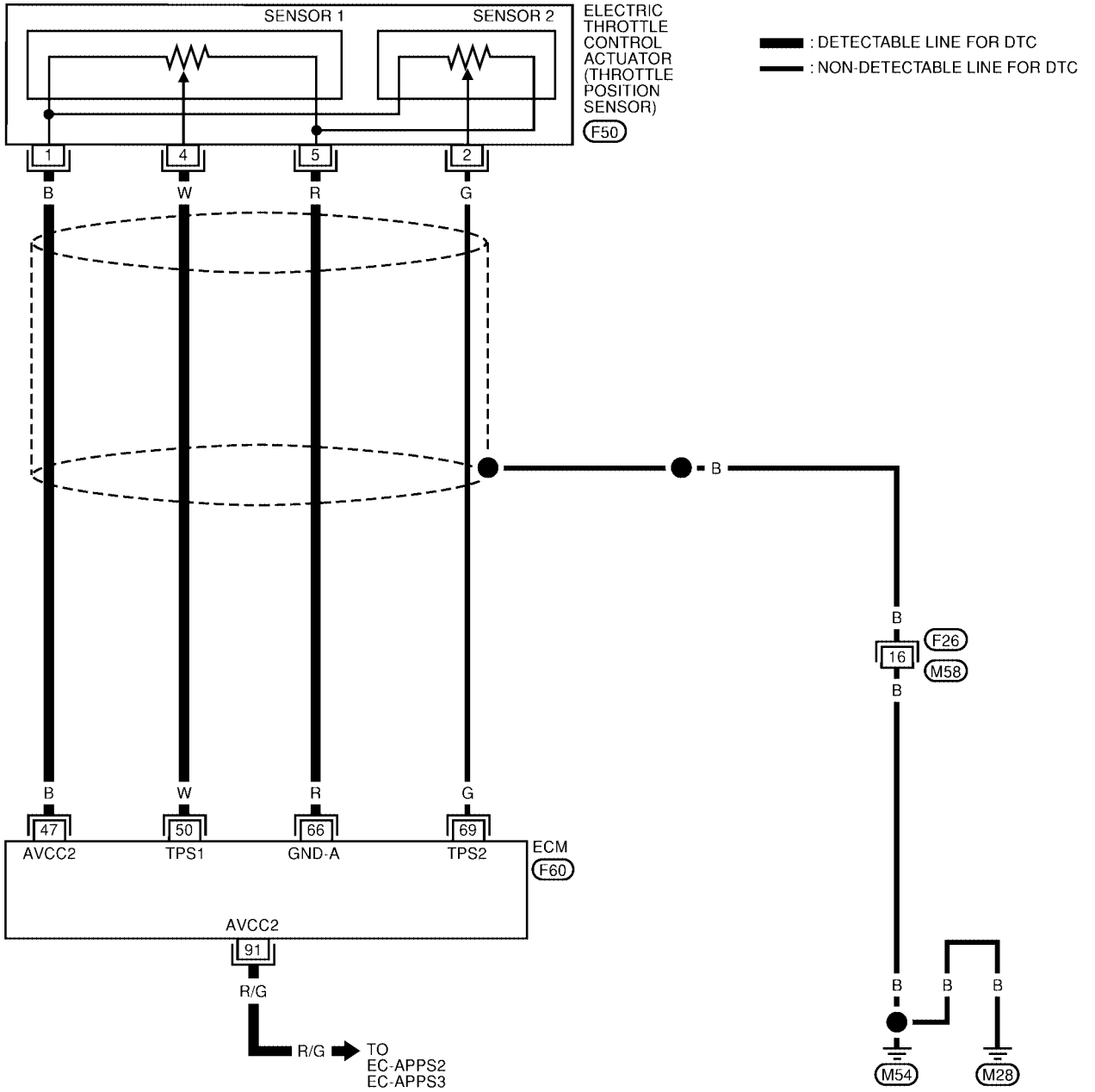
WITH GST

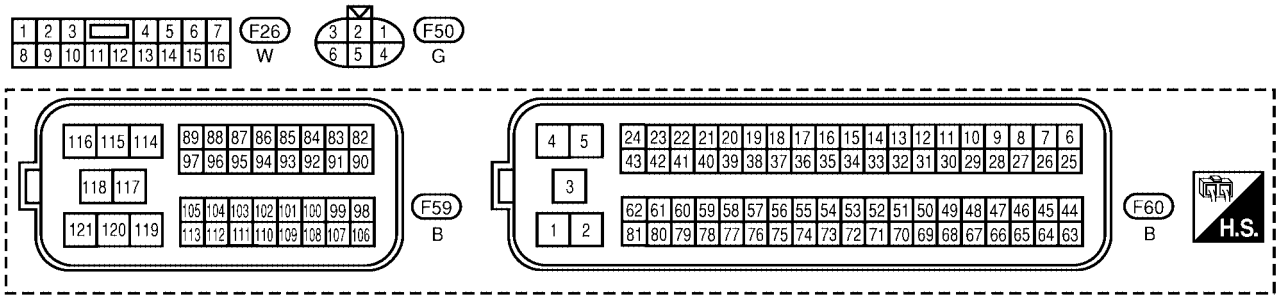
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JDR

EC-TPS1-01





BBWA1406E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

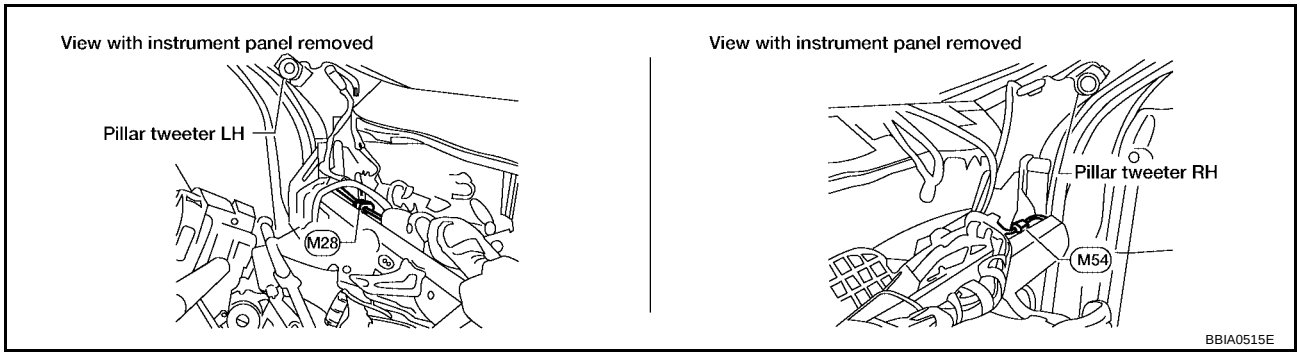
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	B	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
66	R	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
69	G	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
91	R/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

UBS00JDS

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-839, "Ground Inspection" .

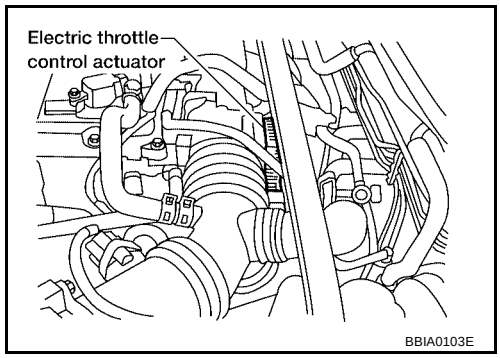


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

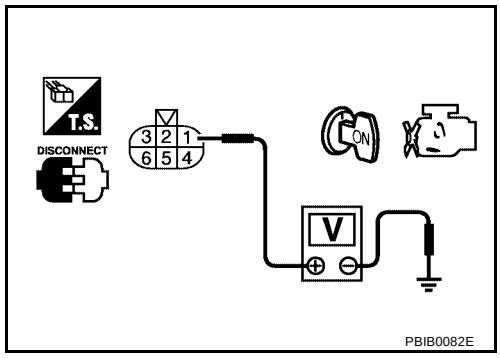
2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.



3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace open circuit.

4. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-III

Check the following.

- Harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 1	EC-973
91	APP sensor terminal 1	EC-1284

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1287, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-748, "Accelerator Pedal Released Position Learning" .
3. Perform EC-748, "Throttle Valve Closed Position Learning" .
4. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 66 and electric throttle control actuator terminal 5. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 50 and electric throttle control actuator terminal 4. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-977, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-748, "Throttle Valve Closed Position Learning" .
3. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

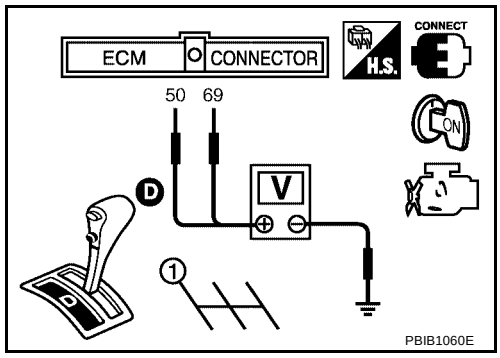
Component Inspection

UBS00JDT

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-748, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set shift lever to D position (A/T) or 1st position (M/T).
5. Check voltage between ECM terminals 50 (TP sensor 1 signal), 69 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-748, "Throttle Valve Closed Position Learning" .
8. Perform EC-749, "Idle Air Volume Learning" .

Remove and Installation

UBS00JDU

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-108, "INTAKE MANIFOLD" .

DTC P0300 - P0304 NO. 4 - 1 CYLINDER MISFIRE, MULTIPLE CYLINDER MISFIRE

PFP:00020

On Board Diagnosis Logic

UBS00JVL

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MIL will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MIL will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MIL will remain on.
   If another misfire condition occurs that can damage the TWC, the MIL will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MIL will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300 0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	● Improper spark plug ● Insufficient compression ● Incorrect fuel pressure ● The injector circuit is open or shorted ● Fuel injector ● Intake air leak ● The ignition signal circuit is open or shorted ● Lack of fuel ● Signal plate ● Heated oxygen sensor 1*1 ● Air fuel ratio (A/F) sensor 1*2 ● Incorrect PCV hose connection
P0301 0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302 0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303 0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304 0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

*1: A/T models ULEV and M/T models.

*2: A/T models except ULEV.

DTC Confirmation Procedure

UBS00JVM

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

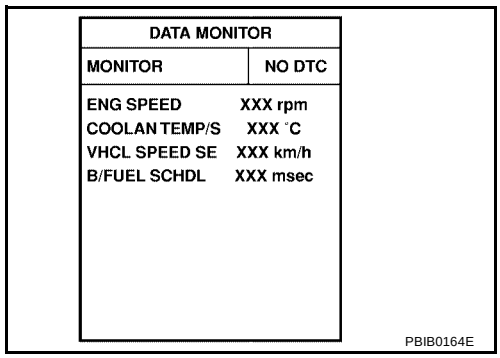
WITH CONSULT-II

1. Turn ignition switch ON, and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart engine and let it idle for about 15 minutes.
5. If 1st trip DTC is detected, go to EC-979, "Diagnostic Procedure" .

NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.

b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to the table below.
Hold the accelerator pedal as steady as possible.



The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

The time to driving varies according to the engine speed in the freeze frame data.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00JVN

1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

OK or NG

OK >> GO TO 2.
NG >> Discover air leak location and repair.

2. CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst (manifold) and muffler for dents.

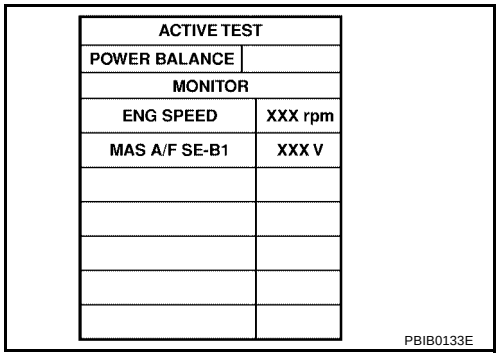
OK or NG

OK >> GO TO 3.
NG >> Repair or replace it.

3. PERFORM POWER BALANCE TEST

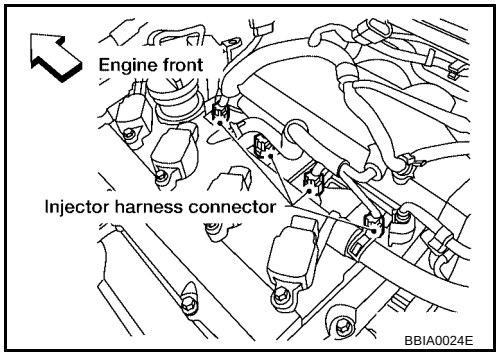
With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?



Without CONSULT-II

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



Yes or No

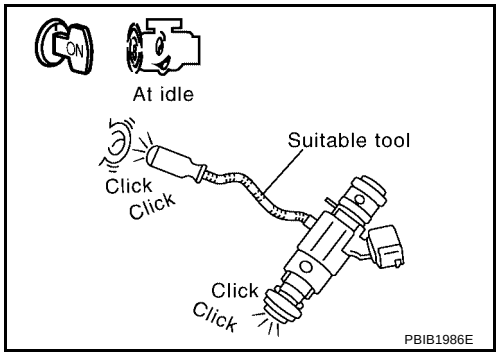
Yes >> GO TO 4.
No >> GO TO 7.

4. CHECK INJECTOR

Does each injector make an operating sound at idle?

Yes or No

Yes >> GO TO 5.
No >> Check injector(s) and circuit(s). Refer to EC-1334, "INJECTOR CIRCUIT" .

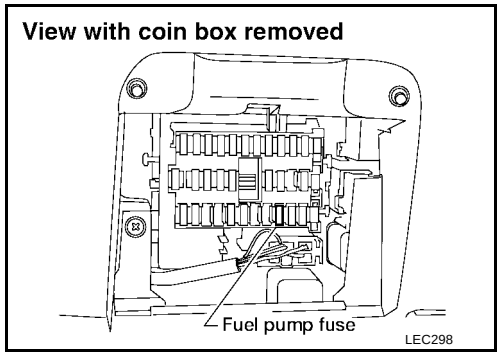


5. CHECK FUNCTION OF IGNITION COIL-I

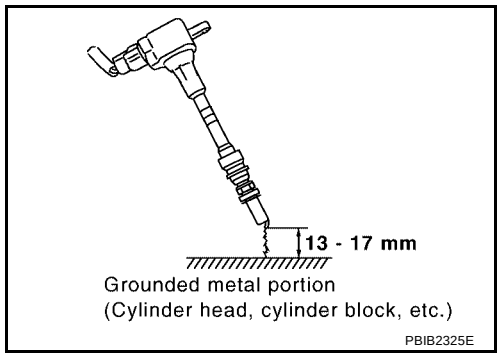
CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse located in fuse box to release fuel pressure.

   NOTE:
   Do not use CONSULT-II to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it 2 or 3 times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.



7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.



Spark should be generated.

CAUTION:
- **Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of 17 mm or more is taken.**

NOTE:
When the gap is 13 mm or less, the spark might be generated even if the coil is malfunctioning.

OK or NG

OK >> GO TO 9.
NG >> GO TO 6.

6. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

OK or NG

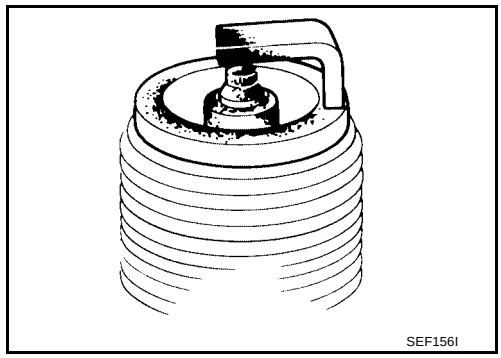
OK >> GO TO 7.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-1312, "IGNITION SIGNAL" .

7. CHECK SPARK PLUGS

Check the spark plugs and check for fouling, etc.

OK or NG

OK >> GO TO 8.
NG >> Repair or replace spark plug (s) with standard type one (s). For spark plug type ignition coil. Refer to MA-28, "Changing Spark Plugs (Double Platinum - Tipped Type)" .



8. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

OK or NG

OK >> **INSPECTION END**
NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-28, "Changing Spark Plugs (Double Platinum - Tipped Type)" .

9. CHECK COMPRESSION PRESSURE

Check compression pressure.
Refer to EM-148, "CHECKING COMPRESSION PRESSURE" .

Standard:	**1,250 kPa (12,8 kg/cm^2 , 181 psi)/300 rpm**
Minimum:	**1,060 kPa (10,8 kg/cm^2 , 154 psi)/300 rpm**
Difference between each cylinder:	**98 kPa (1.0 kg/cm^2 , 14 psi)/300 rpm**

OK or NG

OK >> GO TO 10.
NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

10. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-751, "FUEL PRESSURE RELEASE" .
3. Install fuel pressure gauge and check fuel pressure.

At idle: Approximately 350 kPa (3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-1340, "FUEL PUMP CIRCUIT" .)
- Fuel pressure regulator (Refer to EC-752, "FUEL PRESSURE CHECK" .)
- Fuel lines (Refer to EM-121, "FUEL INJECTOR AND FUEL TUBE" .)
- Fuel filter for clogging

>> Repair or replace.

12. CHECK IGNITION TIMING

Checking the following items. Refer to EC-721, "Basic Inspection" .

Items		Specifications
Target idle speed	M/T	700 ± 50 rpm (in Neutral position)
	A/T	700 ± 50 rpm (in P or N position)
Ignition timing	M/T	15 ± 5° BTDC (in Neutral position)
	A/T	15 ± 5° BTDC (in P or N position)

OK or NG

OK (A/T models ULEV and M/T models)>>GO TO 13.
OK (A/T models except ULEV)>>GO TO 14.
NG >> Follow the EC-721, "Basic Inspection" .

13. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-908, "Component Inspection" .

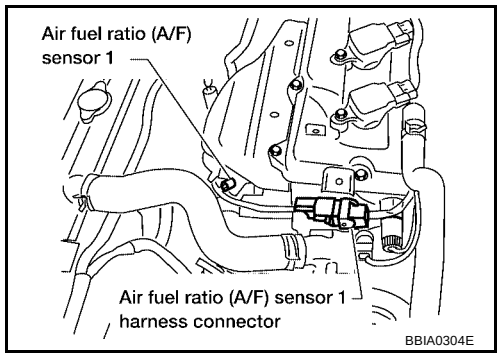
OK or NG

OK >> GO TO 16.
NG >> Replace heated oxygen sensor 1.

14. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and A/F sensor 1 harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	16
5	35
6	56
2	75



Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 15.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK A/F SENSOR 1 HEATER

Refer to EC-1101, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace A/F sensor 1.

16. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10.0 g·m/sec: at 2,500 rpm

With GST

Check mass air flow sensor signal in “Service $01” with GST.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10.0 g·m/sec: at 2,500 rpm

OK or NG

OK >> GO TO 17.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or ground. Refer to EC-859, "DTC P0101 MAF SENSOR" .

17. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-763, "Symptom Matrix Chart" .

OK or NG

OK >> GO TO 18.
NG >> Repair or replace.

18. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 19.

19. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

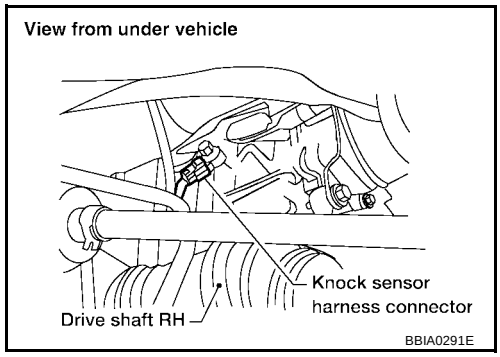
DTC P0327, P0328 KS

PFP:22060

Component Description

UBS00JDY

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.



On Board Diagnosis Logic

UBS00JDZ

The MIL will not light up for these diagnoses.

DTC No.	Trouble Diagnosis Name	DTC Detected Condition	Possible Cause
P0327 0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Knock sensor
P0328 0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

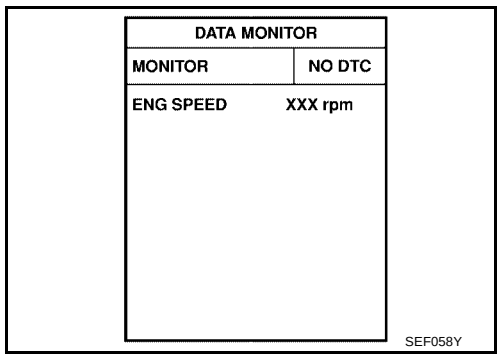
UBS00JE0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-987, "Diagnostic Procedure" .



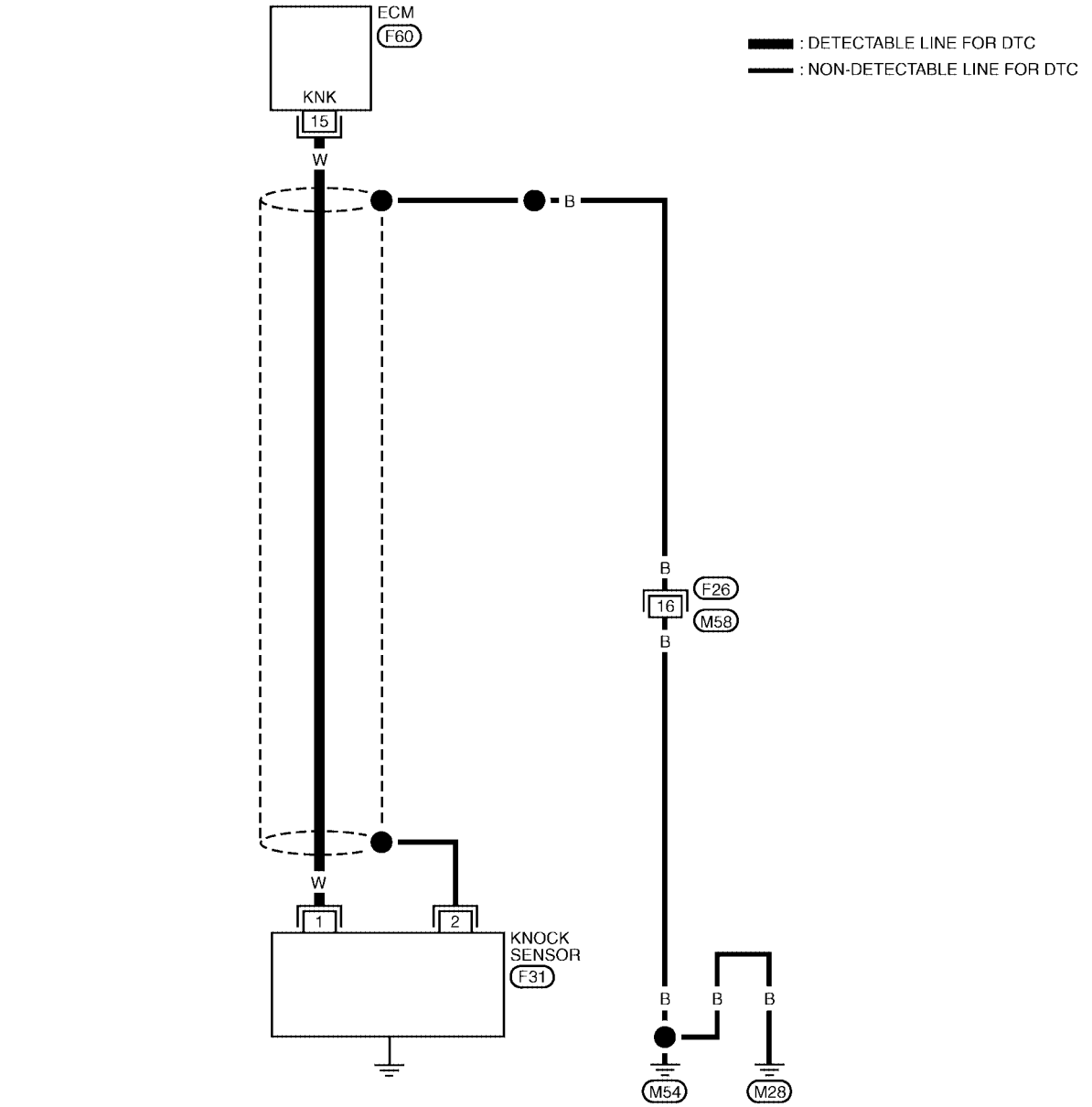
WITH GST

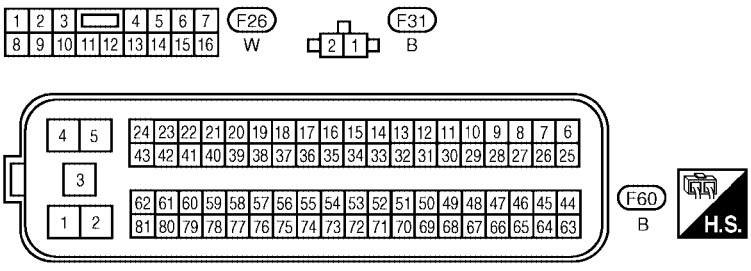
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JE1

EC-KS-01





BBWA1462E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V

Diagnostic Procedure

UBS00JE2

1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 15 and ground. Refer to Wiring Diagram.

   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

   Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-II

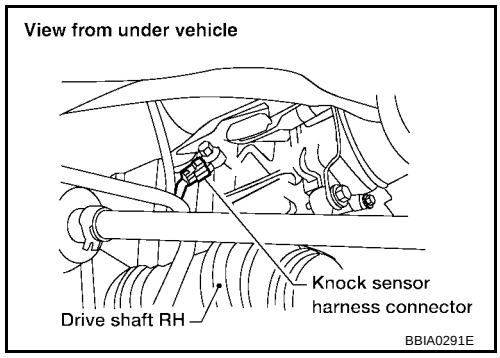
1. Disconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 15 and knock sensor terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK KNOCK SENSOR

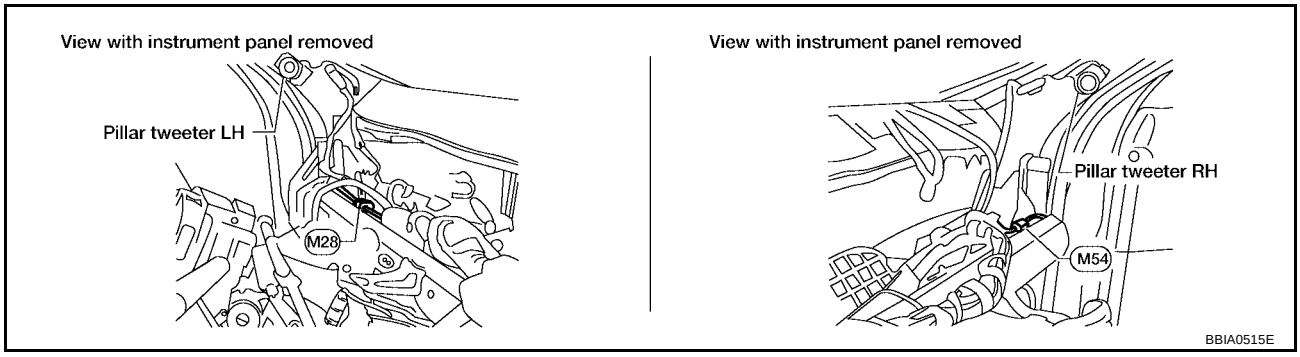
Refer to EC-988, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace knock sensor.

4. CHECK GROUND CONNECTIONS

Loosen and retighten ground two screws on the body.
Refer to EC-839, "Ground Inspection" .



OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Reconnect knock sensor harness connector.
2. Check harness continuity between knock sensor terminal 2 and ground.

Continuity should exist

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING RART

Check the following.

- Harness connectors F26, M58
- Harness for open or short between knock sensor terminal 2 and ground

>> Repair open circuit or short to power in harness or connectors.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00JE3

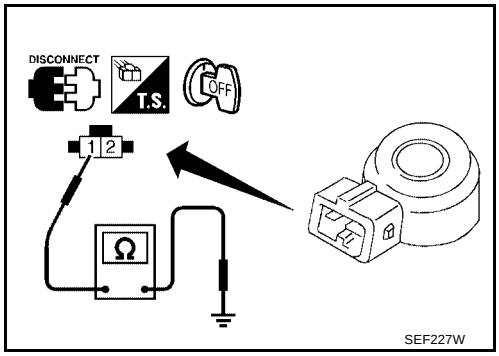
KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

NOTE:
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



Removal and Installation

UBS00JE4

KNOCK SENSOR

Refer to EM-164, "CYLINDER BLOCK" .

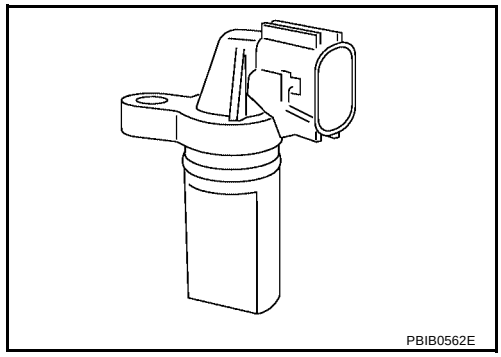
DTC P0335 CKP SENSOR (POS)

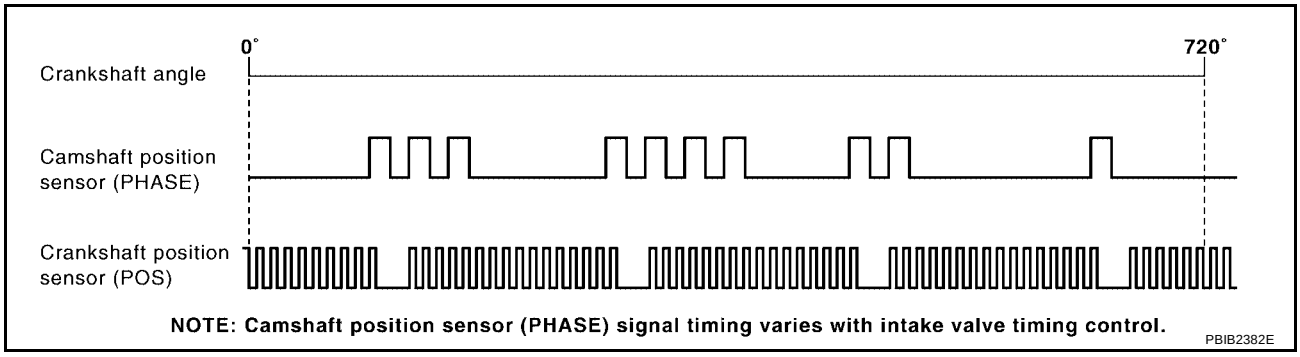
PFP:23731

Component Description

UBS00JE5

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.
ECM receives the signals as shown in the figure.


PBIB0562E



NOTE: Camshaft position sensor (PHASE) signal timing varies with intake valve timing control.
PBIB2382E

CONSULT-II Reference Value in Data Monitor Mode

UBS00JE6

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	● Run engine and compare the CONSULT-II value with tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

UBS00JE7

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor (POS) circuit	● The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. ● The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. ● The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	● Harness or connectors (The sensor circuit is open or shorted) ● Crankshaft position sensor (POS) ● Signal plate

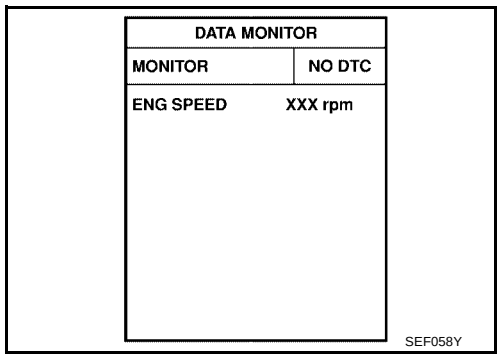
DTC Confirmation Procedure

UBS00JE8

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-993, "Diagnostic Procedure" .



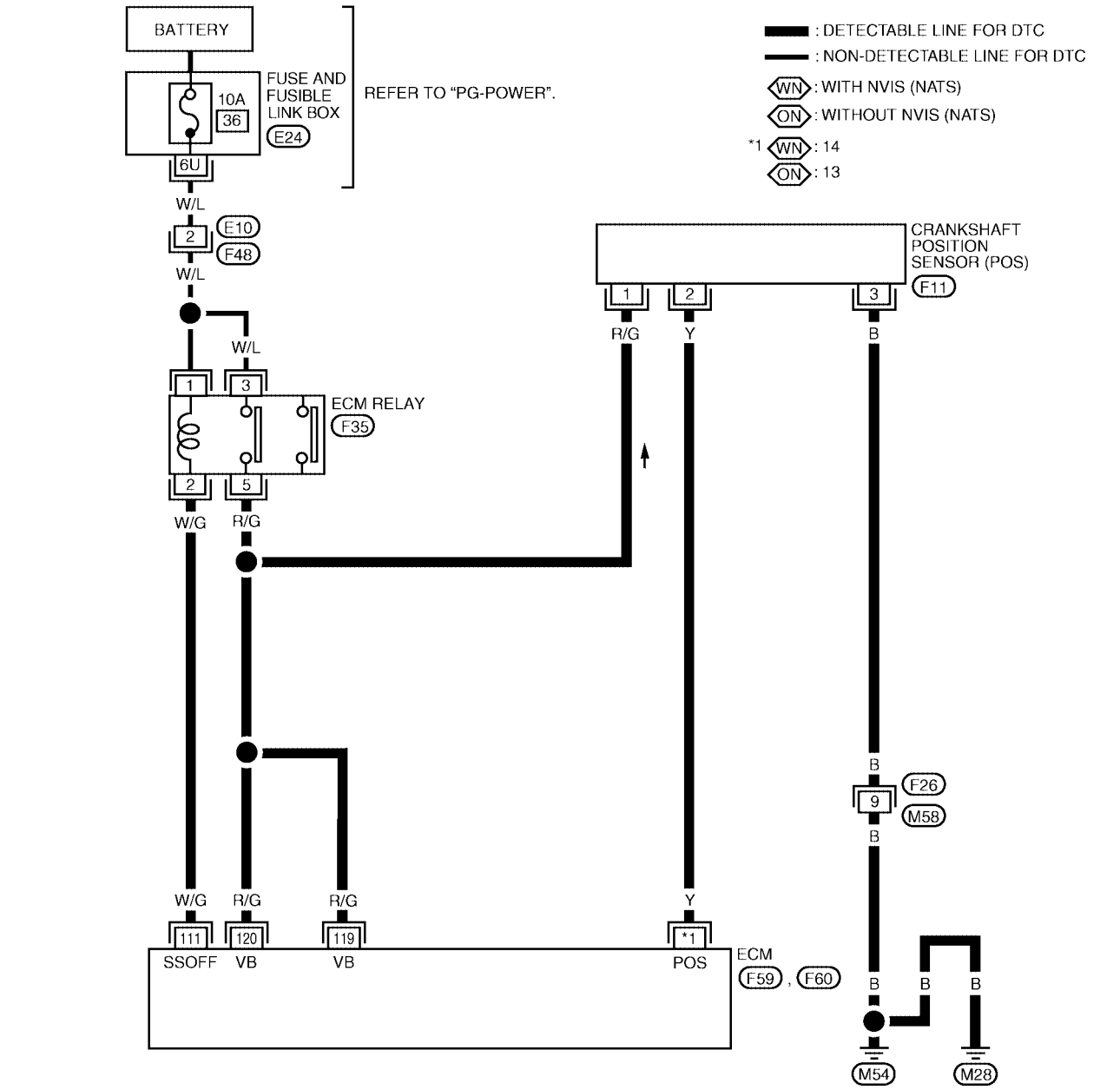
WITH GST

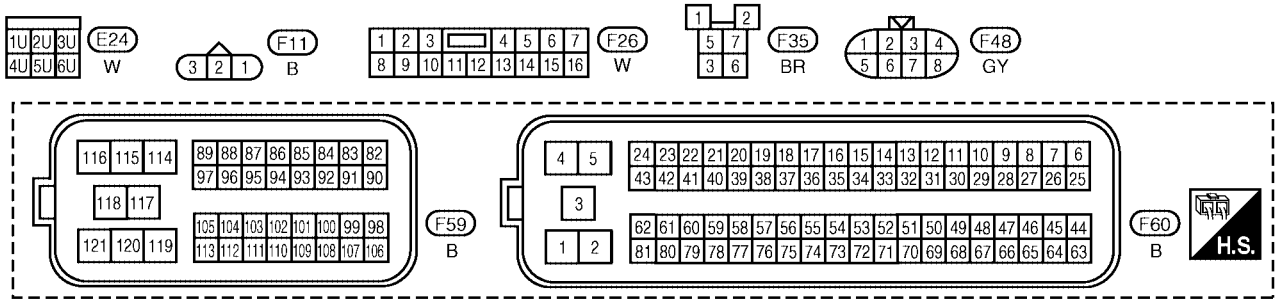
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JE9

EC-POS-01

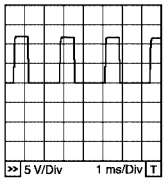
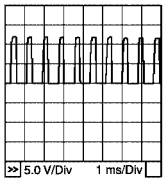




BBWA1408E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13*1 (14)*2	Y	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.0V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E

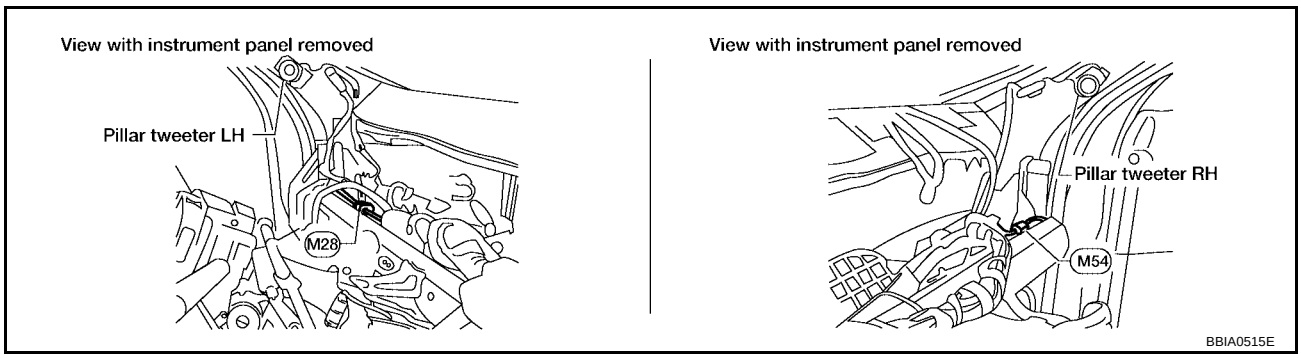
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*1: Without NVIS (NATS).
*2: With NVIS (NATS).

Diagnostic Procedure

UBS00JEA

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-839, "Ground Inspection" .

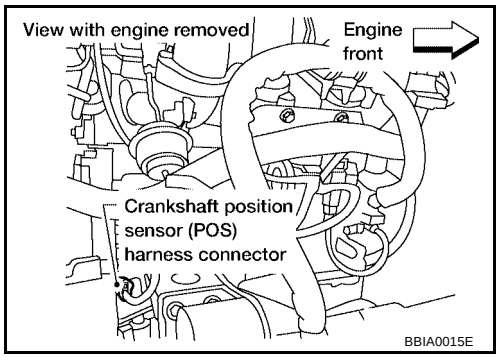


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.
2. Turn ignition switch ON.



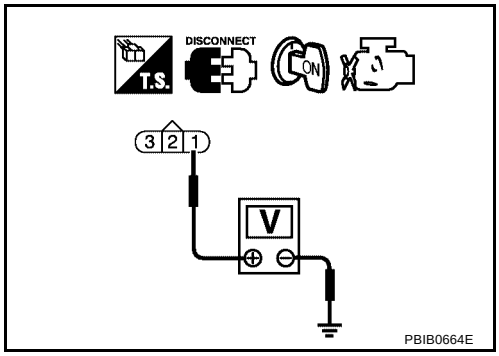
3. Check voltage between CKP sensor (POS) terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CKP sensor (POS) terminal 3 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F26, M58
- Harness for open or short between crankshaft position sensor (POS) and ground.

>> Repair open circuit or short to power in harness or connectors.

6. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 13 [Without NVIS (NATS)] or 14 [With NVIS (NATS)] and CKP sensor (POS) terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-995, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace crankshaft position sensor (POS).

8. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 9.
NG >> Replace the signal plate.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

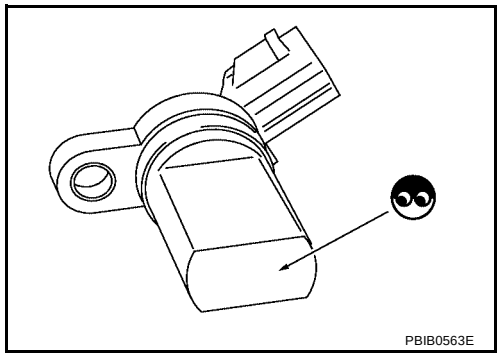
>> **INSPECTION END**

Component Inspection

UBS00JEB

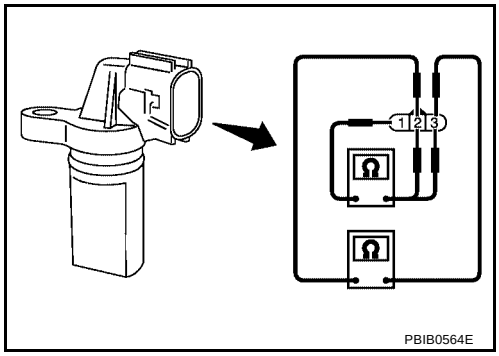
CRANKSHAFT POSITION SENSOR (POS)

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	



6. If NG, replace crankshaft position sensor (POS).

Removal and Installation

UBS00JEC

CRANKSHAFT POSITION SENSOR (POS)

Refer to EM-164, "CYLINDER BLOCK" .

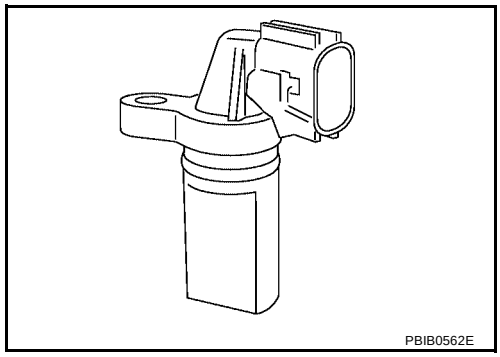
DTC P0340 CMP SENSOR (PHASE)

PFP:23731

Component Description

UBS00JED

The camshaft position sensor (PHASE) senses the retraction with camshaft (intake) to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
ECM receives the signals as shown in the figure.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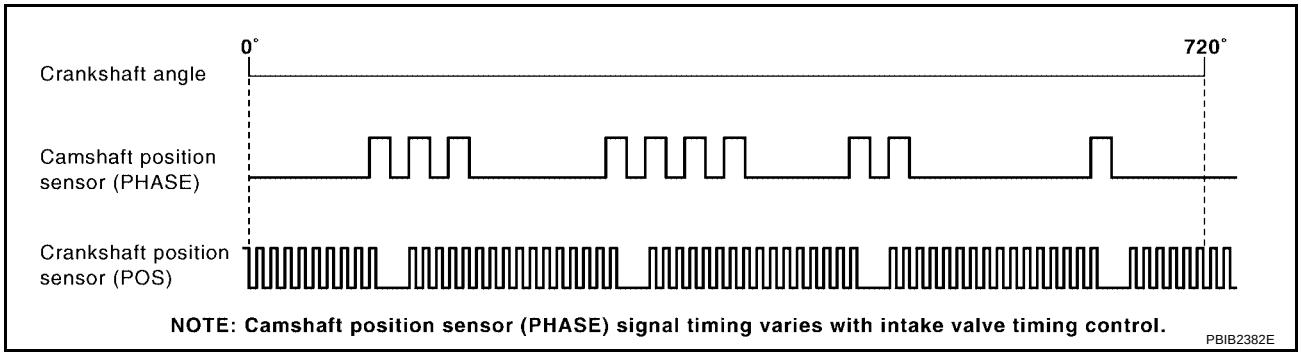


NOTE: Camshaft position sensor (PHASE) signal timing varies with intake valve timing control.
PBIB2382E

On Board Diagnosis Logic

UBS00JEE

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	Camshaft position sensor (PHASE) circuit	● The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. ● The cylinder No. signal is not set to ECM during engine running. ● The cylinder No. signal is not in the normal pattern during engine running.	● Harness or connectors (The sensor circuit is open or shorted) ● Camshaft position sensor (PHASE) ● Camshaft (Intake) ● Starter motor (Refer to SC-21 .) ● Starting system circuit (Refer to SC-9 .) ● Dead (Weak) battery

DTC Confirmation Procedure

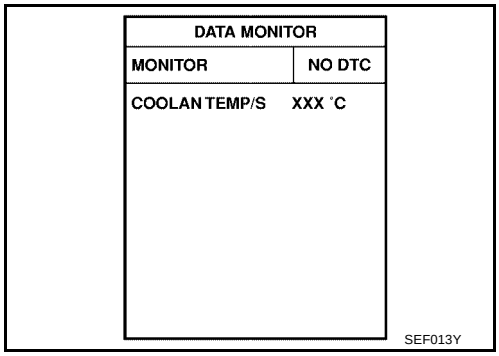
UBS00JEF

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
4. If 1st trip DTC is detected, go to EC-1000, "Diagnostic Procedure" .
   If 1st trip DTC is not detected, go to next step.
5. Maintaining engine speed at more than 800 rpm for at least 5 seconds.
6. If 1st trip DTC is detected, go to EC-1000, "Diagnostic Procedure" .



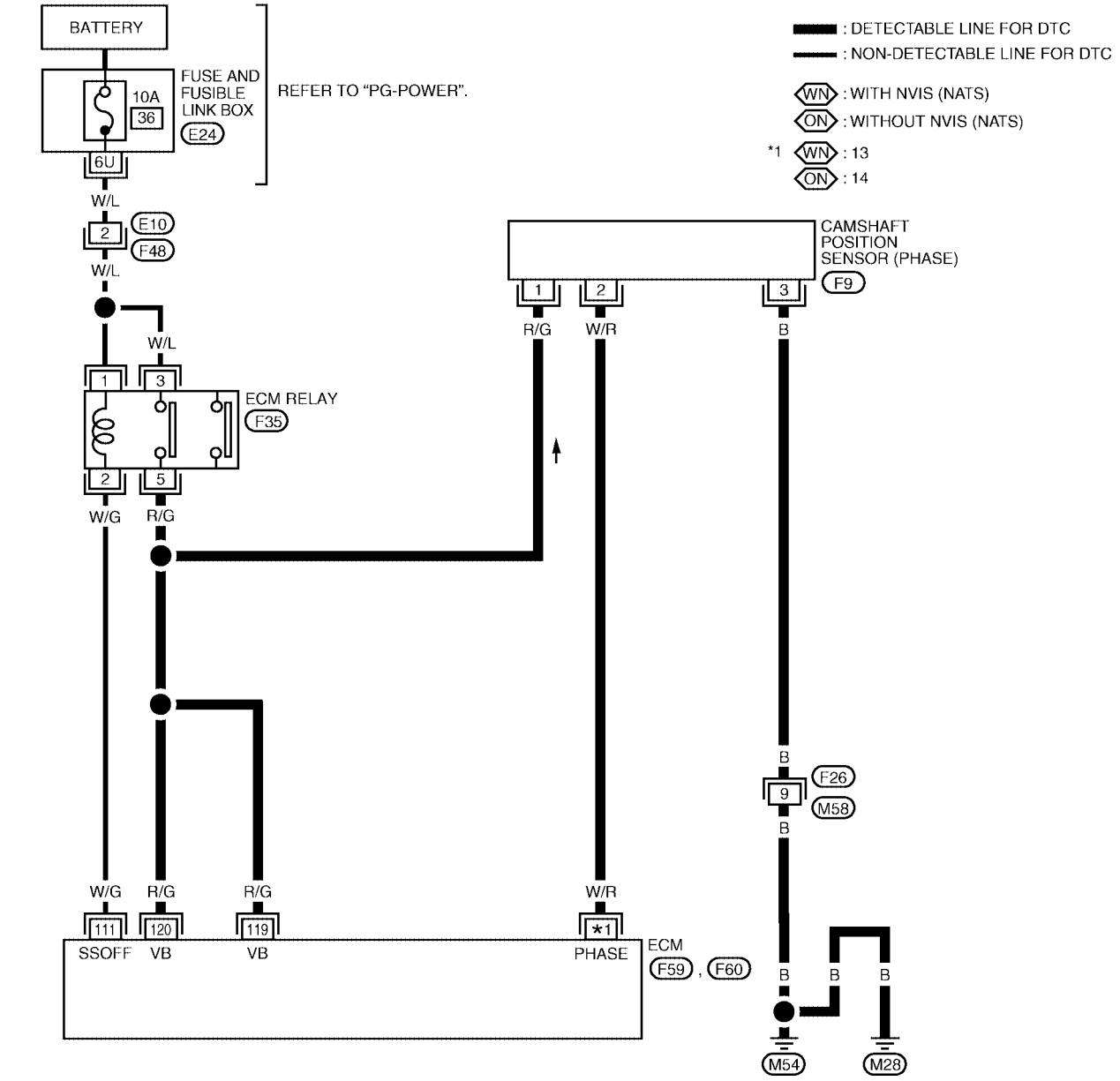
WITH GST

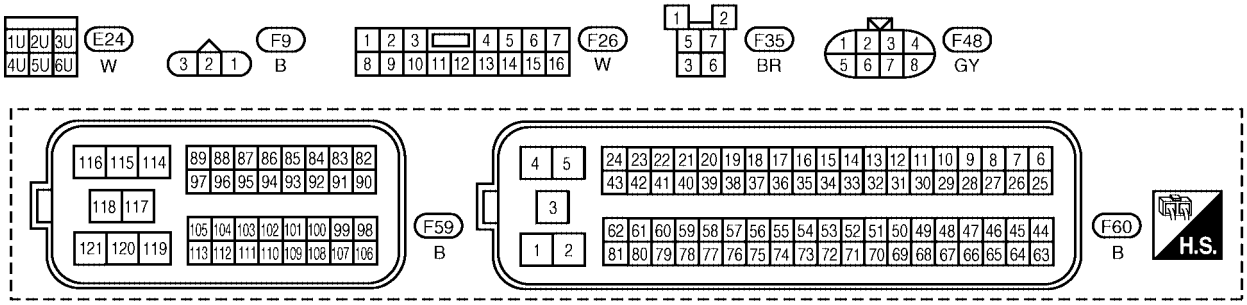
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JEG

EC-PHASE-01



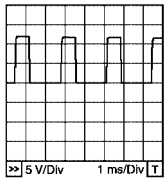
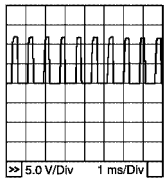


BBWA1417E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13*1 (14)*2	Y	Crankshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.0V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*1: Without NVIS (NATS).
*2: With NVIS (NATS).

Diagnostic Procedure

UBS00JEH

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over?

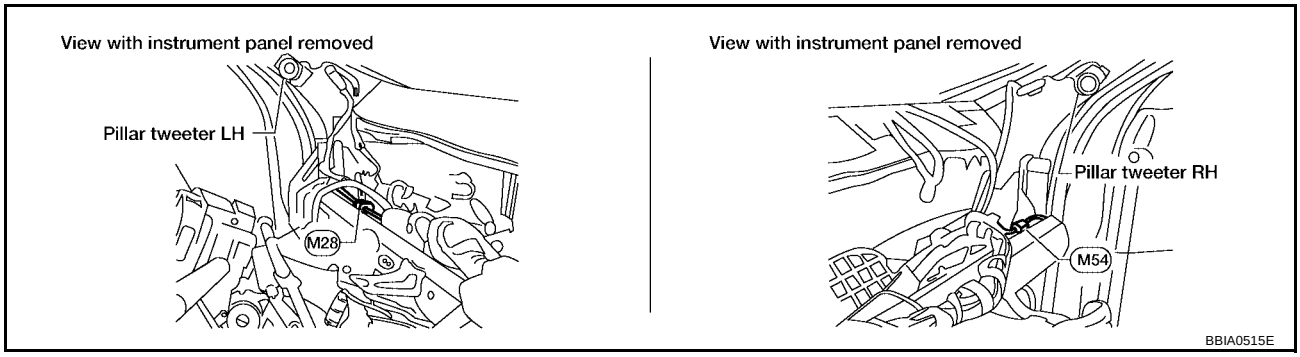
Does the starter motor operate?

Yes or No

Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-9, "STARTING SYSTEM" .)

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-839, "Ground Inspection" .

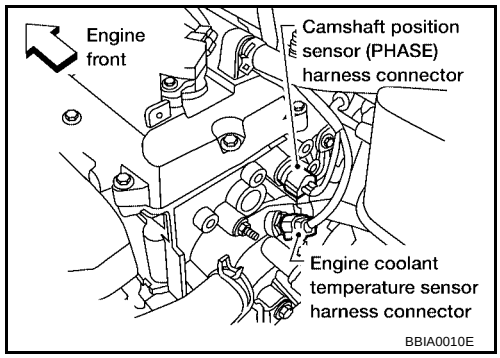


OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.



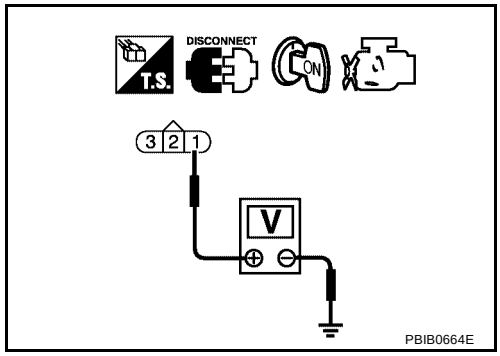
3. Check voltage between CMP sensor (PHASE) terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between camshaft position sensor (PHASE) and ECM
- Harness for open or short between camshaft position sensor (PHASE) and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between CMP sensor (PHASE) terminal 3 and ground.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F26, M58
- Harness for open or short between CMP sensor (PHASE) and ground.

>> Repair open circuit or short to power in harness or connectors.

7. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 14 [Without NVIS (NATS)] or 13 [With NVIS (NATS)] and CMP sensor (PHASE) terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-1002, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace camshaft position sensor (PHASE).

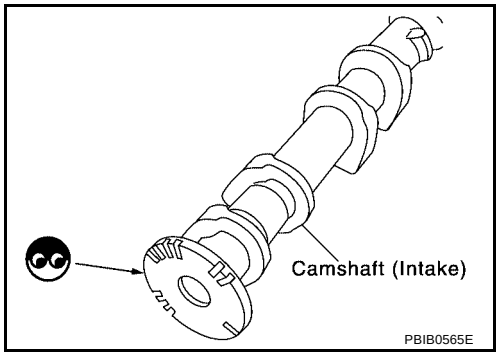
9. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 10.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



10. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

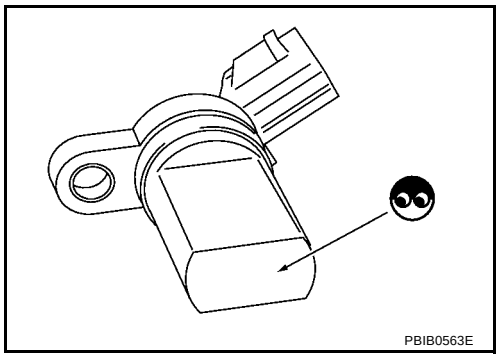
>> **INSPECTION END**

Component Inspection

UBS00JEI

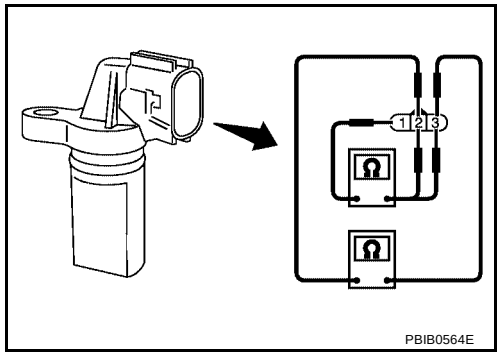
CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	
2 (+) - 3 (-)	



Removal and Installation

CAMSHAFT POSITION SENSOR (PHASE)

Refer to EM-126, "CAMSHAFT" .

UBS00JEJ

DTC P0420 THREE WAY CATALYST FUNCTION

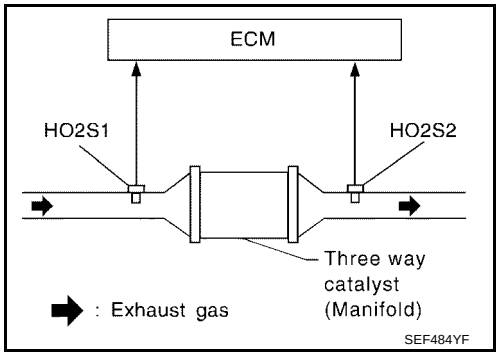
PFP:20905

On Board Diagnosis Logic

UBS00JVO

A/T MODELS ULEV AND M/T MODELS

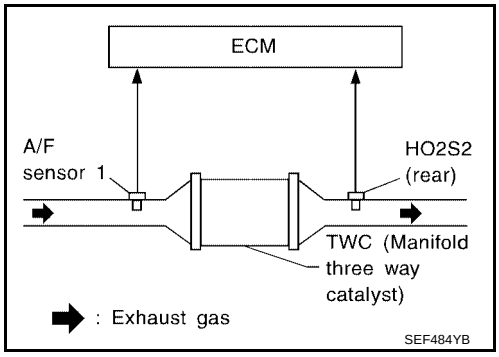
The ECM monitors the switching frequency ratio of heated oxygen sensor 1 and 2.
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2.
As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of heated oxygen sensor 1 and 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420 0420	Catalyst system efficiency below threshold	● Three way catalyst (manifold) does not operate properly. ● Three way catalyst (manifold) does not have enough oxygen storage capacity.	● Three way catalyst (manifold) ● Exhaust tube ● Intake air leaks ● Fuel injector ● Fuel injector leaks ● Spark plug ● Improper ignition timing

A/T MODELS EXCEPT ULEV

The ECM monitors the switching frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2.
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2.
As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of air fuel ratio (A/F) sensor 1 and heated oxygen sensor 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420 0420	Catalyst system efficiency below threshold	● Three way catalyst (manifold) does not operate properly. ● Three way catalyst (manifold) does not have enough oxygen storage capacity.	● Three way catalyst (manifold) ● Exhaust tube ● Intake air leaks ● Fuel injector ● Fuel injector leaks ● Spark plug ● Improper ignition timing

DTC Confirmation Procedure

UBS00JVP

A/T MODELS ULEV AND M/T MODELS

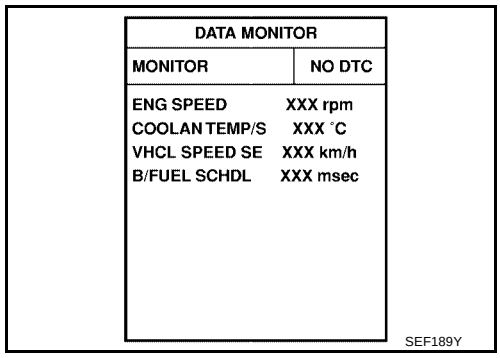
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

With CONSULT-II

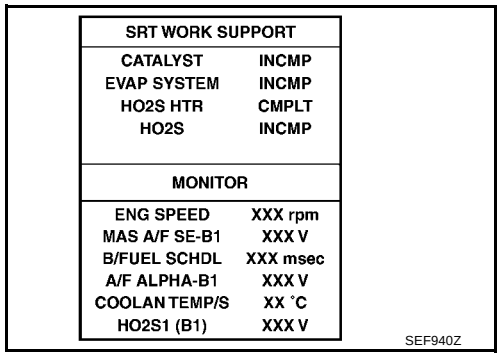
TESTING CONDITION:

- **Open engine hood before conducting the following procedure.**
- **Do not hold engine speed for more than the specified minutes below.**

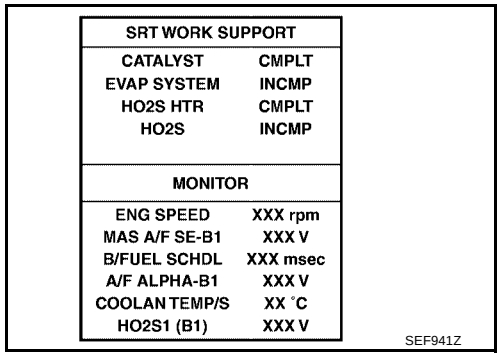
1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.



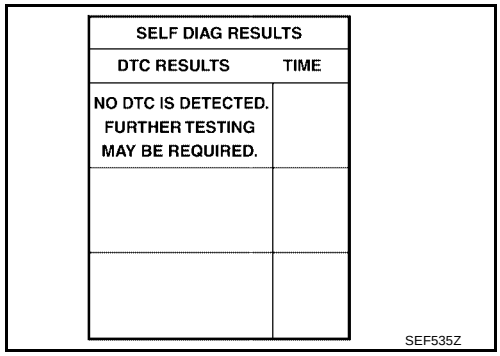
6. Make sure that “COOLANT TEMP/S” indicates more than 70°C (158°F).
7. Open engine hood.
8. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
9. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
   If “INCMP” of “CATALYST” changed to “COMPLT”, go to step 7
10. Wait 5 seconds at idle.



11. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).
    If not “CMPLT”, stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.



12. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
13. Confirm that the 1st trip DTC is not detected.
    If the 1st trip DTC is detected, go to EC-1008, "Diagnostic Procedure" .



A/T MODELS EXCEPT ULEV

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

With CONSULT-II

TESTING CONDITION:
Do not hold engine speed for more than the specified minutes below.

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
7. Open engine hood.
8. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
9. Rev engine up to 2,500 to 3,500 rpm and hold it for 3 consecutive minutes, then release the accelerator pedal completely.
   If “CMPLT” of “CATALYST” changed to “COMPLT”, go to STEP 12.
10. Wait 5 seconds at idle.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
COOLAN TEMP/S	XXX ˚C
VHCL SPEED SE	XXX km/h
B/FUEL SCHDL	XXX msec

SEF189Y

SRT WORK SUPPORT	
CATALYST	INCMP
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX ˚C
A/F SEN1 (B1)	XXX V

PBIB1784E

11. Rev engine up to 2,000 to 3,000 rpm and maintain it until “IMCMP” of “CATALYST” changes to “CMPLT” (it will take approximately 5 minutes).
    If not “CMPLT”, stop engine and cool it down to less than 70°C (158°F) and then retest step 1.

SRT WORK SUPPORT	
CATALYST	CMPLT
EVAP SYSTEM	INCMP
HO2S HTR	CMPLT
HO2S	INCMP
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
B/FUEL SCHDL	XXX msec
A/F ALPHA-B1	XXX V
COOLAN TEMP/S	XX ˚C
A/F SEN1 (B1)	XXX V

PBIB1785E

12. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
13. Confirm that the 1st trip DTC is not detected.
    If the 1st trip DTC is detected, go to EC-1008, "Diagnostic Procedure" .

SELF DIAG RESULTS	
DTC RESULTS	TIME
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	

SEF535Z

Overall Function Check

UBS00JVQ

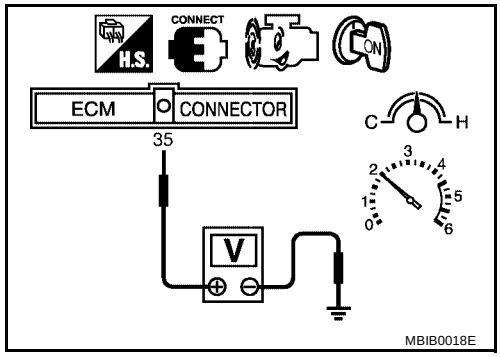
Use this procedure to check the overall function of the three way catalyst (Manifold). During this check, a DTC might not be confirmed.

CAUTION:
Always drive vehicle at a safe speed.

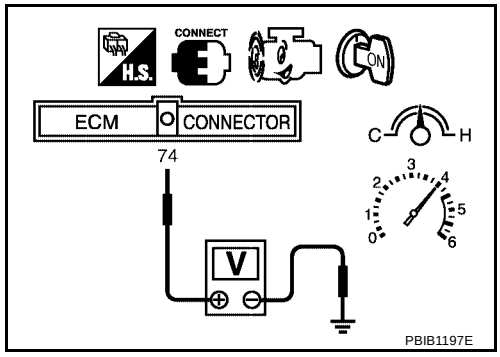
A/T MODELS ULEV AND M/T MODELS

With GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeters probes between ECM terminal 35 (HO2S1 signal) and ground, and ECM terminal 74 (HO2S2 signal) and engine ground.
6. Keep engine speed at 2,000 rpm constant under no load.



7. Make sure that the voltage switching frequency (high & low) between ECM terminal 74 and engine ground is very less than that of ECM terminal 35 and engine ground.
   Switching frequency ratio = A/B
   A: Heated oxygen sensor 2 voltage switching frequency
   B: Heated oxygen sensor 1 voltage switching frequency
   This ratio should be less than 0.75.
   If the ratio is greater than above, it means three way catalyst does not operate properly. Go to EC-1008, "Diagnostic Procedure" .

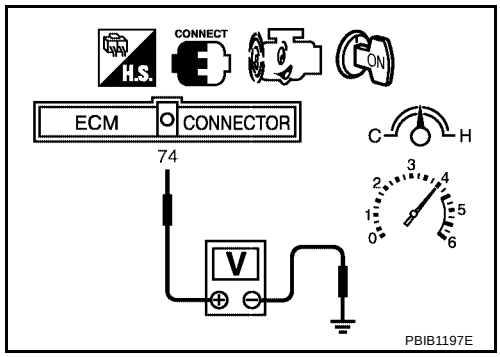


NOTE:
If the voltage at terminal 35 does not switch periodically more than 5 times within 10 seconds at step 7, perform trouble diagnosis for “DTC P0133” first. (See EC-914 .)

AT MODELS EXCEPT ULEV

With GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Open engine hood.
6. Set voltmeter probe between ECM terminal 74 and ground.
7. Keep engine speed at 2,500 rpm constant under no load.
8. Make sure that the voltage does not vary for more than 5 seconds.
   If the voltage fluctuation cycle takes less than 5 seconds, go to EC-1008, "Diagnostic Procedure" .
   - 1 cycle: 0.6 - 1.0 V → 0 - 0.3 V → 0.6 - 1.0 V



Diagnostic Procedure

UBS00JVR

A/T MODELS ULEV AND M/T MODELS

1. CHECK EXHAUST SYSTEM

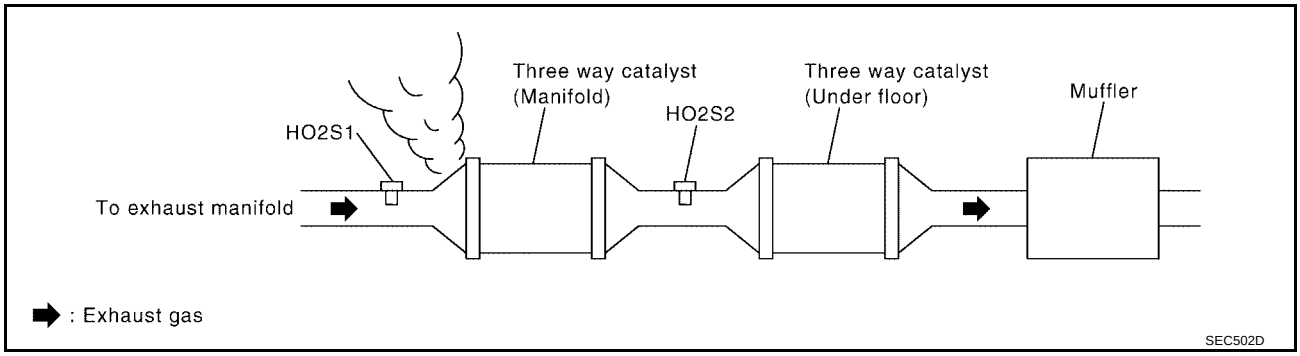
Visually check exhaust tubes and muffler for dent.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK IGNITION TIMING

Check for ignition timing. Refer to EC-721, "Basic Inspection" .

Items	Specifications	
Target idle speed	A/T	700 ± 50 rpm (in P or N position)
	M/T	700 ± 50 rpm (in Neutral position)
Ignition timing	A/T	15 ± 5° BTDC (in P or N position)
	M/T	15 ± 5° BTDC (in Neutral position)

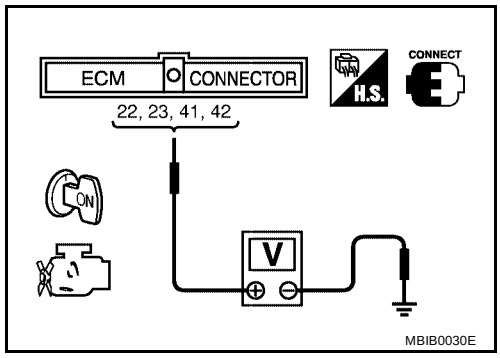
OK or NG

OK >> GO TO 5.
NG >> Follow the EC-721, "Basic Inspection" .

5. CHECK INJECTORS

1. Refer to Wiring Diagram for Injectors, EC-1335 .
2. Stop engine and then turn ignition switch ON.
3. Check voltage between ECM terminals 22, 23, 41, 42 and ground with CONSULT-II or tester.

Battery voltage should exist.



OK or NG

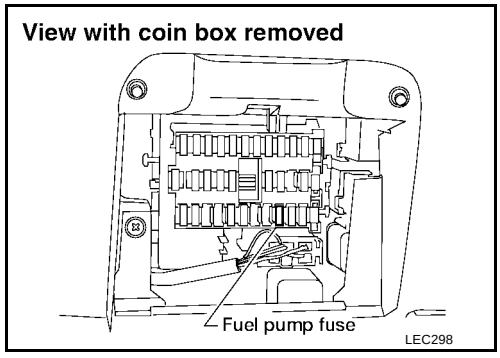
OK >> GO TO 6.
NG >> Perform EC-1336, "Diagnostic Procedure" .

6. CHECK FUNCTION OF IGNITION COIL-I

CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

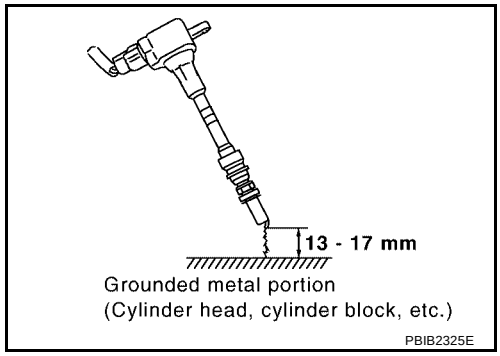
1. Turn ignition switch OFF.
2. Remove fuel pump fuse located in fuse box to release fuel pressure.

   NOTE:
   Do not use CONSULT-II to release fuel pressure, or fuel pressure applies again during the following procedure.
3. Start engine.
4. After engine stalls, crank it 2 or 3 times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.



7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
11. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.



CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of 17 mm or more is taken.**

NOTE:
When the gap is 13 mm or less, the spark might be generated even if the coil is malfunctioning.

OK or NG

OK >> GO TO 10.
NG >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

OK or NG

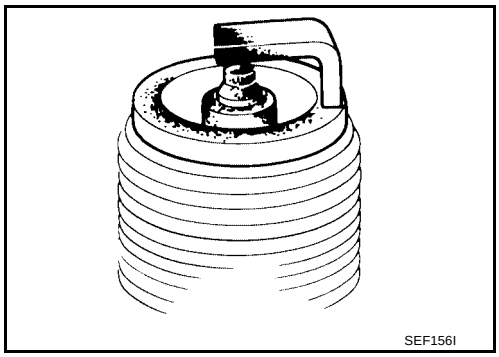
OK >> GO TO 8.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-1312, "IGNITION SIGNAL" .

8. CHECK SPARK PLUGS

Check the spark plugs and check for fouling, etc.

OK or NG

OK >> GO TO 9.
NG >> Repair or replace spark plug (s) with standard type one (s). For spark plug type ignition coil. Refer to MA-28, "Changing Spark Plugs (Double Platinum - Tipped Type)" .



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

OK or NG

OK >> **INSPECTION END**
NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-28, "Changing Spark Plugs (Double Platinum - Tipped Type)" .

10. CHECK INJECTOR

1. Turn ignition switch OFF.
2. Remove injector assembly. Refer to EM-121, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect ignition coil assembly harness connector.
4. Reconnect all injector harness connectors.
5. Turn ignition switch ON.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip)>>GO TO 11.
NG (Drips)>>Replace the injector(s) from which fuel is dripping.

11. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Trouble is fixed>>**INSPECTION END**
Trouble is not fixed>>Replace three way catalyst (manifold).

A/T MODELS EXCEPT ULEV

1. CHECK EXHAUST SYSTEM

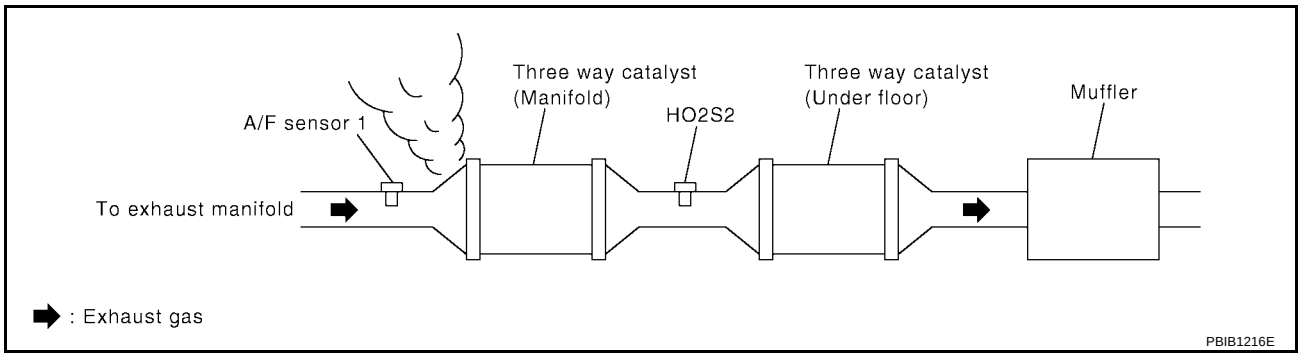
Visually check exhaust tubes and muffler for dent.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK IGNITION TIMING

Check for ignition timing. Refer to EC-721, "Basic Inspection" .

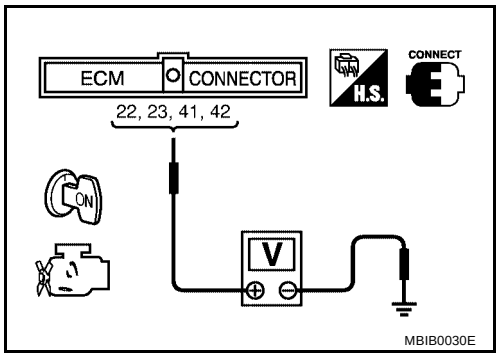
Items		Specifications
Target idle speed	A/T	700 ± 50 rpm (in P or N position)
	M/T	700 ± 50 rpm (in Neutral position)
Ignition timing	A/T	15 ± 5° BTDC (in P or N position)
	M/T	15 ± 5° BTDC (in Neutral position)

OK or NG

OK >> GO TO 5.
NG >> Follow the Basic Inspection.

5. CHECK INJECTORS

1. Refer to Wiring Diagram for Injectors, EC-1335 .
2. Stop engine and then turn ignition switch ON.
3. Check voltage between ECM terminals 22, 23, 41, 42 and ground with CONSULT-II or tester.



Battery voltage should exist.

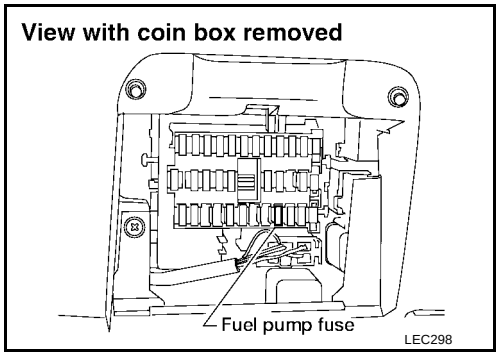
OK or NG

OK >> GO TO 6.
NG >> Perform EC-1336, "Diagnostic Procedure" .

6. CHECK FUNCTION OF IGNITION COIL-I

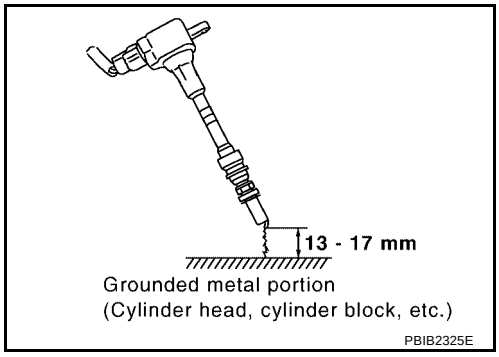
CAUTION:
Do the following procedure in the place where ventilation is good without the combustible.

1. Turn ignition switch OFF.
2. Remove fuel pump fuse located in fuse box to release fuel pressure.



NOTE:
Do not use CONSULT-II to release fuel pressure, or fuel pressure applies again during the following procedure.

3. Start engine.
4. After engine stalls, crank it 2 or 3 times to release all fuel pressure.
5. Turn ignition switch OFF.
6. Remove all ignition coil harness connectors to avoid the electrical discharge from the ignition coils.
7. Remove ignition coil and spark plug of the cylinder to be checked.
8. Crank engine for 5 seconds or more to remove combustion gas in the cylinder.
9. Connect spark plug and harness connector to ignition coil.
10. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.



11. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of 17 mm or more is taken.**

NOTE:
When the gap is 13 mm or less, the spark might be generated even if the coil is malfunctioning.

OK or NG

OK >> GO TO 10.
NG >> GO TO 7.

7. CHECK FUNCTION OF IGNITION COIL-II

1. Turn ignition switch OFF.
2. Disconnect spark plug and connect a known-good spark plug.
3. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded metal portion.

Spark should be generated.

OK or NG

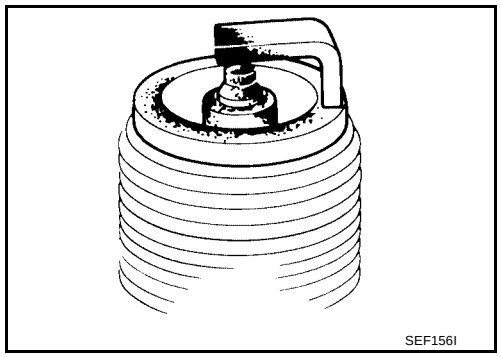
OK >> GO TO 8.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-1312, "IGNITION SIGNAL" .

8. CHECK SPARK PLUG

Check the initial spark plug for fouling, etc.

OK or NG

OK >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-28, "Changing Spark Plugs (Double Platinum - Tipped Type)" .
NG >> 1. Repair or clean spark plug.
2. GO TO 9.



9. CHECK FUNCTION OF IGNITION COIL-III

1. Reconnect the initial spark plugs.
2. Crank engine for about 3 seconds, and recheck whether spark is generated between the spark plug and the grounded portion.

Spark should be generated.

OK or NG

OK >> **INSPECTION END**
NG >> Replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-28, "Changing Spark Plugs (Double Platinum - Tipped Type)" .

10. CHECK INJECTOR

1. Turn ignition switch OFF.
2. Remove injector assembly. Refer to EM-121, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect ignition coil assembly harness connector.
4. Reconnect all injector harness connectors.
5. Turn ignition switch ON.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip)>>GO TO 11.
NG (Drips)>>Replace the injector(s) from which fuel is dripping.

11. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Trouble is fixed>>**INSPECTION END**
Trouble is not fixed>>Replace three way catalyst (manifold).

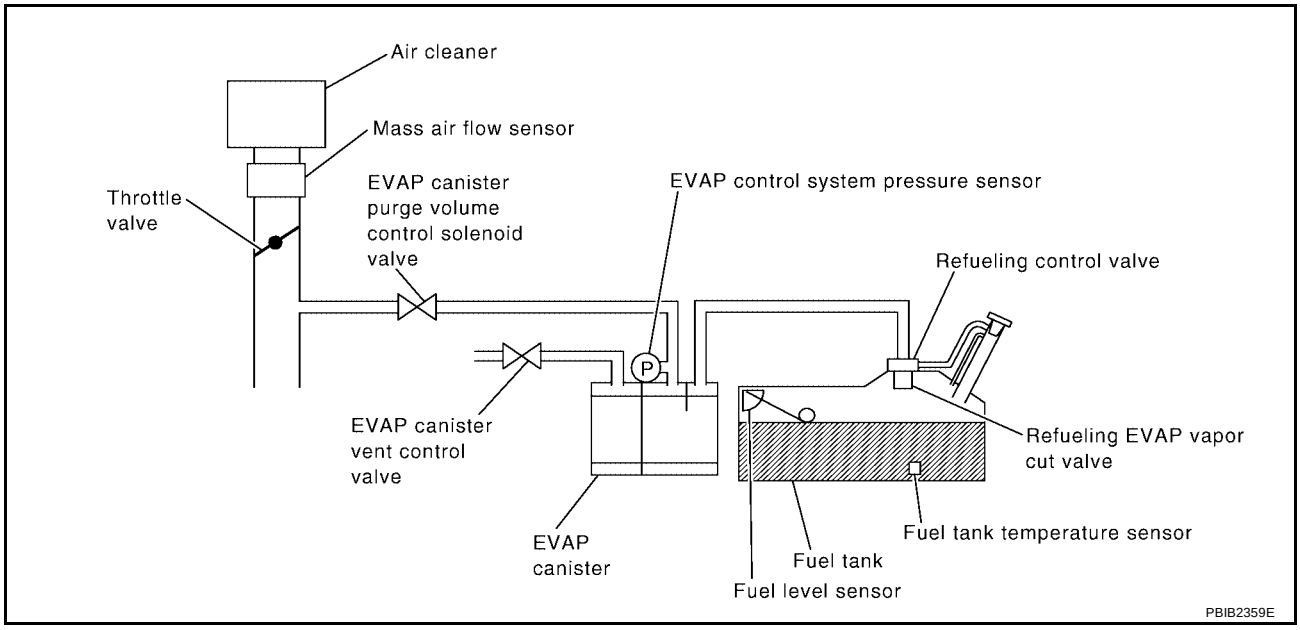
DTC P0441 EVAP CONTROL SYSTEM

PFP:14950

System Description

UBS00JVS

NOTE:
If DTC P0441 is displayed with other DTC such as P2122, P2123 P2127, P2128, P2138, first perform trouble diagnosis for other DTC.



In this evaporative emission (EVAP) control system, purge flow occurs during non-closed throttle conditions. Purge volume is related to air intake volume. Under normal purge conditions (non-closed throttle), the EVAP canister purge volume control solenoid valve is open to admit purge flow. Purge flow exposes the EVAP control system pressure sensor to intake manifold vacuum.

On Board Diagnosis Logic

UBS00JVT

Under normal conditions (non-closed throttle), sensor output voltage indicates if pressure drop and purge flow are adequate. If not, a malfunction is determined.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0441 0441	EVAP control system incorrect purge flow	EVAP control system does not operate properly, EVAP control system has a leak between intake manifold and EVAP control system pressure sensor.	● EVAP canister purge volume control solenoid valve stuck closed ● EVAP control system pressure sensor and the circuit ● Loose, disconnected or improper connection of rubber tube ● Blocked rubber tube ● Cracked EVAP canister ● EVAP canister purge volume control solenoid valve circuit ● Accelerator pedal position sensor ● Blocked purge port ● EVAP canister vent control valve

DTC Confirmation Procedure

UBS00JVU

CAUTION:
Always drive vehicle at a safe speed.

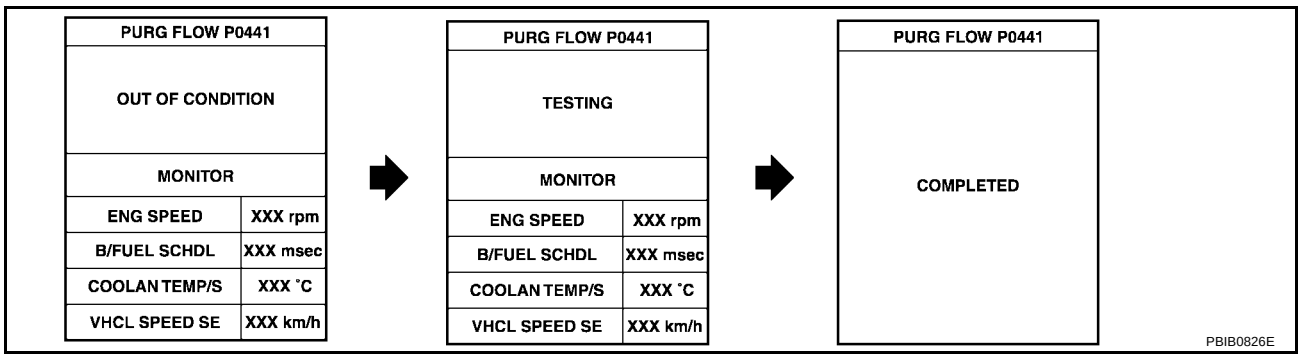
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 70 seconds.
4. Select “PURG FLOW P0441” of “EVAPORATIVE SYSTEM” in “DTC CONFIRMATION” mode with CONSULT-II.
5. Touch “START”.
   If “COMPLETED” is displayed, go to step 7.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take at least 35 seconds.)

Selector lever	Suitable position
Vehicle speed	32 - 120 km/h (20 - 75 MPH)
ENG SPEED	500 - 3,800 rpm
B/FUEL SCHDL	1.0 - 10.0 msec
Engine coolant temperature	More than 0°C



If TESTING is not changed for a long time, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-1016, "Diagnostic Procedure" .

Overall Function Check

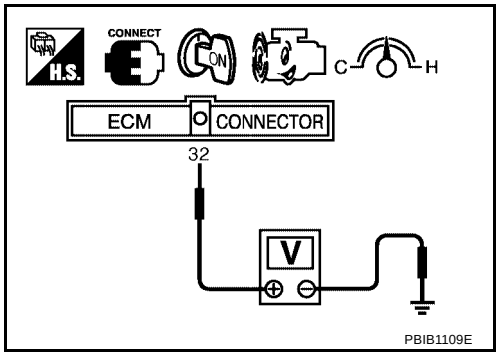
UBS00JVV

Use this procedure to check the overall monitoring function of the EVAP control system purge flow monitoring. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF, wait at least 10 seconds.
4. Start engine and wait at least 70 seconds.

5. Set voltmeter probes to ECM terminals 32 (EVAP control system pressure sensor signal) and ground.
6. Check EVAP control system pressure sensor value at idle speed and note it.
7. Establish and maintain the following conditions for at least 1 minute.



Air conditioner switch	ON
Headlamp switch	ON
Rear window defogger switch	ON
Engine speed	Approx. 3,000 rpm
Shift lever	Any position other than P, N or R (A/T), Neutral (M/T)

8. Verify that EVAP control system pressure sensor value stays 0.1V less than the value at idle speed (measured at step 6) for at least 1 second.
9. If NG, go to EC-1016, "Diagnostic Procedure" .

Diagnostic Procedure

UBS00JVW

1. CHECK EVAP CANISTER

1. Turn ignition switch OFF.
2. Check EVAP canister for cracks.

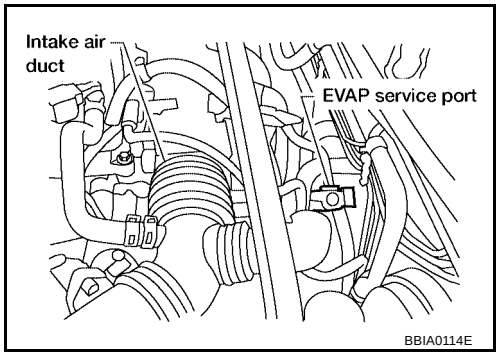
OK or NG

OK (With CONSULT-II)>>GO TO 2.
OK (Without CONSULT-II)>>GO TO 3.
NG >> Replace EVAP canister.

2. CHECK PURGE FLOW

With CONSULT-II

1. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge.
2. Start engine and let it idle.
3. Select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
4. Rev engine up to 2,000 rpm.

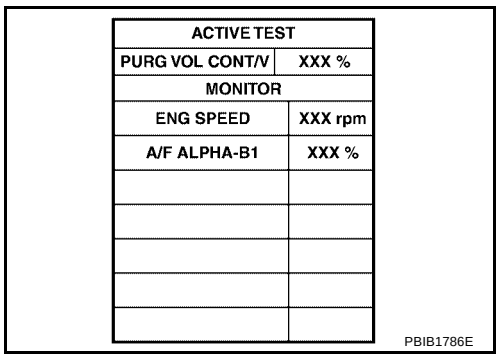


5. Touch “Qd” and “Qu” on CONSULT-II screen to adjust “PURG VOL CONT/V” opening and check vacuum existence.

PURG VOL CONT/V	VACUUM
100%	Should exist.
0%	should not exist.

OK or NG

OK >> GO TO 7.
NG >> GO TO 4.



3. CHECK PURGE FLOW

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose connected to EVAP canister purge volume control solenoid valve at EVAP service port and install vacuum gauge. For the location of EVAP service port, refer to EC-681, "EVAPORATIVE EMISSION LINE DRAWING" .
4. Start engine and let it idle.
   Do not depress accelerator pedal even slightly.
5. Check vacuum gauge indication before 60 seconds passed after starting engine.

   Vacuum should not exist.

6. Revving engine up to 2,000 rpm after 100 seconds passed after starting engine.

   Vacuum should exist.

OK or NG

OK >> GO TO 7.
NG >> GO TO 4.

4. CHECK EVAP PURGE LINE

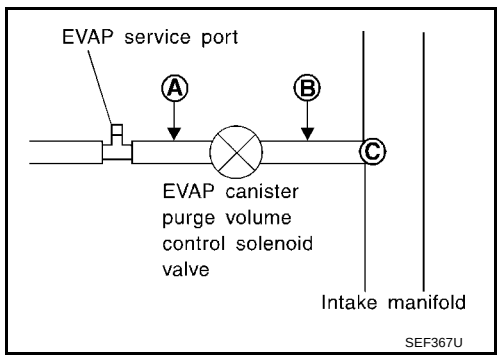
1. Turn ignition switch OFF.
2. Check EVAP purge line for improper connection or disconnection.
   Refer to EC-681, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 5.
NG >> Repair it.

5. CHECK EVAP PURGE HOSE AND PURGE PORT

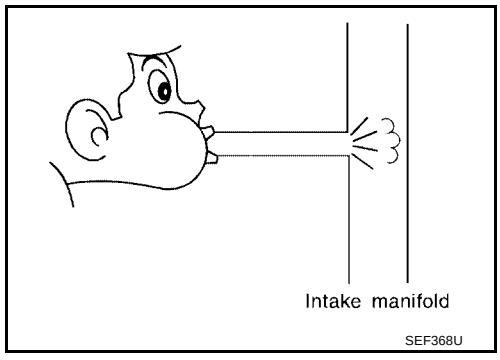
1. Disconnect purge hoses connected to EVAP service port **A** and EVAP canister purge volume control solenoid valve **B** .
2. Blow air into each hose and EVAP purge port **C** .



3. Check that air flows freely.

OK or NG

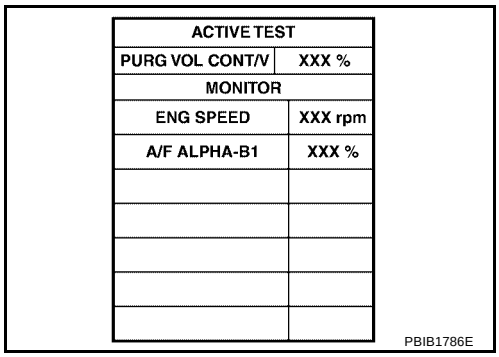
OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> Repair or clean hoses and/or purge port.



6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1029 .

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.
2. Check connectors for water.

Water should not exist

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP control system pressure sensor.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR FUNCTION

Refer to DTC Confirmation Procedure for DTC P0452, EC-1046 P0453, EC-1052 .

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 11.
NG >> Clean the rubber tube using an air blower.

11. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1041 .

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP canister vent control valve.

12. CHECK EVAP PURGE LINE

Inspect EVAP purge line (pipe and rubber tube). Check for evidence of leaks.
Refer to EC-681, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 13.
NG >> Replace it.

13. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 14.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

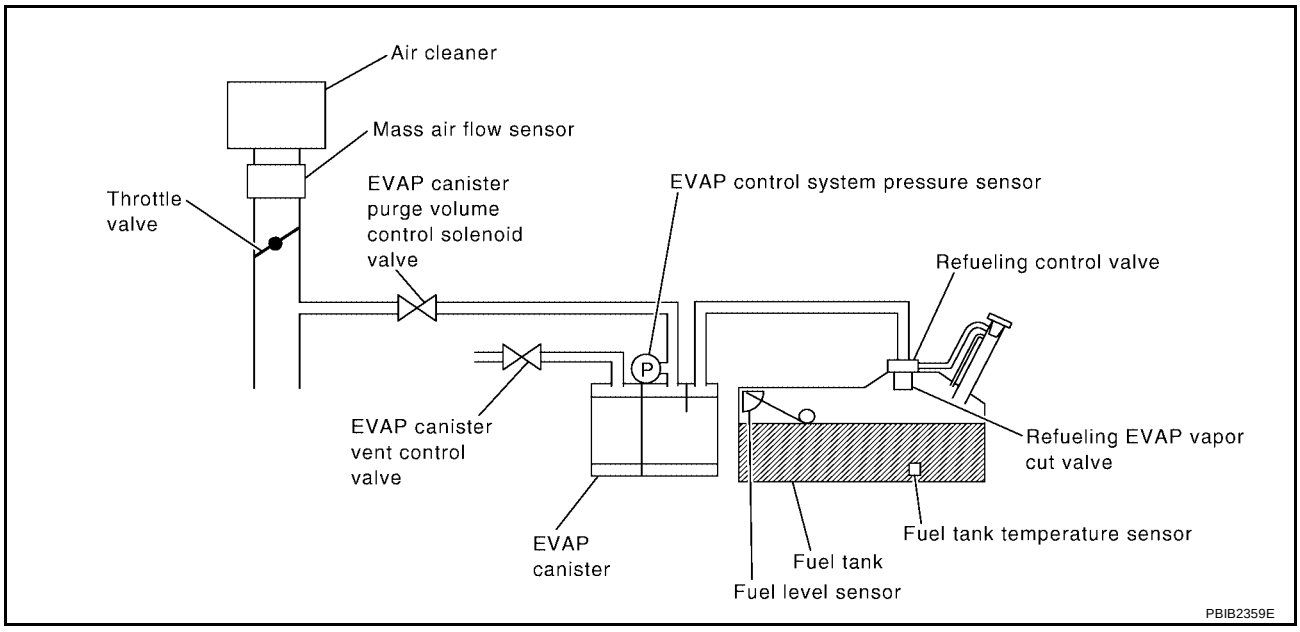
DTC P0442 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS00JVX

This diagnosis detects leaks in the EVAP purge line using engine intake manifold vacuum.
If pressure does not increase, the ECM will check for leaks in the line between the fuel tank and EVAP canister purge volume control solenoid valve, under the following Vacuum test conditions.
The EVAP canister vent control valve is closed to shut the EVAP purge line off. The EVAP canister purge volume control solenoid valve will then be opened to depressurize the EVAP purge line using intake manifold vacuum. After this occurs, the EVAP canister purge volume control solenoid valve will be closed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0442 0442	EVAP control system small leak detected (negative pressure)	EVAP control system has a leak, EVAP control system does not operate properly.	● Incorrect fuel tank vacuum relief valve ● Incorrect fuel filler cap used ● Fuel filler cap remains open or fails to close. ● Foreign matter caught in fuel filler cap. ● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. ● Foreign matter caught in EVAP canister vent control valve. ● EVAP canister or fuel tank leaks ● EVAP purge line (pipe and rubber tube) leaks ● EVAP purge line rubber tube bent ● Loose or disconnected rubber tube ● EVAP canister vent control valve and the circuit ● EVAP canister purge volume control solenoid valve and the circuit ● Fuel tank temperature sensor ● O-ring of EVAP canister vent control valve is missing or damaged ● EVAP canister is saturated with water ● EVAP control system pressure sensor ● Fuel level sensor and the circuit ● Refueling EVAP vapor cut valve ● Refueling control valve ● ORVR system leaks

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

UBS00JVY

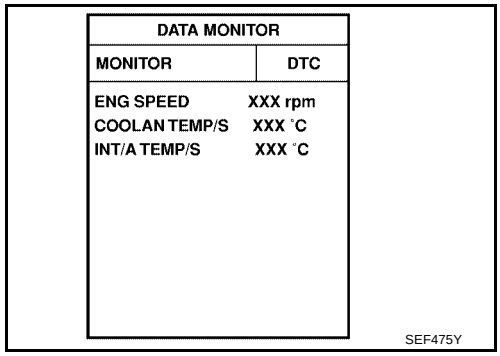
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

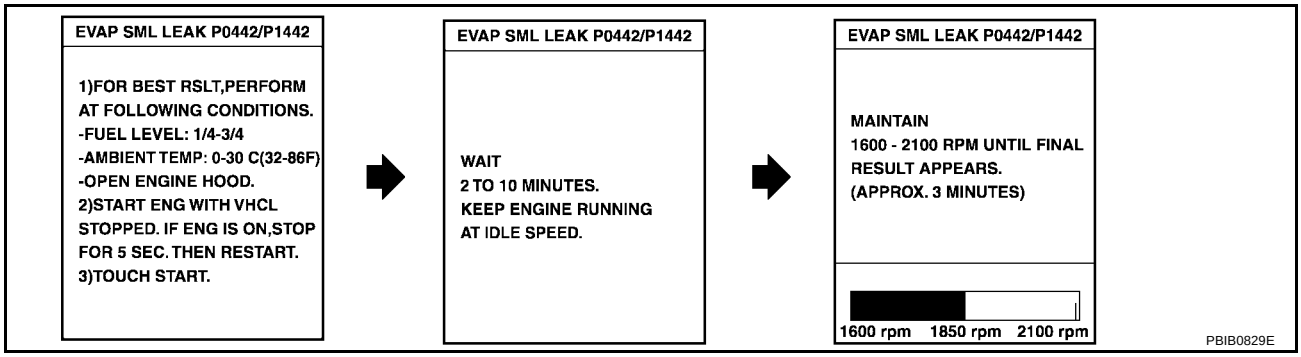
- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Always perform test at a temperature of 0 to 30°C (32 to 86°F).**
- **Open engine hood before conducting following procedure.**

WITH CONSULT-II

1. Turn ignition switch ON.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
4. Check the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 30°C (32 - 86°F)



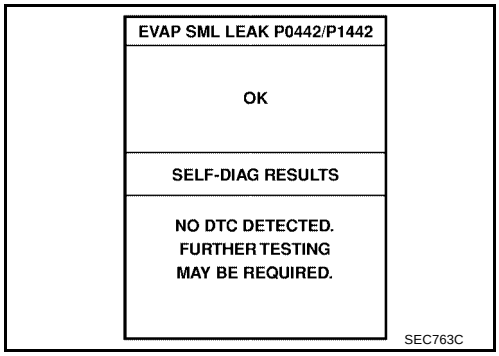
5. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.



NOTE:
If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-721, "Basic Inspection" .

6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-1023, "Diagnostic Procedure" .

   NOTE:
   Make sure that EVAP hoses are connected to the EVAP canister purge volume control solenoid valve properly.



WITH GST

NOTE:
Be sure to read the explanation of EC-707, "Driving Pattern" before driving vehicle.

1. Start engine.
2. Drive vehicle according to EC-707, "Driving Pattern"
3. Stop vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ignition switch ON.
5. Select Service $07 with GST.

- If P0442 is displayed on the screen, go to EC-1020, "DTC P0442 EVAP CONTROL SYSTEM" .
- If P0441 is displayed on the screen, go to Diagnostic Procedure for DTC P0441, EC-1016, "Diagnostic Procedure" .

Diagnostic Procedure

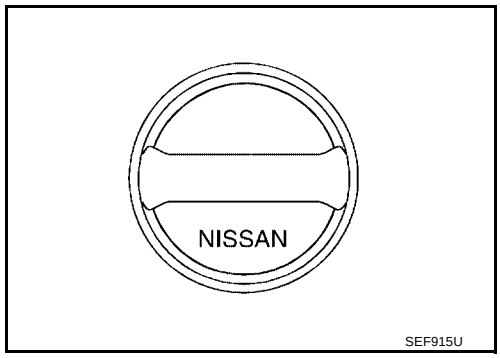
UBS00JVZ

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Retighten until reteaching sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-683, "FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)" .

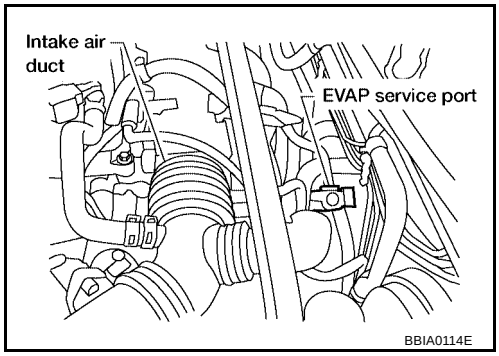
OK or NG

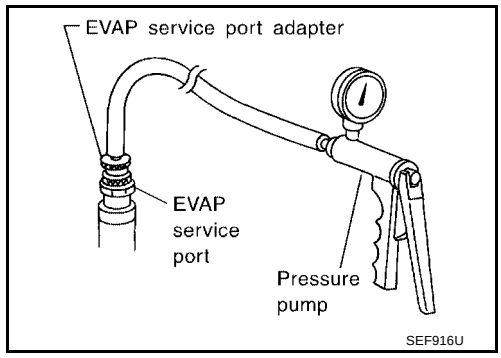
OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.
For the location of EVAP service port, refer to EC-681, "EVAPORATIVE EMISSION LINE DRAWING" .

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





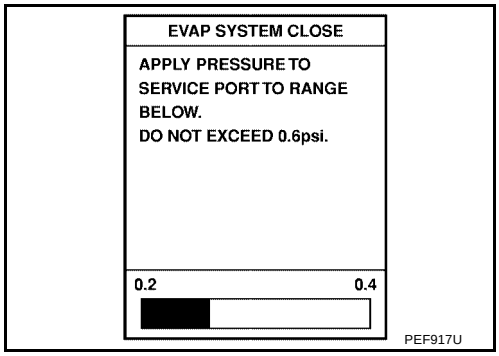
With CONSULT-II>>GO TO 6.
Without CONSULT-II>>GO TO 7.

6. CHECK FOR EVAP LEAK

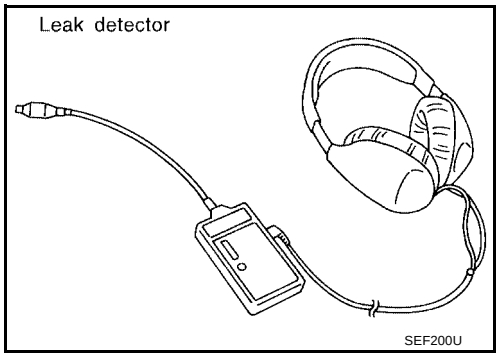
With CONSULT-II

1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

   CAUTION:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-681, "EVAPORATIVE EMISSION LINE DRAWING" .



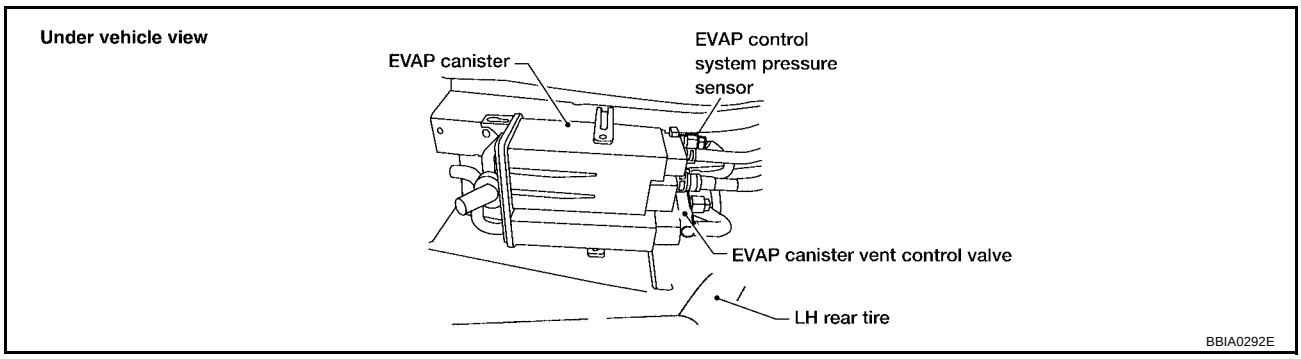
OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)

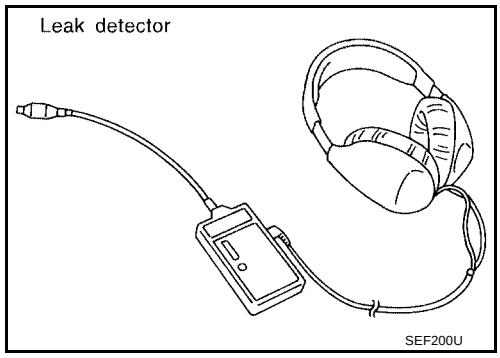


3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

CAUTION:

- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-681, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following,

- EVAP canister vent control valve is installed properly.
  Refer to EC-684, "Removal and Installation" .
- EVAP canister vent control valve.
  Refer to EC-683, "Component Inspection" .

OK or NG

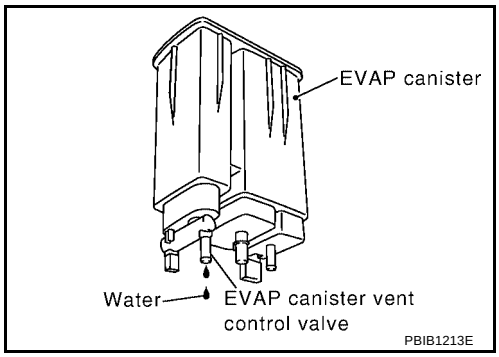
OK >> GO TO 9.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

9. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 10.
No (With CONSULT-II)>>GO TO 12.
No (Without CONSULT-II)>>GO TO 13.



10. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK (With CONSULT-II)>>GO TO 12.
OK (Without CONSULT-II)>>GO TO 13.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose connected to EVAP canister for clogging or poor connection

>> Repair hose or replace EVAP canister.

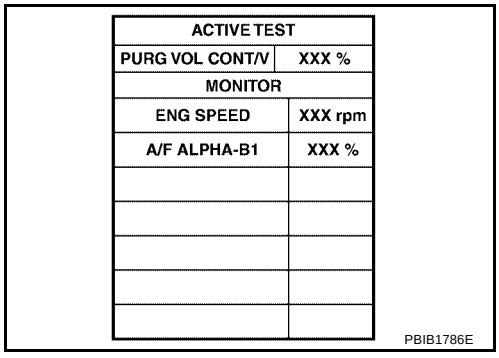
12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.



13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

OK or NG

OK >> GO TO 16.
NG >> GO TO 14.

14. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-681, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 15.
NG >> Repair or reconnect the hose.

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-683, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.

16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-966, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace fuel level sensor unit.

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1045, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-680, "EVAPORATIVE EMISSION SYSTEM" .

OK or NG

OK >> GO TO 19.
NG >> Repair or reconnect the hose.

19. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 20.

20. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-687, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 21.
NG >> Repair or replace hoses and tubes.

21. CHECK SIGNAL LINE AND RECIRCULATION LINE

Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 22.
NG >> Repair or replace hoses, tubes or filler neck tube.

22. CHECK REFUELING CONTROL VALVE

Refer to EC-690, "Component Inspection" .

OK or NG

OK >> GO TO 24.
NG >> Replace refueling control valve.

23. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-690, "Component Inspection" .

OK or NG

OK >> GO TO 24.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

24. CHECK FUEL LEVEL SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

OK or NG

OK >> GO TO 25.
NG >> Replace fuel level sensor unit.

25. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0444, P0445 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

UBS00JW0

SYSTEM DESCRIPTION

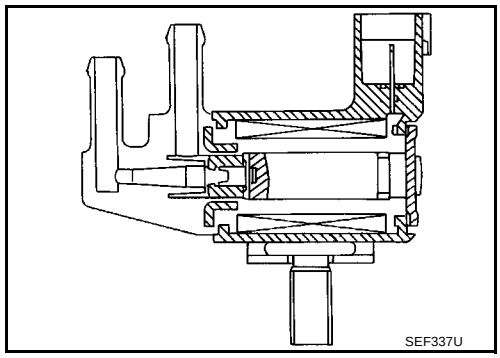
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Heated oxygen sensor 1*3	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Air fuel ratio (A/F) sensor 1*4			
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed signal*2	Vehicle speed		

*1: The ECM determines the start signal status by the signal of engine speed and battery voltage.
*2: This signal is sent to the ECM through CAN communication line.
*3: A/T models ULEV and M/T models.
*4: A/T models except ULEV.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JW1

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)*	0%
		2,000 rpm	20 - 30%

*: A/T models except ULEV

On Board Diagnosis Logic

UBS00JW2

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444 0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	● Harness or connectors (The solenoid valve circuit is open or shorted.) ● EVAP canister purge volume control solenoid valve
P0445 0445	EVAP canister purge volume control solenoid valve circuit shorted	An excessively high voltage signal is sent to ECM through the valve	● Harness or connectors (The solenoid valve circuit is shorted.) ● EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

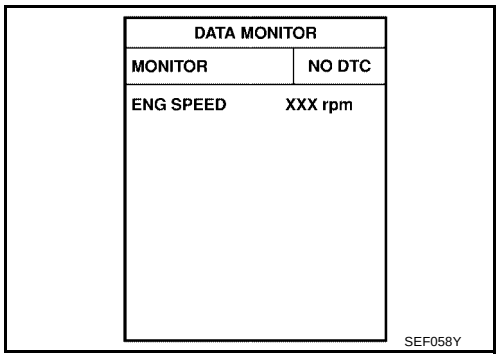
UBS00JW3

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 13 seconds.
4. If 1st trip DTC is detected, go to EC-1033, "Diagnostic Procedure" .



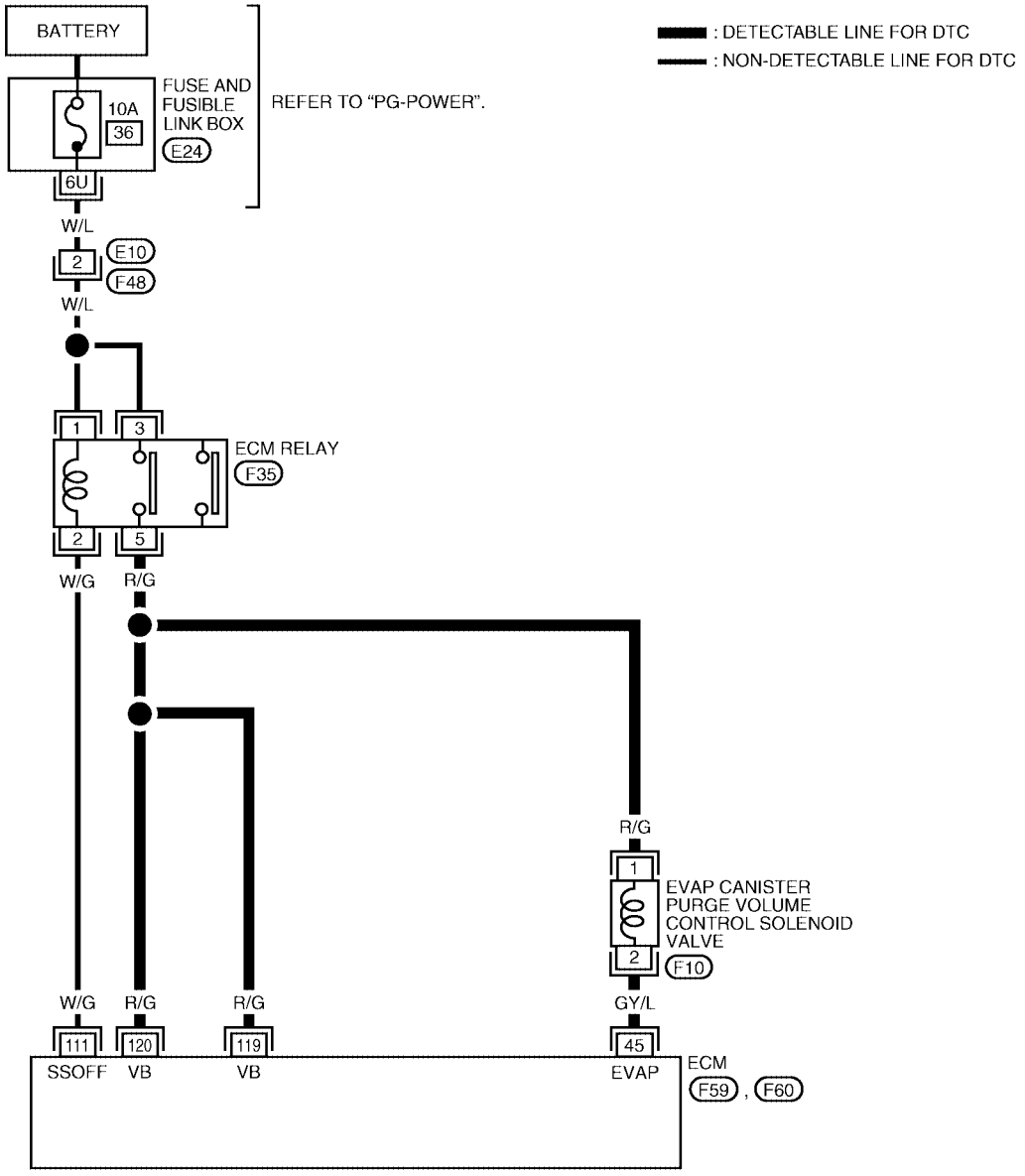
WITH GST

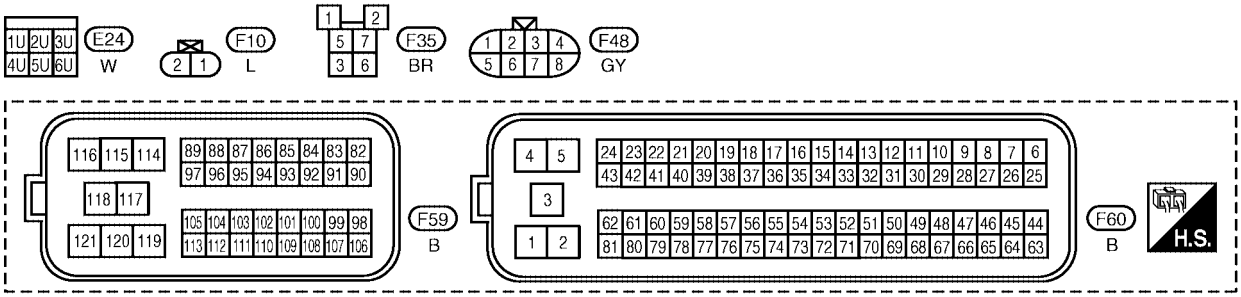
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JW4

EC-PGC/V-01



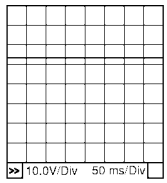
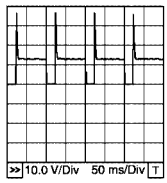


BBWA1418E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed ● Accelerator pedal is not depressed even slightly, after engine starting*	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

*: A/T models except ULEV

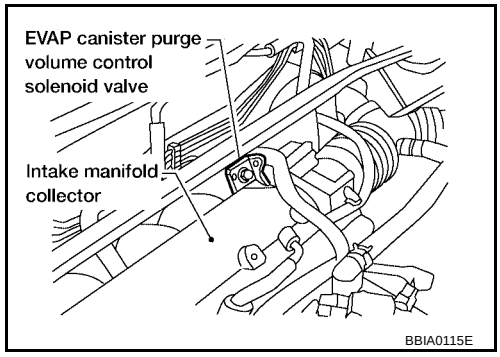
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00JW5

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.

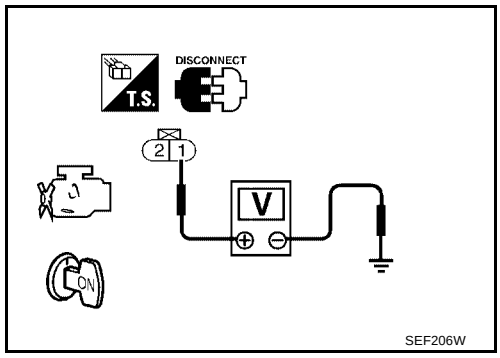


4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay.

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

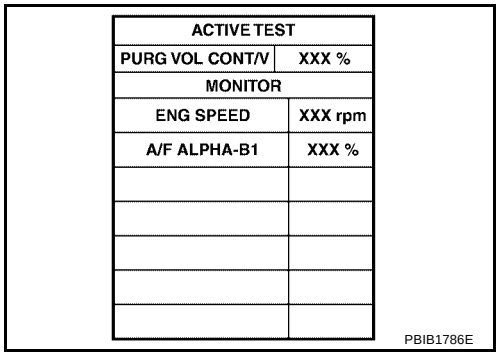
OK or NG

OK (With CONSULT-II)>>GO TO 4.
OK (Without CONSULT-II)>>GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1034, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace EVAP canister purge volume control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

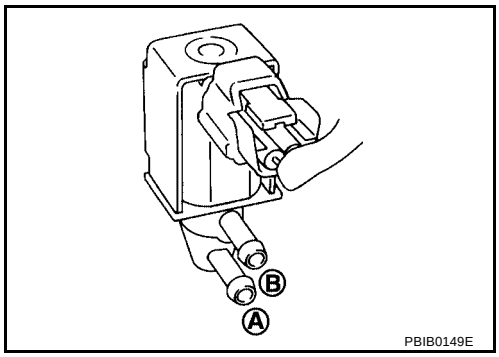
UBS00JW6

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

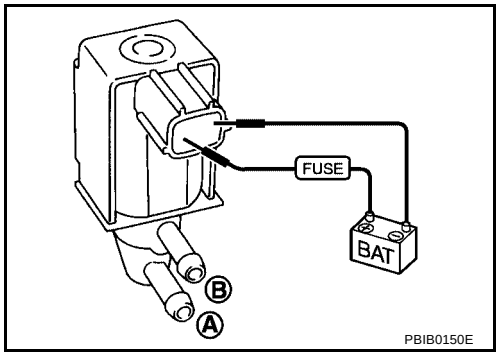
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

UBS00JW7

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-108, "INTAKE MANIFOLD" .

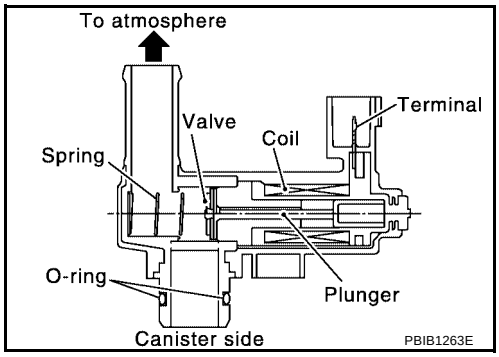
DTC P0447 EVAP CANISTER VENT CONTROL VALVE

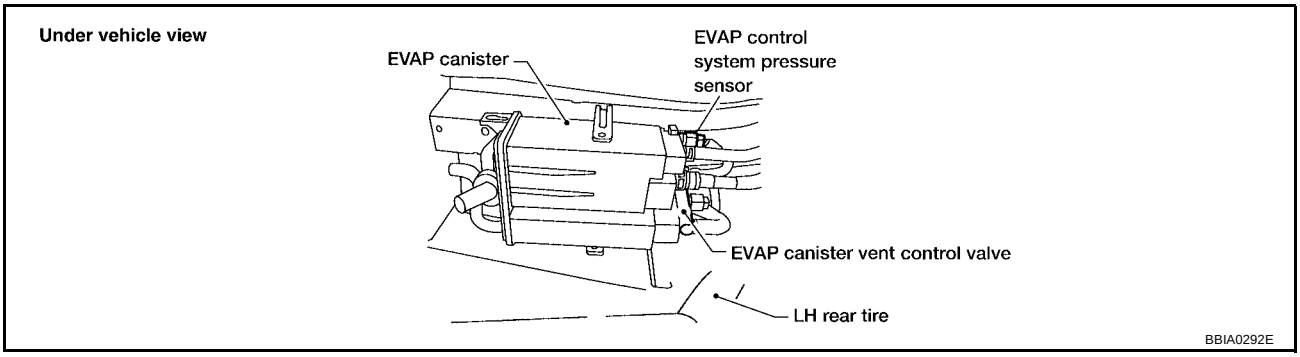
PFP:14935

Component Description

UBS00JW8

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows EVAP Control System diagnoses.





CONSULT-II Reference Value in Data Monitor Mode

UBS00JW9

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00JWA

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0447 0447	EVAP canister vent control valve circuit open	An improper voltage signal is sent to ECM through EVAP canister vent control valve.	● Harness or connectors (The valve circuit is open or shorted.) ● EVAP canister vent control valve

DTC Confirmation Procedure

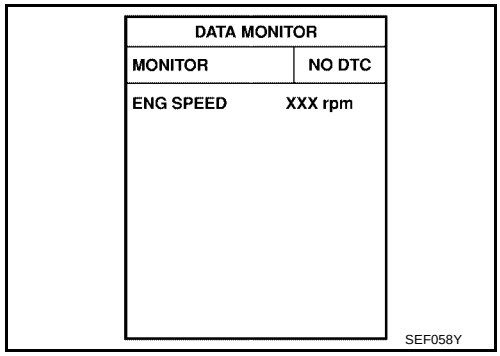
UBS00JWB

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 8 seconds.
4. If 1st trip DTC is detected, go to EC-1039, "Diagnostic Procedure" .



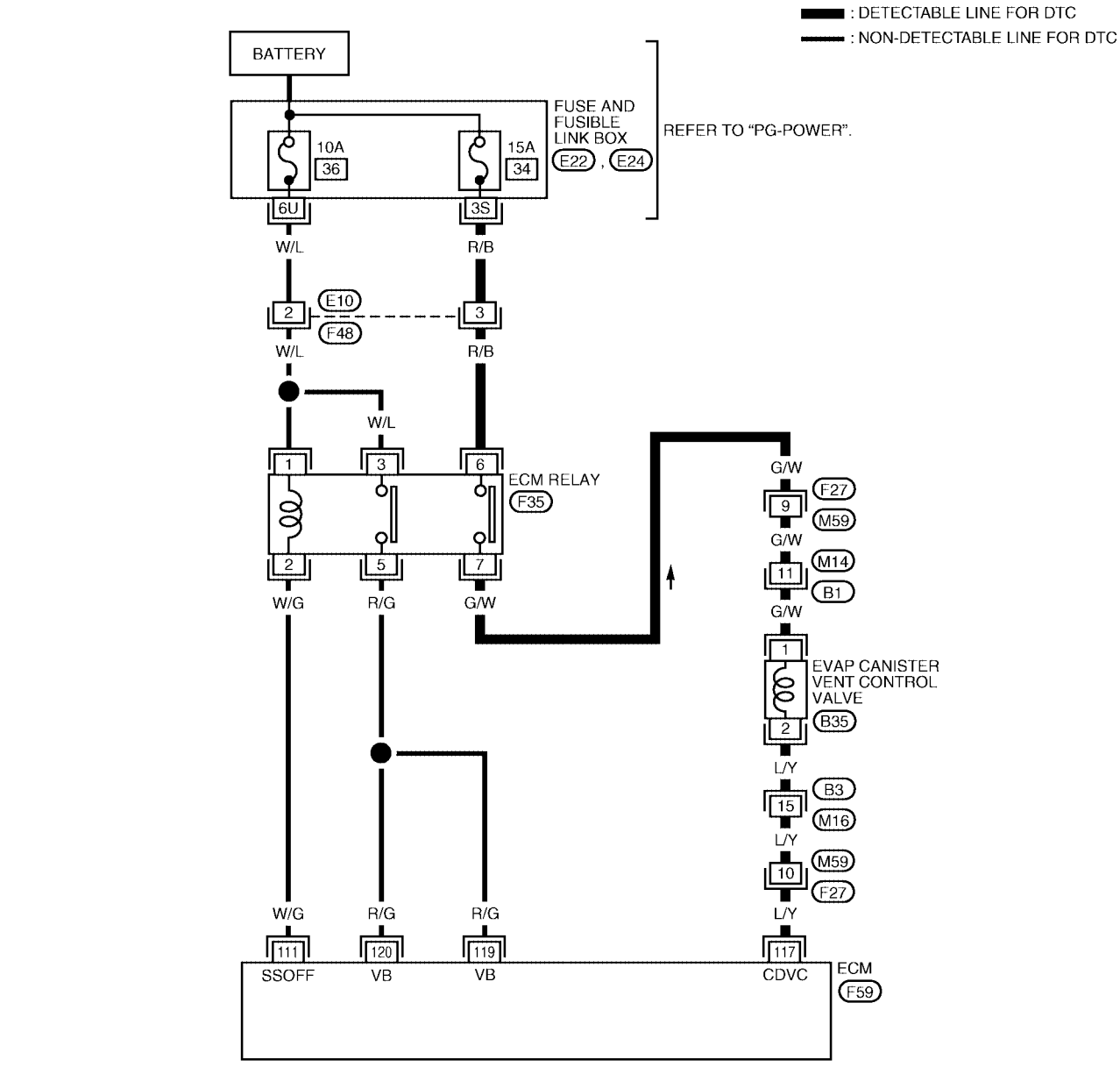
WITH GST

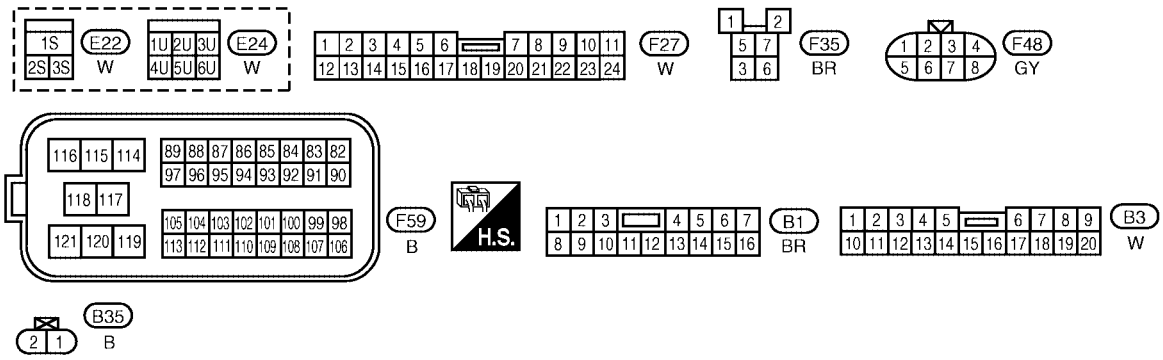
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JWC

EC-VENT/V-01





BBWA1419E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● A few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
117	L/Y	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00JWD

1. INSPECTION START

1. Do you have CONSULT-II?

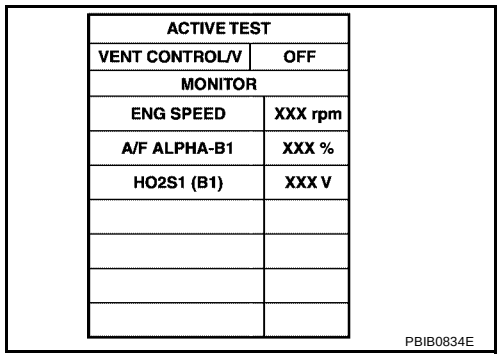
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK EVAP CANISTER VENT CONTROL VALVE CIRCUIT

With CONSULT-II

1. Turn ignition switch OFF and then turn ON.
2. Select “VENT CONTROL/V” in “ACTIVE TEST” mode with CONSULT-II.
3. Touch “ON/OFF” on CONSULT-II screen.
4. Check for operating sound of the valve.
   Clicking noise should be heard.

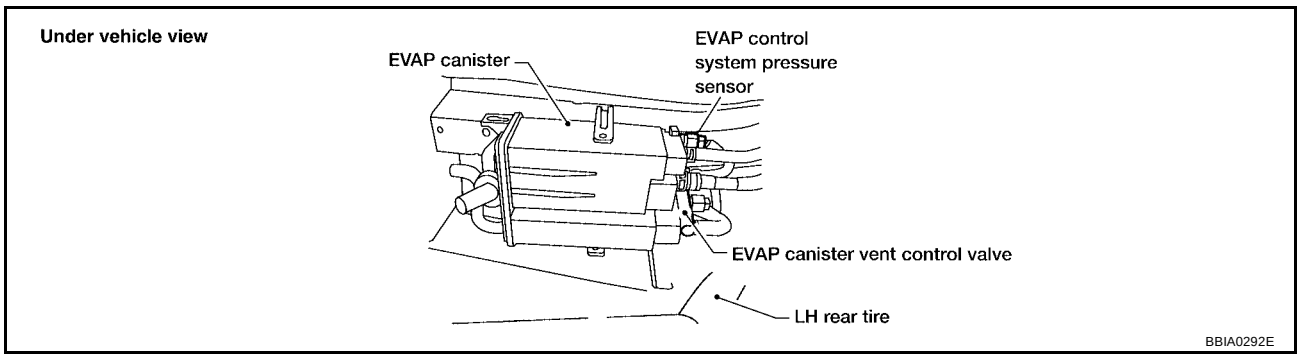


OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

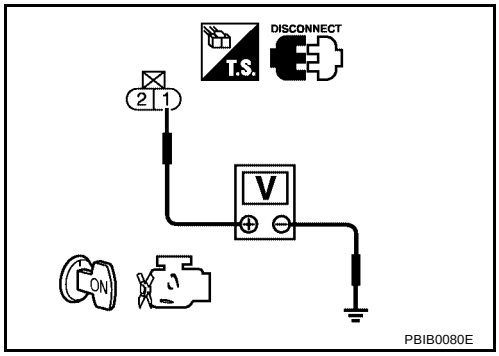
3. CHECK EVAP CANISTER VENT CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister vent control valve harness connector.



3. Turn ignition switch ON.
4. Check voltage between EVAP canister vent control valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F27, M59
- Harness connectors B1, M14
- Harness for open or short between EVAP canister vent control valve and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CANISTER VENT CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 117 and EVAP canister vent control valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B3, M16
- Harness connectors M59, F27
- Harness for open or short between EVAP canister vent control valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 8.
NG >> Clean the rubber tube using an air blower.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-1041, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP canister vent control valve.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

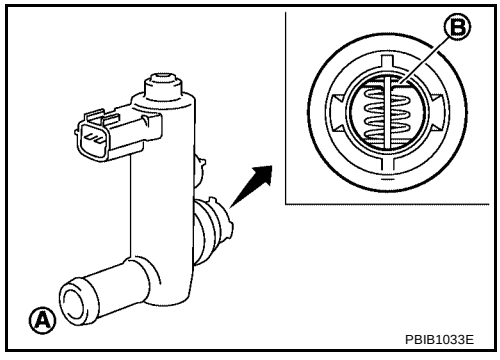
Component Inspection

UBS00JWE

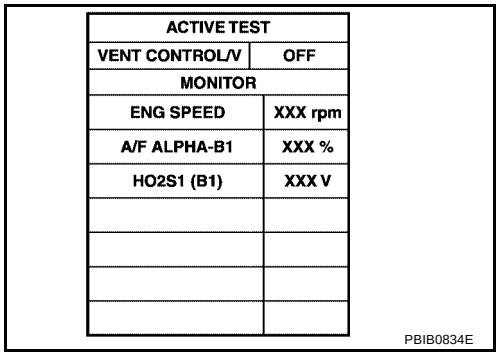
EVAP CANISTER VENT CONTROL VALVE

With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
   If NG, replace EVAP canister vent control valve.
   If OK, go to next step.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch ON.



5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
6. Check air passage continuity and operation delay time.
   Make sure new O-ring is installed properly.



Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

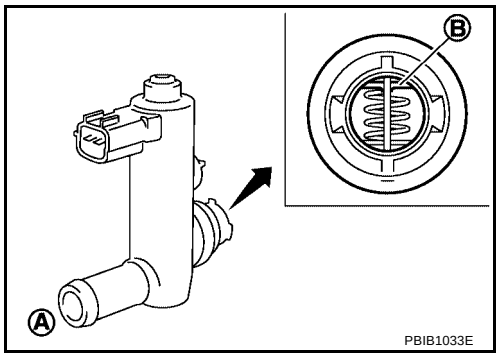
Operation takes less than 1 second.

If NG, replace EVAP canister vent control valve.
If OK, go to next step.

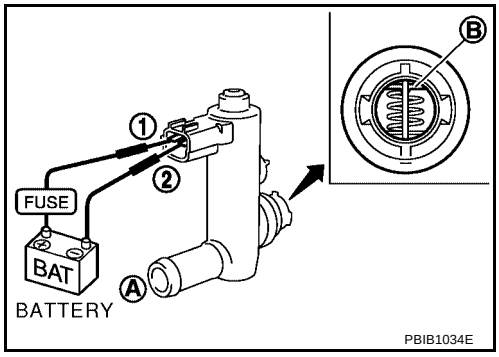
7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform step 6 again.

Without CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



3. Check air passage continuity and operation delay time under the following conditions.
   Make sure new O-ring is installed properly.



Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes

Operation takes less than 1 second.

If NG, replace EVAP canister vent control valve.
If OK, go to next step.

4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.

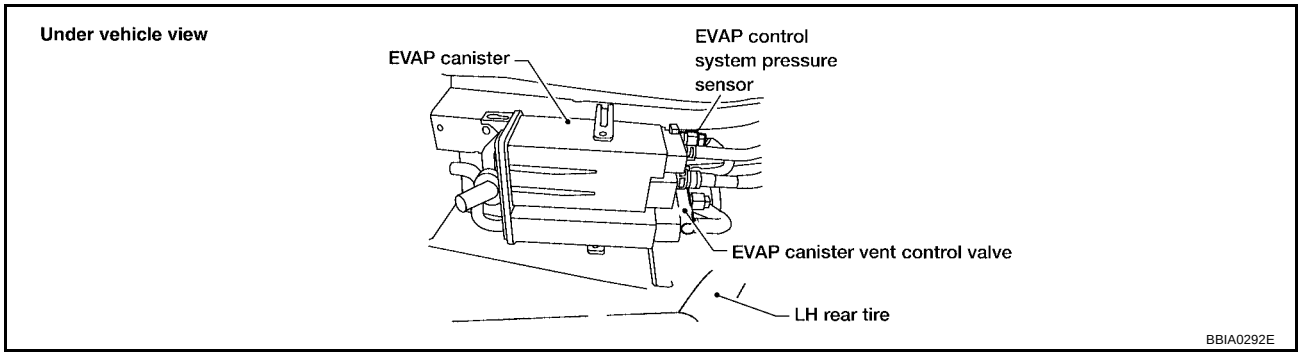
DTC P0451 EVAP CONTROL SYSTEM PRESSURE SENSOR

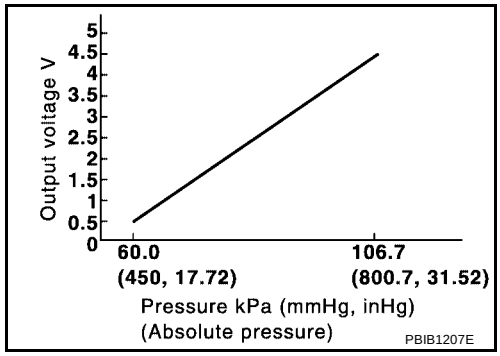
PFP:22365

Component Description

UBS00JFB

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.





CONSULT-II Reference Value in Data Monitor Mode

UBS00JFC

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

UBS00JFD

NOTE:
If DTC P0451 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-1176 .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0451 0451	EVAP control system pressure sensor performance	ECM detects a sloshing signal from the EVAP control system pressure sensor	● Harness or connectors ● EVAP control system pressure sensor

DTC Confirmation Procedure

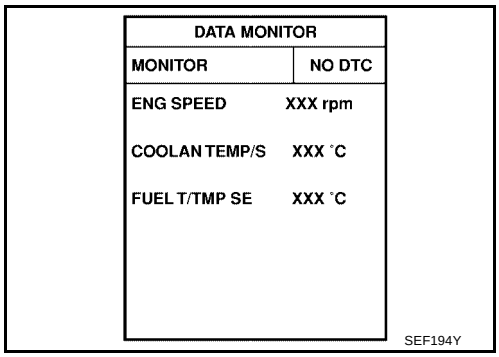
UBS00JFE

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 40 seconds.

   NOTE:
   Do not depress accelerator pedal even slightly.
   If 1st trip DTC is detected, go to EC-1044, "Diagnostic Procedure" .



WITH GST

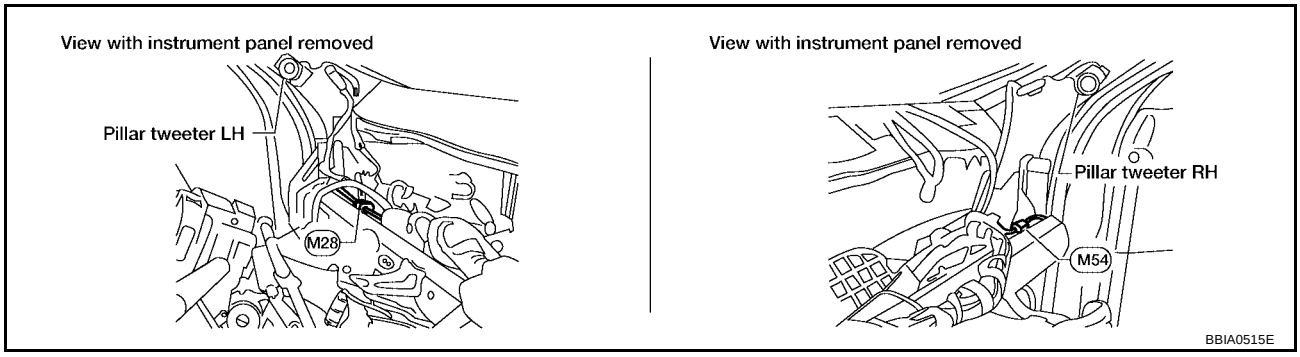
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00JFF

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten two ground screws on the body. Refer to EC-839, "Ground Inspection" .

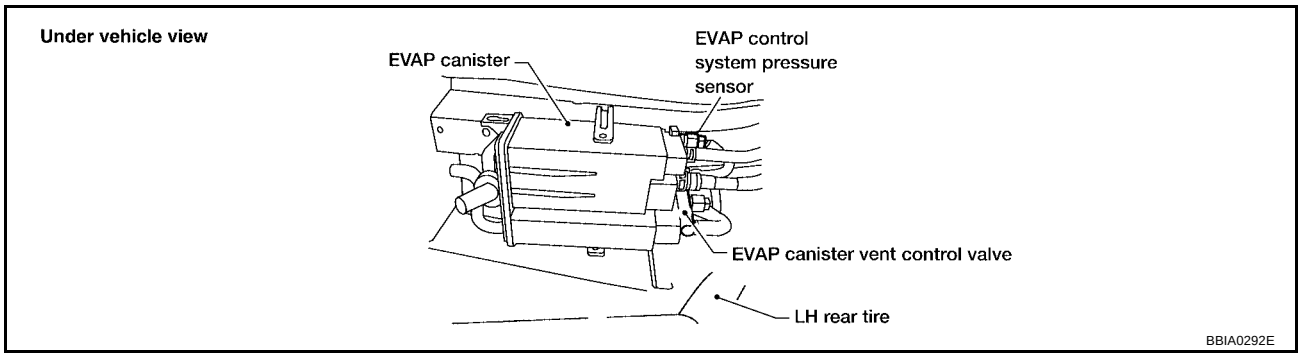


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK EVPA CONTROL SYSTEM PRESSURE SENSOR CONNECTOR FOR WATER

1. Disconnect EVAP control system pressure sensor harness connector.



2. Check sensor harness connector for water.

Water should not exist.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness connector.

3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1045, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace EVAP control system pressure sensor.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For wiring diagram, refer to EC-1048 .

>> **INSPECTION END**

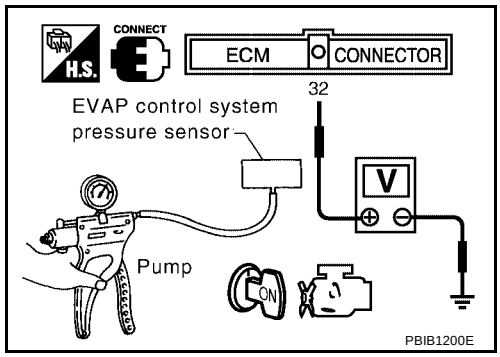
Component Inspection

UBS00JFG

EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Do not reuse the O-ring, replace it with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value



CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

4. If NG, replace EVAP control system pressure sensor.

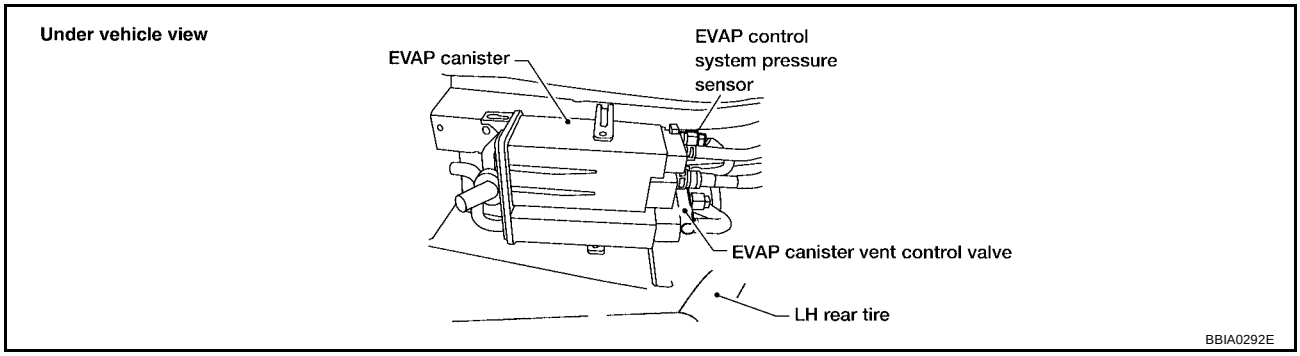
DTC P0452 EVAP CONTROL SYSTEM PRESSURE SENSOR

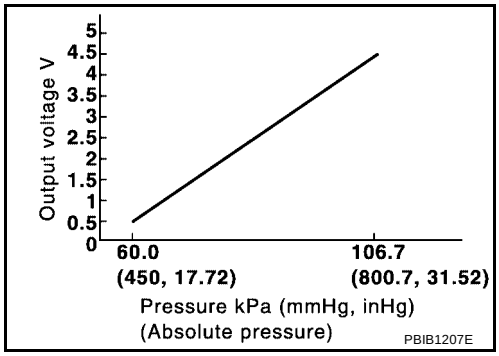
PFP:25085

Component Description

UBS00JFH

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.





CONSULT-II Reference Value in Data Monitor Mode

UBS00JFI

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

UBS00JFJ

NOTE:
If DTC P0452 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-1176 .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0452 0452	EVAP control system pressure sensor low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● EVAP control system pressure sensor

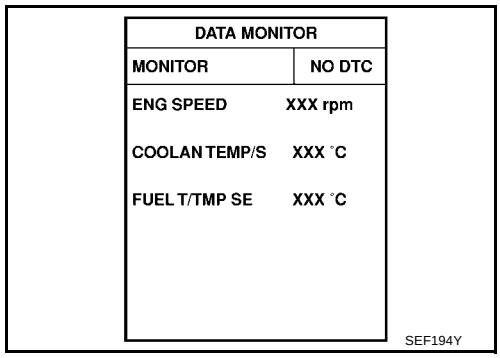
DTC Confirmation Procedure

UBS00JFK

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

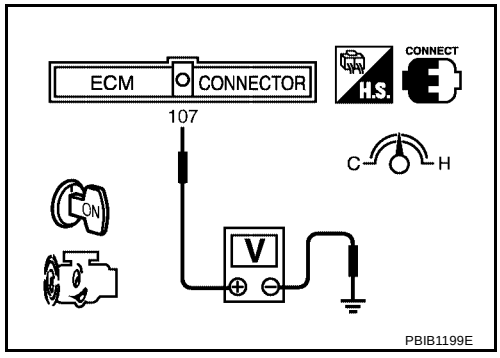
WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “FUEL T/TMP SE” is more than 0°C (32°F).
6. Start engine and wait at least 20 seconds.
   If 1st trip DTC is detected, go to EC-1049, "Diagnostic Procedure" .



WITH GST

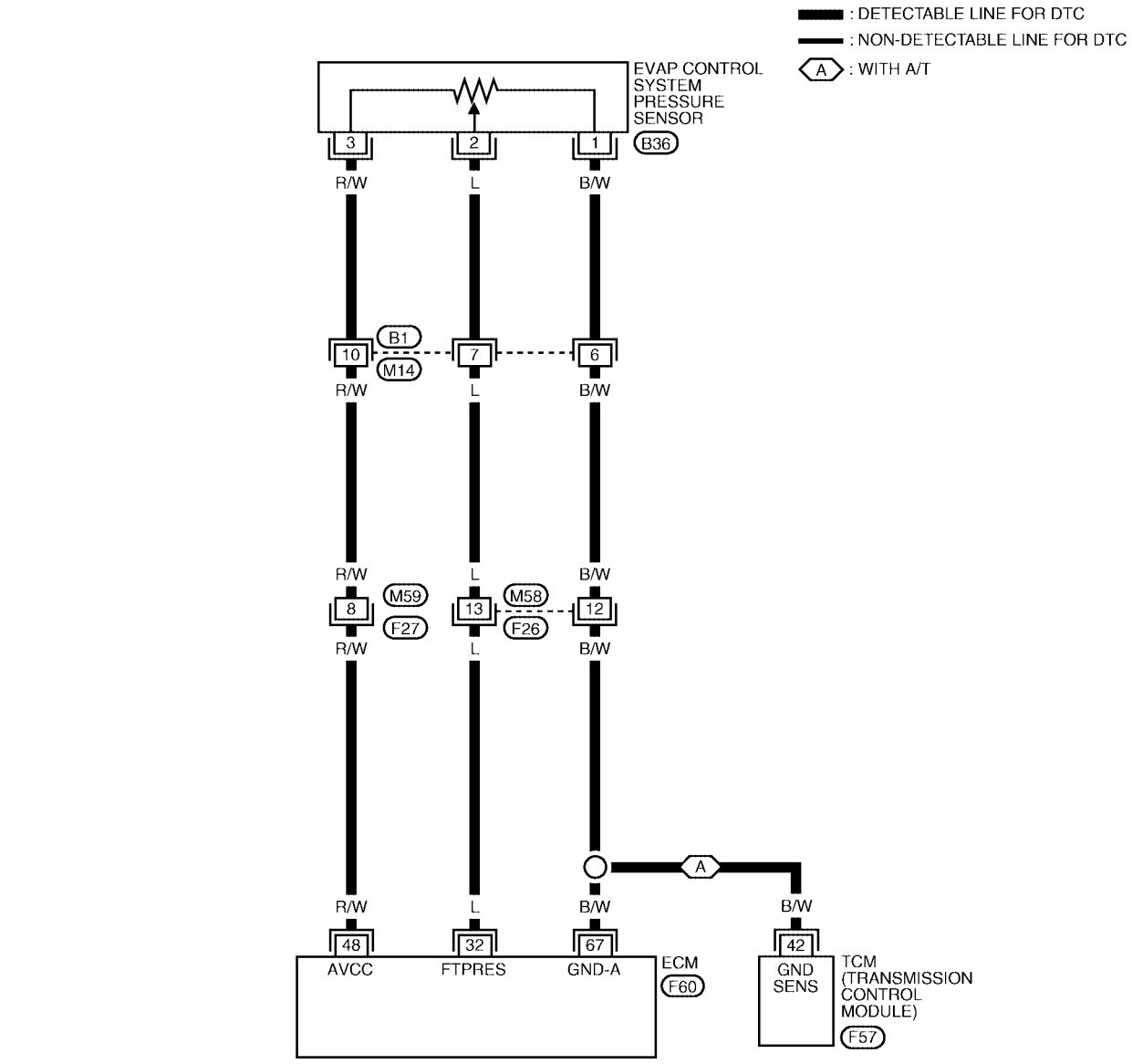
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 107 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and wait at least 20 seconds.
5. Select Service $07 with GST.
   If 1st trip DTC is detected, go to EC-1049, "Diagnostic Procedure" .

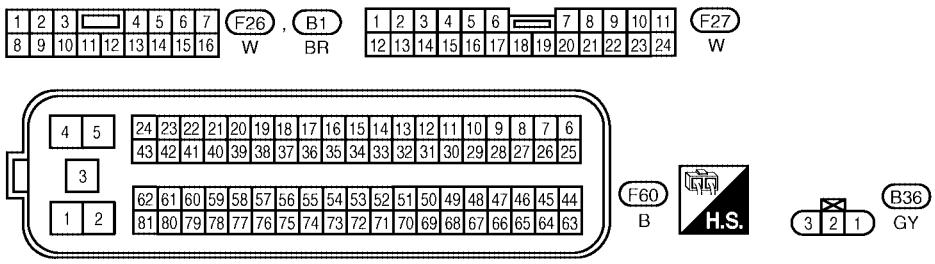


Wiring Diagram

UBS00JFL

EC-PRE/SE-01





REFER TO THE FOLLOWING.
F57 - ELECTRICAL UNITS

BBWA1469E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

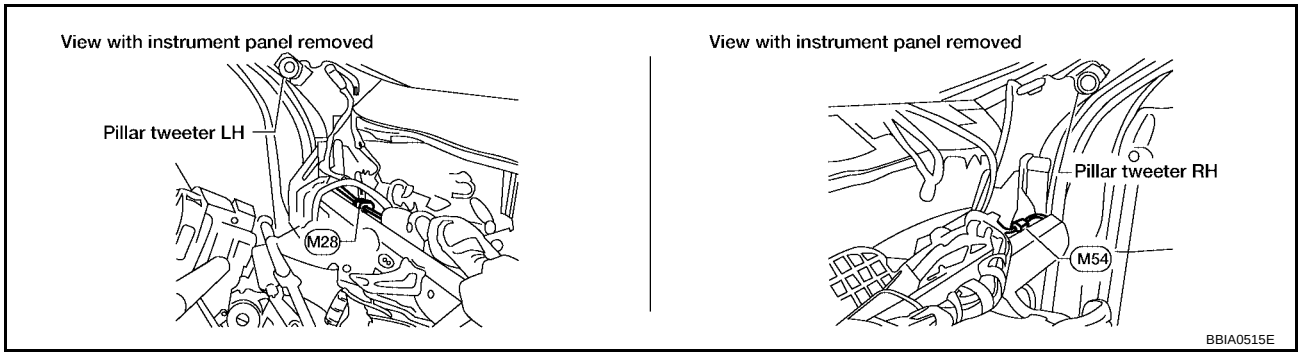
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	L	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V
48	R/W	Sensor power supply (EVAP control system pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00JFM

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .

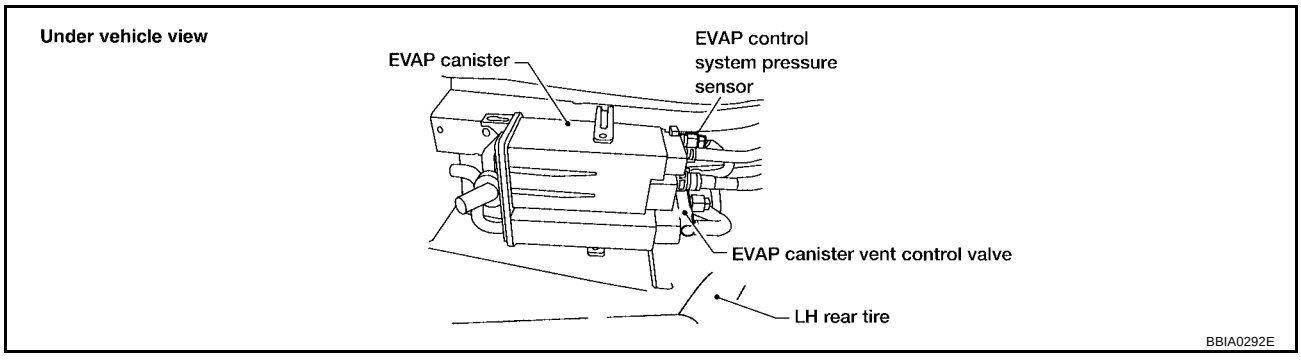


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



2. Check sensor harness connector for water.

Water should not exist.

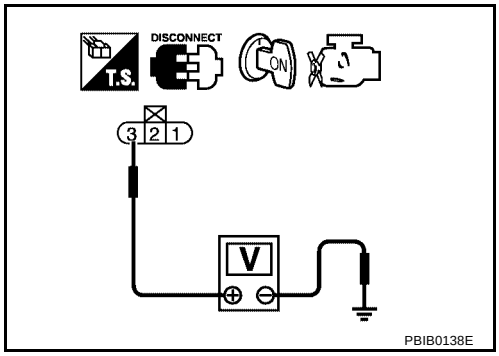
OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness connector.

3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector (A/T models).
4. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 67, TCM terminal 42 (A/T models).
   Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness connectors B1, M14
- Harness for open or short between EVAP control system pressure sensor and ECM
- Harness for open or short between EVAP control system pressure sensor and TCM (A/T models)

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 32 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness connectors B1, M14
- Harness for open or short between ECM and EVAP control system pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1051, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace EVAP control system pressure sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

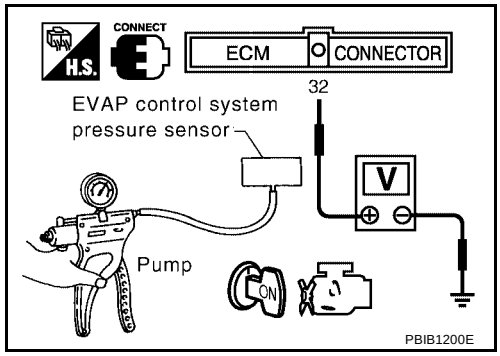
Component Inspection

UBS00JFN

EVAP CONTROL SYSTEM PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister.
   Do not reuse the O-ring, replace it with a new one.
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.

Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value



CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

4. If NG, replace EVAP control system pressure sensor.

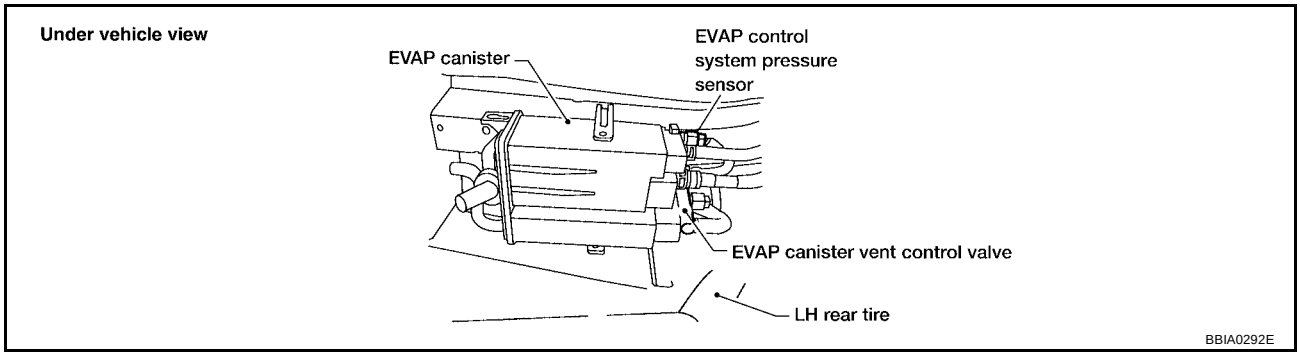
DTC P0453 EVAP CONTROL SYSTEM PRESSURE SENSOR

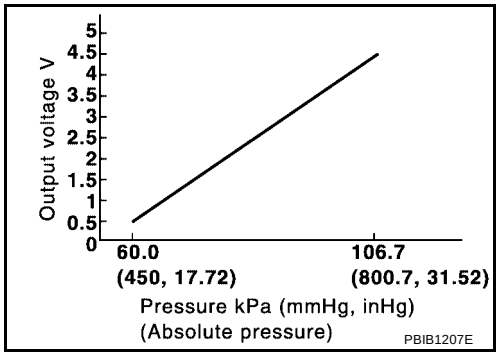
PFP:25085

Component Description

UBS00JFO

The EVAP control system pressure sensor detects pressure in the purge line. The sensor output voltage to the ECM increases as pressure increases.





CONSULT-II Reference Value in Data Monitor Mode

UBS00JFP

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
EVAP SYS PRES	● Ignition switch: ON	Approx. 1.8 - 4.8V

On Board Diagnosis Logic

UBS00JFQ

NOTE:
If DTC P0453 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-1176 .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0453 0453	EVAP control system pressure sensor high input	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● EVAP control system pressure sensor ● EVAP canister vent control valve ● EVAP canister ● Rubber hose to EVAP canister vent control valve

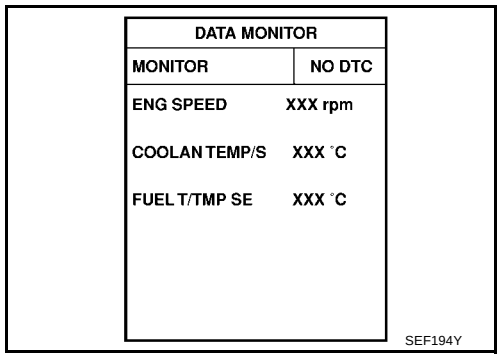
DTC Confirmation Procedure

UBS00JFR

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

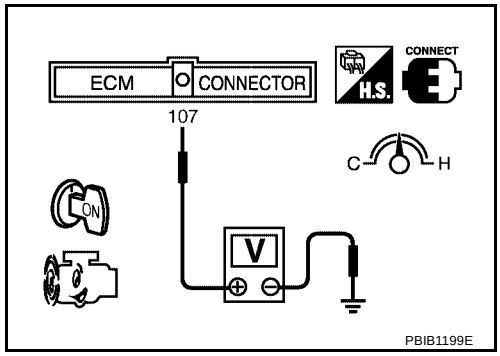
WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Make sure that “FUEL T/TMP SE” is more than 0°C (32°F).
6. Wait at least 10 seconds.
   If 1st trip DTC is detected, go to EC-1055, "Diagnostic Procedure" .



WITH GST

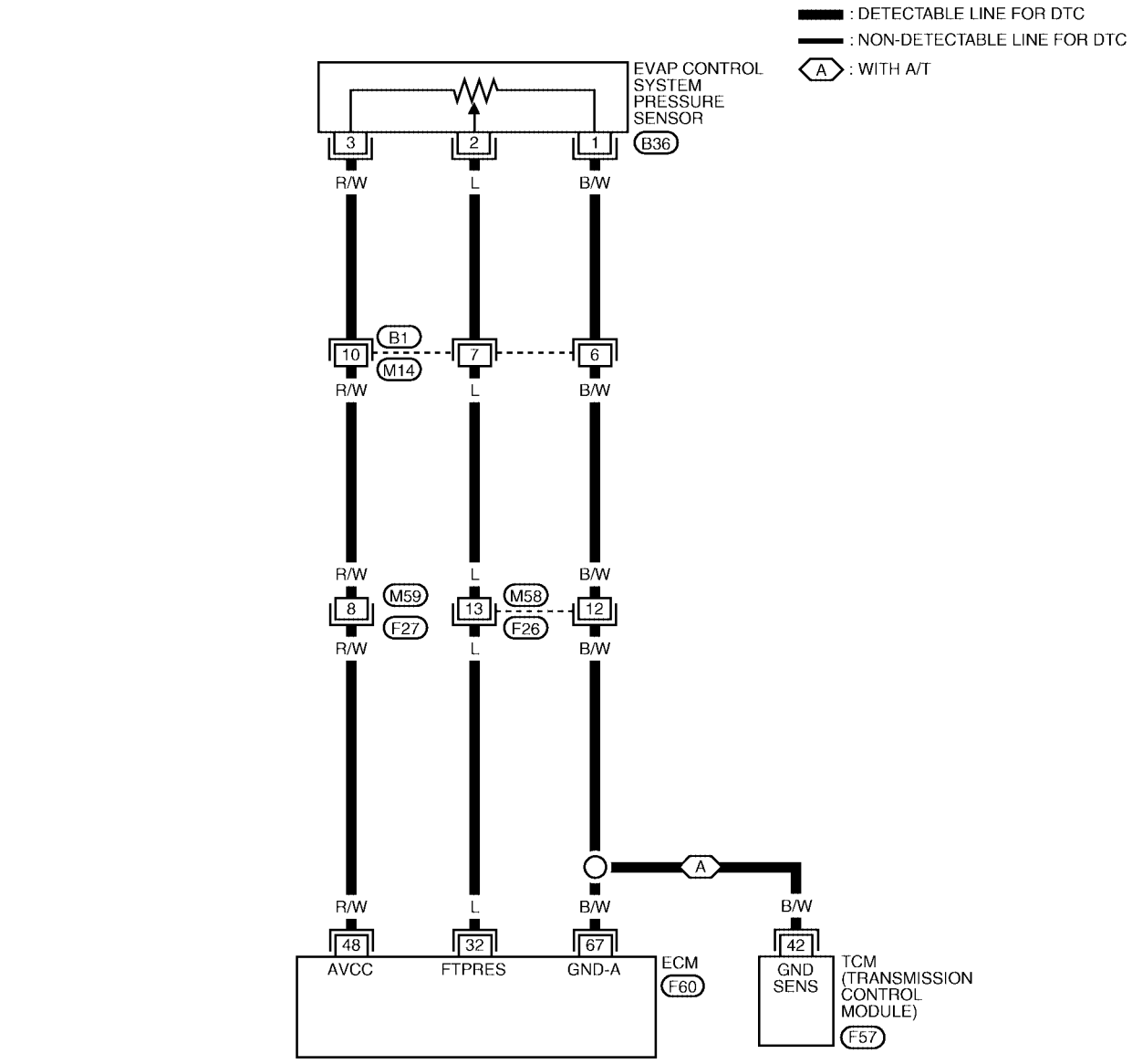
1. Start engine and warm it up to normal operating temperature.
2. Check that voltage between ECM terminal 107 (Fuel tank temperature sensor signal) and ground is less than 4.2V.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Wait at least 10 seconds.
5. Select Service $07 with GST.
   If 1st trip DTC is detected, go to EC-1055, "Diagnostic Procedure" .

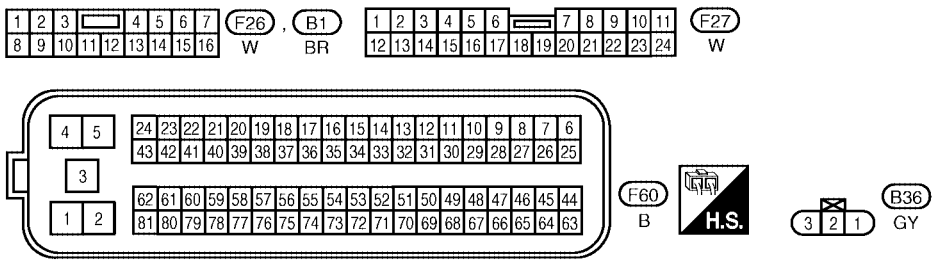


Wiring Diagram

UBS00JFS

EC-PRE/SE-01





REFER TO THE FOLLOWING.
F57 - ELECTRICAL UNITS

BBWA1469E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

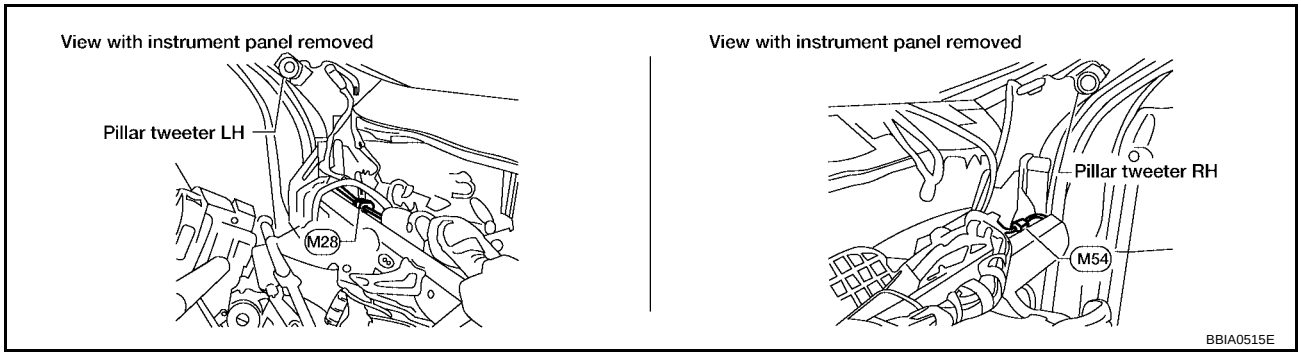
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
32	L	EVAP control system pressure sensor	**[Ignition switch: ON]**	Approximately 1.8 - 4.8V
48	R/W	Sensor power supply (EVAP control system pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00JFT

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .

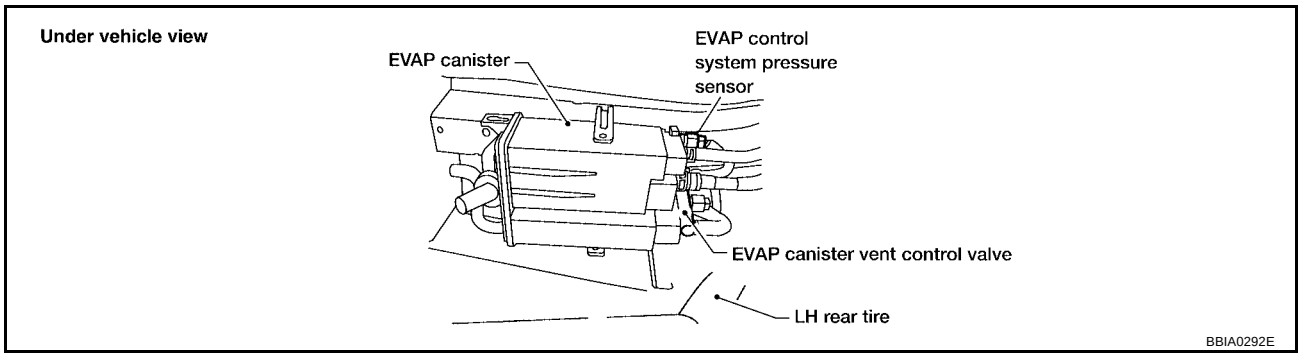


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



2. Check sensor harness connector for water.

Water should not exist.

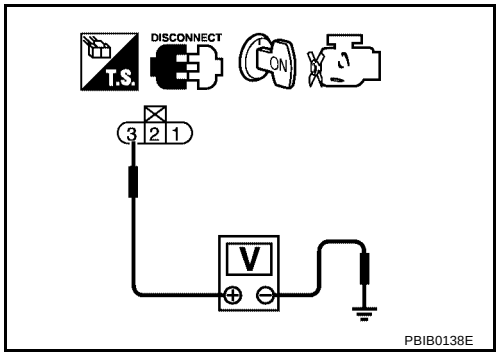
OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness connector.

3. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between EVAP control system pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness for open or short between EVAP control system pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connectors (A/T models).
4. Check harness continuity between EVAP control system pressure sensor terminal 1 and ECM terminal 67, TCM terminal 42 (A/T models).
   Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness connectors B1, M14
- Harness for open or short between EVAP control system pressure sensor and ECM
- Harness for open or short between EVAP control system pressure sensor and TCM (A/T models)

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 32 and EVAP control system pressure sensor terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M58, F26
- Harness connectors B1, M14
- Harness for open or short between ECM and EVAP control system pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK RUBBER TUBE

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging, vent and kinked.

OK or NG

OK >> GO TO 10.
NG >> Clean the rubber tube using an air blower, repair or replace rubber tube.

10. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-683, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace EVAP canister vent control valve.

11. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

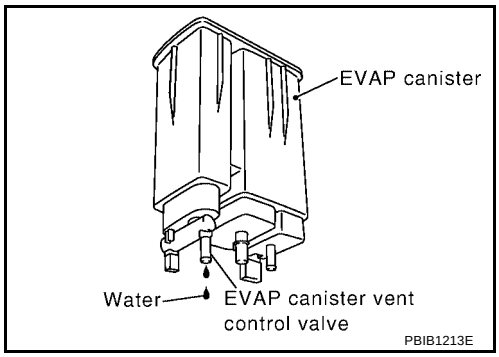
Refer to EC-1058, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace EVAP control system pressure sensor.

12. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Check if water will drain from the EVAP canister.



Yes or No

Yes >> GO TO 13.
No >> GO TO 15.

13. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.
The weight should be less than 2.1 kg (4.6 lb).

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose connected to EVAP canister for clogging or poor connection

>> Repair hose or replace EVAP canister.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

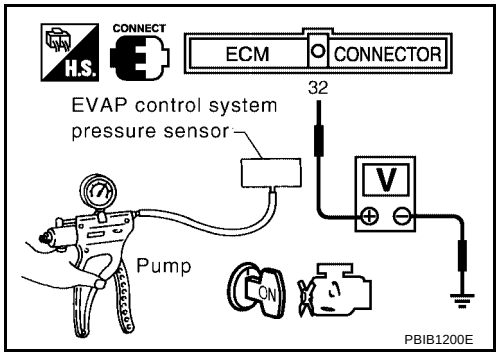
>> **INSPECTION END**

Component Inspection

UBS00JFU

EVAP CONTROL PRESSURE SENSOR

1. Remove EVAP control system pressure sensor with its harness connector connected from EVAP canister. **Do not reuse the O-ring, replace it with a new one.**
2. Install a vacuum pump to EVAP control system pressure sensor.
3. Turn ignition switch ON and check output voltage between ECM terminal 32 and ground under the following conditions.



Applied vacuum kPa (mmHg, inHg)	Voltage V
Not applied	1.8 - 4.8
-26.7 (-200, -7.87)	2.1 to 2.5V lower than above value

CAUTION:

- **Always calibrate the vacuum pump gauge when using it.**
- **Do not apply below -93.3 kPa (-700 mmHg, -27.56 inHg) or pressure over 101.3 kPa (760 mmHg, 29.92 inHg).**

4. If NG, replace EVAP control system pressure sensor.

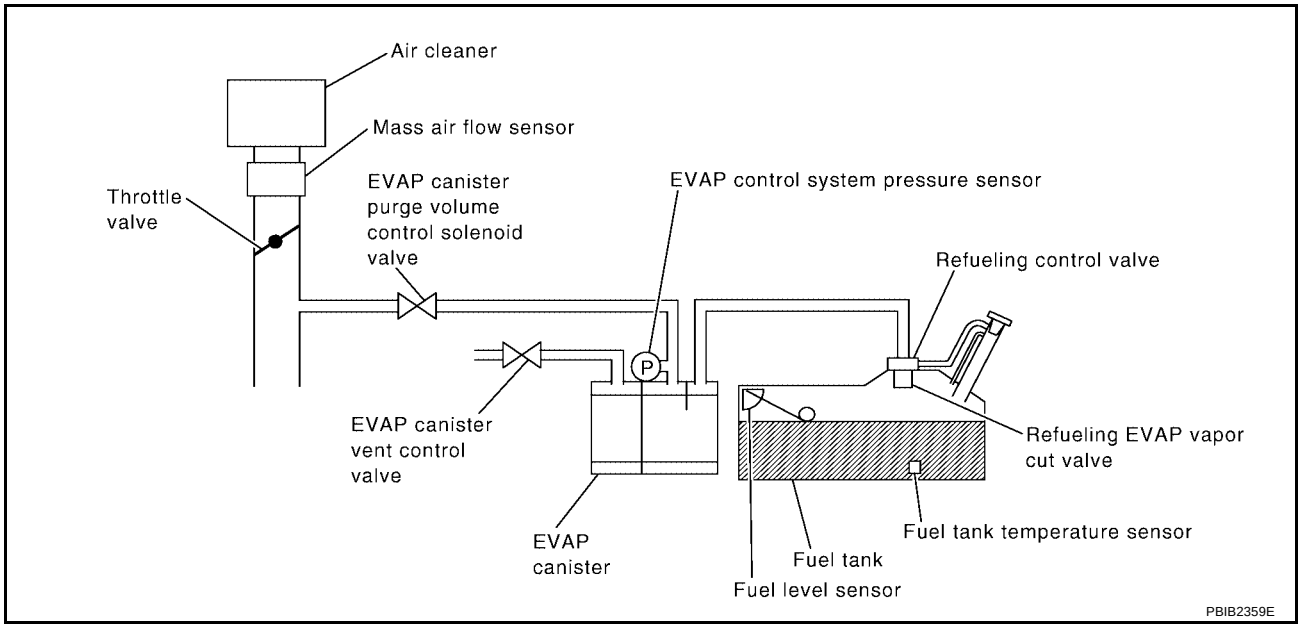
DTC P0455 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS00JWF

This diagnosis detects a very large leak (fuel filler cap fell off etc.) in EVAP system between the fuel tank and EVAP canister purge volume control solenoid valve.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0455 0455	EVAP control system gross leak detected	EVAP control system has a very large leak such as fuel filler cap fell off, EVAP control system does not operate properly.	● Fuel filler cap remains open or fails to close. ● Incorrect fuel tank vacuum relief valve ● Incorrect fuel filler cap used ● Foreign matter caught in fuel filler cap. ● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. ● Foreign matter caught in EVAP canister vent control valve. ● EVAP canister or fuel tank leaks ● EVAP purge line (pipe and rubber tube) leaks ● EVAP purge line rubber tube bent. ● Loose or disconnected rubber tube ● EVAP canister vent control valve and the circuit ● EVAP canister purge volume control solenoid valve and the circuit ● Fuel tank temperature sensor ● O-ring of EVAP canister vent control valve is missing or damaged. ● EVAP control system pressure sensor ● Refueling EVAP vapor cut valve ● ORVR system leaks

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

UBS00JWG

CAUTION:

Never remove fuel filler cap during the DTC Confirmation Procedure.

NOTE:

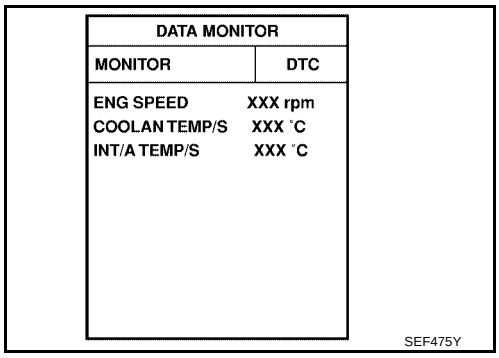
- **Make sure that EVAP hose are connected to EVAP canister purge volume control solenoid valve properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

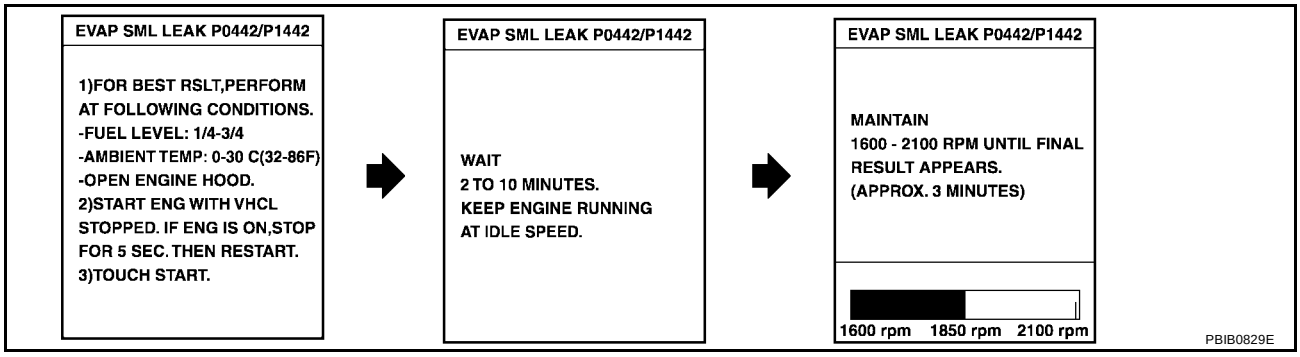
- **Perform "DTC WORK SUPPORT" when the fuel level is between 1/4 and 3/4 full, and vehicle is placed on flat level surface.**
- **Open engine hood before conducting the following procedure.**

WITH CONSULT-II

1. Tighten fuel filler cap securely until reteaching sound is heard.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and select "DATA MONITOR" mode with CONSULT-II.
5. Make sure that the following conditions are met.
   COOLAN TEMP/S: 0 - 70°C (32 - 158°F)
   INT/A TEMP SE: 0 - 60°C (32 - 140°F)



6. Select "EVAP SML LEAK P0442/P1442" of "EVAPORATIVE SYSTEM" in "DTC WORK SUPPORT" mode with CONSULT-II.
   Follow the instruction displayed.

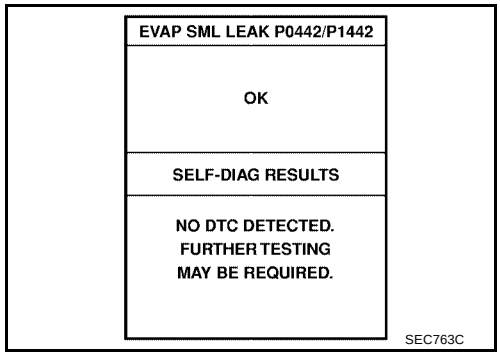


NOTE:

If the engine speed cannot be maintained within the range displayed on the CONSULT-II screen, go to EC-721, "Basic Inspection" .

7. Make sure that "OK" is displayed.

If “NG” is displayed, select “SELF-DIAG RESULTS” mode with CONSULT-II and make sure that “EVAP GROSS LEAK [P0455]” is displayed. If it is displayed, refer to EC-1061, "Diagnostic Procedure" .
If P0442 is displayed, perform Diagnostic Procedure for DTC P0442, EC-1023 .



WITH GST

NOTE:
Be sure to read the explanation of EC-707, "Driving Pattern" before driving vehicle.

1. Start engine.
2. Drive vehicle according to EC-707, "Driving Pattern" .
3. Stop vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ignition switch ON.
5. Select Service $07 with GST.

- If P0455 is displayed on the screen, go to EC-1061, "Diagnostic Procedure" .
- If P0442 is displayed on the screen, go to Diagnostic Procedure, for DTC P0442, EC-1023 .
- If P0441 is displayed on the screen, go to Diagnostic Procedure for DTC P0441, EC-1016 .

Diagnostic Procedure

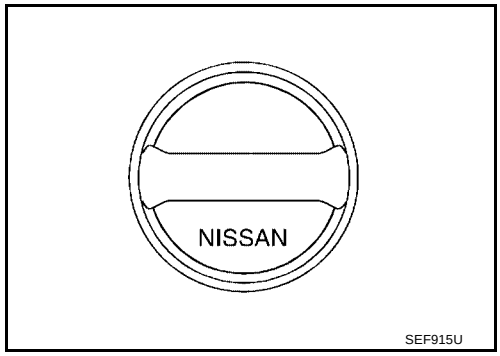
UBS00JWH

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.

OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.



2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Retighten until reteaching sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

Refer to EC-683, "FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)"

OK or NG

OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks, improper connection or disconnection.
Refer to EC-680, "EVAPORATIVE EMISSION SYSTEM" .

OK or NG

OK >> GO TO 6.
NG >> Repair or reconnect the hose.

6. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 7.

7. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control is installed properly.
  Refer to EC-684, "Removal and Installation"
- EVAP canister vent control valve.
  Refer to EC-1041, "Component Inspection"

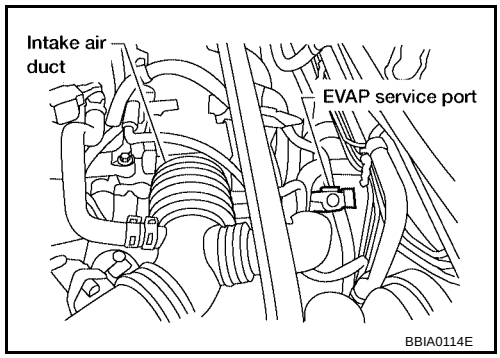
OK or NG

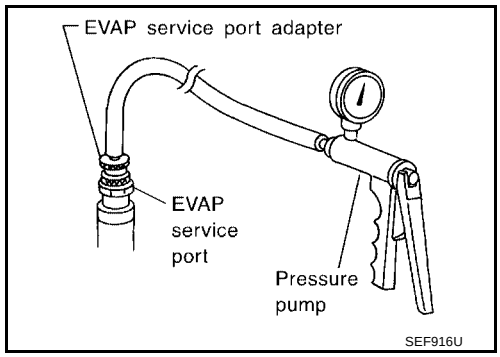
OK >> GO TO 8.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

8. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.

NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.





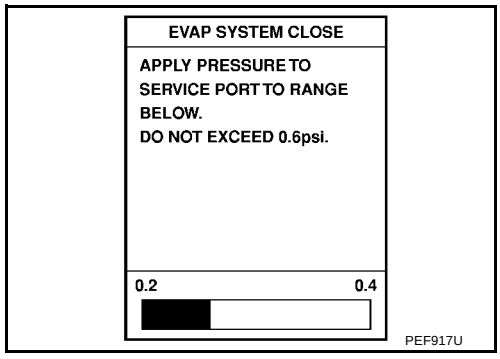
With CONSULT-II>>GO TO 9.
Without CONSULT-II>>GO TO 10.

9. CHECK FOR EVAP LEAK

With CONSULT-II

1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

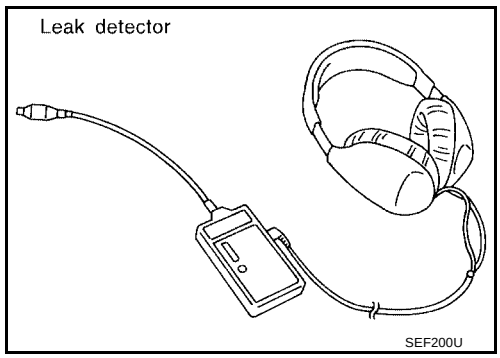
   CAUTION:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-681, "EVAPORATIVE EMISSION LINE DRAWING"
   .

OK or NG

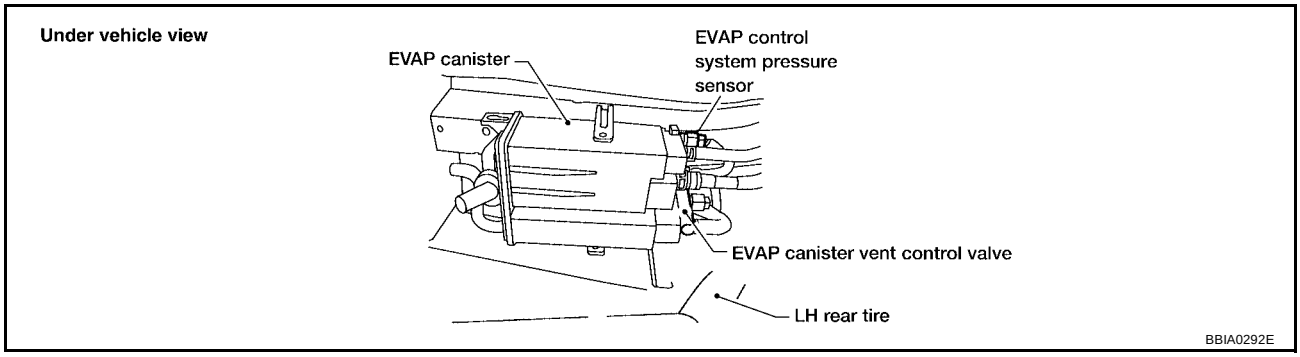
OK >> GO TO 11.
NG >> Repair or replace.



10. CHECK FOR EVAP LEAK

Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)

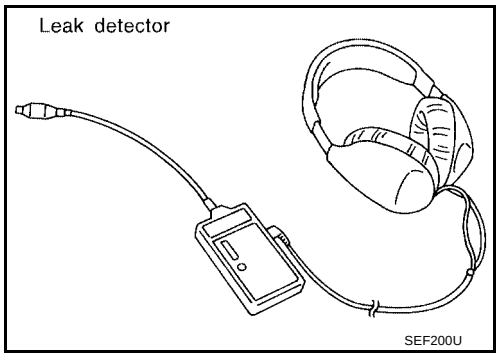


3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

CAUTION:

- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-681, "EVAPORATIVE EMISSION LINE DRAWING" .



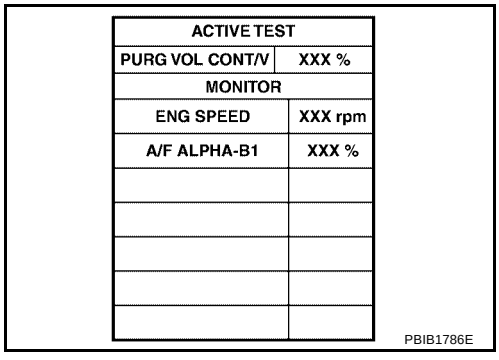
OK or NG

OK >> GO TO 12.
NG >> Repair or replace.

11. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.



OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

OK or NG

OK >> GO TO 15.
NG >> GO TO 13.

13. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-681, "EVAPORATIVE EMISSION LINE DRAWING" .

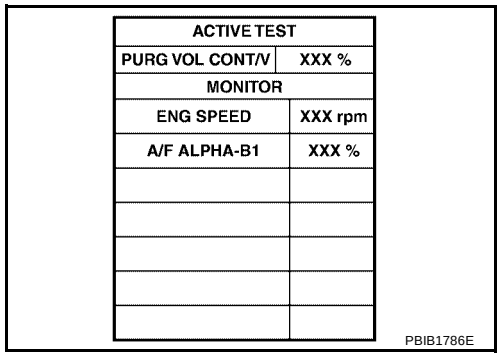
OK or NG

OK (With CONSULT-II)>>GO TO 14.
OK (Without CONSULT-II)>>GO TO 15.
NG >> Repair or reconnect the hose.

14. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Start engine.
2. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1034, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.

16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-966, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace fuel level sensor unit.

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1045, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. CHECK EVAP/ORVR LINE

Check refueling EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-687, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 19.
>> Repair or replace hoses and tubes.

19. CHECK SIGNAL LINE AND RECIRCULATION LINE

Check signal line and recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 20.
>> Repair or replace hoses, tubes or filler neck tube.

20. CHECK REFUELING CONTROL VALVE

Refer to EC-690, "Component Inspection" .

OK or NG

OK >> GO TO 21.
>> Replace refueling EVAP control valve.

21. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

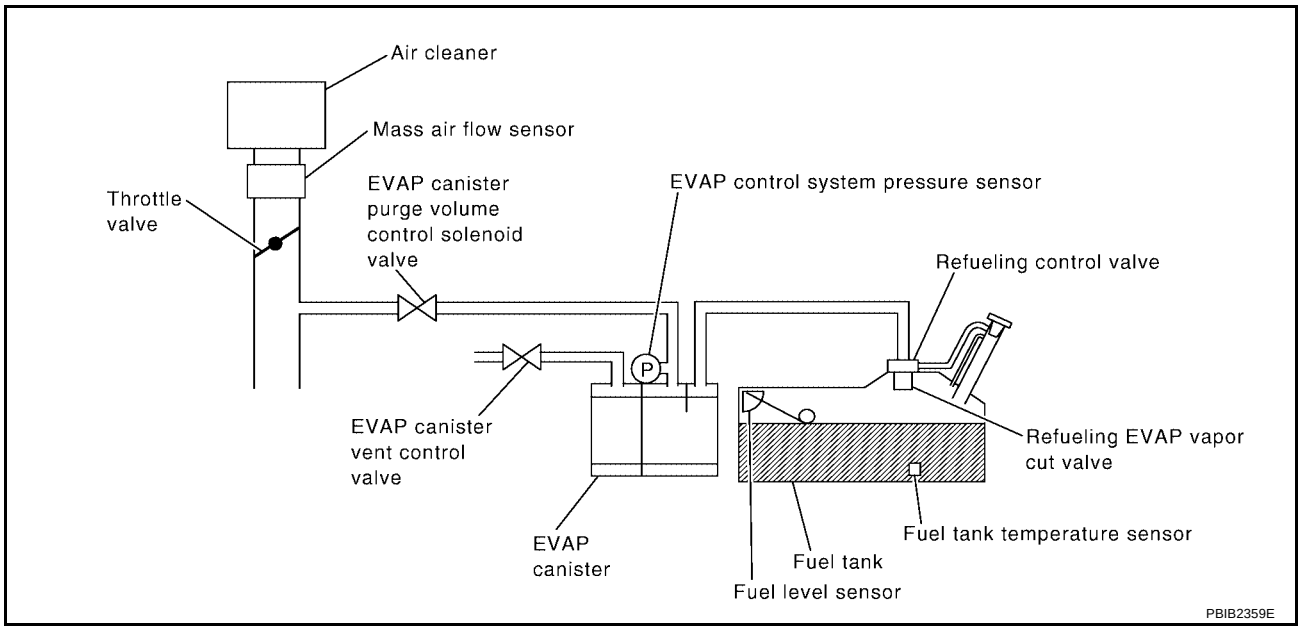
DTC P0456 EVAP CONTROL SYSTEM

PFP:14950

On Board Diagnosis Logic

UBS00JWI

This diagnosis detects very small leaks in the EVAP line between fuel tank and EVAP canister purge volume control solenoid valve, using the intake manifold vacuum in the same way as conventional EVAP small leak diagnosis.
If ECM judges a leak which corresponds to a very small leak, the very small leak P0456 will be detected.
If ECM judges a leak equivalent to a small leak, EVAP small leak P0442 will be detected.
If ECM judges there are no leaks, the diagnosis will be OK.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0456 0456	Evaporative emission control system very small leak (negative pressure check)	● EVAP system has a very small leak. ● EVAP system does not operate properly.	● Incorrect fuel tank vacuum relief valve ● Incorrect fuel filler cap used ● Fuel filler cap remains open or fails to close. ● Foreign matter caught in fuel filler cap. ● Leak is in line between intake manifold and EVAP canister purge volume control solenoid valve. ● Foreign matter caught in EVAP canister vent control valve. ● EVAP canister or fuel tank leaks ● EVAP purge line (pipe and rubber tube) leaks ● EVAP purge line rubber tube bent ● Loose or disconnected rubber tube ● EVAP canister vent control valve and the circuit ● EVAP canister purge volume control solenoid valve and the circuit ● Fuel tank temperature sensor ● O-ring of EVAP canister vent control valve is missing or damaged ● EVAP canister is saturated with water ● EVAP control system pressure sensor ● Refueling EVAP vapor cut valve ● Refueling control valve ● ORVR system leaks ● Fuel level sensor and the circuit ● Foreign matter caught in EVAP canister purge volume control solenoid valve

CAUTION:

- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **If the fuel filler cap is not tightened properly, the MIL may come on.**
- **Use only a genuine NISSAN rubber tube as a replacement.**

DTC Confirmation Procedure

UBS00JWJ

NOTE:

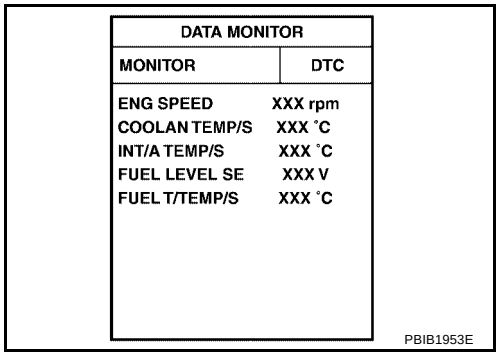
- **If DTC P0456 is displayed with P0442, first perform trouble diagnosis for DTC P0456.**
- **After repair, make sure that the hoses and clips are installed properly.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

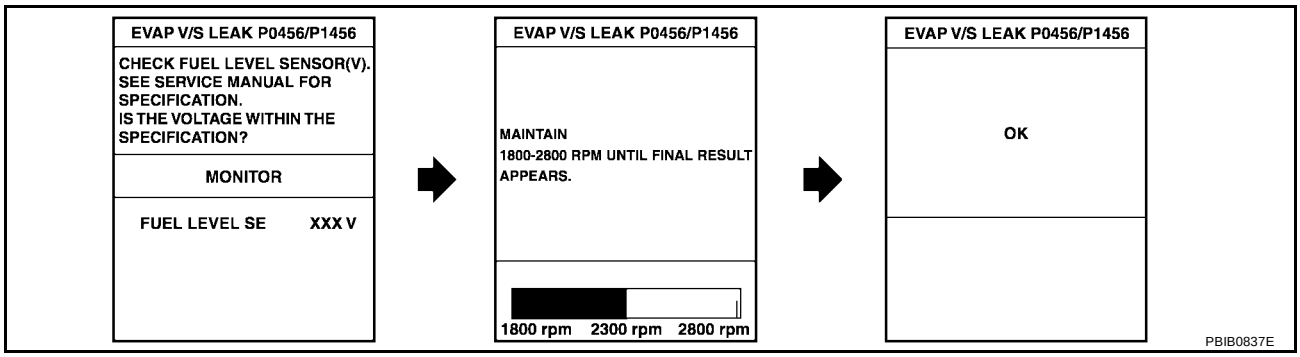
- **Open engine hood before conducting following procedure.**
- **If any of following conditions are met just before the DTC confirmation procedure, leave the vehicle for more than 1 hour.**
  - **Fuel filler cap is removed.**
  - **Refilled or drained the fuel.**
  - **EVAP component parts is/are removed.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Make sure the following conditions are met.
   FUEL LEVEL SE: 0.25 - 1.4V
   COOLAN TEMP/S: 0 - 32°C (32 - 90°F)
   FUEL T/TMP SE: 0 - 35°C (32 - 95°F)
   INT A/TEMP SE: More than 0°C (32°F)
   If NG, turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle) or refilling/draining fuel until the output voltage condition of the “FUEL LEVEL SE” meets within the range above and leave the vehicle for more than 1 hour. Then start from step 1).



3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Select “EVAP V/S LEAK P0456” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
   Follow the instruction displayed.



6. Make sure that “OK” is displayed.
   If “NG” is displayed, refer to EC-1070, "Diagnostic Procedure" .

   NOTE:
   - **If the engine speed cannot be maintained within the range displayed on CONSULT-II screen, go to EC-721, "Basic Inspection" .**

- **Make sure that EVAP hoses are connected to EVAP canister purge volume control solenoid valve properly.**

Overall Function Check

UBS00JWK

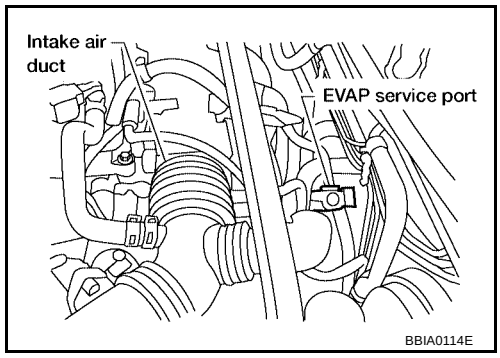
WITH GST

Use this procedure to check the overall function of the EVAP very small leak function. During this check, a 1st trip DTC might not be confirmed.

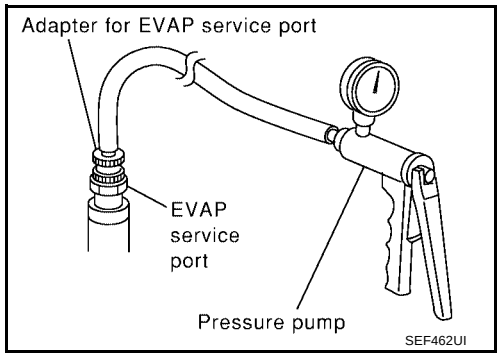
CAUTION:

- **Never use compressed air, doing so may damage the EVAP system.**
- **Do not start engine.**
- **Do not exceeded 4.12 kPa (0.042 kg/cm^2 , 0.6 psi).**

1. Attach the EVAP service port adapter securely to the EVAP service port.



2. Set the pressure pump and a hose.
3. Also set the pressure pump with pressure gauge to the EVAP service port adapter.
4. Turn ignition switch ON.
5. Connect GST and select Service $08.
6. Using Service $08 control the EVAP canister vent control valve (close).
7. Apply pressure and make sure the following conditions are satisfied.
   Pressure to be applied: 2.7 kPa (20 mmHg, 0.79 inHg)
   Time to be waited after the pressure drawn in to the EVAP system and the pressure to be dropped: 60 seconds and the pressure should not be dropped more than 0.4 kPa (3 mmHg, 0.12 inHg).
   If NG, go to EC-1070, "Diagnostic Procedure" .
   If OK, go to next step.



8. Disconnect GST.
9. Start engine and warm it up to normal operating temperature.
10. Turn ignition switch OFF and wait at least 10 seconds.
11. Restart engine and let it idle for 90 seconds.
12. Keep engine speed at 2,000 rpm for 30 seconds.
13. Turn ignition switch OFF.

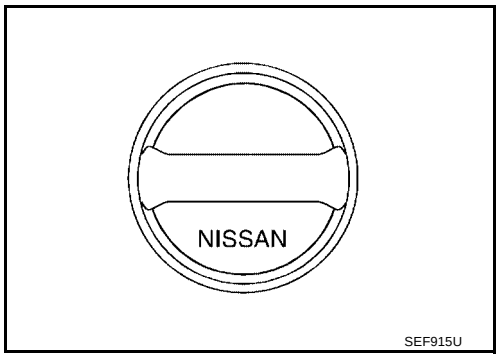
    NOTE:
    For more information, refer to GST Instruction Manual.

Diagnostic Procedure

UBS00JWL

1. CHECK FUEL FILLER CAP DESIGN

1. Turn ignition switch OFF.
2. Check for genuine NISSAN fuel filler cap design.



OK or NG

OK >> GO TO 2.
NG >> Replace with genuine NISSAN fuel filler cap.

2. CHECK FUEL FILLER CAP INSTALLATION

Check that the cap is tightened properly by rotating the cap clockwise.

OK or NG

OK >> GO TO 3.
NG >> 1. Open fuel filler cap, then clean cap and fuel filler neck threads using air blower.
2. Retighten until reteaching sound is heard.

3. CHECK FUEL FILLER CAP FUNCTION

Check for air releasing sound while opening the fuel filler cap.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK FUEL TANK VACUUM RELIEF VALVE

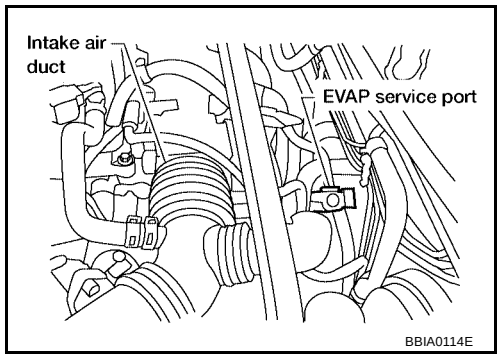
Refer to EC-683, "FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)" .

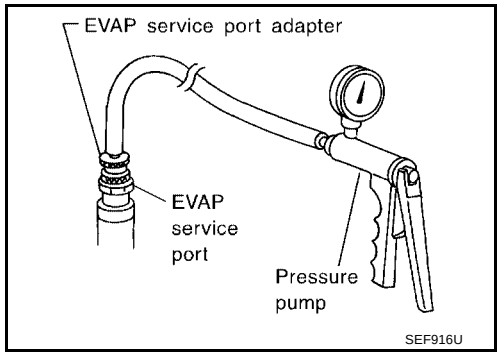
OK or NG

OK >> GO TO 5.
NG >> Replace fuel filler cap with a genuine one.

5. INSTALL THE PRESSURE PUMP

To locate the EVAP leak, install EVAP service port adapter and pressure pump to EVAP service port securely.





NOTE:
Improper installation of the EVAP service port adapter to the EVAP service port may cause leaking.

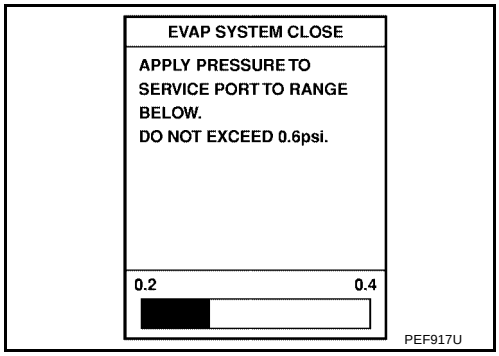
With CONSULT-II>>GO TO 6.
Without CONSULT-II>>GO TO 7.

6. CHECK FOR EVAP LEAK

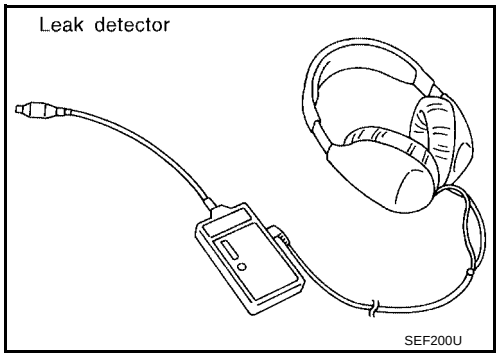
With CONSULT-II

1. Turn ignition switch ON.
2. Select “EVAP SYSTEM CLOSE” of “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START” and apply pressure into the EVAP line until the pressure indicator reaches the middle of the bar graph.

   CAUTION:
   - **Never use compressed air or a high pressure pump.**
   - **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**



4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details.
   Refer to EC-681, "EVAPORATIVE EMISSION LINE DRAWING"
   .



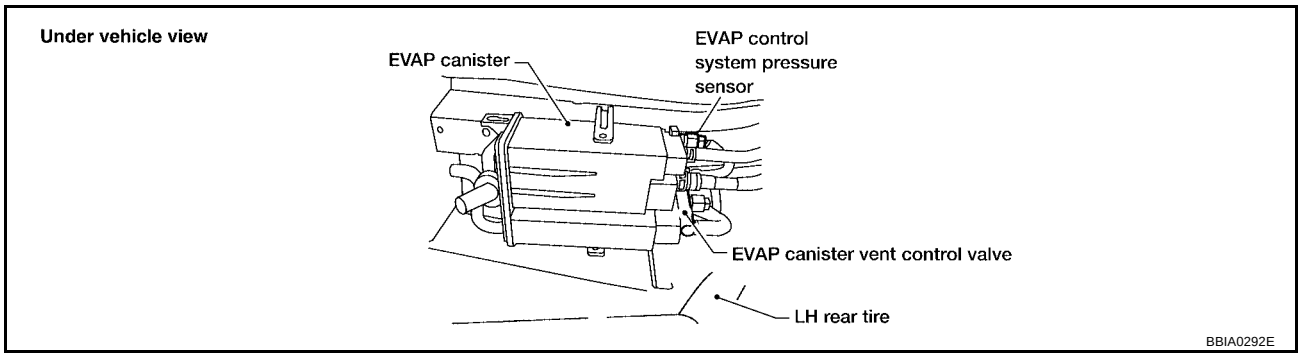
OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

7. CHECK FOR EVAP LEAK

Without CONSULT-II

1. Turn ignition switch OFF.
2. Apply 12 volts DC to EVAP canister vent control valve. The valve will close. (Continue to apply 12 volts until the end of test.)

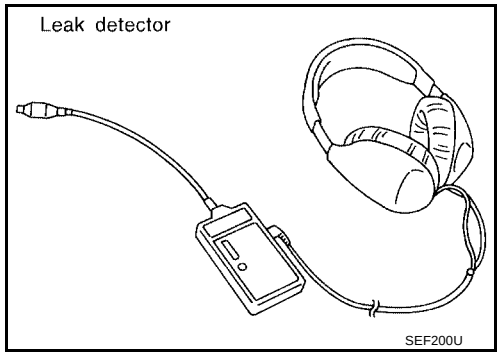


3. Pressurize the EVAP line using pressure pump with 1.3 to 2.7 kPa (10 to 20 mmHg, 0.39 to 0.79 inHg), then remove pump and EVAP service port adapter.

CAUTION:

- **Never use compressed air or a high pressure pump.**
- **Do not exceed 4.12 kPa (0.042 kg/cm^2 , 0.6 psi) of pressure in the system.**

4. Using EVAP leak detector, locate the EVAP leak. For the leak detector, refer to the instruction manual for more details. Refer to EC-681, "EVAPORATIVE EMISSION LINE DRAWING" .



OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. CHECK EVAP CANISTER VENT CONTROL VALVE

Check the following.

- EVAP canister vent control valve is installed properly.
  Refer to EC-684, "Removal and Installation"
- EVAP canister vent control valve.
  Refer to EC-1041, "Component Inspection"

OK or NG

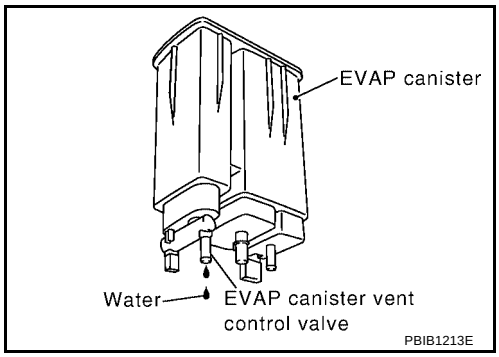
OK >> GO TO 9.
NG >> Repair or replace EVAP canister vent control valve and O-ring.

9. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve and EVAP control system pressure sensor attached.
2. Does water drain from the EVAP canister?

Yes or No

Yes >> GO TO 10.
No (With CONSULT-II)>>GO TO 12.
No (Without CONSULT-II)>>GO TO 13.



10. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK (With CONSULT-II)>>GO TO 12.
OK (Without CONSULT-II)>>GO TO 13.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

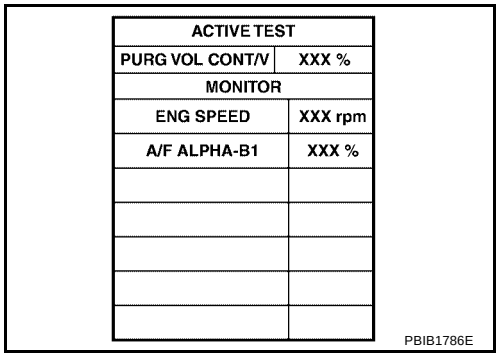
12. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode.
4. Touch “Qu” on CONSULT-II screen to increase “PURG VOL CONT/V” opening to 100%.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.



13. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine.
3. Disconnect vacuum hose to EVAP canister purge volume control solenoid valve at EVAP service port.
4. Start engine and let it idle for at least 80 seconds.
5. Check vacuum hose for vacuum when revving engine up to 2,000 rpm.

OK or NG

OK >> GO TO 16.
NG >> GO TO 14.

14. CHECK VACUUM HOSE

Check vacuum hoses for clogging or disconnection. Refer to EC-777, "Vacuum Hose Drawing" .

OK or NG

OK >> GO TO 15.
NG >> Repair or reconnect the hose.

15. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1034, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace EVAP canister purge volume control solenoid valve.

16. CHECK FUEL TANK TEMPERATURE SENSOR

Refer to EC-966, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace fuel level sensor unit.

17. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1045, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace EVAP control system pressure sensor.

18. CHECK EVAP PURGE LINE

Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-681, "EVAPORATIVE EMISSION LINE DRAWING" .

OK or NG

OK >> GO TO 19.
NG >> Repair or reconnect the hose.

19. CLEAN EVAP PURGE LINE

Clean EVAP purge line (pipe and rubber tube) using air blower.

>> GO TO 20.

20. CHECK EVAP/ORVR LINE

Check EVAP/ORVR line between EVAP canister and fuel tank for clogging, kink, looseness and improper connection. For location, refer to EC-687, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" .

OK or NG

OK >> GO TO 21.
NG >> Repair or replace hoses and tubes.

21. CHECK SIGNAL LINE AND RECIRCULATION LINE

Check signal line recirculation line between filler neck tube and fuel tank for clogging, kink, cracks, looseness and improper connection.

OK or NG

OK >> GO TO 22.
NG >> Repair or replace hose, tube or filler neck tube.

22. CHECK REFUELING CONTROL VALVE

Refer to EC-690, "Component Inspection" .

OK or NG

OK >> GO TO 23.
NG >> Replace refueling control valve.

23. CHECK REFUELING EVAP VAPOR CUT VALVE

Refer to EC-690, "Component Inspection" .

OK or NG

OK >> GO TO 24.
NG >> Replace refueling EVAP vapor cut valve with fuel tank.

24. CHECK FUEL LEVEL SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

OK or NG

OK >> GO TO 25.
NG >> Replace fuel level sensor unit.

25. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

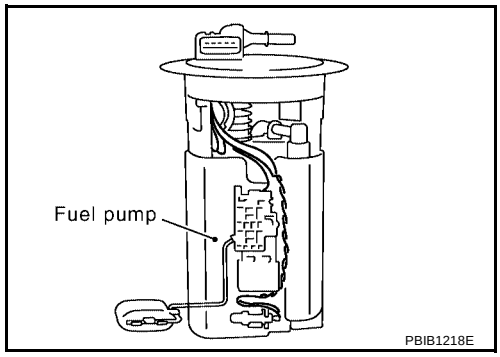
DTC P0460 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00JWM

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter. sends the fuel level sensor signal to the ECM through CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnostic Logic

UBS00JWN

NOTE:
If DTC P0460 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-840, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
When the vehicle is parked, naturally the fuel level in the fuel tank is stable. It means that output signal of the fuel level sensor does not change. If ECM senses sloshing signal from the sensor, fuel level sensor malfunction is detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0460 0460	Fuel level sensor circuit noise	Even though the vehicle is parked, a signal being varied is sent from the fuel level sensor to ECM.	● Harness or connectors (The CAN communication line is open or shorted) ● Harness or connectors (The sensor circuit is open or shorted) ● Combination meter. ● Fuel level sensor

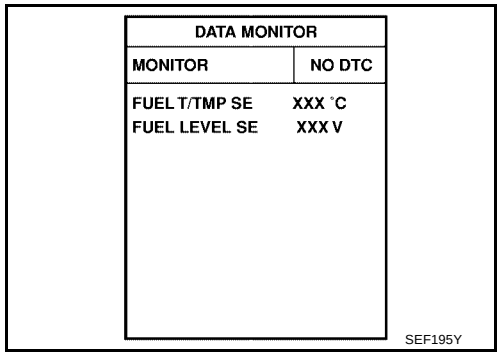
DTC Confirmation Procedure

UBS00JWO

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait maximum of 2 consecutive minutes.
4. If 1st trip DTC is detected, go to EC-1078, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00JWP

1. CHECK FUEL GAUGE OPERATION

Refer to DI-16, "Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode" .

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of DI-16, "Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode" .

2. CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to DI-26, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace malfunctioning parts.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00JWQ

FUEL LEVEL SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

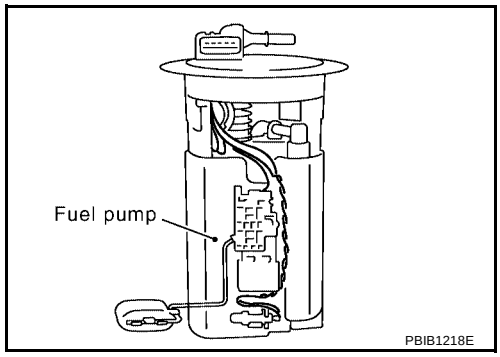
DTC P0461 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00JWR

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter. sends the fuel level sensor signal to the ECM through CAN communication line.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnostic Logic

UBS00JWS

NOTE:
If DTC P0461 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-840, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
Driving long distances naturally affect fuel gauge level.
This diagnosis detects the fuel gauge malfunction of the gauge not moving even after a long distance has been driven.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0461 0461	Fuel level sensor circuit range/performance	The output signal of the fuel level sensor does not change within the specified range even though the vehicle has been driven a long distance.	● Harness or connectors (the CAN communication line is open or shorted) ● Harness or connectors (The sensor circuit is open or shorted) ● Combination meter. ● Fuel level sensor

Overall Function Check

UBS00JWT

Use this procedure to check the overall function of the fuel level sensor function. During this check, a 1st trip DTC might not be confirmed.

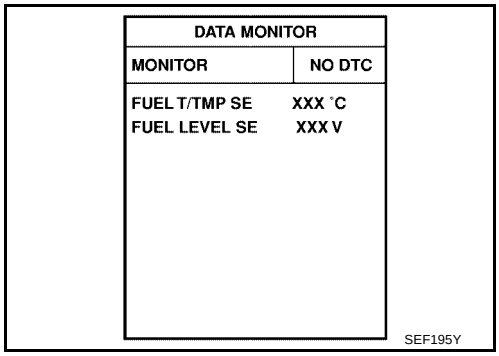
WARNING:
When performing following procedure, be sure to observe the handling of the fuel. Refer to FL-7, "FUEL TANK" .
TESTING CONDITION:
Before starting overall function check, preparation of draining fuel and refilling fuel is required.

WITH CONSULT-II

NOTE:
Start from step 11, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-751, "FUEL PRESSURE RELEASE" .
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.

5. Turn ignition switch OFF and wait at least 10 seconds then turn ON.
6. Select “FUEL LEVEL SE” in “DATA MONITOR” mode with CONSULT-II.
7. Check “FUEL LEVEL SE” output voltage and note it.
8. Select “FUEL PUMP” in “ACTIVE TEST” mode with CONSULT-II.
9. Touch “ON” and drain fuel approximately 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) and stop it.
10. Check “FUEL LEVEL SE” output voltage and note it.
11. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
12. Check “FUEL LEVEL SE” output voltage and confirm whether the voltage changes more than 0.03V during step 7 to 10 and 10 to 12.
    If NG, go to Diagnostic Procedure EC-1080 .



WITH GST

NOTE:
Start from step 8, if it is possible to confirm that the fuel cannot be drained by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) in advance.

1. Prepare a fuel container and a spare hose.
2. Release fuel pressure from fuel line, refer to EC-751, "FUEL PRESSURE RELEASE" .
3. Remove the fuel feed hose on the fuel level sensor unit.
4. Connect a spare fuel hose where the fuel feed hose was removed.
5. Turn ignition switch ON.
6. Drain fuel by 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal) from the fuel tank using proper equipment.
7. Confirm that the fuel gauge indication varies.
8. Fill fuel into the fuel tank for 30 ℓ (7-7/8 US gal, 6-5/8 Imp gal).
9. Confirm that the fuel gauge indication varies.
10. If NG, go to Diagnostic Procedure, EC-1080 .

Diagnostic Procedure

UBS00JWU

1. CHECK FUEL GAUGE OPERATION

Refer to DI-16, "Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode" .

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of DI-16, "Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode" .

2. CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to DI-26, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace malfunctioning parts.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00JWV

FUEL LEVEL SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

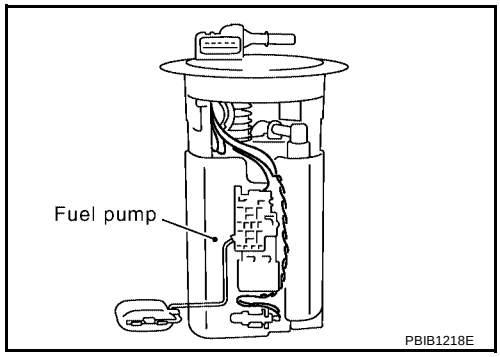
DTC P0462, P0463 FUEL LEVEL SENSOR

PFP:25060

Component Description

UBS00JWW

The fuel level sensor is mounted in the fuel level sensor unit. The sensor detects a fuel level in the fuel tank and transmits a signal to the combination meter. The combination meter. sends the fuel level sensor signal to the ECM through CAN communication.
It consists of two parts, one is mechanical float and the other is variable resistor. Fuel level sensor output voltage changes depending on the movement of the fuel mechanical float.



On Board Diagnostic Logic

UBS00JWX

NOTE:
If DTC P0462 or P0463 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-840, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0462 0462	Fuel level sensor circuit low input	An excessively low voltage it from the sensor to ECM.	● Harness or connectors (The CAN communication line is open or shorted) ● Harness or connectors (The sensor circuit is open or shorted) ● Combination meter. ● Fuel level sensor
P0463 0463	Fuel level sensor circuit high input	An excessively high voltage from the sensor to ECM.	

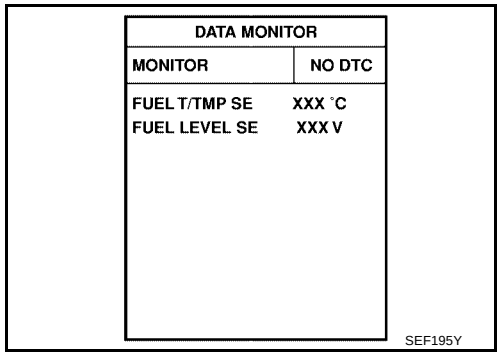
DTC Confirmation Procedure

UBS00JWY

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at ignition switch ON.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1082, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00JWZ

1. CHECK FUEL GAUGE OPERATION

Refer to DI-16, "Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode" .

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of DI-16, "Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode" .

2. CHECK FUEL LEVEL SENSOR AND CIRCUIT

Refer to DI-26, "FUEL LEVEL SENSOR UNIT CHECK" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace malfunctioning parts.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

UBS00JX0

FUEL LEVEL SENSOR

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

DTC P0500 VSS

PFP:32702

Component Description

UBS00JGH

NOTE:
If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-840, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
The vehicle speed sensor is installed in the transaxle. It contains a pulse generator which provides a vehicle speed signal to the combination meter. The combination meter then sends a signal to the ECM through CAN communication line.

On Board Diagnosis Logic

UBS00JGI

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500 0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	● Harness or connectors (The CAN communication line is open or shorted) ● Harness or connectors (The vehicle speed signal circuit is open or shorted) ● Vehicle speed sensor ● Combination meter

DTC Confirmation Procedure

UBS00JGJ

CAUTION:
Always drive vehicle at a safe speed.

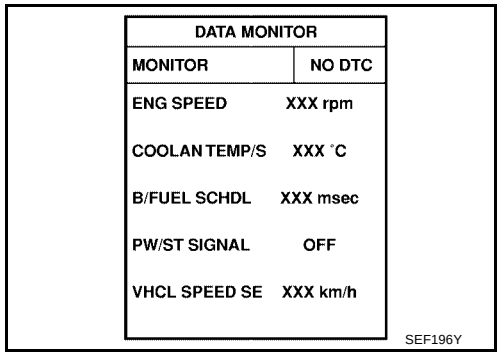
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine (TCS switch OFF).
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to EC-1084, "Diagnostic Procedure" .
   If OK, go to following step.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Warm engine up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,200 - 6,000 rpm (A/T models) 1,800 - 6,000 rpm (M/T models)
COOLANT TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	More then 6.0 msec (A/T models) More than 5.0 msec (M/T models)
Selector lever	Suitable position
PW/ST SIGNAL	OFF



6. If 1st trip DTC is detected, go to EC-1084, "Diagnostic Procedure" .

Overall Function Check

UBS00JGK

Use this procedure to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed sensor signal in Service $01 with GST.
   The vehicle speed sensor on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to EC-1084, "Diagnostic Procedure" .

Diagnostic Procedure

UBS00JGL

1. CHECK VEHICLE SPEED SENSOR CITCUIT

Refer to DI-4, "METERS AND GAUGES" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK DTC WITH COMBINATION METER

Refer to DI-16, "Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode" .

>> **INSPECTION END**

DTC P0506 ISC SYSTEM

PFP:23781

Description

UBS00JGM

NOTE:
If DTC P0506 is displayed with other DTC, first perform the trouble diagnosis for the other DTC displayed.
The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

On Board Diagnosis Logic

UBS00JGN

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0506 0506	Idle speed control system RPM lower than expected	The idle speed is less than the target idle speed by 100 rpm or more.	● Electric throttle control actuator ● Intake air leak

DTC Confirmation Procedure

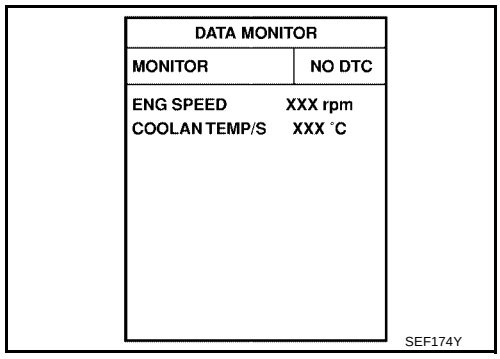
UBS00JGO

NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- **If the target idle speed is out of the specified value, perform EC-749, "Idle Air Volume Learning" , before conducting DTC Confirmation Procedure. For the target idle speed, refer to the EC-1383, "SERVICE DATA AND SPECIFICATIONS (SDS)" .**

TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**

WITH CONSULT-II

1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON again and select “DATA MONITOR” mode with CONSULT-II.
5. Start engine and run it for at least 1 minute at idle speed.
6. If 1st trip DTC is detected, go to EC-1086, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00JGP

1. CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 2.
NG >> Discover air leak location and repair.

2. REPLACE ECM

1. Stop engine.
2. Replace ECM.
3. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to EC-695, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM-NATS)" .
4. Perform EC-748, "VIN Registration" .
5. Perform EC-748, "Accelerator Pedal Released Position Learning" .
6. Perform EC-748, "Throttle Valve Closed Position Learning" .
7. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P0507 ISC SYSTEM

PFP:23781

Description

UBS00JGQ

NOTE:
If DTC P0507 is displayed with other DTC, first perform the trouble diagnosis for the other DTC displayed.
The ECM controls the engine idle speed to a specified level through the fine adjustment of the air, which is let into the intake manifold, by operating the electric throttle control actuator. The operating of the throttle valve is varied to allow for optimum control of the engine idling speed. The crankshaft position sensor (POS) detects the actual engine speed and sends a signal to the ECM.
The ECM controls the electric throttle control actuator so that the engine speed coincides with the target value memorized in the ECM. The target engine speed is the lowest speed at which the engine can operate steadily. The optimum value stored in the ECM is determined by taking into consideration various engine conditions, such as during warming up, deceleration, and engine load (air conditioner, power steering and cooling fan operation, etc.).

On Board Diagnosis Logic

UBS00JGR

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0507 0507	Idle speed control system RPM higher than expected	The idle speed is more than the target idle speed by 200 rpm or more.	● Electric throttle control actuator ● Intake air leak ● PCV system

DTC Confirmation Procedure

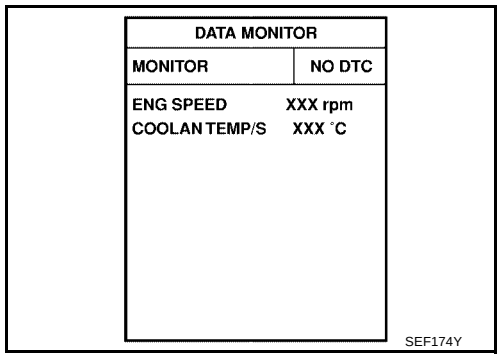
UBS00JGS

NOTE:
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- **If the target idle speed is out of the specified value, perform EC-749, "Idle Air Volume Learning" , before conducting "DTC Confirmation Procedure". For the target idle speed, refer to the EC-1383, "SERVICE DATA AND SPECIFICATIONS (SDS)" .**

TESTING CONDITION:
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**
- **Always perform the test at a temperature above −10°C (14°F).**

WITH CONSULT-II

1. Open engine hood.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON again and select "DATA MONITOR" mode with CONSULT-II.
5. Start engine and run it for at least 1 minute at idle speed.
6. If 1st trip DTC is detected, go to EC-1088, "Diagnostic Procedure" .



WITH GST

Follow the procedure "WITH CONSULT-II" above.

Diagnostic Procedure

UBS00JGT

1. CHECK PCV HOSE CONNECTION

Confirm that PCV hose is connected correctly.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK INTAKE AIR LEAK

1. Start engine and let it idle.
2. Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 3.
NG >> Discover air leak location and repair.

3. REPLACE ECM

1. Stop engine.
2. Replace ECM.
3. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to EC-695, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM-NATS)" .
4. Perform EC-748, "VIN Registration" .
5. Perform EC-748, "Accelerator Pedal Released Position Learning" .
6. Perform EC-748, "Throttle Valve Closed Position Learning" .
7. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

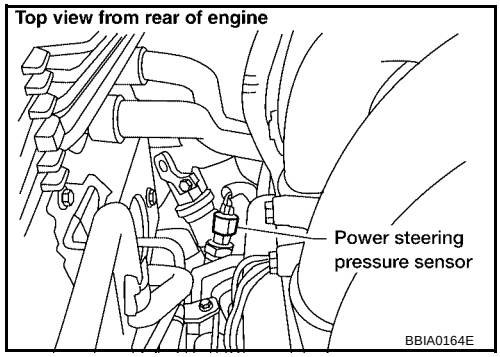
DTC P0550 PSP SENSOR

PFP:49763

Component Description

UBS00JGU

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JGV

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is in not being turned. (Forward direction)	OFF
		Steering wheel is being turned.	ON

On Board Diagnosis Logic

UBS00JGW

The MIL will not light up for this diagnosis.

NOTE:
If DTC P0550 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-1176 .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550 0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Power steering pressure sensor

DTC Confirmation Procedure

UBS00JGX

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1091, "Diagnostic Procedure" .

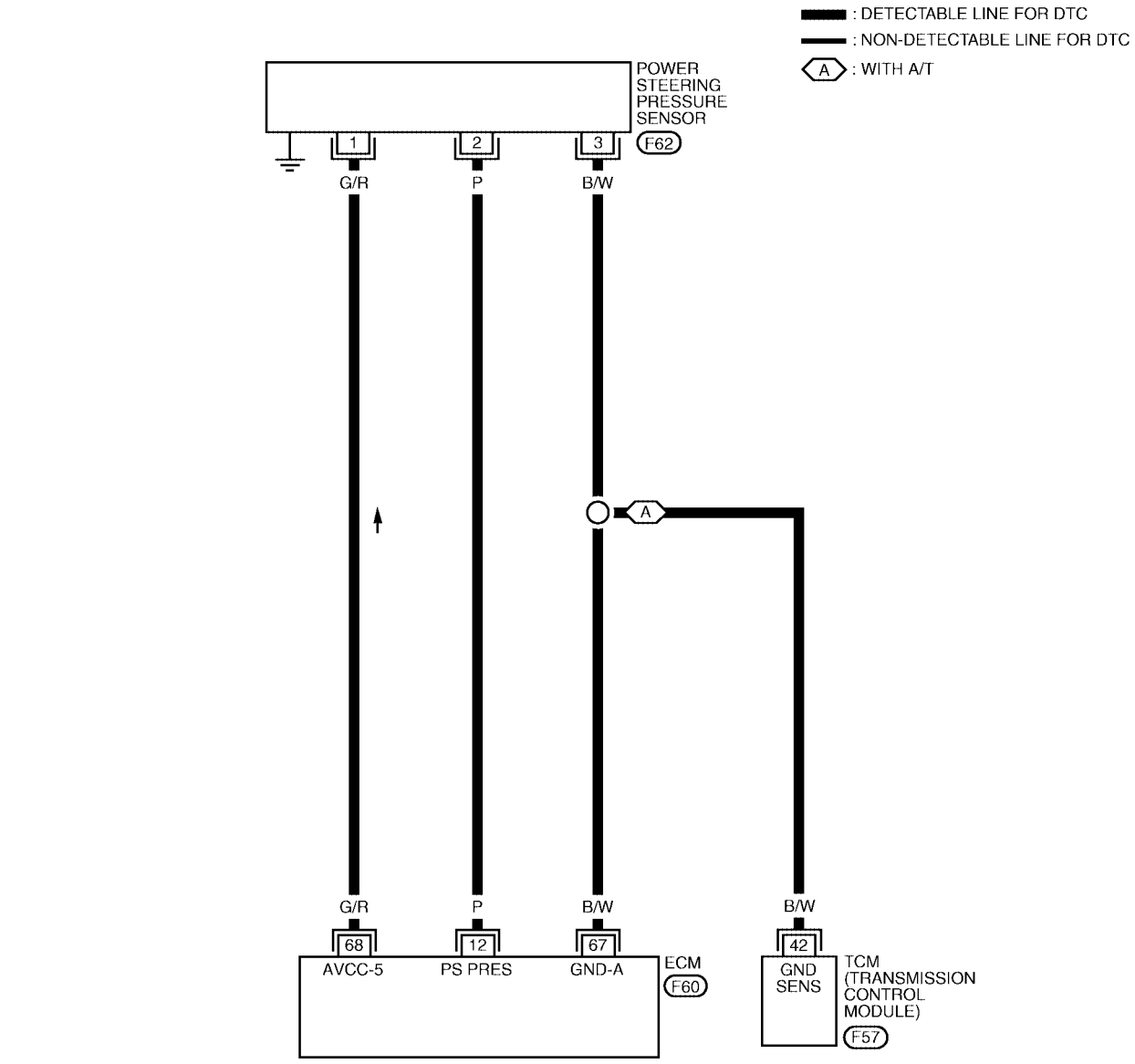
WITH GST

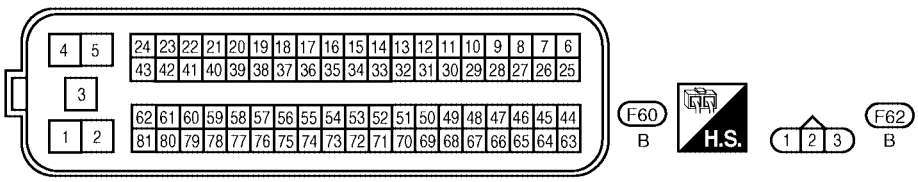
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JGY

EC-PS/SEN-01





REFER TO THE FOLLOWING.
F57 - ELECTRICAL UNITS

BBWA1470E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

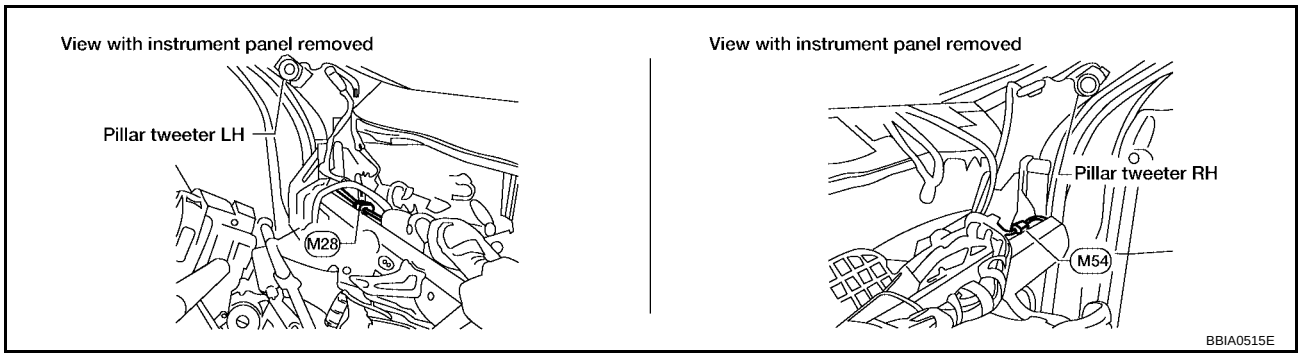
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	P	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned	0.4 - 0.8V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	G/R	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

UBS00JGZ

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .

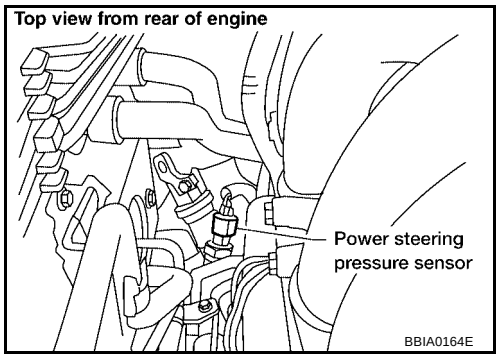


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

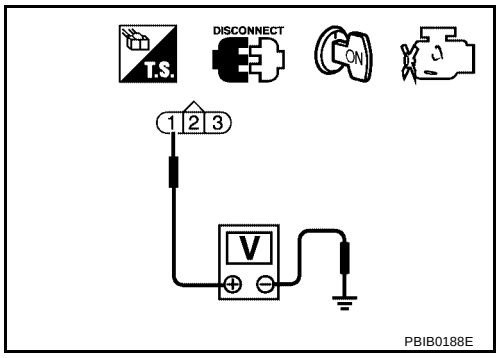
2. CHECK POWER STEERING PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect power steering pressure (PSP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between power steering pressure sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK POWER STEERING PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector (A/T models).
4. Check harness continuity between power steering pressure sensor terminal 3 and ECM terminal 67, TCM terminal 42 (A/T models).

Continuity should exist.

5. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between power steering pressure sensor and ECM
- Harness for open or short between power steering pressure sensor and TCM (A/T models)

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK POWER STEERING PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 12 and power steering pressure sensor terminal 2.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK POWER STEERING PRESSURE SENSOR

Refer to EC-1093, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace power steering pressure sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

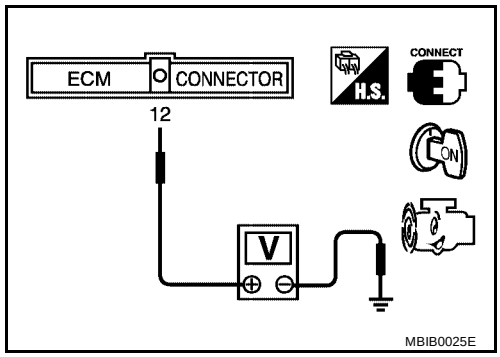
Component Inspection

UBS00JH0

POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.
3. Check voltage between ECM terminal 12 and ground under the following conditions.

Condition	Voltage
Steering wheel is being turned.	0.5 - 4.5V
Steering wheel is not being turned.	0.4 - 0.8V



Removal and Installation

UBS00KPE

POWER STEERING PRESSURE SENSOR

Refer to PS-25, "HYDRAULIC LINE" .

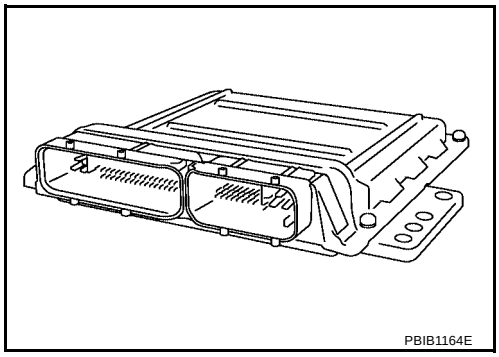
DTC P0605 ECM

PFP:23710

Component Description

UBS00JH1

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


PBIB1164E

On Board Diagnosis Logic

UBS00JH2

This self-diagnosis has one or two trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 0605	Engine control module	A)	ECM calculation function is malfunctioning.	● ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

FAIL-SAFE MODE

ECM enters fail-safe mode when malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode
Malfunction A	● ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ● ECM deactivates ASCD operation.

DTC Confirmation Procedure

UBS00JH3

Perform PROCEDURE FOR MALFUNCTION A first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. If there is no malfunction on PROCEDURE FOR MALFUNCTION B, perform PROCEDURE FOR MALFUNCTION C.

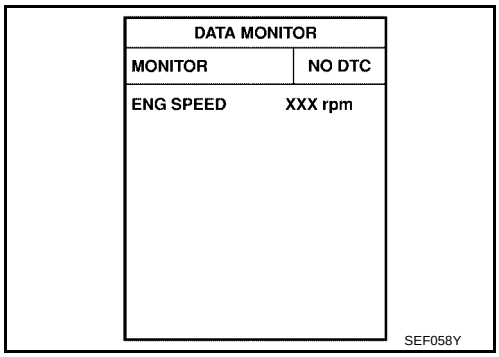
NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-1095, "Diagnostic Procedure" .



SEF058Y

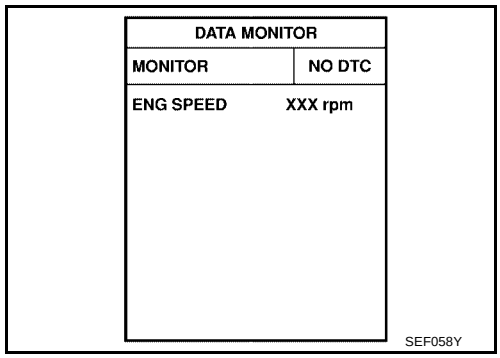
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. If 1st trip DTC is detected, go to EC-1095, "Diagnostic Procedure" .



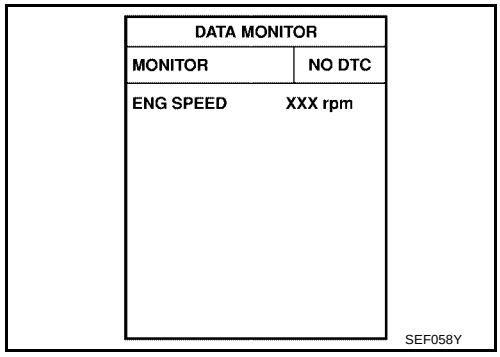
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
4. Repeat step 3 for 32 times.
5. If 1st trip DTC is detected, go to EC-1095, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

UBS00JH4

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-1094 .
5. Is the 1st trip DTC P0605 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-1094 .
5. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to EC-695, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM-NATS)" .
3. Perform EC-748, "VIN Registration" .
4. Perform EC-748, "Accelerator Pedal Released Position Learning" .
5. Perform EC-748, "Throttle Valve Closed Position Learning" .
6. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1031, P1032 A/F SENSOR 1 HEATER

PFP:22693

Description

UBS00JH5

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF duty control of the A/F sensor 1 heater corresponding to the engine operating condition to keep the temperature of A/F sensor 1 element at the specified range.

CONSULT-II Reference Value in Data Monitor Mode

UBS00JH6

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
A/F S1 HTR (B1)	● Engine: After warming up, idle the engine	0 - 100%

On Board Diagnosis Logic

UBS00JH7

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1031 1031	Air fuel ratio (A/F) sensor 1 heater control circuit low	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.)	● Harness or connectors (The A/F sensor 1 heater circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1 heater
P1032 1032	Air fuel ratio (A/F) sensor 1 heater control circuit high	The current amperage in the air fuel ratio (A/F) sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the air fuel ratio (A/F) sensor 1 heater.)	● Harness or connectors (The A/F sensor 1 heater circuit is shorted.) ● Air fuel ratio (A/F) sensor 1 heater

DTC Confirmation Procedure

UBS00JH8

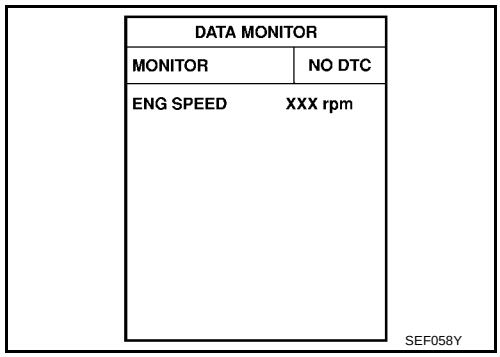
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

With CONSULT-II

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and run it for at least 10 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-1099, "Diagnostic Procedure" .

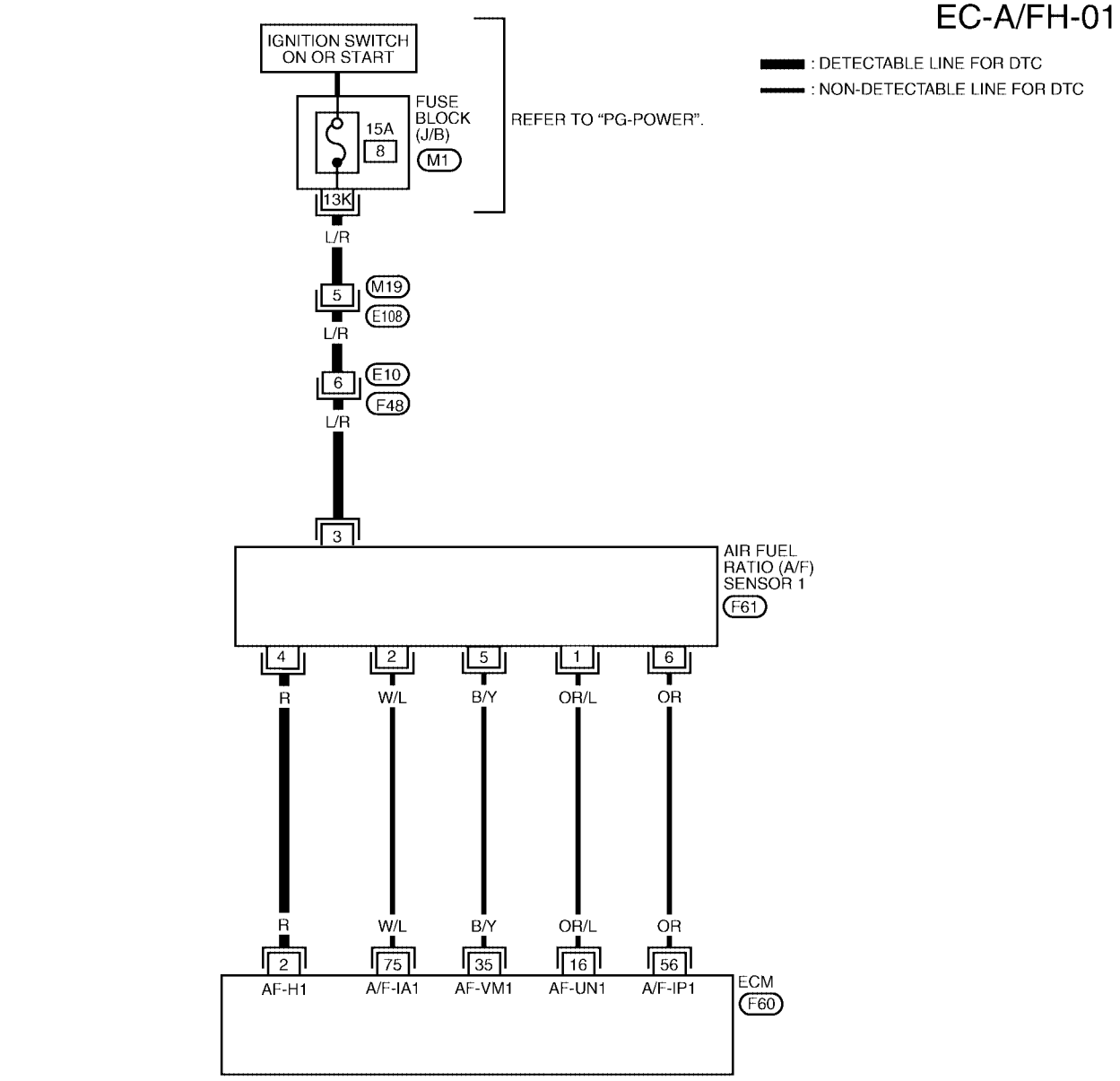


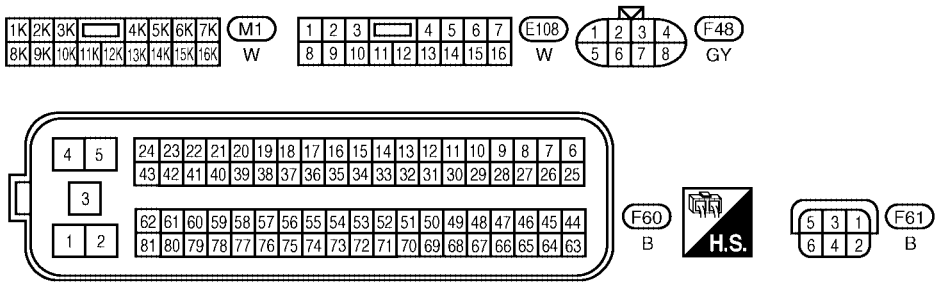
WITH GST

Follow the procedure ″WITH CONSULT-II″ above.

Wiring Diagram

UBS00JH9

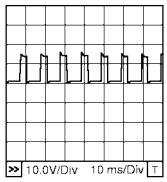




BBWA1471E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	R	A/F sensor 1 heater	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 5V★  PBIB1584E

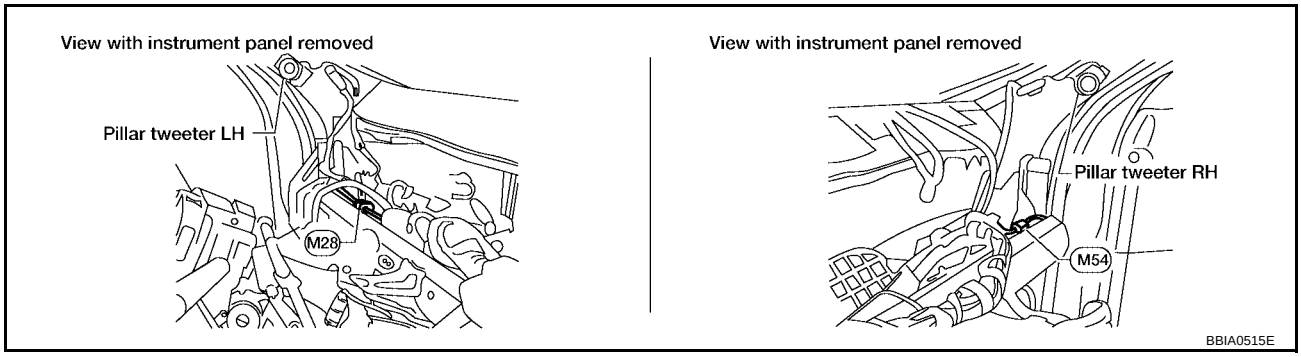
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00JHA

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .

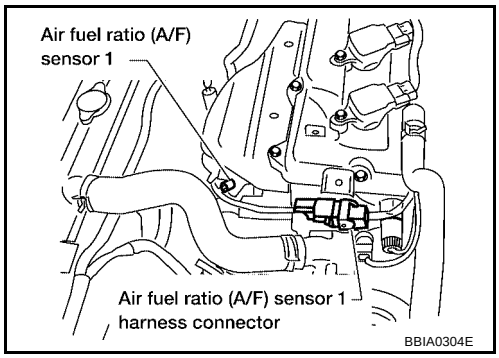


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector.
2. Turn ignition switch ON.

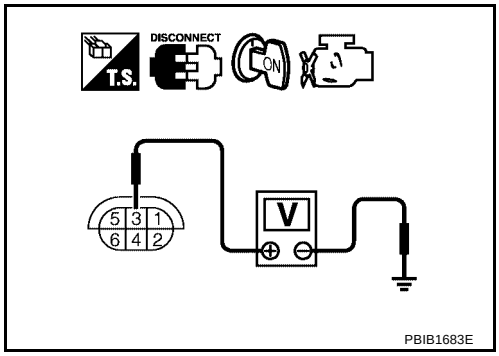


3. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E10, F48
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 2 and A/F sensor 1 terminal 4. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK A/F SENSOR 1 HEATER

Refer to EC-1101, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace A/F sensor 1.

6. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Component Inspection

UBS00JHB

AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Check resistance between terminals 3 and 4.

Resistance: 2.3 - 4.3Ω [at 25°C (77°F)]

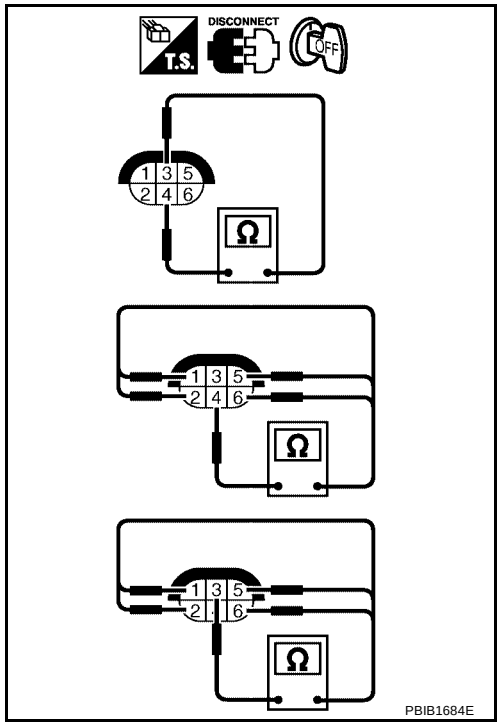
Check continuity between terminals 3 and 1, 2, 5, 6, terminals 4 and 1, 2, 5, 6.

Continuity should not exist.

If NG, replace the A/F sensor 1.

CAUTION:

- **Discard any A/F sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new A/F sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**



Removal and Installation

UBS00JHC

AIR FUEL RATIO SENSOR HEATER

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

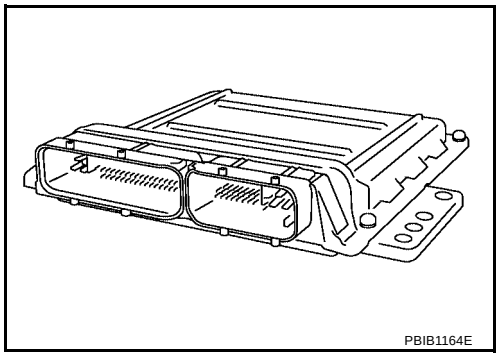
DTC P1065 ECM POWER SUPPLY

PFP:23710

Component Description

UBS00JHD

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the Idle Air Volume Learning value memory, etc.


PBIB1164E

On Board Diagnosis Logic

UBS00JHE

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065 1065	ECM power supply circuit	ECM back-up RAM system does not function properly.	● Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] ● ECM

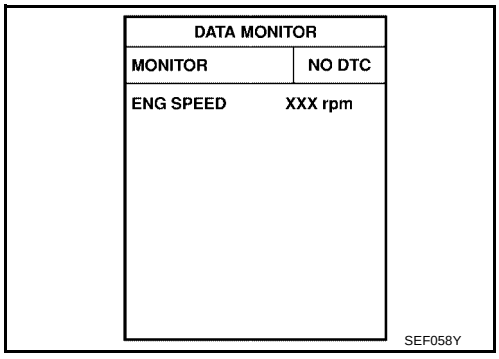
DTC Confirmation Procedure

UBS00JHF

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
5. Repeat steps 3 and 4 for 4 times.
6. If 1st trip DTC is detected, go to EC-1104, "Diagnostic Procedure" .



SEF058Y

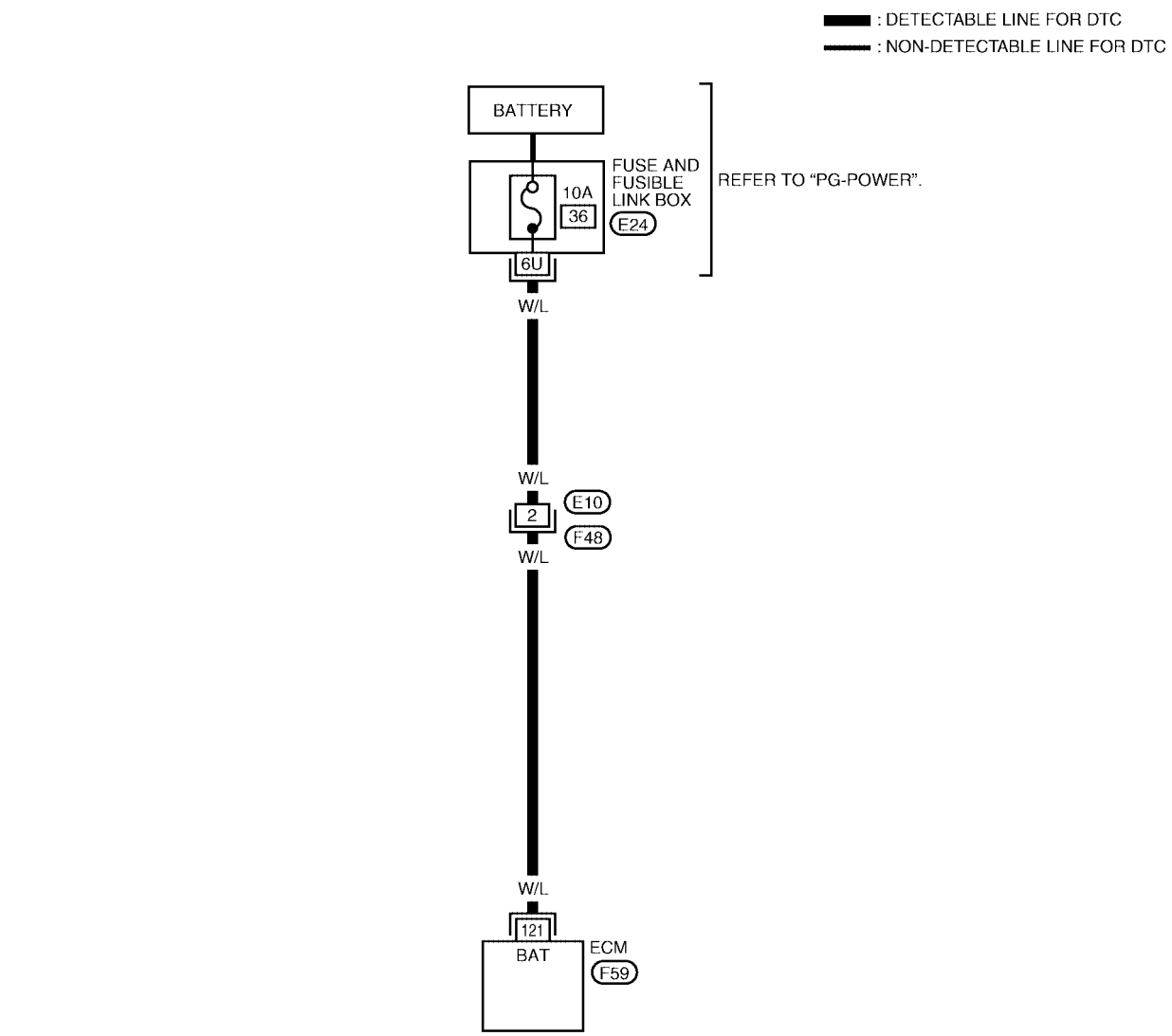
WITH GST

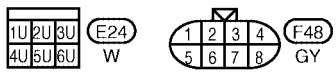
Follow the procedure “WITH CONSULT-II” above.

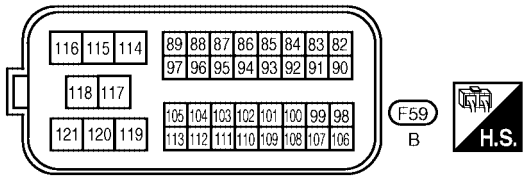
Wiring Diagram

UBS00JHG

EC-ECM/PW-01







BBWA1437E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

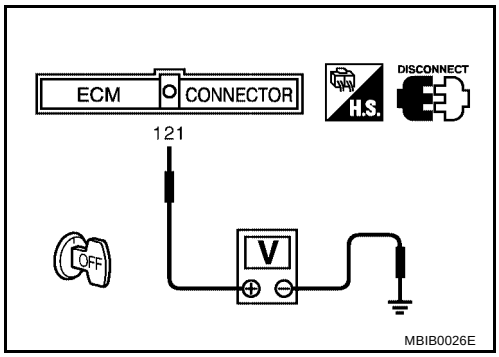
Diagnostic Procedure

UBS00JHH

1. CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- 10A fuse
- Harness for open or short between ECM and battery
- Fuse and fusible link box connector E24

>> Repair or replace harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-1102 .
5. Is the 1st trip DTC P1065 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. Touch “ERASE”.
4. **Perform “DTC Confirmation Procedure”.**
   See EC-1102 .
5. Is the 1st trip DTC P1065 displayed again?

Yes or No

Yes >> GO TO 5.
No >> **INSPECTION END**

5. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NVIS (NATS) system and registration of all NVIS (NATS) ignition key IDs. Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .
3. Perform EC-748, "VIN Registration" .
4. Perform EC-748, "Accelerator Pedal Released Position Learning" .
5. Perform EC-748, "Throttle Valve Closed Position Learning" .
6. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

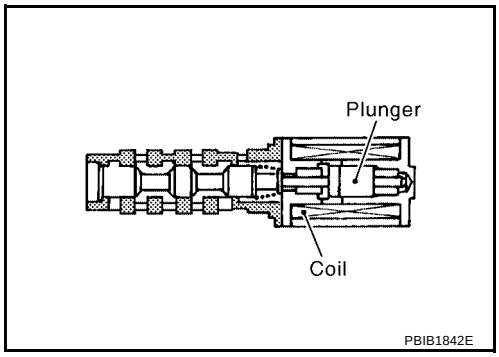
DTC P1111 IVT CONTROL SOLENOID VALVE

PFP:23796

Component Description

UBS00JHI

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JHJ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	0% - 2%
		2,000 rpm	Approx. 25% - 60%

On Board Diagnosis Logic

UBS00JHK

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111 1111	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	● Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) ● Intake valve timing control solenoid valve

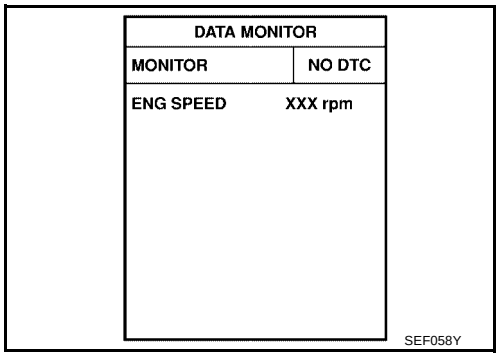
DTC Confirmation Procedure

UBS00JHL

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If 1st trip DTC is detected, go to EC-1108, "Diagnostic Procedure" .



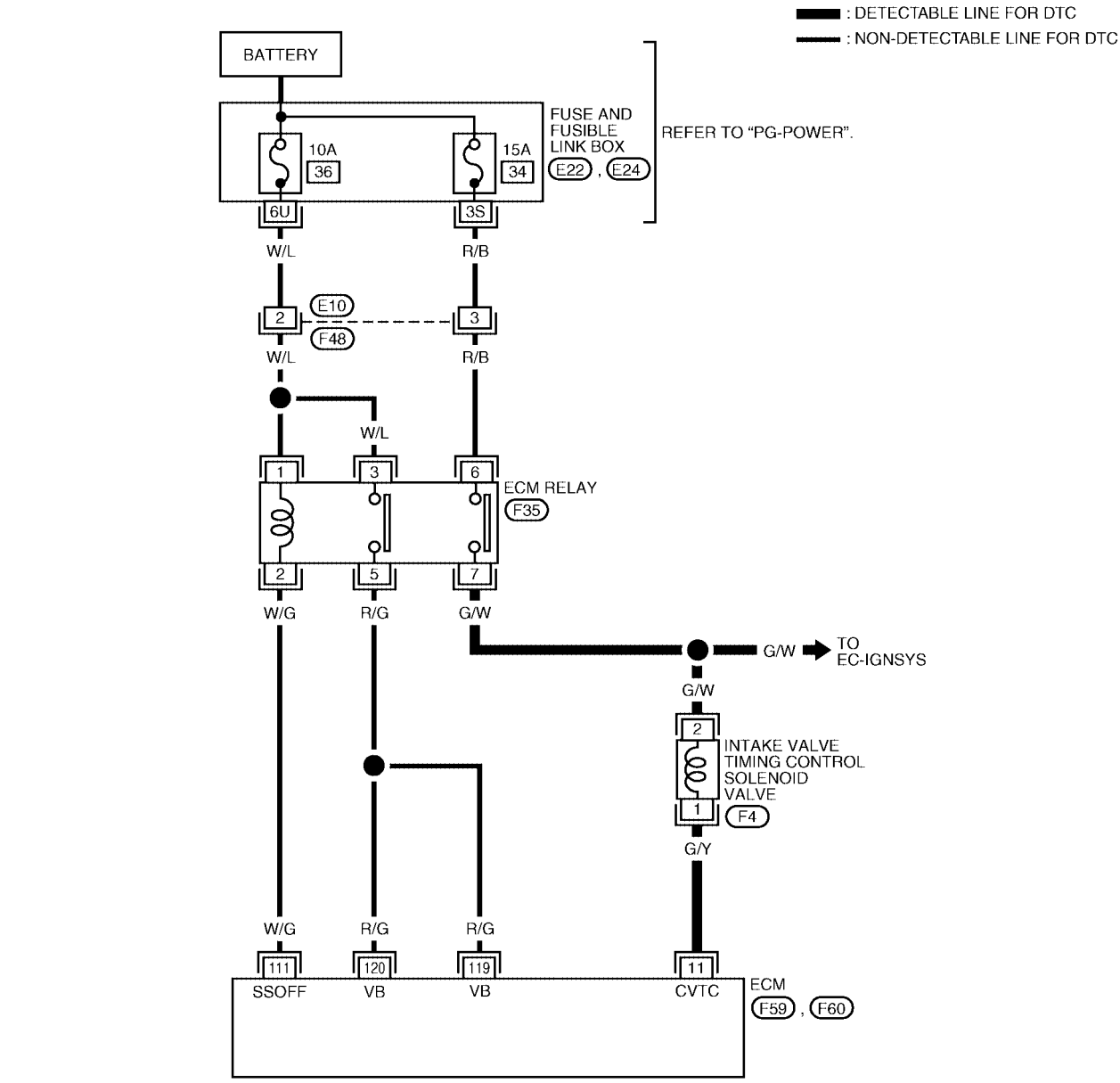
WITH GST

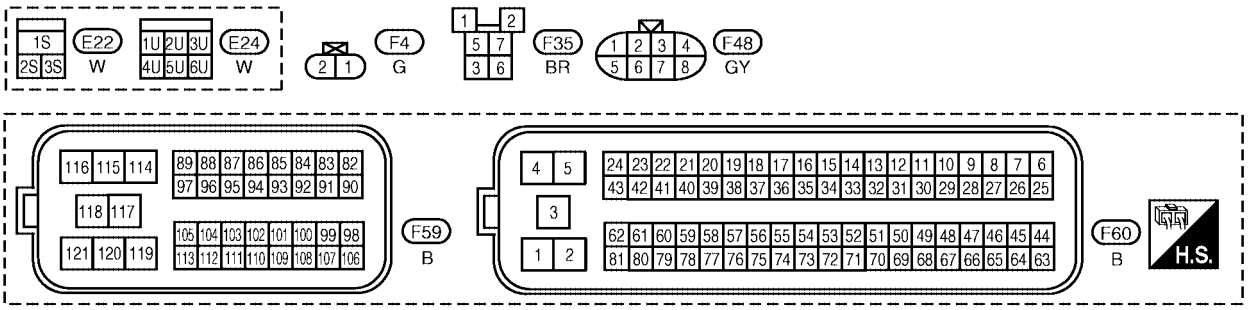
Following the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JHM

EC-IVC-01

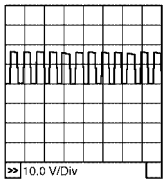




BBWA1465E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
11	G/Y	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed 2,500 rpm	7 - 10V★  PBIB1790E

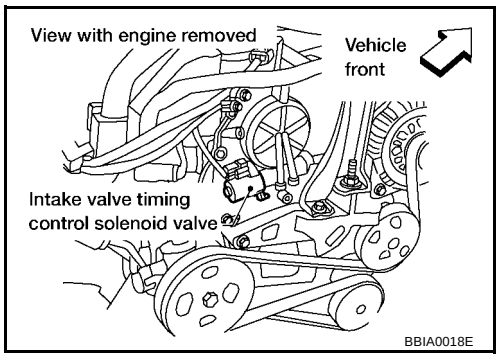
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00JHN

1. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.
3. Turn ignition switch ON.

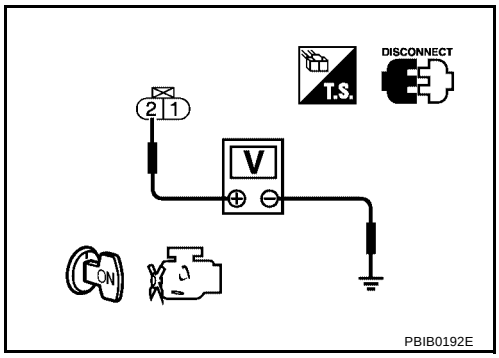


4. Check voltage between intake valve timing control solenoid valve terminal 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



2. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 11 and intake valve timing control solenoid valve terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-1109, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace intake valve timing control solenoid valve.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

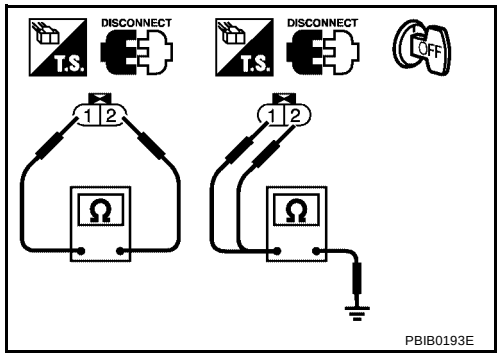
Component Inspection

UBS00JHO

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve as follows.

Terminal	Resistance
1 and 2	Approximately 8 Ω [at 20°C (68°F)]
1 or 2 and ground	(Continuity should not exist.)

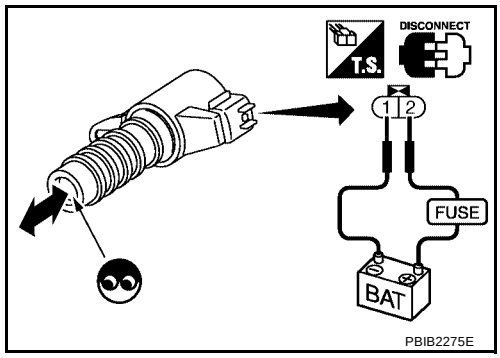


If NG, replace intake valve timing control solenoid valve.
If OK, go to next step.

3. Remove intake valve timing control solenoid valve.
4. Provide 12V DC between intake valve timing control solenoid valve terminals and then interrupt it. Make sure that the plunger moves as shown in the figure.

CAUTION:
Do not apply 12V DC continuously for 5 seconds or more. Doing so may result in damage to the coil in intake valve timing control solenoid valve.
If NG, replace intake valve timing control solenoid valve.

NOTE:
Always replace O-ring when intake valve timing control solenoid valve is removed.



Removal and Installation

UBS00JHP

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-136, "TIMING CHAIN" .

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

PFP:16119

Component Description

UBS00JHQ

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

UBS00JHR

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121 1121	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	● Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detects the throttle valve is stuck open.	

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position, and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

UBS00JHS

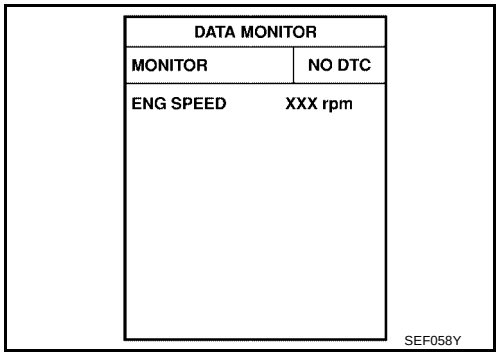
NOTE:

- **Perform PROCEDURE FOR MALFUNCTION A AND B first. If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION C.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A AND B

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift shift lever to D position (A/T) or 1st position (M/T), and wait at least 3 seconds.
4. Shift shift lever to P position (A/T) or Neutral position (M/T).
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Turn ignition switch ON and wait at least 1 second.
7. Shift shift lever to D position (A/T) or 1st position (M/T), and wait at least 3 seconds.
8. Shift shift lever to P position (A/T) or Neutral position (M/T).
9. Turn ignition switch OFF, wait at least 10 seconds, and then turn ON.
10. If DTC is detected, go to EC-1111, "Diagnostic Procedure" .



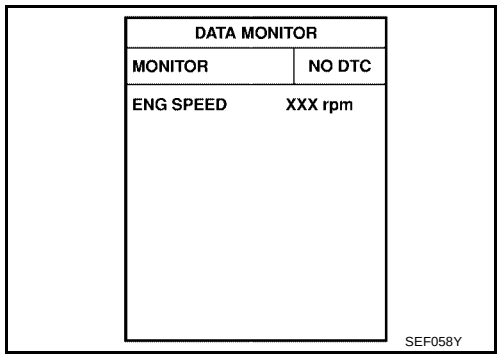
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift shift lever to D position (A/T) or 1st position (M/T) and wait at least 3 seconds.
4. Shift shift lever to N, P position (A/T) or Neutral (M/T) position.
5. Start engine and let it idle for 3 seconds.
6. If DTC is detected, go to EC-1111, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

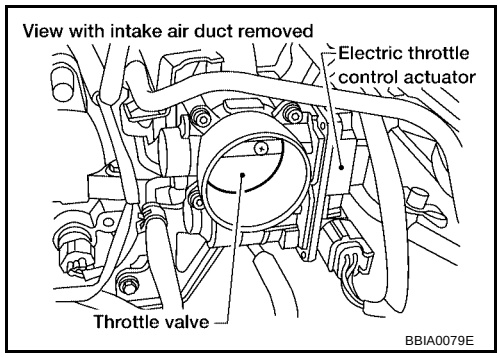
UBS00JHT

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-748, "Throttle Valve Closed Position Learning" .
3. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

PFP:16119

Description

UBS00JHU

NOTE:
If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-1110 or EC-1119 .
Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

UBS00JHV

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122 1122	Electric throttle control performance problem	Electric throttle control function does not operate properly.	● Harness or connectors (Throttle control motor circuit is open or shorted) ● Electric throttle control actuator

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

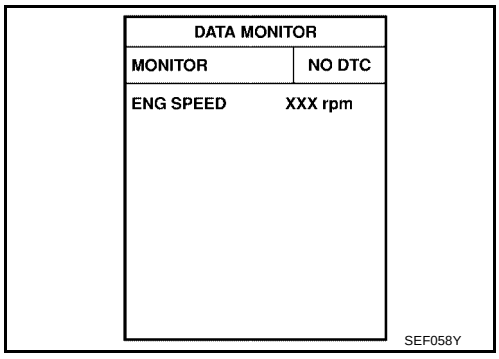
DTC Confirmation Procedure

UBS00JHW

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-1114, "Diagnostic Procedure" .

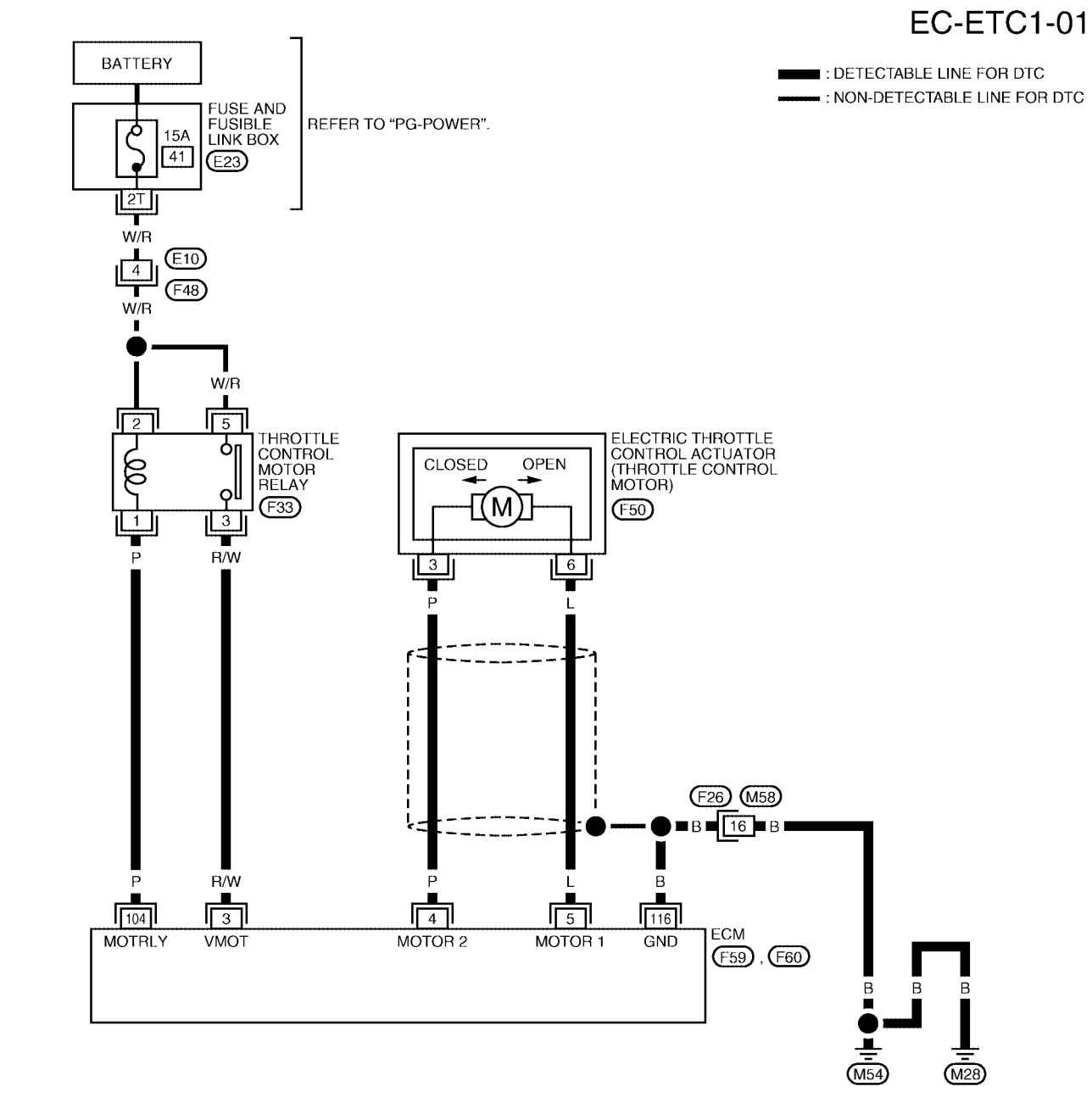


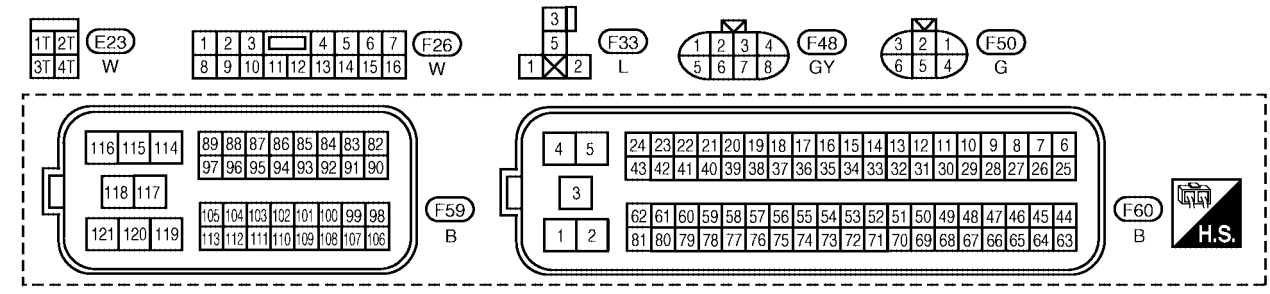
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JHX

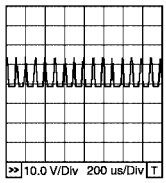
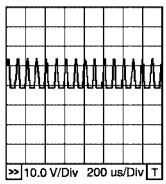




BBWA1466E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	R/W	Throttle control motor power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	P	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB0534E
5	L	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB0533E
104	P	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

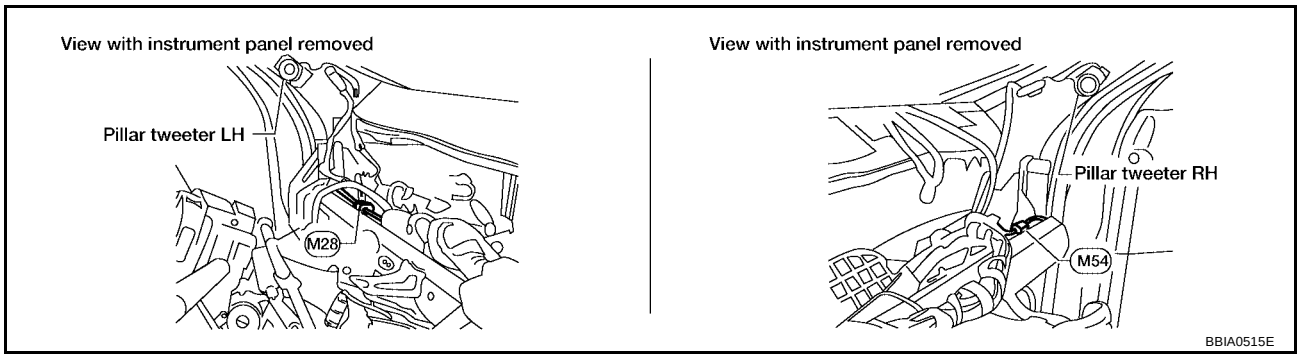
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00JHY

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .



BBIA0515E

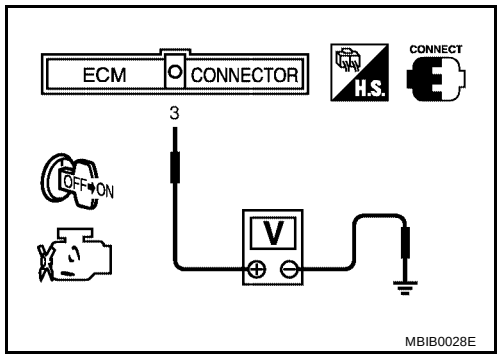
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE CONTROL MOTOR RELAY SIGNAL CIRCUIT

Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

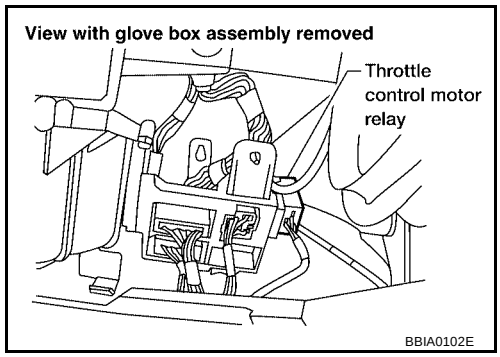


OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

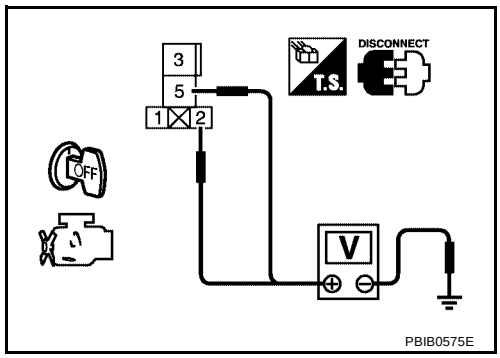
3. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect throttle control motor relay.



3. Check voltage between throttle control motor relay terminals 2, 5 and ground.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Fuse and fusible link box connector E23
- 15A fuse
- Harness for open or short between throttle control motor relay and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 3 and throttle control motor relay terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check continuity between ECM terminal 104 and throttle control motor relay terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK THROTTLE CONTROL MOTOR RELAY

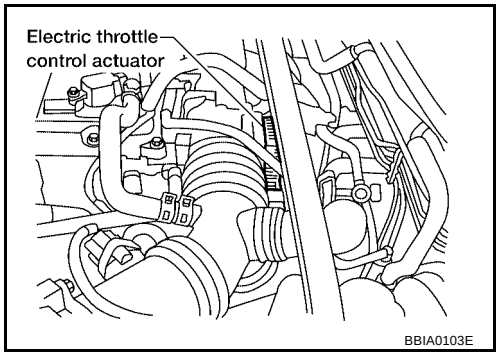
Refer to EC-1117, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace throttle control motor relay.

8. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
3	4	Should exist
	5	Should not exist
6	4	Should not exist
	5	Should exist

5. Also check harness for short to ground and short to power.

OK or NG

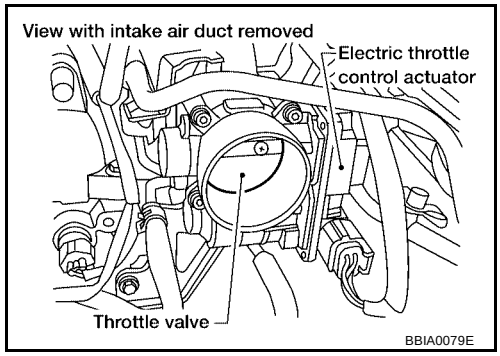
OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 10.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



10. CHECK THROTTLE CONTROL MOTOR

Refer to EC-1117, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 12.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"

OK or NG

OK >> GO TO 12.
NG >> Repair or replace harness or connectors.

12. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-748, "Throttle Valve Closed Position Learning" .
3. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

Component Inspection

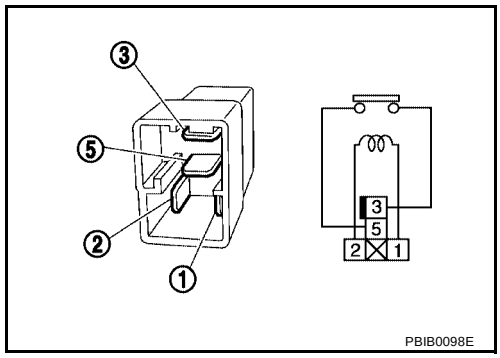
UBS00JHZ

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.



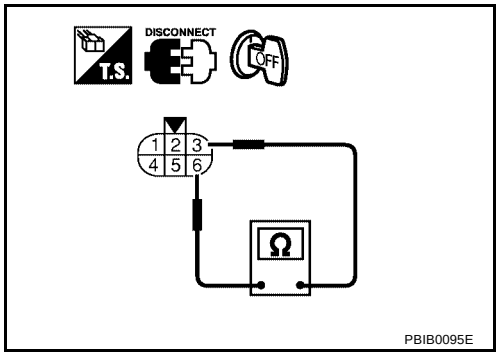
THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.

2. Check resistance between terminals 3 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-748, "Throttle Valve Closed Position Learning" .
5. Perform EC-749, "Idle Air Volume Learning" .



Remove and Installation

UBS00JI0

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-108, "INTAKE MANIFOLD" .

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

PFP:16119

Component Description

UBS00JI1

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

CONSULT-II Reference Value in Data Monitor Mode

UBS00JI2

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	● Ignition switch: ON	ON

On Board Diagnosis Logic

UBS00JI3

These self-diagnoses have one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124 1124	Throttle control motor relay circuit short	ECM detects the throttle control motor relay is stuck ON.	● Harness or connectors (Throttle control motor relay circuit is shorted) ● Throttle control motor relay
P1126 1126	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	● Harness or connectors (Throttle control motor relay circuit is open) ● Throttle control motor relay

FAIL-SAFE MODE

When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

UBS00JI4

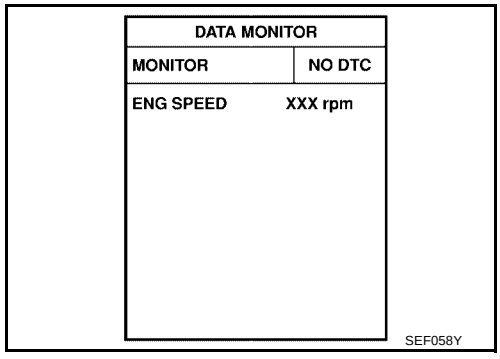
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P1124

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-1122, "Diagnostic Procedure" .



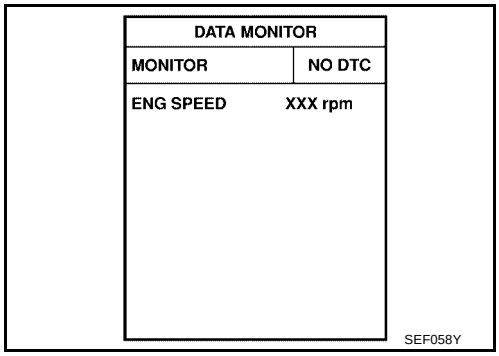
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR DTC P1126

With CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-1122, "Diagnostic Procedure" .

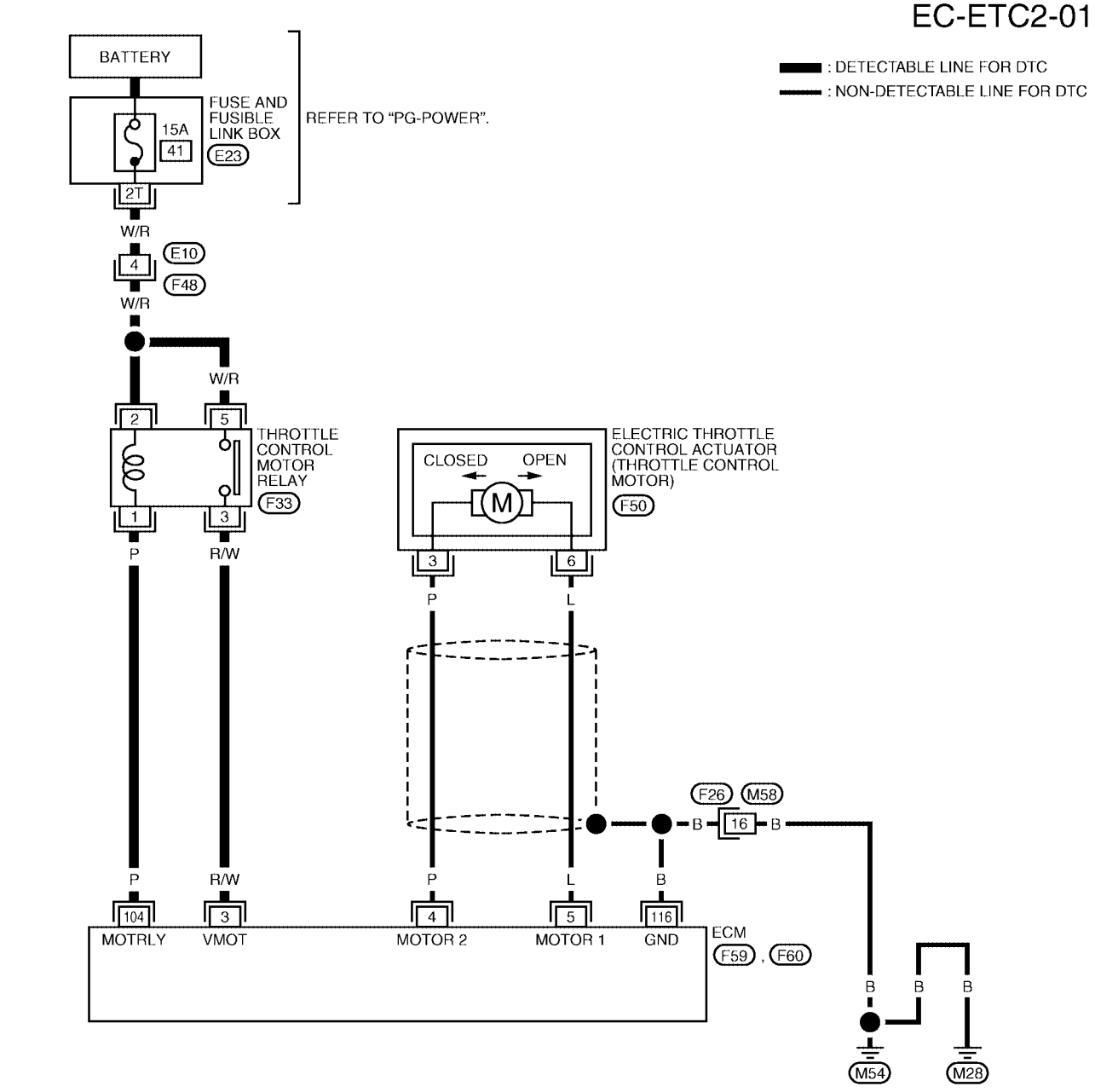


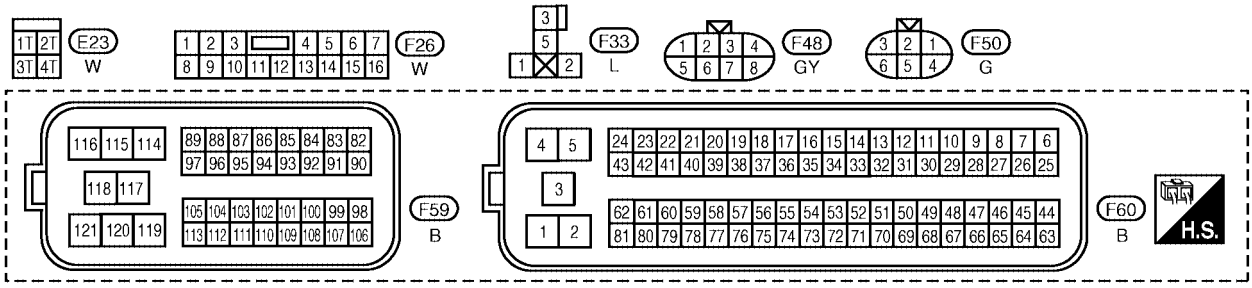
With GST

Follow the procedure “With CONSULT-II” above.

Wiring Diagram

UBS00JI5





BBWA1467E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

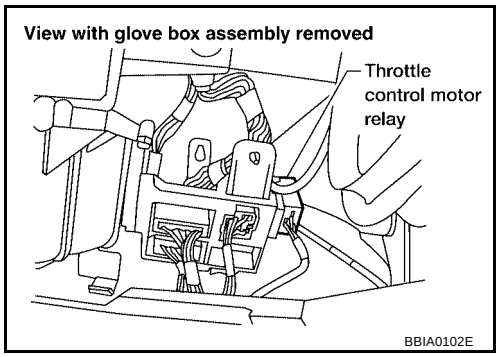
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	R/W	Throttle control motor power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
104	P	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

Diagnostic Procedure

UBS00JI6

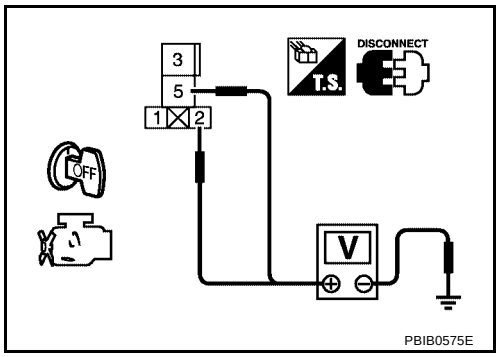
1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect throttle control motor relay harness connector.



3. Check voltage between throttle control motor relay terminal 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Fuse and fusible link box connector E23
- 15A fuse
- Harness for open or short between throttle control motor relay and battery

>> Repair or replace harness or connectors.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check continuity between ECM terminal 3 and throttle control motor relay terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check continuity between ECM terminal 104 and throttle control motor relay terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE CONTROL MOTOR RELAY

Refer to EC-1123, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace throttle control motor relay.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

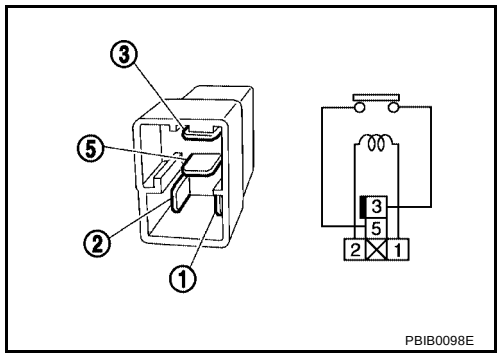
UBS00KK6

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.



DTC P1128 THROTTLE CONTROL MOTOR

PFP:16119

Component Description

UBS00JI7

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

UBS00JI8

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128 1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	● Harness or connectors (Throttle control motor circuit is shorted.) ● Electric throttle control actuator (Throttle control motor)

FAIL-SAFE MODE
When the malfunction is detected, ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

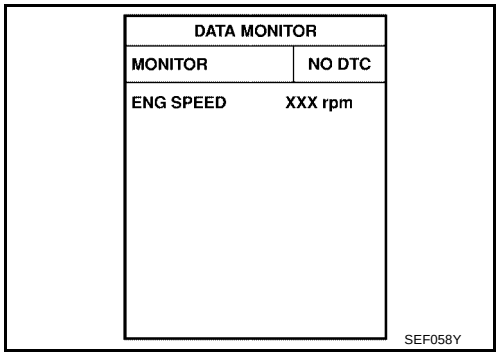
DTC Confirmation Procedure

UBS00JI9

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-1126, "Diagnostic Procedure" .

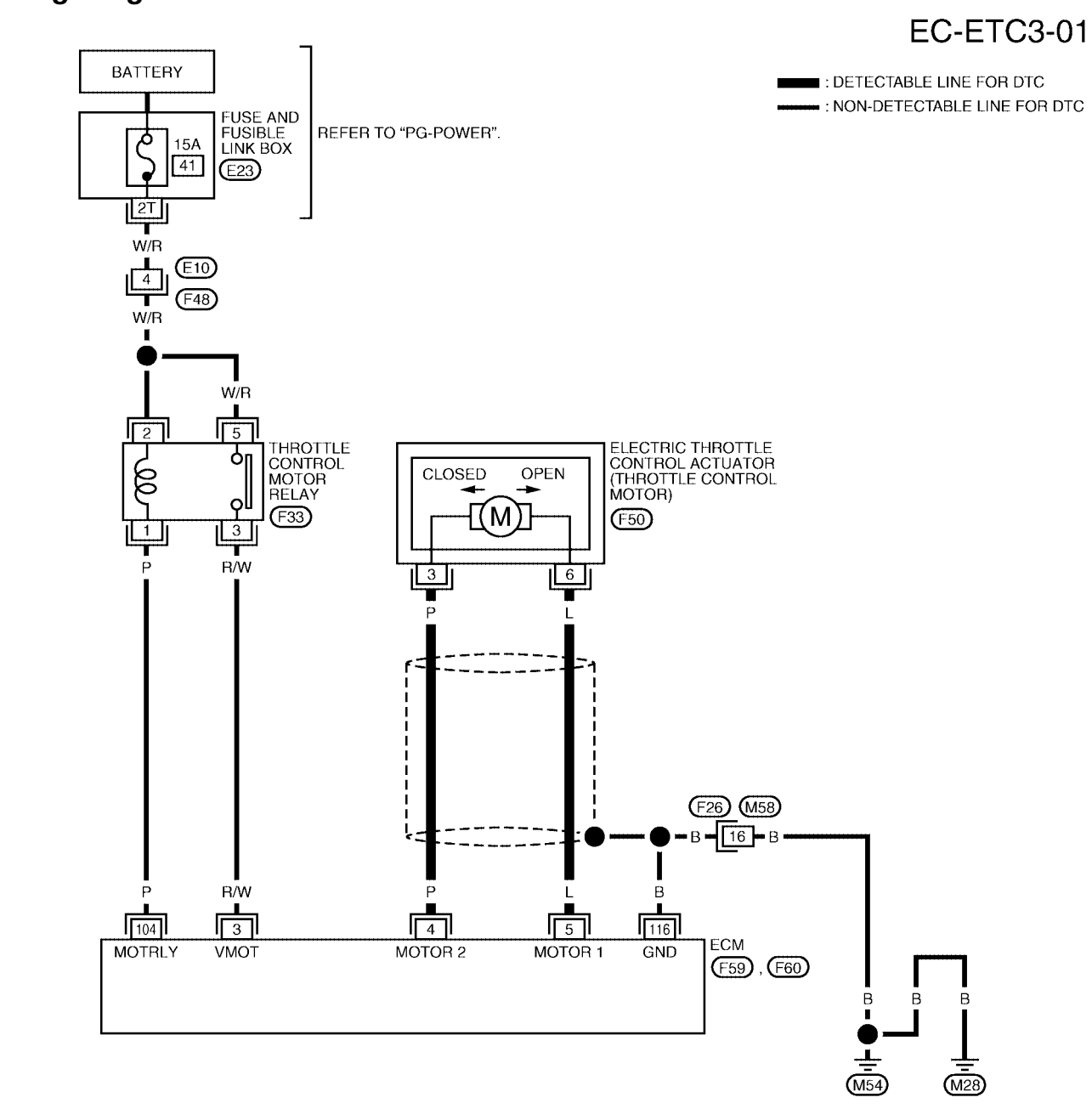


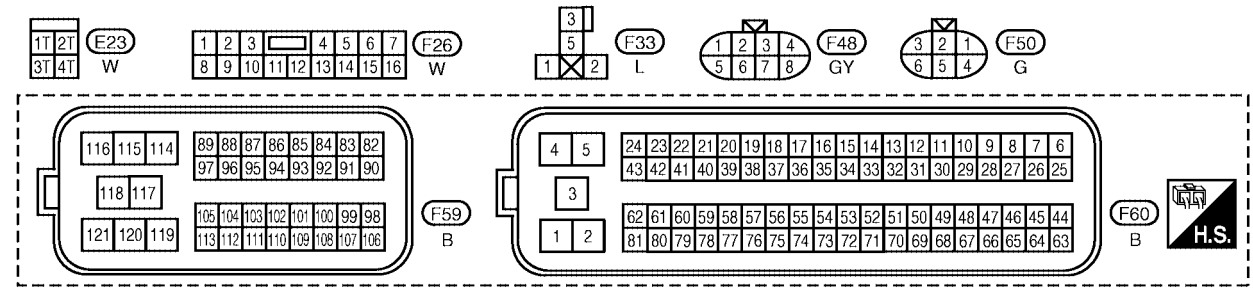
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JIA

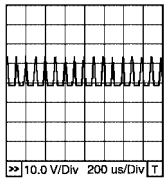
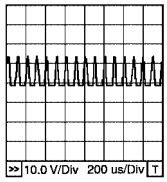




BBWA1468E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	P	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB0534E
5	L	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB0533E

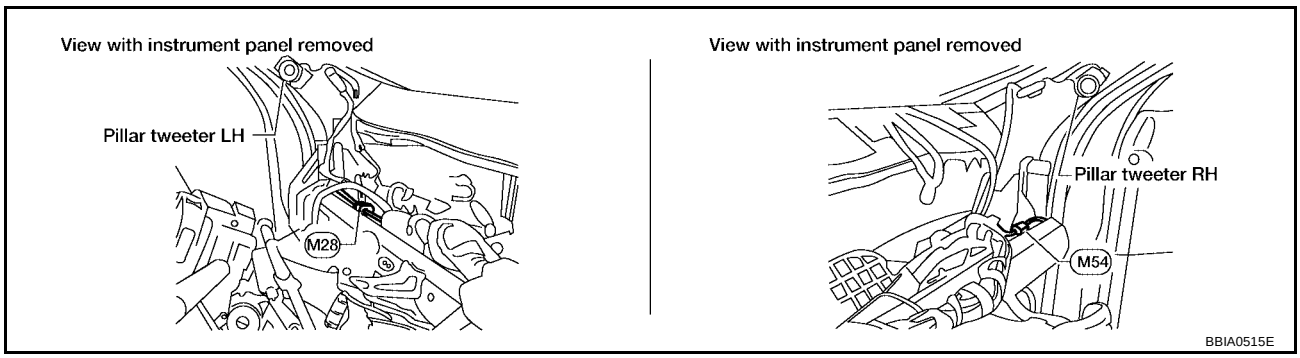
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00JIB

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .

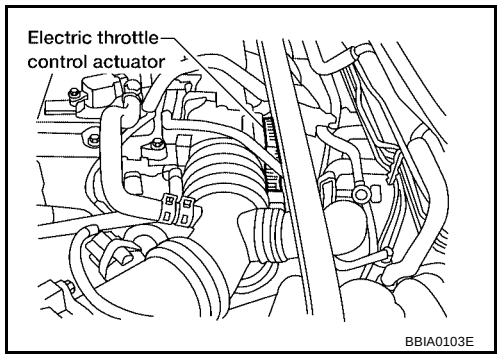


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
3	4	Should exist
	5	Should not exist
6	4	Should not exist
	5	Should exist

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK THROTTLE CONTROL MOTOR

Refer to EC-1127, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-748, "Throttle Valve Closed Position Learning" .
3. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

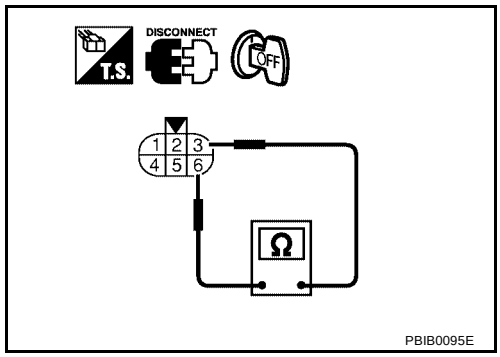
Component Inspection

UBS00JIC

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 3 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]



3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-748, "Throttle Valve Closed Position Learning" .
5. Perform EC-749, "Idle Air Volume Learning" .

Removal and Installation

UBS00JID

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-108, "INTAKE MANIFOLD" .

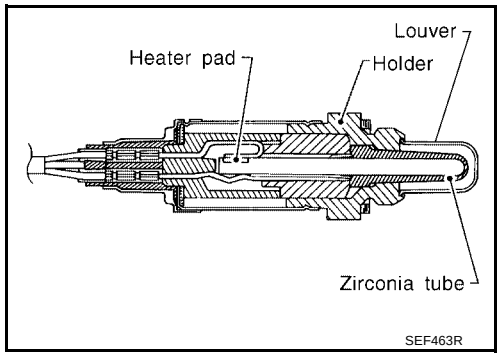
DTC P1143 HO2S1

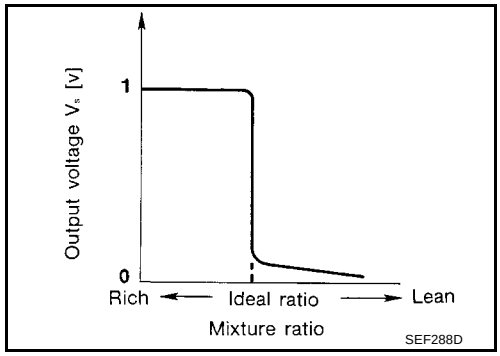
PFP:22690

Component Description

UBS00JX1

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

UBS00JX2

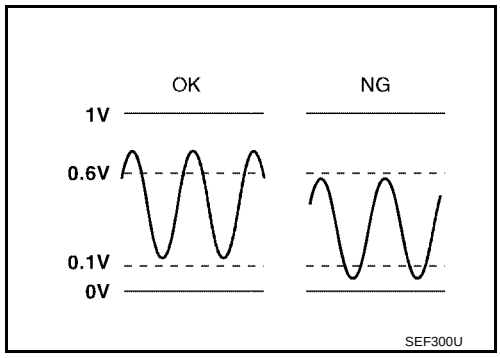
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

UBS00JX3

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the rich output is sufficiently high and whether the lean output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1143 1143	Heated oxygen sensor 1 lean shift monitoring	The maximum and minimum voltage from the sensor are not reached to the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Fuel injector ● Intake air leaks

DTC Confirmation Procedure

UBS00JX4

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

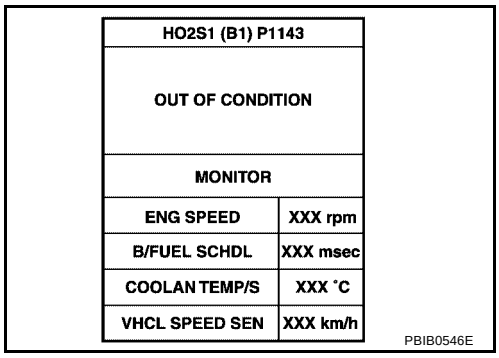
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P1143” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

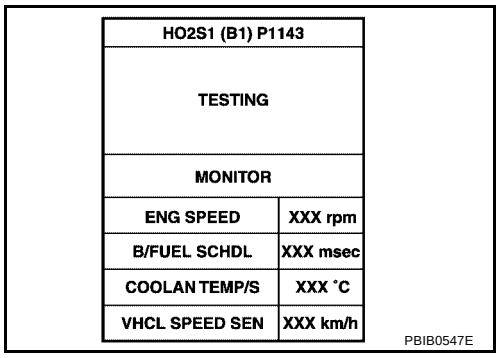
   NOTE:

   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.



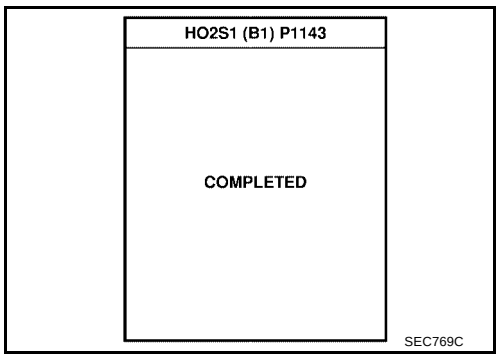
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,200 - 3,200 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	1.9 - 13.0 msec
Shift lever	Suitable position



   If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-1131, "Diagnostic Procedure" .



Overall Function Check

UBS00JX5

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

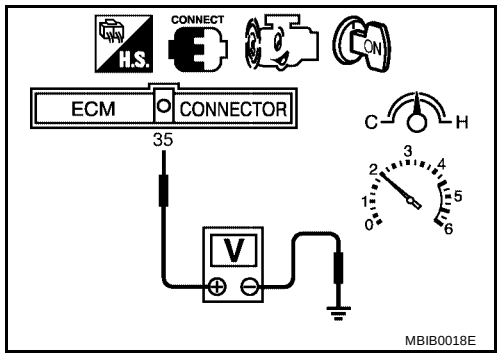
WITH GST

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes between ECM terminal 35 [HO2S1(B1) signal] and engine ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.

- The maximum voltage is over 0.6V at at least 1 time.
- The minimum voltage is over 0.1V at at least 1 time.

4. If NG, go to EC-1131, "Diagnostic Procedure" .

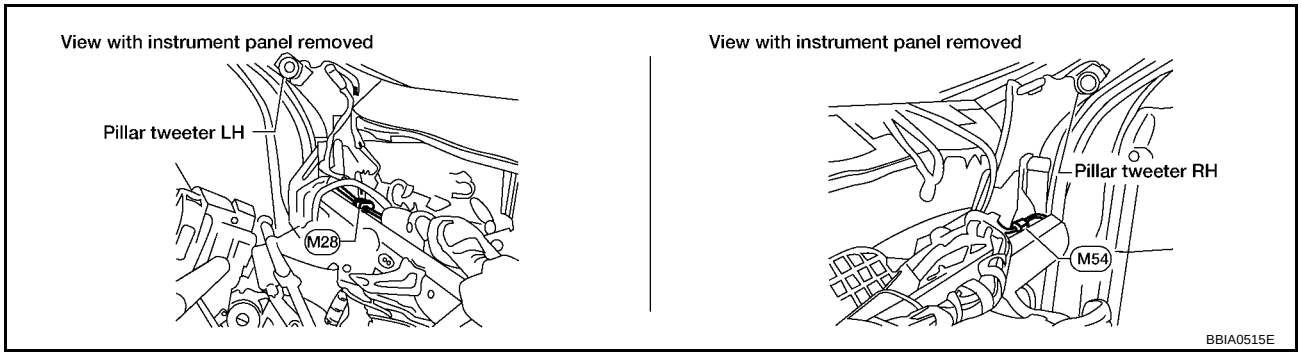


Diagnostic Procedure

UBS00JX6

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

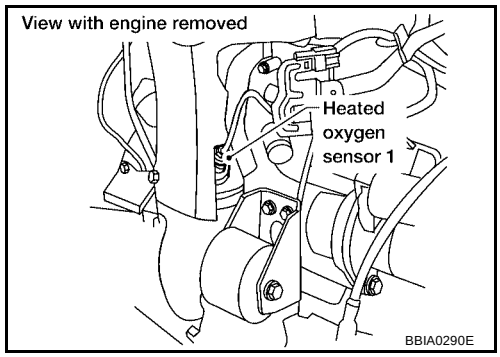
2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque:

40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

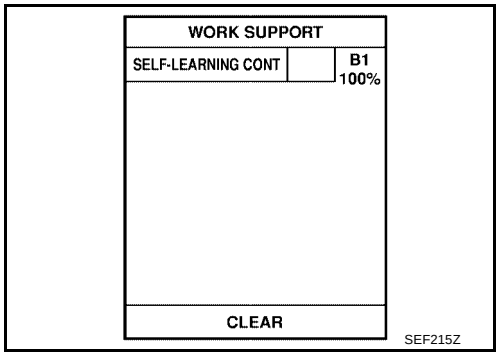
>> GO TO 3.



3. CLEAR THE SELF-LEARNING DATA

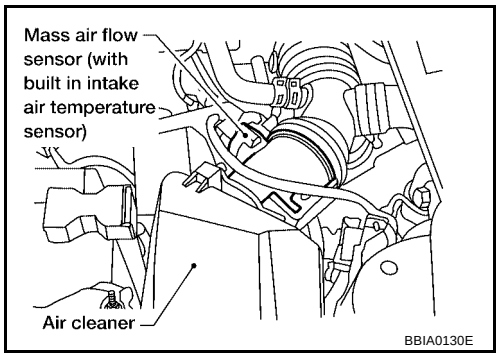
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-941 .
No >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-852, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 1.

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-1133, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-905, "Wiring Diagram" .

>> **INSPECTION END**

Component Inspection

UBS00JX7

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

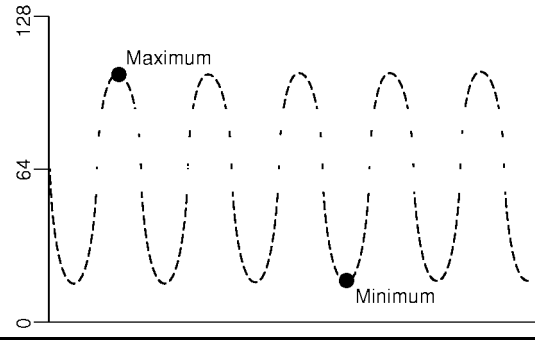
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH”more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

CAUTION:

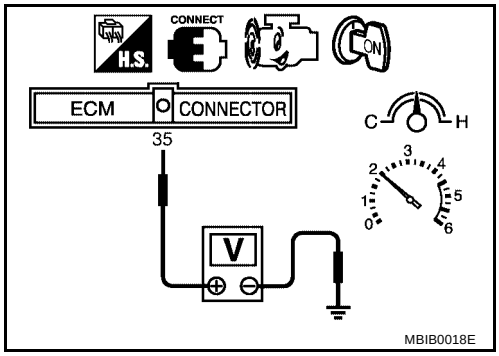
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least 1 time.
   - The minimum voltage is below 0.3V at least 1 time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00JX8

HEATED OXYGEN SENSOR 1

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

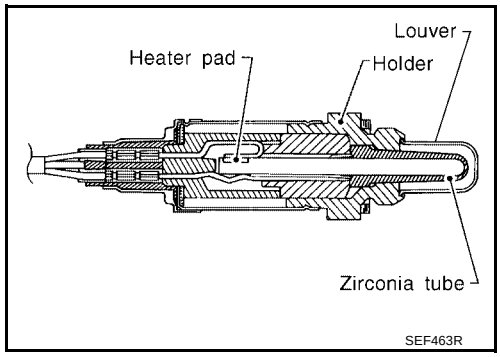
DTC P1144 HO2S1

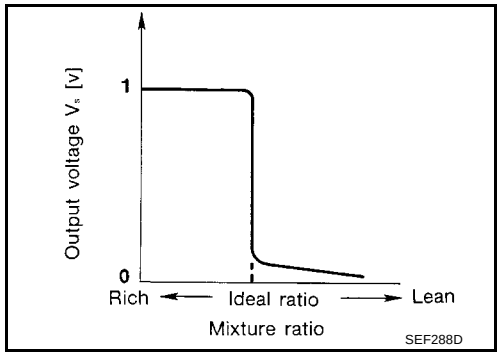
PFP:22690

Component Description

UBS00JX9

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

UBS00JXA

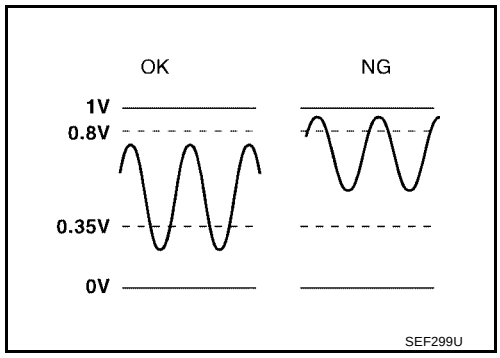
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

UBS00JXB

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the rich output is sufficiently high and lean output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1144 1144	Heated oxygen sensor 1 rich shift monitoring	The maximum and minimum voltages from the sensor are beyond the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Fuel injector

DTC Confirmation Procedure

UBS00JXC

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

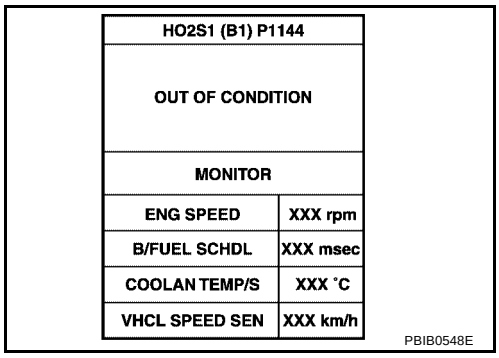
- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 5 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P1144” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

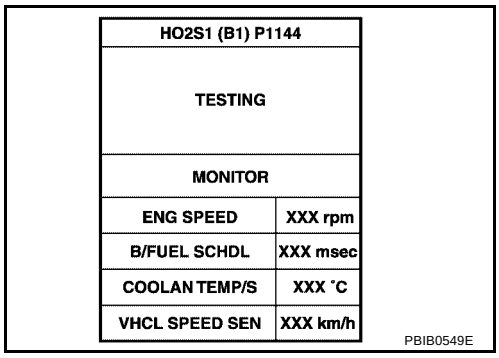
   NOTE:

   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.



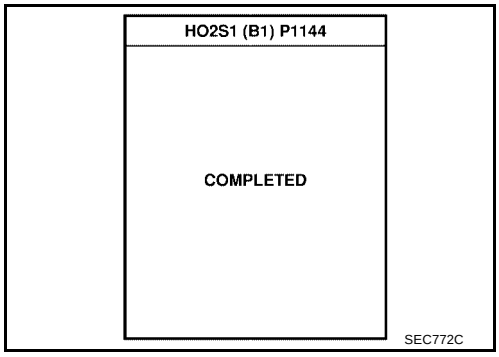
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	1,200 - 3,200 rpm
Vehicle speed	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	1.9 - 13.0 msec
Shift lever	Suitable position



   If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-1137, "Diagnostic Procedure" .



Overall Function Check

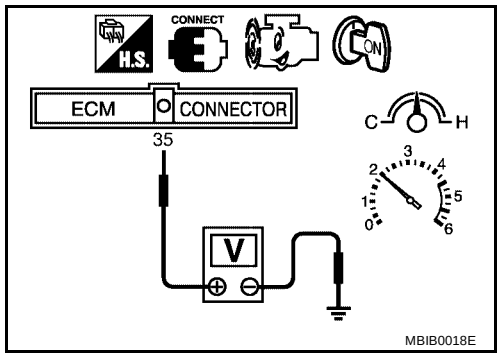
UBS00JXD

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.

2. Set voltmeter probes between ECM terminal 35 [HO2S1(B1) signal] and ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.
   - The maximum voltage is below 0.8V at at least 1 time.
   - The minimum voltage is below 0.35V at at least 1 time.
4. If NG, go to EC-1137, "Diagnostic Procedure" .

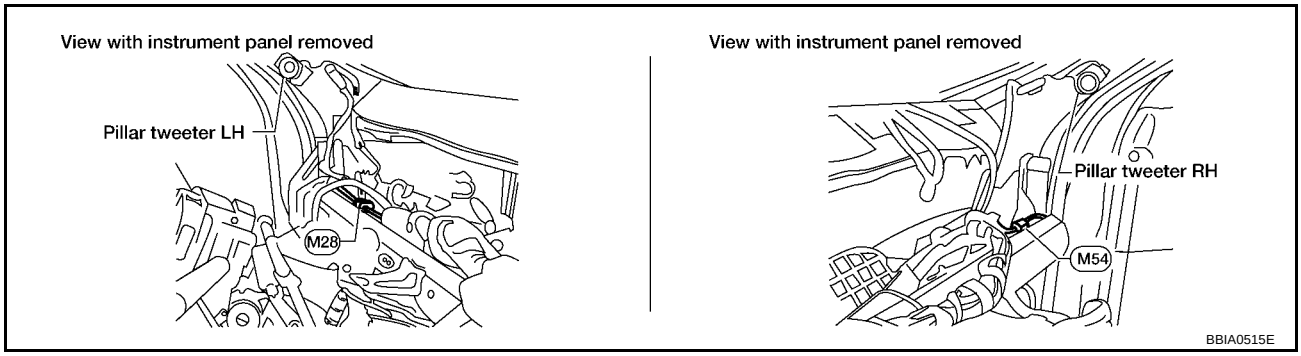


Diagnostic Procedure

UBS00JXE

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .



OK or NG

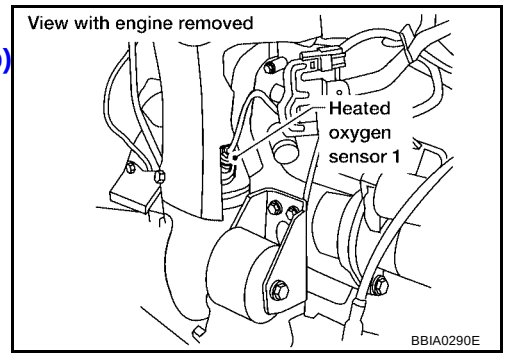
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

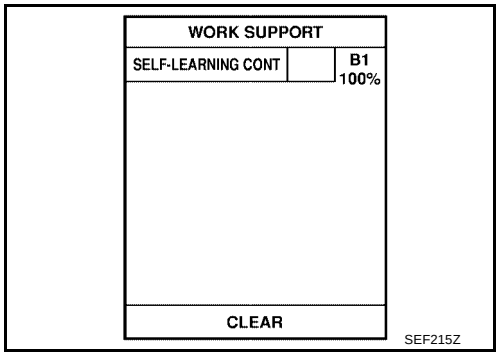
>> GO TO 3.



3. CLEAR THE SELF-LEARNING DATA

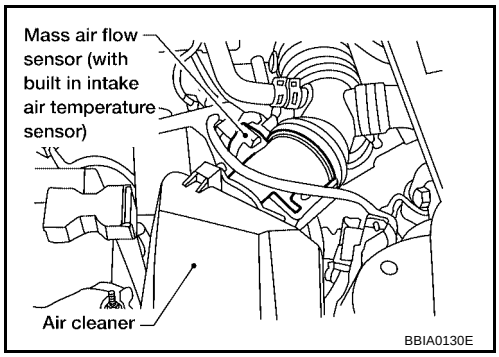
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



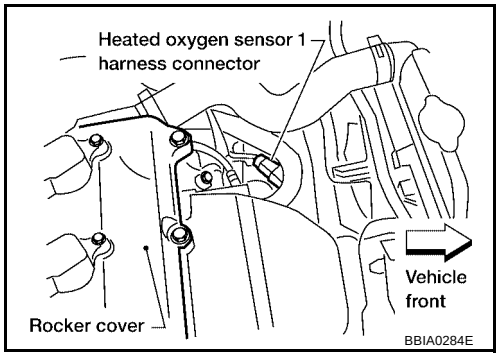
Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-952 .
No >> GO TO 4.

4. CHECK HO2S1 CONNECTOR FOR WATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check connectors for water.

Water should not exist.



OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-852, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-1139, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace heated oxygen sensor 1.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-905, "Wiring Diagram" .

>> **INSPECTION END**

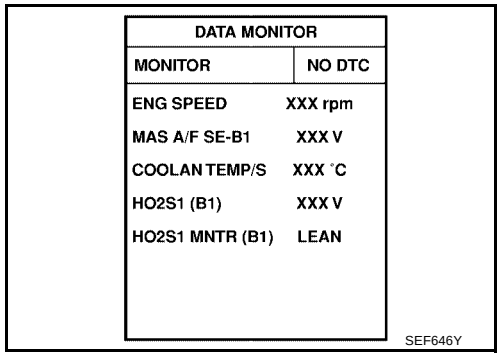
Component Inspection

UBS00JXF

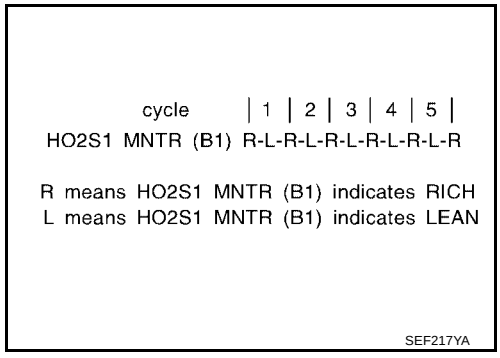
HEATED OXYGEN SENSOR 1

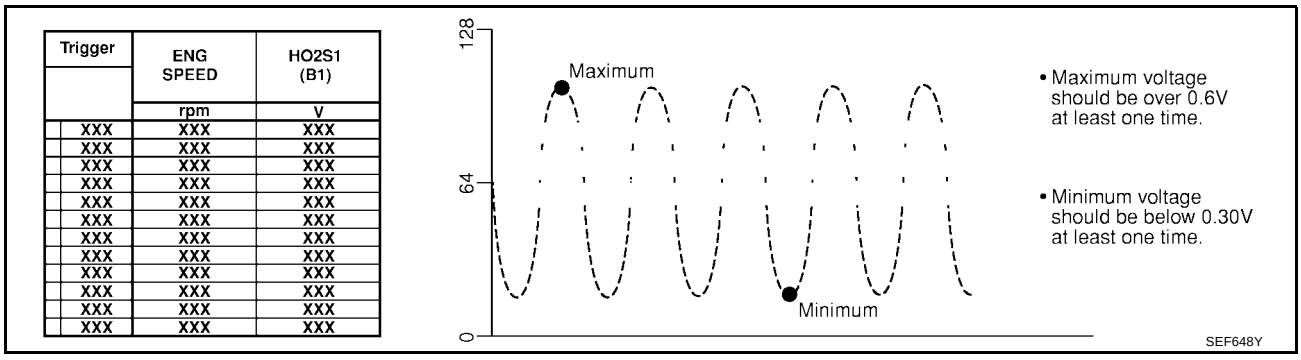
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.



6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.





CAUTION:

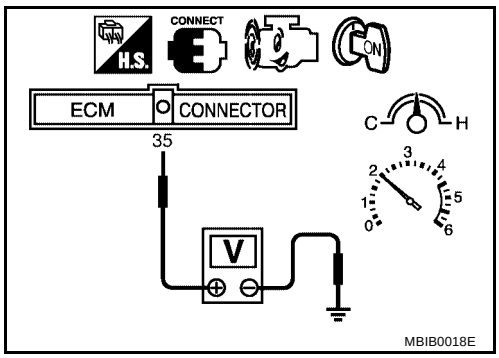
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least 1 time.
   - The minimum voltage is below 0.3V at least 1 time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00JXG

HEATED OXYGEN SENSOR 1

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

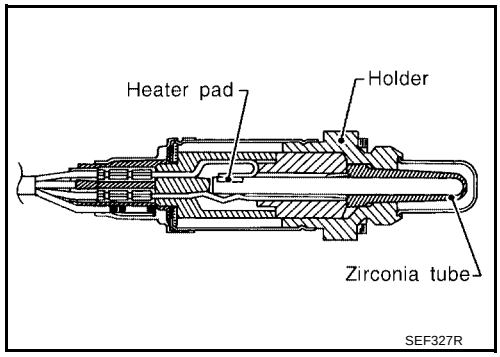
DTC P1146 HO2S2

PFP:226A0

Component Description

UBS00JXH

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 (A/T models ULEV and M/T models) or the air fuel ratio (A/F) sensor 1 (A/T models except ULEV) are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JXI

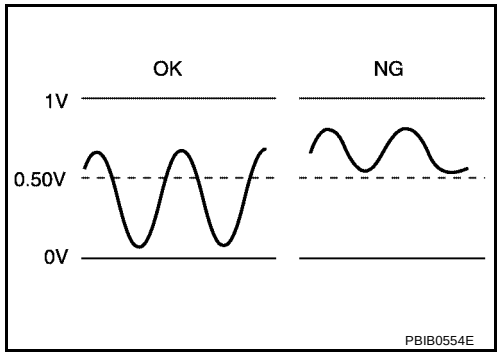
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ←→ 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS00JXJ

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1 (A/T models ULEV and M/T models) or the air fuel ratio (A/F) sensor 1 (A/T models except ULEV). The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146 1146	Heated oxygen sensor 2 minimum voltage monitoring	The minimum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector

DTC Confirmation Procedure

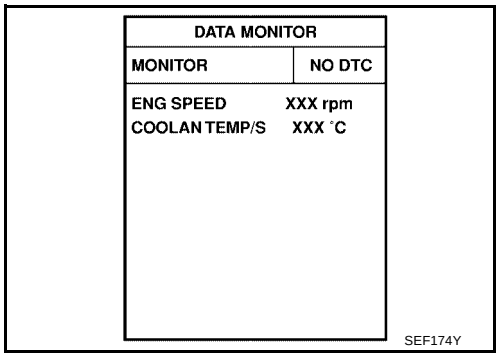
UBS00JXK

NOTE:
If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

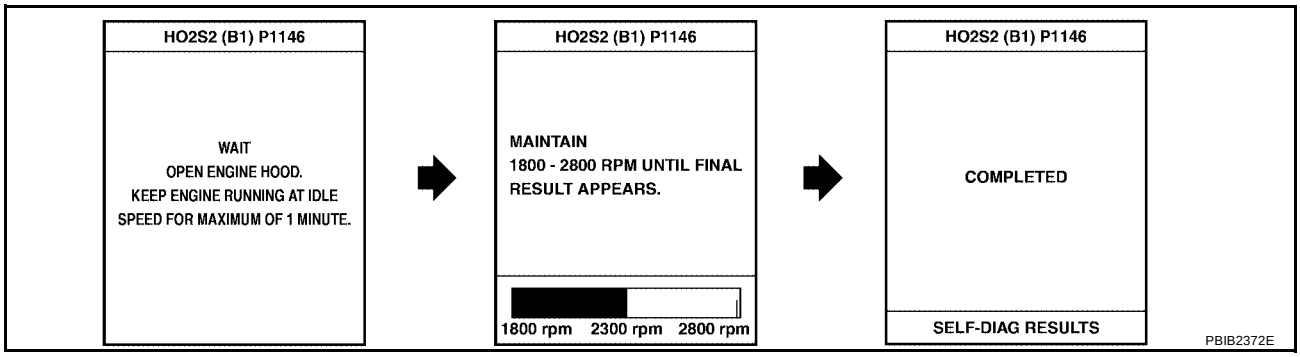
WITH CONSULT-II

TESTING CONDITION:
For the best results, perform DTC WORK SUPPORT at a temperature of 0 to 30°C (32 to 86°F).

1. Turn ignition switch ON and select “DATA MONITOR ” mode with CONSULT-II
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).



7. Open engine hood.
8. Select “HO2S2 (B1) P1146” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
9. Start engine and following the instruction of COSULT-II.



NOTE:
It will take at most 10 minutes until “COMPLETED” is displayed.

10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
    If “NG” is displayed, refer to EC-1145, "Diagnostic Procedure" .
    If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Return to step 1.

Overall Function Check

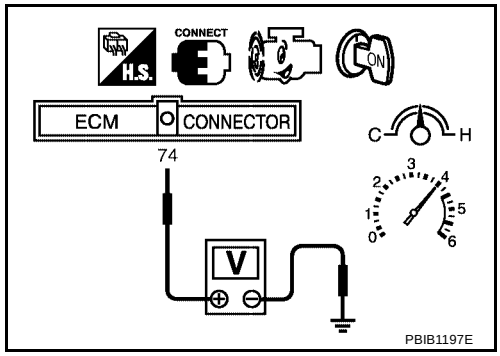
UBS00JXL

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 signal) and ground.

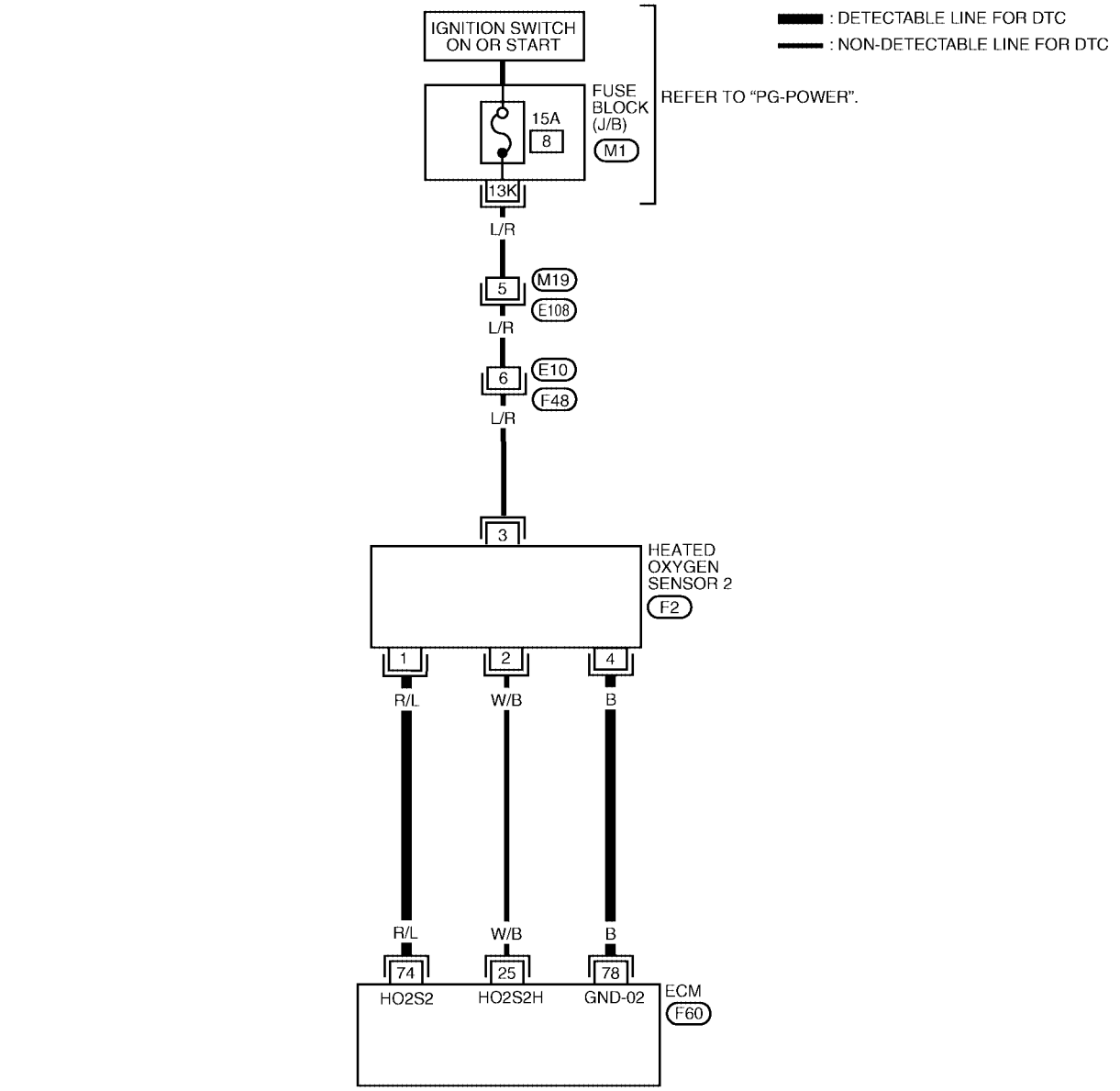
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.50V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T models) 3rd gear position (M/T models).
   The voltage should be below 0.50V at least once during this procedure.
8. If NG, go to EC-1145, "Diagnostic Procedure" .

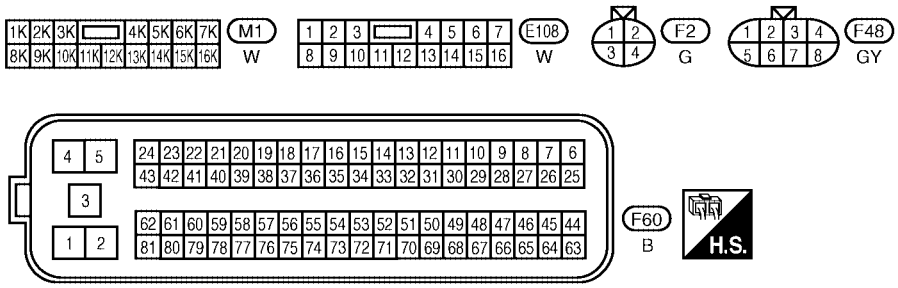


Wiring Diagram

UBS00JXM

EC-HO2S2-01





BBWA1427E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

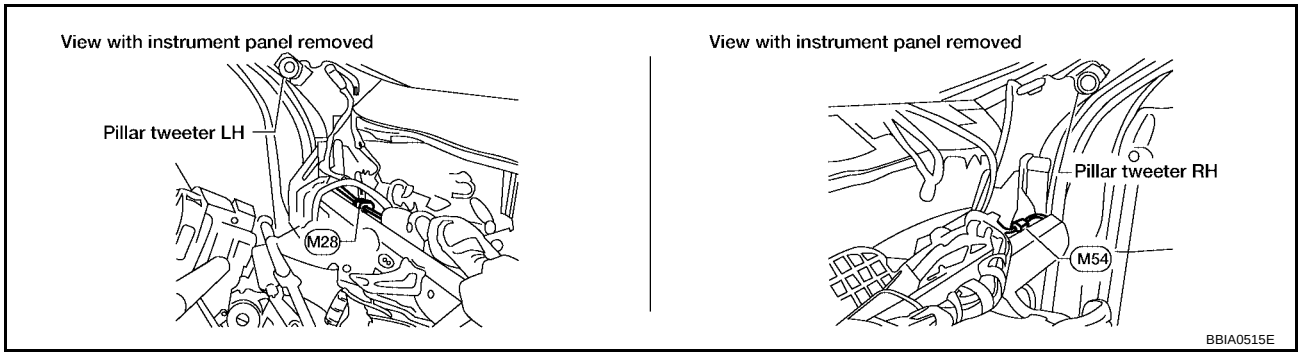
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	R/L	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00JXN

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .



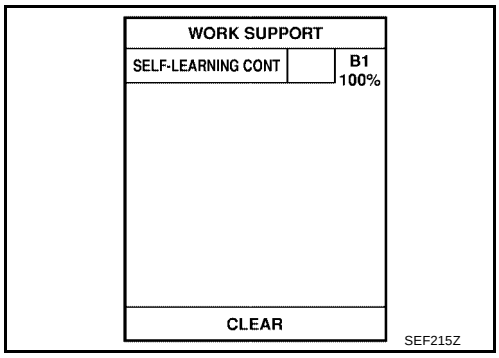
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

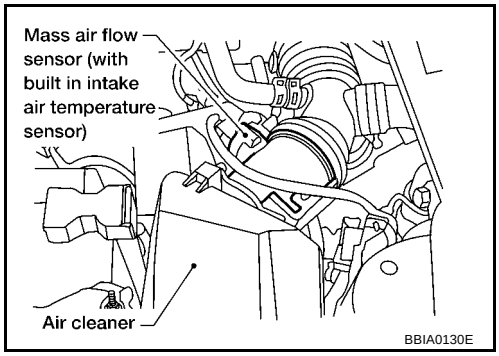
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-952 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

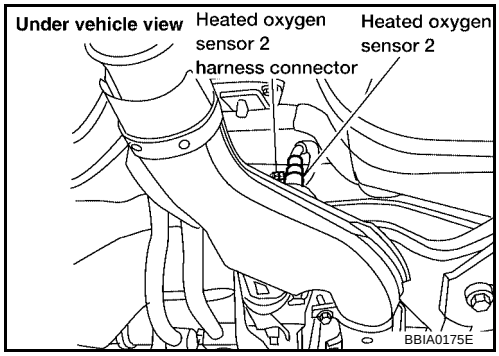
1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 78 and HO2S2 terminal 4.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 74 and HO2S2 terminal 1. Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 74 or HO2S2 terminal 1 and ground. Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-1147, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00JXO

HEATED OXYGEN SENSOR 2

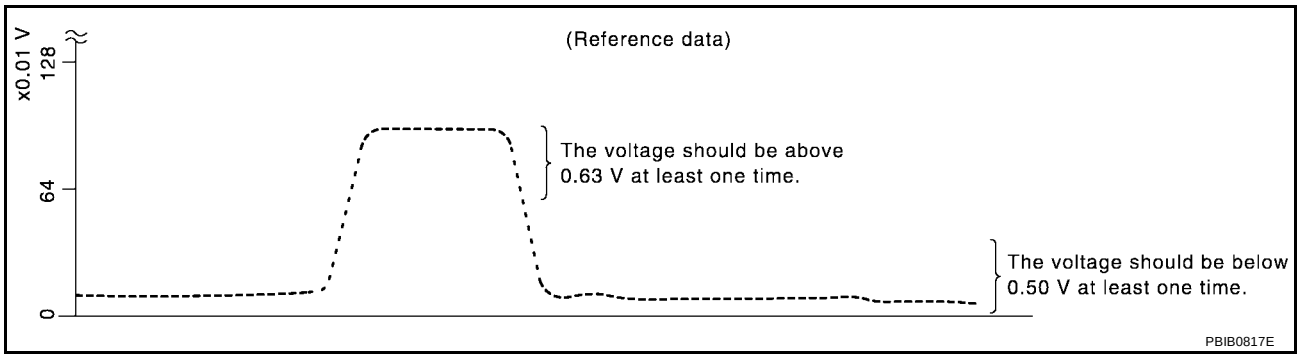
With CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle and wait until 2 minutes have passed from starting the engine.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S2 (B1)	XXX V

PBIB1783E

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



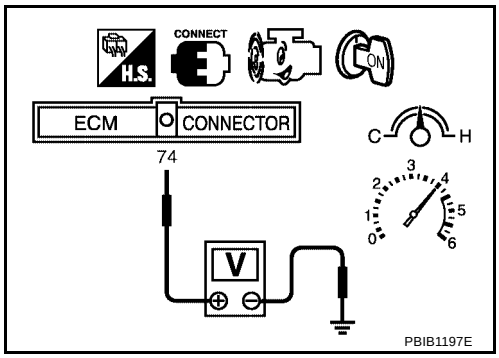
“HO2S2 (B1)” should be above 0.63V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is –25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.63V at least once during this procedure.
   If the voltage is above 0.63V at step 6, step 7 is not necessary.



7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with“OD” OFF (A/T models) or 3rd gear position (M/T models).
   The voltage should be below 0.50V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00JXP

HEATED OXYGEN SENSOR 2

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

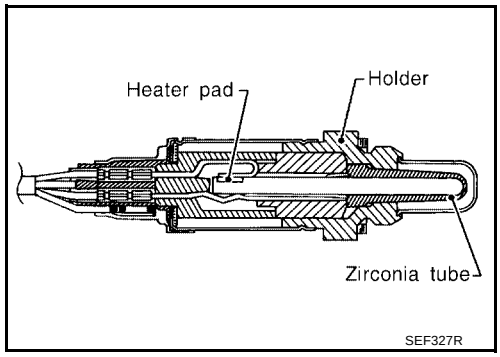
DTC P1147 HO2S2

PFP:226A0

Component Description

UBS00JXQ

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 (A/T models ULEV and M/T models) or the air fuel ratio (A/F) sensor 1 (A/T models except ULEV) are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JXR

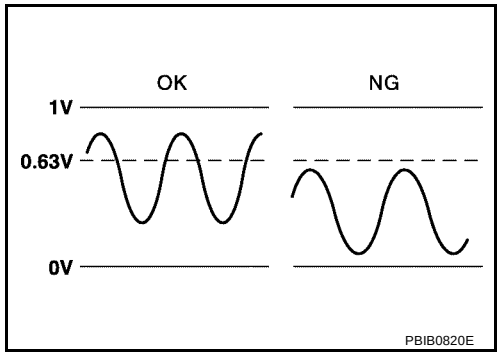
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S2 (B1)	● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	Revving engine from idle to 3,000 rpm quickly	0 - 0.3V ←→ 0.6 - 1.0V
HO2S2 MNTR (B1)			LEAN ←→ RICH

On Board Diagnosis Logic

UBS00JXS

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1 (A/T models ULEV and M/T models) or the air fuel ratio (A/F) sensor 1 (A/T models except ULEV). The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1147 1147	Heated oxygen sensor 2 maximum voltage monitoring	The maximum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector ● Intake air leaks

DTC Confirmation Procedure

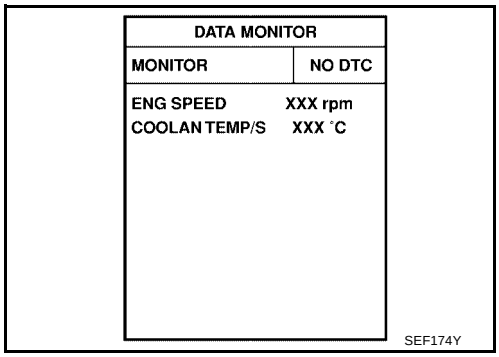
UBS00JXT

NOTE:
If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

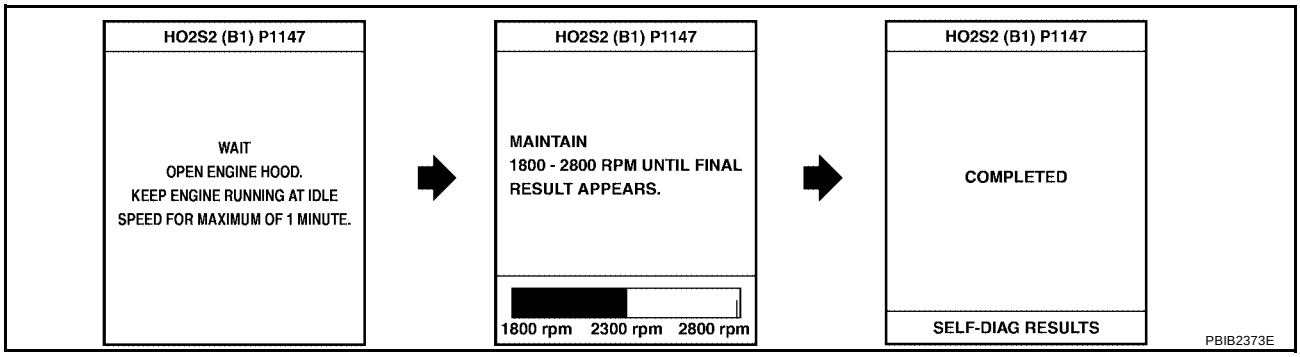
WITH CONSULT-II

TESTING CONDITION:
For the best results, perform DTC WORK SUPPORT at a temperature of 0 to 30°C (32 to 86°F).

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. Make sure that “COOLAN TEMP/S” indicates more than 70°C (158°F).
   If not, warm up engine and go to next step when “COOLAN TEMP/S” indication reaches to 70°C (158°F).



7. Open engine hood.
8. Select “HO2S2 (B1) P1147” of “HO2S2” in “DTC WORK SUPPORT” mode with CONSULT-II.
9. Start engine and following the instruction of CONSULT-II.



NOTE:
It will take at most 10 minutes until “COMPLETED” is displayed.

10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
    If “NG” is displayed, refer to EC-1153, "Diagnostic Procedure" .
    If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Return to step 1.

Overall Function Check

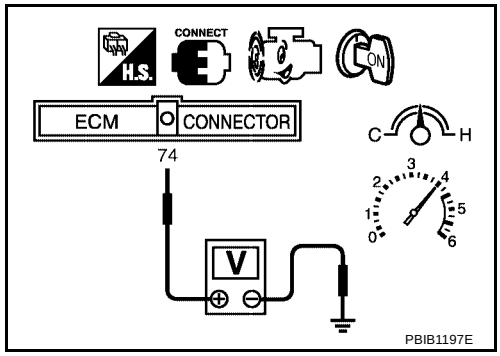
UBS00JXU

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 signal) and ground.

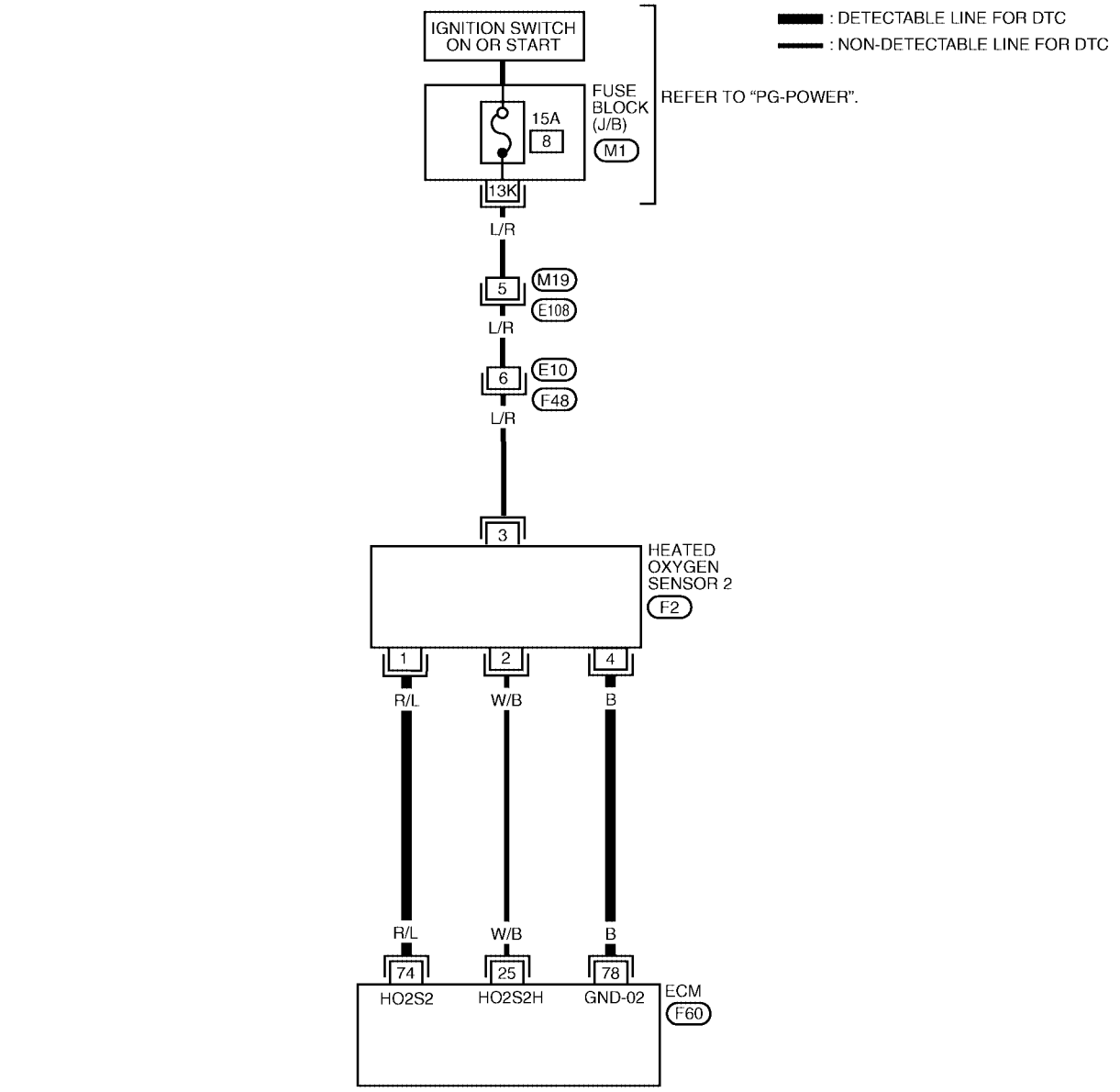
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.63V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T models) 3rd gear position (M/T models).
   The voltage should be above 0.63V at least once during this procedure.
8. If NG, go to EC-1153, "Diagnostic Procedure" .

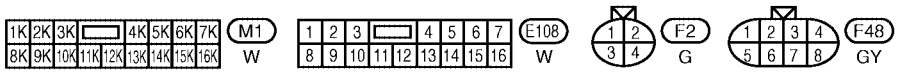


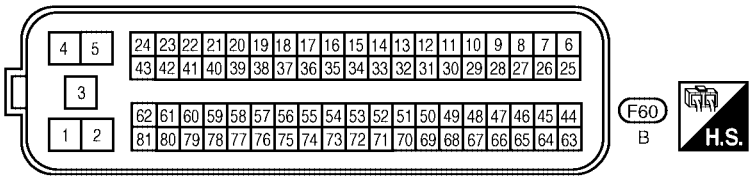
Wiring Diagram

UBS00JXV

EC-HO2S2-01







BBWA1427E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

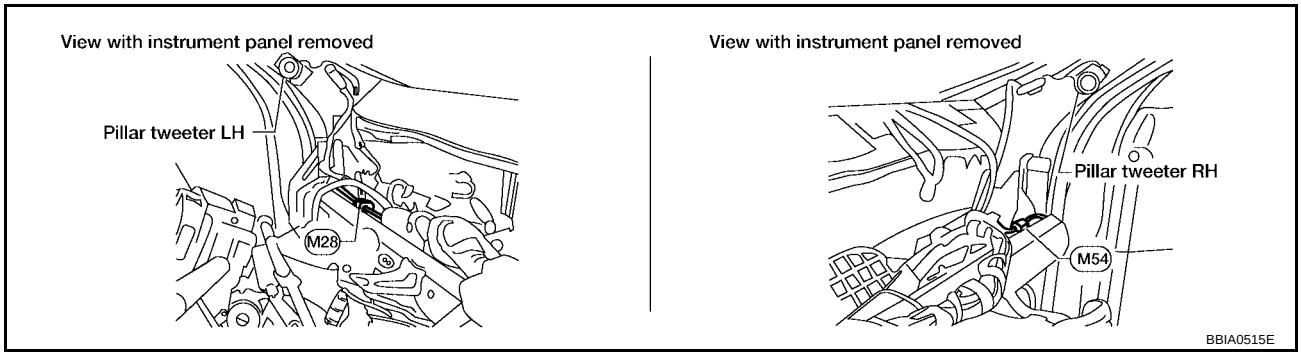
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
74	R/L	Heated oxygen sensor 2	**[Engine is running]** ● **Warm-up condition** ● Revving engine from idle up to 3,000 rpm quickly after the following conditions are met. ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - Approximately 1.0V
78	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

UBS00JXW

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .



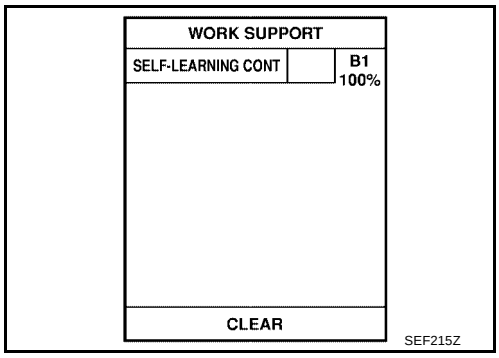
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

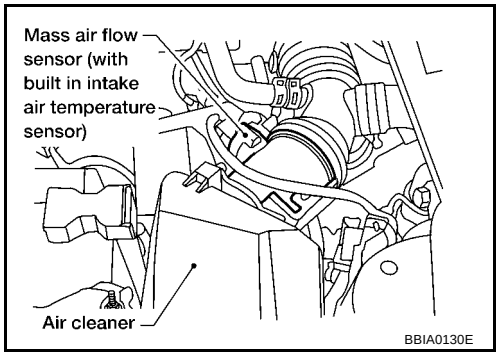
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-941 .
No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

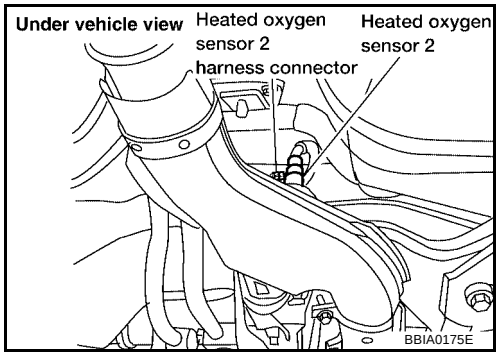
1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 78 and HO2S2 terminal 4.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 74 and HO2S2 terminal 1. Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 74 or HO2S2 terminal 1 and ground. Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-1155, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

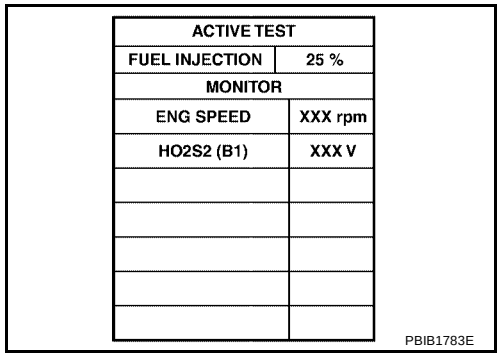
Component Inspection

UBS00JXX

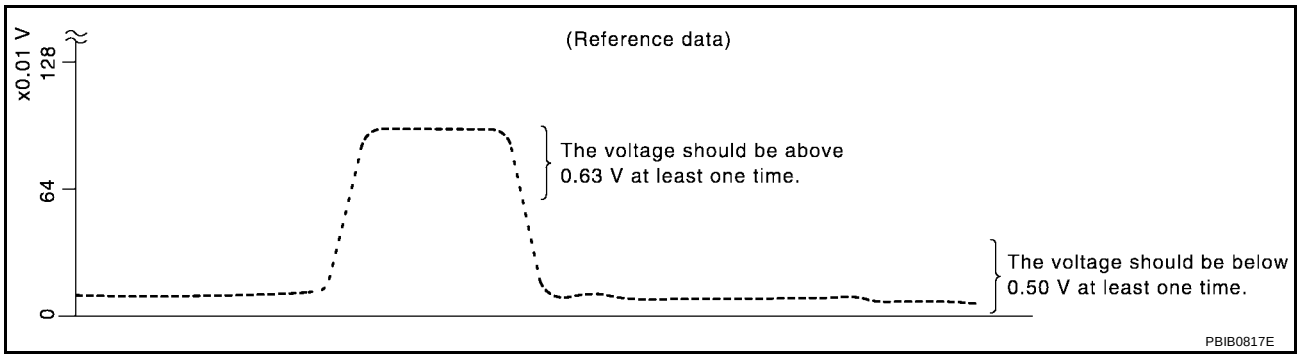
HEATED OXYGEN SENSOR 2

With CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.



6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



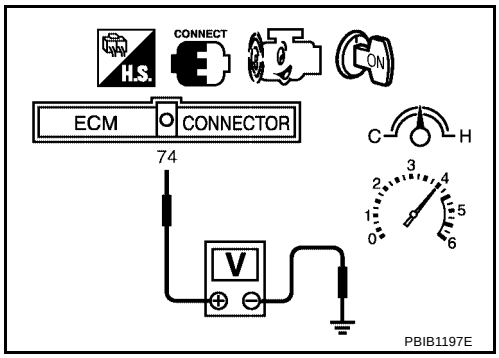
“HO2S2 (B1)” should be above 0.63V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is –25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 74 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.63V at least once during this procedure.
   If the voltage is above 0.63V at step 6, step 7 is not necessary.



7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T models) 3rd gear position (M/T models).
   The voltage should be below 0.50V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool J-43897-18 or J-43897-12 and approved anti-seize lubricant.**

Removal and Installation

UBS00JXY

HEATED OXYGEN SENSOR 2

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P1148 CLOSED LOOP CONTROL

PFP:22690

On Board Diagnosis Logic

UBS00JXZ

A/T MODELS ULEV AND M/T MODELS

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148 1148	Closed loop control function	The closed loop control function does not operate even when vehicle is driving in the specified condition.	● The heated oxygen sensor 1 circuit is open or shorted. ● Heated oxygen sensor 1 ● Heated oxygen sensor heater

A/T MODELS EXCEPT ULEV

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1148 1148	Closed loop control function	The closed loop control function for bank 1 does not operate even when vehicle is driving in the specified condition.	● The air fuel ratio (A/F) sensor 1 circuit is open or shorted. ● Air fuel ratio (A/F) sensor 1 ● Air fuel ratio (A/F) sensor 1 heater

DTC P1148 is displayed with another DTC for air fuel ratio (A/F) sensor 1. Perform the trouble diagnosis for the corresponding DTC.

DTC Confirmation Procedure (A/T MODELS ULEV AND M/T MODELS)

UBS00JY0

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

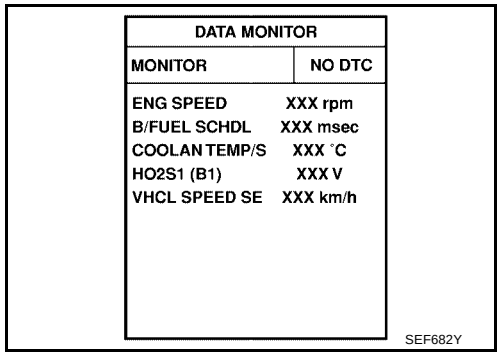
TESTING CONDITION:

- **Never raise engine speed above 3,600 rpm during the DTC Confirmation Procedure. If the engine speed limit is exceeded, retry the procedure from step 2.**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Hold engine speed at 2,000 rpm and check one of the following.
   - “HO2S1 (B1)” voltage should go above 0.70V at least once.
   - “HO2S1 (B1)” voltage should go below 0.21V at least once.

   If the check result is NG, perform EC-1158, "Diagnostic Procedure (A/T MODELS ULEV AND M/T MODELS)" .
   If the check result is OK, perform the following step.
4. Let engine idle at least 5 minutes.
5. Maintain the following condition at least 50 consecutive seconds.



B/FUEL SCHDL	2.8 msec or more
ENG SPEED	More than 1,600 rpm
Shift lever	Suitable position
VHCL SPEED SE	More than 70 km/h (43 MPH)

During this test, P0134 may be displayed on CONSULT-II screen.

6. If DTC is detected, go to EC-1158, "Diagnostic Procedure (A/T MODELS ULEV AND M/T MODELS)" .

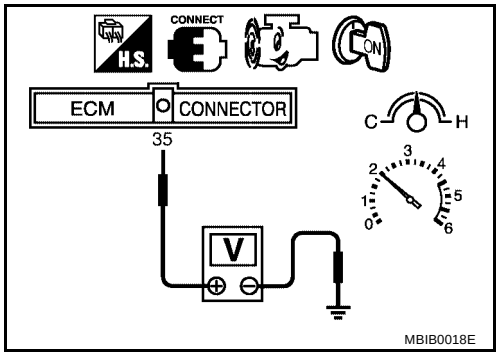
Overall Function Check (A/T MODELS ULEV AND M/T MODELS)

UBS00JY1

Use this procedure to check the overall function of the closed loop control. During this check, a DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 [HO2S1 (B1) signal] and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no-load.
   - The voltage should go above 0.70V at least once.
   - The voltage should go below 0.21V at least once.
4. If NG, go to EC-1158, "Diagnostic Procedure (A/T MODELS ULEV AND M/T MODELS)" .



Diagnostic Procedure (A/T MODELS ULEV AND M/T MODELS)

UBS00JY2

Perform trouble diagnosis for DTC P0133, EC-914 .

DTC P1217 ENGINE OVER TEMPERATURE

PFP:00000

System Description

UBS00KJM

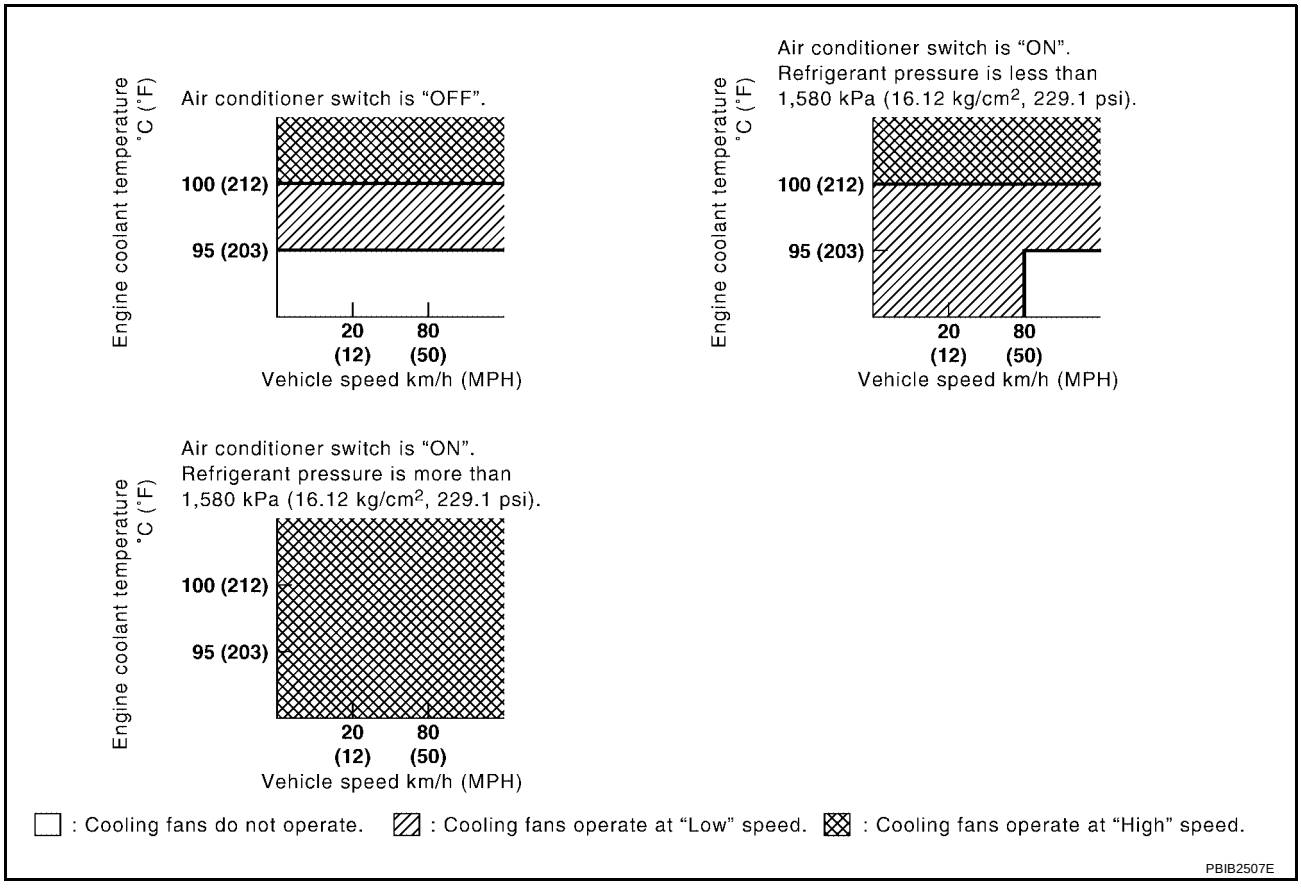
COOLING FAN CONTROL

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed*1	Cooling fan control	Cooling fan relay
Battery	Battery voltage*1		
Vehicle speed sensor	Vehicle speed*1		
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner ON signal		
Refrigerant pressure sensor	Refrigerant pressure		

*1: The ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to ECM through CAN communication line.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

OPERATION



CONSULT-II Reference Value in Data Monitor Mode

UBS00KJN

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	● Engine: After warming up, idle the engine	A/C switch: OFF	OFF
		A/C switch: ON (Compressor operates)	ON

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH

On Board Diagnosis Logic

UBS00KJO

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise.
When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.
This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1217 1217	Engine over temperature (Overheat)	● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant was not added to the system using the proper filling method. ● Engine coolant is not within the specified range.	● Harness or connectors (The cooling fan circuit is open or shorted.) ● Cooling fan ● Cooling fan relays ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-1170, "Main 12 Causes of Overheating" .

CAUTION:
When a malfunction is indicated, be sure to replace the coolant. Refer to MA-23, "Changing Engine Coolant" . Also, replace the engine oil. Refer to MA-26, "Changing Engine Oil" .

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-14, "Anti-freeze Coolant Mixture Ratio" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

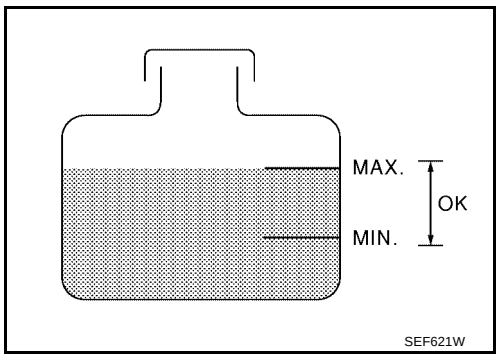
UBS00KJP

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

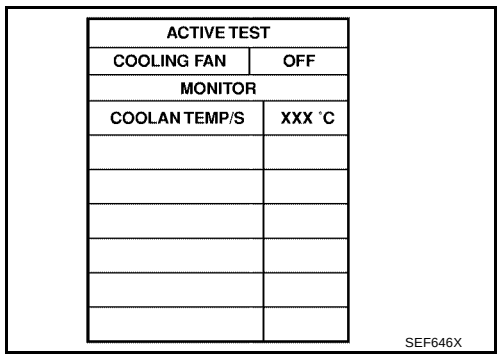
WARNING:
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

WITH CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.
   NOTE:
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-1163, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1163, "Diagnostic Procedure" .
3. Turn ignition switch ON.

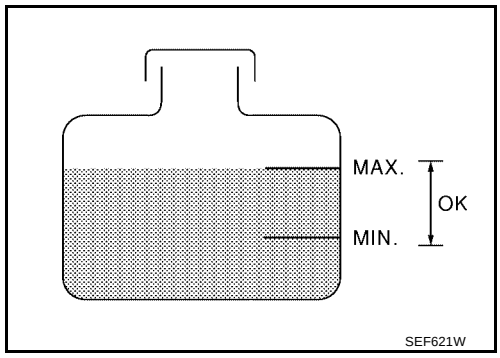


4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-1163, "Diagnostic Procedure" .

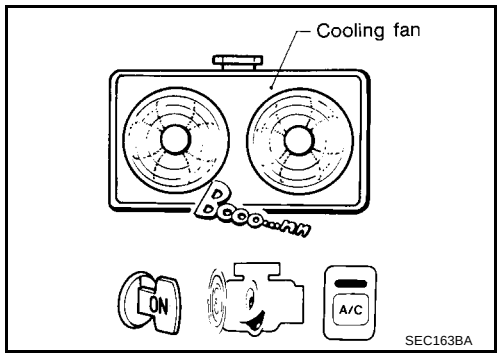


WITH GST

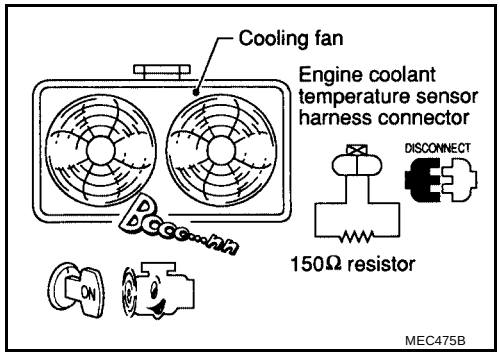
1. Check the coolant level in the reservoir tank and radiator.
   NOTE:
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-1163, "Diagnostic Procedure" .



2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1163, "Diagnostic Procedure" .
3. Start engine.
   CAUTION:
   Be careful not to overheat engine.
4. Set temperature control lever to full cold position.
5. Turn air conditioner switch ON.
6. Turn blower fan switch ON.
7. Run engine at idle for a few minutes with air conditioner operating.
   CAUTION:
   Be careful not to overheat engine.

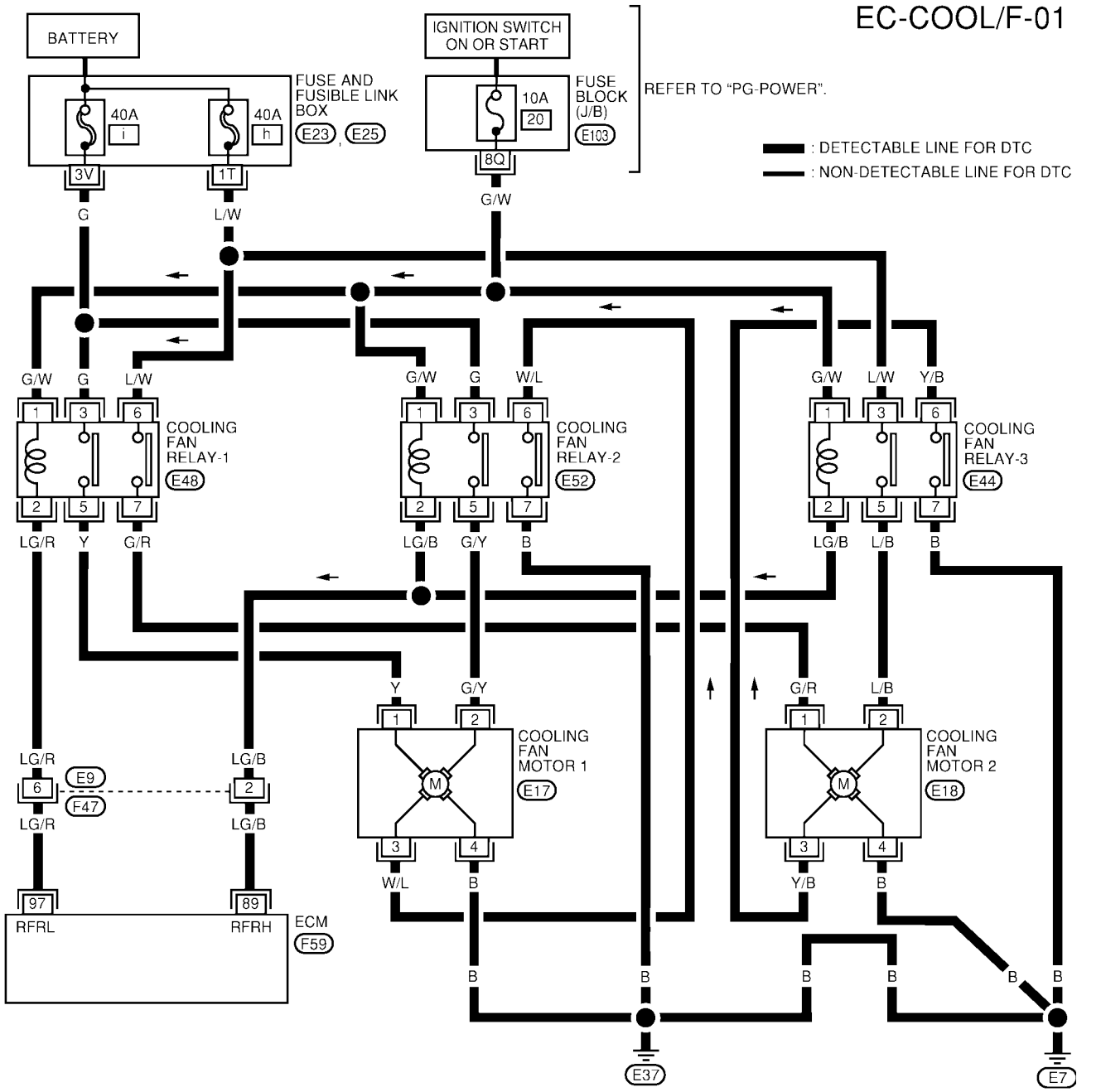


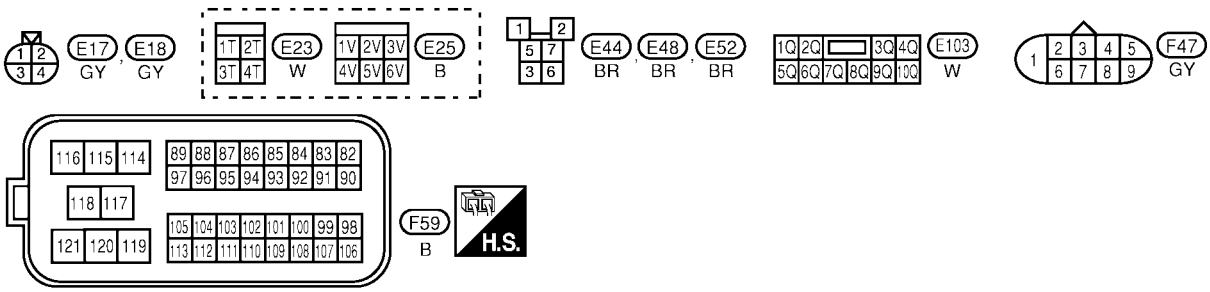
8. Make sure that cooling fan operates at low speed.
   If NG, go to EC-1163, "Diagnostic Procedure" .
   If OK, go to the following step.
9. Turn ignition switch OFF.
10. Turn air conditioner switch and blower fan switch OFF.
11. Disconnect engine coolant temperature sensor harness connector.
12. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
13. Restart engine and make sure that cooling fan operates at higher speed than low speed.
    CAUTION:
    Be careful not to overheat engine.
14. If NG, go to EC-1163, "Diagnostic Procedure" .



Wiring Diagram

UBS00KJQ





BBWA1476E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
89	LG/B	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is high speed operating	0 - 1.0V
97	LG/R	Cooling fan relay (Low)	**[Ignition switch: ON]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Cooling fan is operating	0 - 1.0V

Diagnostic Procedure

UBS00KJR

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 4.

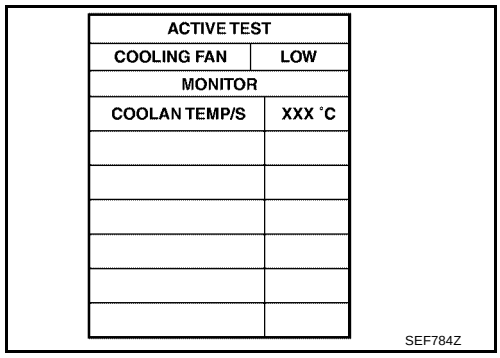
2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II and touch “LOW” on the CONSULT-II screen.
3. Make sure that cooling fans-1 and -2 operate at low speed.

OK or NG

OK >> GO TO 3.
NG >> Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-1167 .)



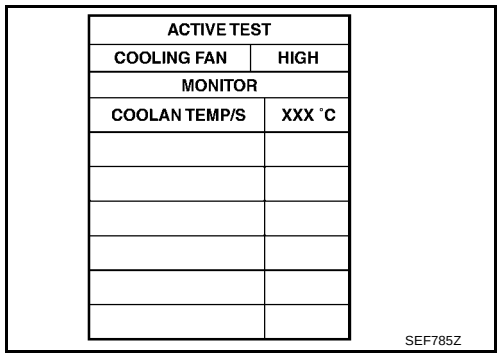
3. CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Touch “HI” on the CONSULT-II screen.
2. Make sure that cooling fans-1 and -2 operates at high speed.

OK or NG

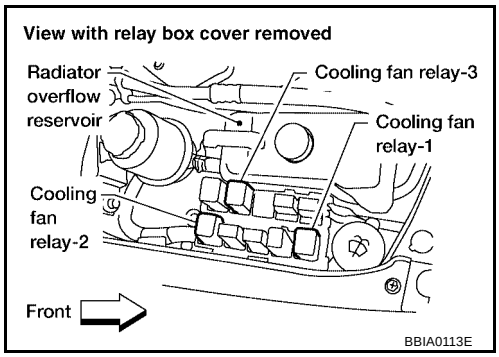
OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-1169 .)



4. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-II

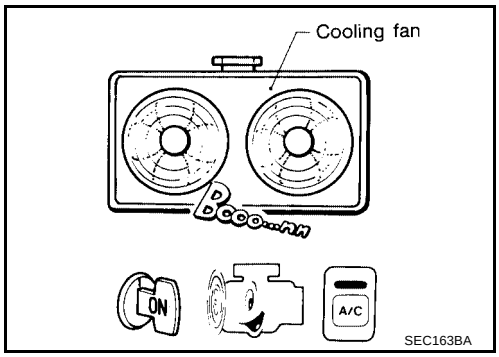
1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-2 and relay-3.
3. Start engine and let it idle.
4. Set temperature lever at full cold position.
5. Turn air conditioner switch ON.
6. Turn blower fan switch ON.



7. Make sure that cooling fans-1 and -2 operate at low speed.

OK or NG

OK >> GO TO 5.
NG >> Check cooling fan low speed control circuit. (Go to PROCEDURE A, EC-1167 .)



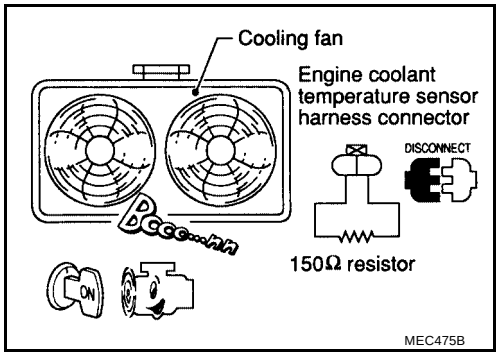
5. CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch OFF.
2. Reconnect cooling fan relay-2 and relay-3.
3. Turn air conditioner switch and blower fan switch OFF.
4. Disconnect engine coolant temperature sensor harness connector.
5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6. Restart engine and make sure that cooling fans-1 and -2 operates at high speed.

OK or NG

OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to PROCEDURE B, EC-1169 .)

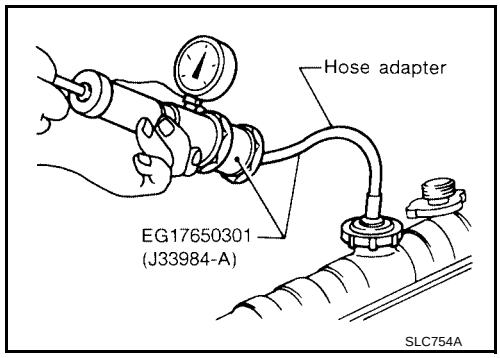


6. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.6 kg/cm^2 , 23 psi)

CAUTION:
Higher than the specified pressure may cause radiator damage.
Pressure should not drop.



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following for leak.

- Hose
- Radiator
- Water pump (Refer to CO-28, "WATER PUMP" .)

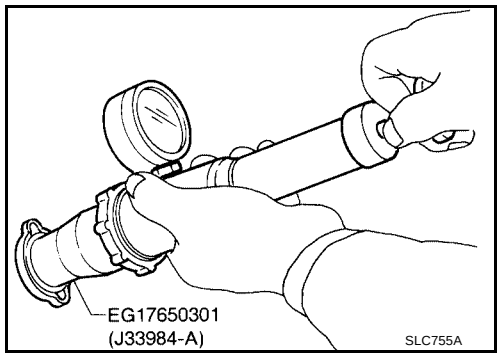
>> Repair or replace.

8. CHECK RADIATOR CAP

Apply pressure to cap with a tester.

Radiator cap relief pressure:

59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi)



OK or NG

OK >> GO TO 9.
NG >> Replace radiator cap.

9. CHECK THERMOSTAT

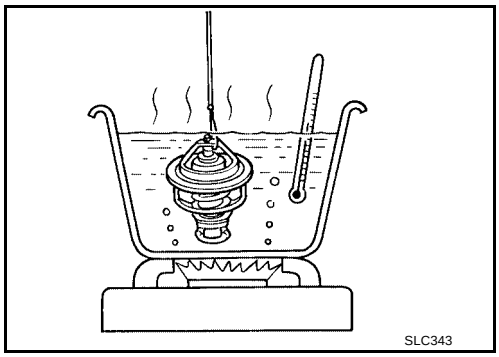
1. Check valve seating condition at normal room temperatures.
   It should seat tightly.
2. Check valve opening temperature and valve lift.

   Valve opening temperature:

   82°C (180°F) [standard]

   Valve lift:

   More than 8 mm/95°C (0.31 in/203°F)
3. Check if valve is closed at 5°C (9°F) below valve opening temperature.



For details, refer to CO-30, "THERMOSTAT AND THERMOSTAT HOUSING" .

OK or NG

OK >> GO TO 10.
NG >> Replace thermostat.

10. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1171, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace engine coolant temperature sensor.

11. CHECK MAIN 12 CAUSES

If the cause cannot be isolated, go to EC-1170, "Main 12 Causes of Overheating" .

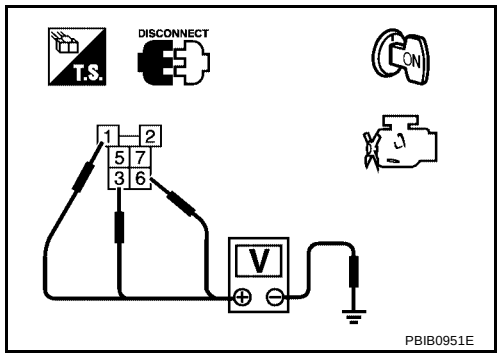
>> **INSPECTION END**

PROCEDURE A

1. CHECK POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch ON.
4. Check voltage between cooling fan relay-1 terminals 1, 3, 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

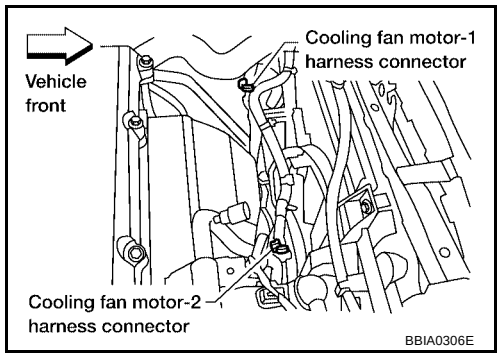
- Fuse block (J/B) connector E103
- Fuse and fusible link box connectors E23, E25
- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between the following;
   cooling fan relay-1 terminal 5 and cooling fan motor-1 terminal 1,
   cooling fan motor-1 terminal 4 and ground.
   Refer to Wiring Diagram.

Continuity should exist.



4. Also check harness for short to ground and short to power.
5. Check harness continuity between the following;
   cooling fan relay-1 terminal 7 and cooling fan motor-2 terminal 1,
   cooling fan motor-2 terminal 4 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

6. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK OUTPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 97 and cooling fan relay-1 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Harness for open or short between cooling fan relay-1 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-1

Refer to EC-1171, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-1171, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

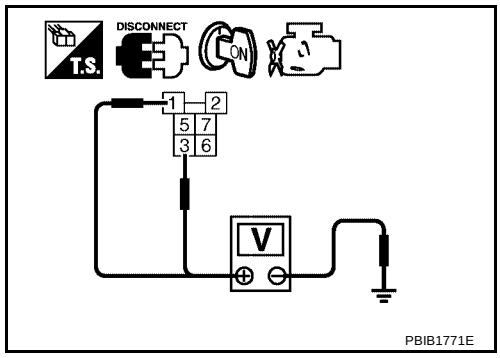
>> **INSPECTION END**

PROCEDURE B

1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-2 and relay-3.
3. Turn ignition switch ON.
4. Check voltage between cooling fan relay-2 and relay-3 terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

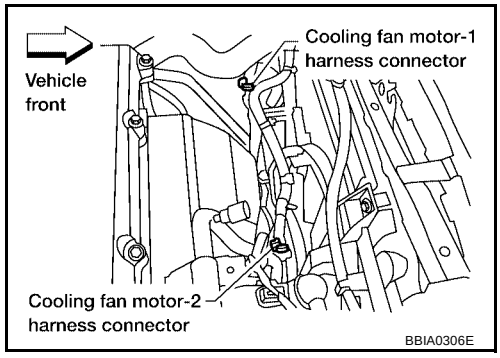
- Harness for open or short between cooling fan relay-2, relay-3 and fuse
- Harness for open or short between cooling fan relay-2, relay-3 and fusible link

>> Repair harness or connectors.

3. CHECK COOLING FAN MOTORS CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between the following;
   cooling fan motor-1 terminal 2 and cooling fan relay-2 terminal 5,
   cooling fan motor-1 terminal 3 and cooling fan relay-2 terminal 6,
   cooling fan relay-2 terminal 7and ground.
   Refer to wiring diagram.

Continuity should exist.



4. Also check harness for short to ground and short to power.
5. Check harness continuity between the following;
   cooling fan motor-2 terminal 2 and cooling fan relay-3 terminal 5,
   cooling fan motor-2 terminal 3 and cooling fan relay-3 terminal 6,
   cooling fan relay-3 terminal 7and ground.
   Refer to wiring diagram.

Continuity should exist.

6. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 89 and cooling fan relay-2 and relay-3 terminals 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Harness for open or short between cooling fan relay-2 and ECM
- Harness for open or short between cooling fan relay-3 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-2 AND RELAY-3

Refer to EC-1171, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relays.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-1171, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

UBS00KJS

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	See MA-14 .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See MA-23 .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See CO-27 .
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-26 .

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-30 and CO-32 .
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-1159).
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See CO-26 .
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See CO-26 .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-164 .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-164 .

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (56 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to CO-23, "OVERHEATING CAUSE ANALYSIS" .

Component Inspection

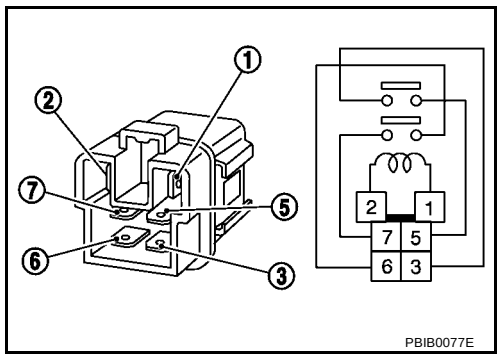
UBS00KJT

COOLING FAN RELAYS-1 AND -2

Check continuity between terminals 3 and 5, 6 and 7.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

If NG, replace relay.

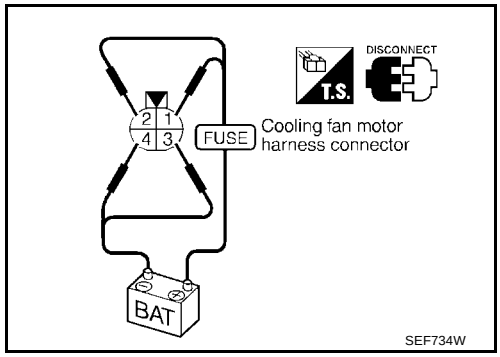


COOLING FAN MOTOR-1 AND MOTOR-2

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	Terminals	
		(+)	(–)
Cooling fan motor	Low	1	4
	High	1, 2	3, 4

Cooling fan motor should operate.
If NG, replace cooling fan motor.



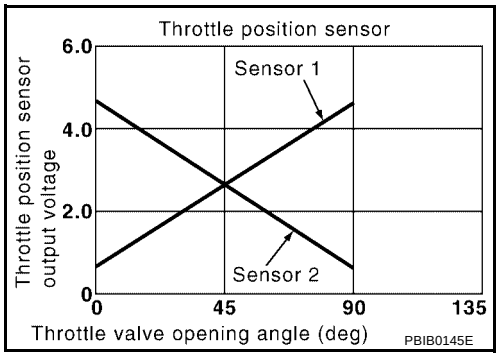
DTC P1225 TP SENSOR

PFP:16119

Component Description

UBS00JJ5

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

UBS00JJ6

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance problem	Closed throttle position learning value is excessively low.	● Electric throttle control actuator (TP sensor 1 and 2)

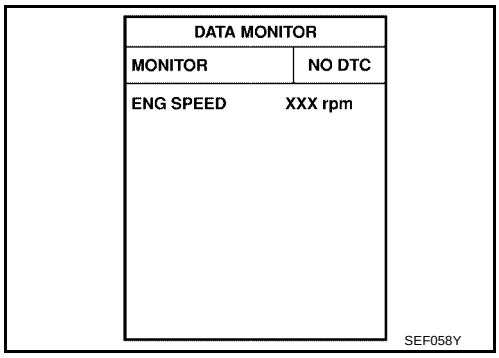
DTC Confirmation Procedure

UBS00JJ7

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds.
4. Turn ignition switch ON.
5. If 1st trip DTC is detected, go to EC-1173, "Diagnostic Procedure" .



WITH GST

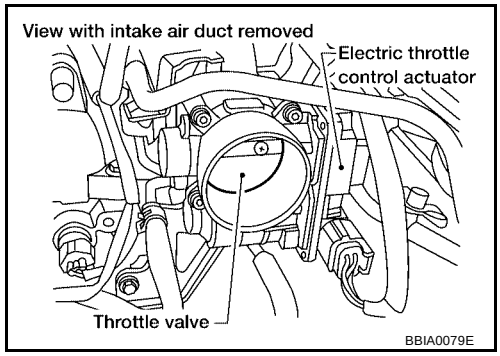
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00JJ8

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-748, "Throttle Valve Closed Position Learning" .
3. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

Remove and Installation

UBS00JJ9

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-108, "INTAKE MANIFOLD" .

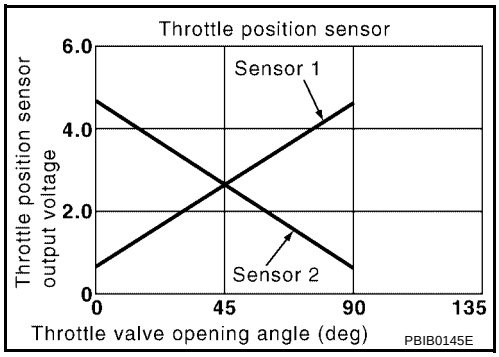
DTC P1226 TP SENSOR

PFP:16119

Component Description

UBS00JJA

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

UBS00JJB

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance problem	Closed throttle position learning is not performed successfully, repeatedly.	● Electric throttle control actuator (TP sensor 1 and 2)

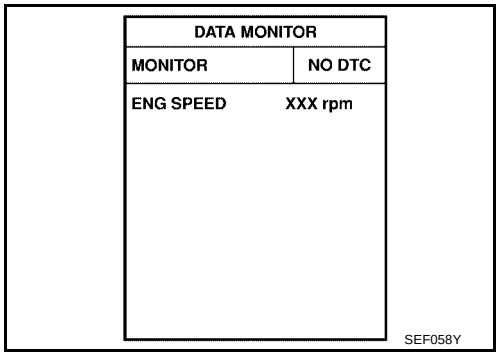
DTC Confirmation Procedure

UBS00JJC

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds.
4. Turn ignition switch ON.
5. Repeat steps 3 and 4 for 32 times.
6. If 1st trip DTC is detected, go to EC-1175, "Diagnostic Procedure" .



WITH GST

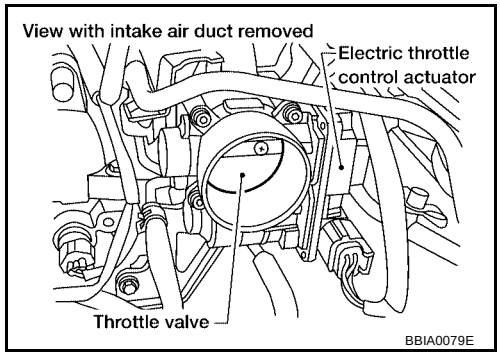
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00JJD

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-748, "Throttle Valve Closed Position Learning" .
3. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

Remove and Installation

UBS00JJE

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-108, "INTAKE MANIFOLD" .

DTC P1229 SENSOR POWER SUPPLY

PFP:16119

On Board Diagnosis Logic

UBS00JJF

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229 1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	● Harness or connectors (APP sensor 1 circuit is shorted.) (PSP sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) (EVAP control system pressure sensor circuit is shorted.) ● Accelerator pedal position sensor (APP sensor 1) ● Power steering pressure sensor ● Refrigerant pressure sensor ● EVAP control system pressure sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

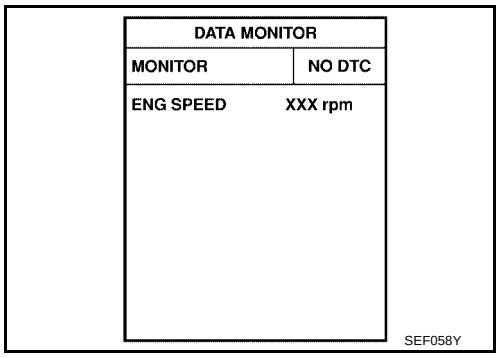
UBS00JJG

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-1178, "Diagnostic Procedure" .



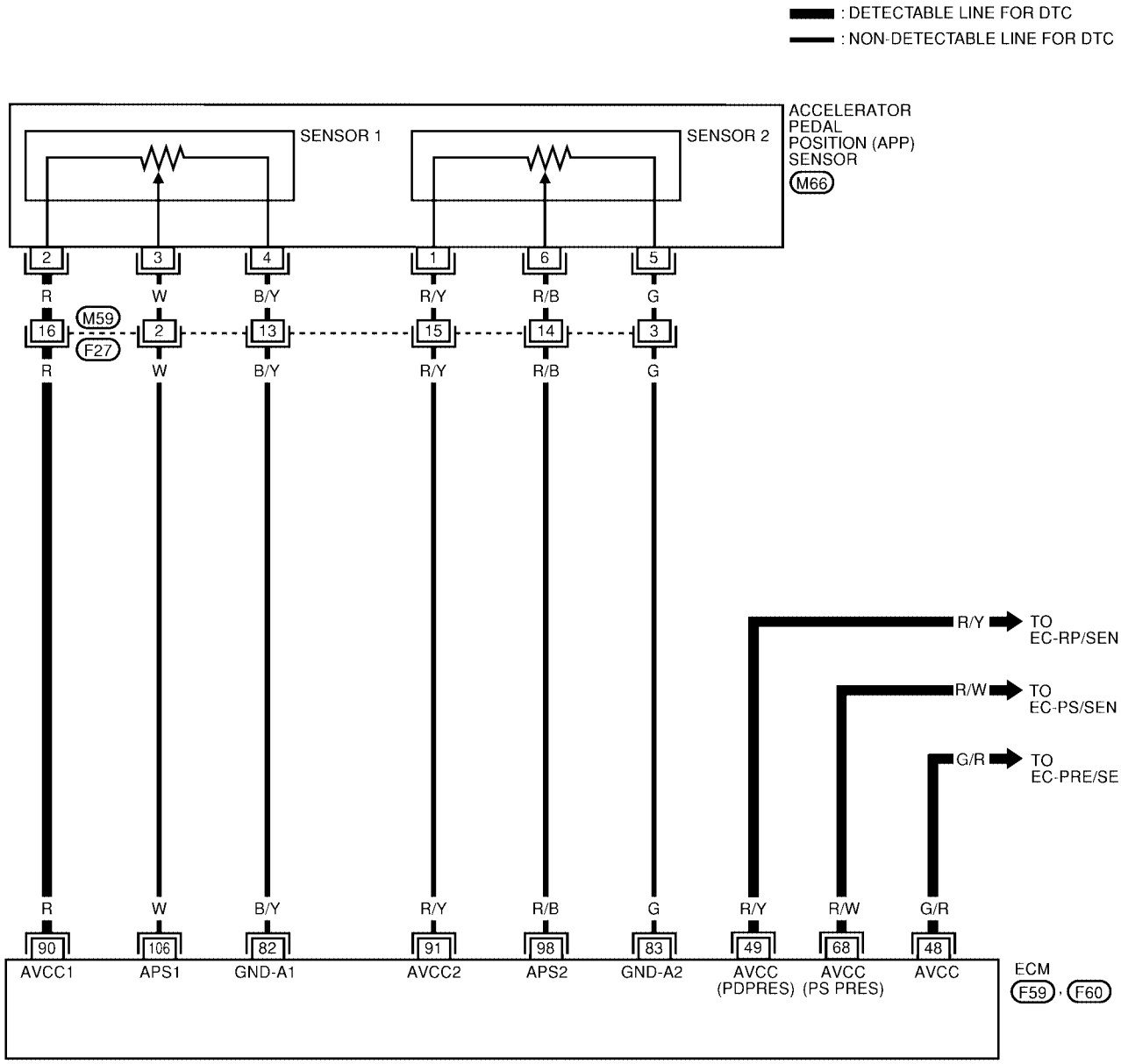
WITH GST

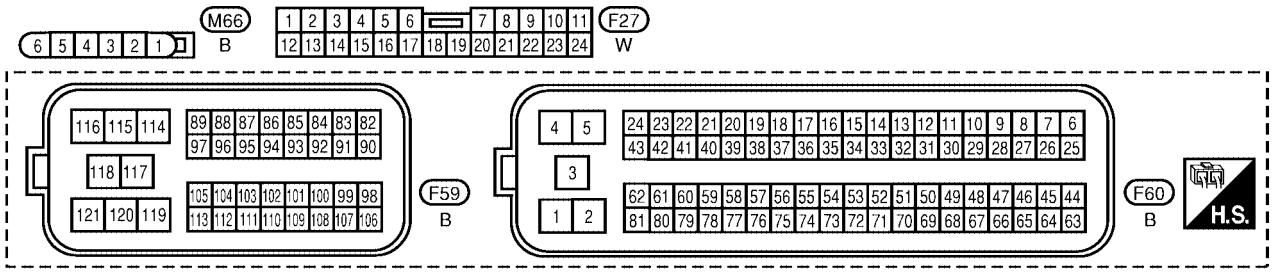
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JJH

EC-SEN/PW-01





BBWA1477E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

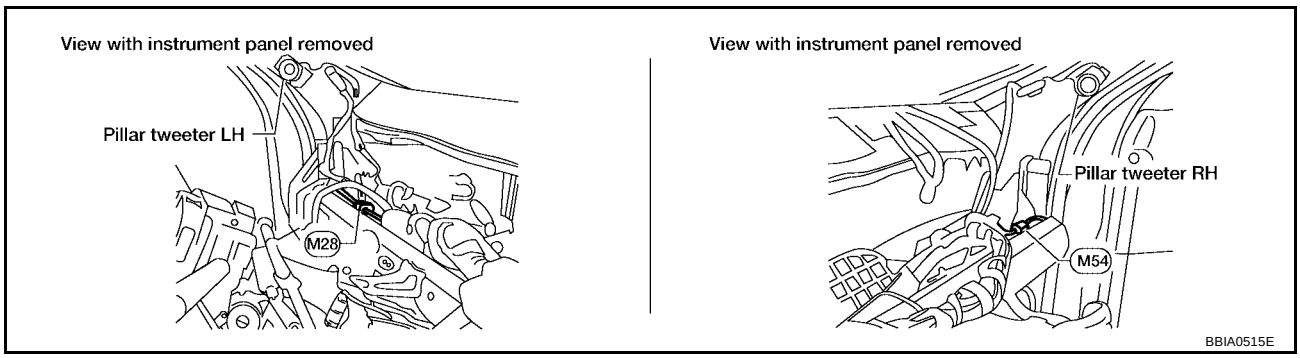
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
48	R/W	Sensor power supply (EVAP control system pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
49	R/Y	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
68	G/R	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

UBS00JJI

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .

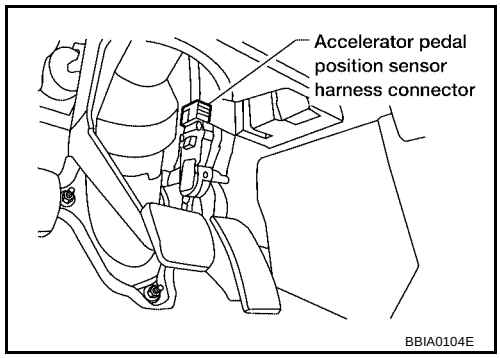


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

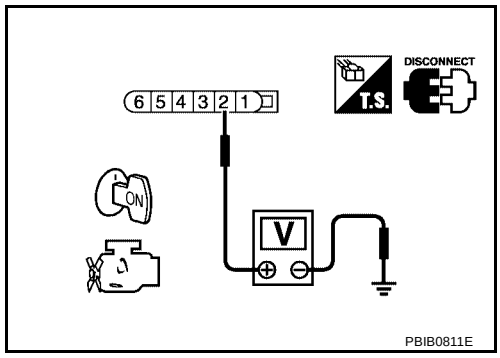
2. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 3.

3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check the following.

- Harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
90	APP sensor terminal 2	EC-1291
48	EVAP control system pressure sensor terminal 3	EC-1048
49	Refrigerant pressure sensor terminal 1	EC-1346
68	PSP sensor terminal 1	EC-1090

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.

- Refrigerant pressure sensor (Refer to EC-1345 .)
- Power steering pressure sensor (Refer to EC-1093 .)
- EVAP control system pressure sensor (Refer to EC-1058 .)

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning component.

5. CHECK APP SENSOR

Refer to EC-1296, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-748, "Accelerator Pedal Released Position Learning" .
3. Perform EC-748, "Throttle Valve Closed Position Learning" .
4. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1271 A/F SENSOR 1

PFP:22693

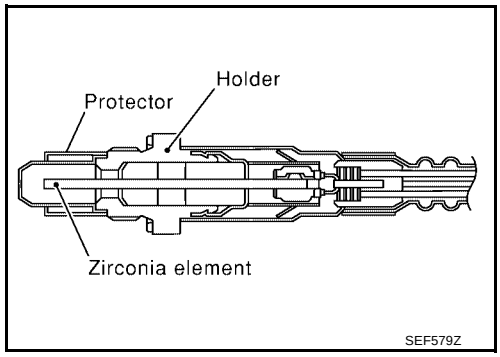
Component Description

UBS00JJJ

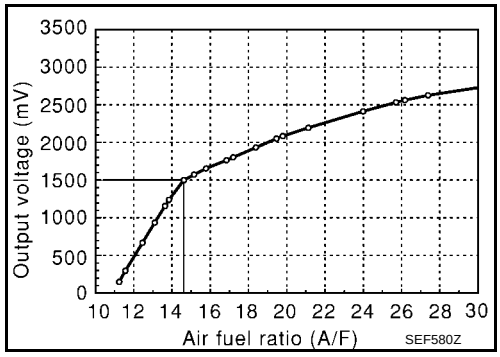
The A/F sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air-fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

UBS00JJK

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

UBS00JJL

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately low.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1271 1271	Air fuel ratio (A/F) sensor 1 circuit no activity detected	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 0V.	● Harness or connectors (The sensor circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

UBS00JJM

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

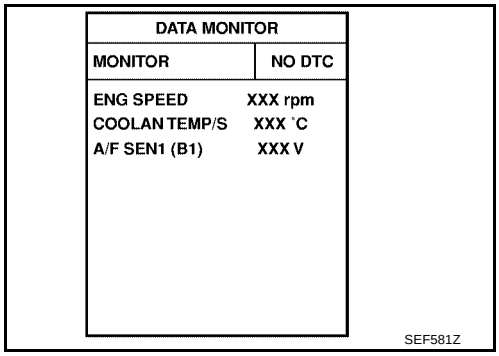
TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-II.

3. Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 0V, go to EC-1184, "Diagnostic Procedure" .
   If the indication is not constantly approx. 0V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.



ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
COOLANT TEMP/S	Less than 70°C (158°F)
Shift lever	Suitable position

NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.**

7. If 1st trip DTC is displayed, go to EC-1184, "Diagnostic Procedure" .

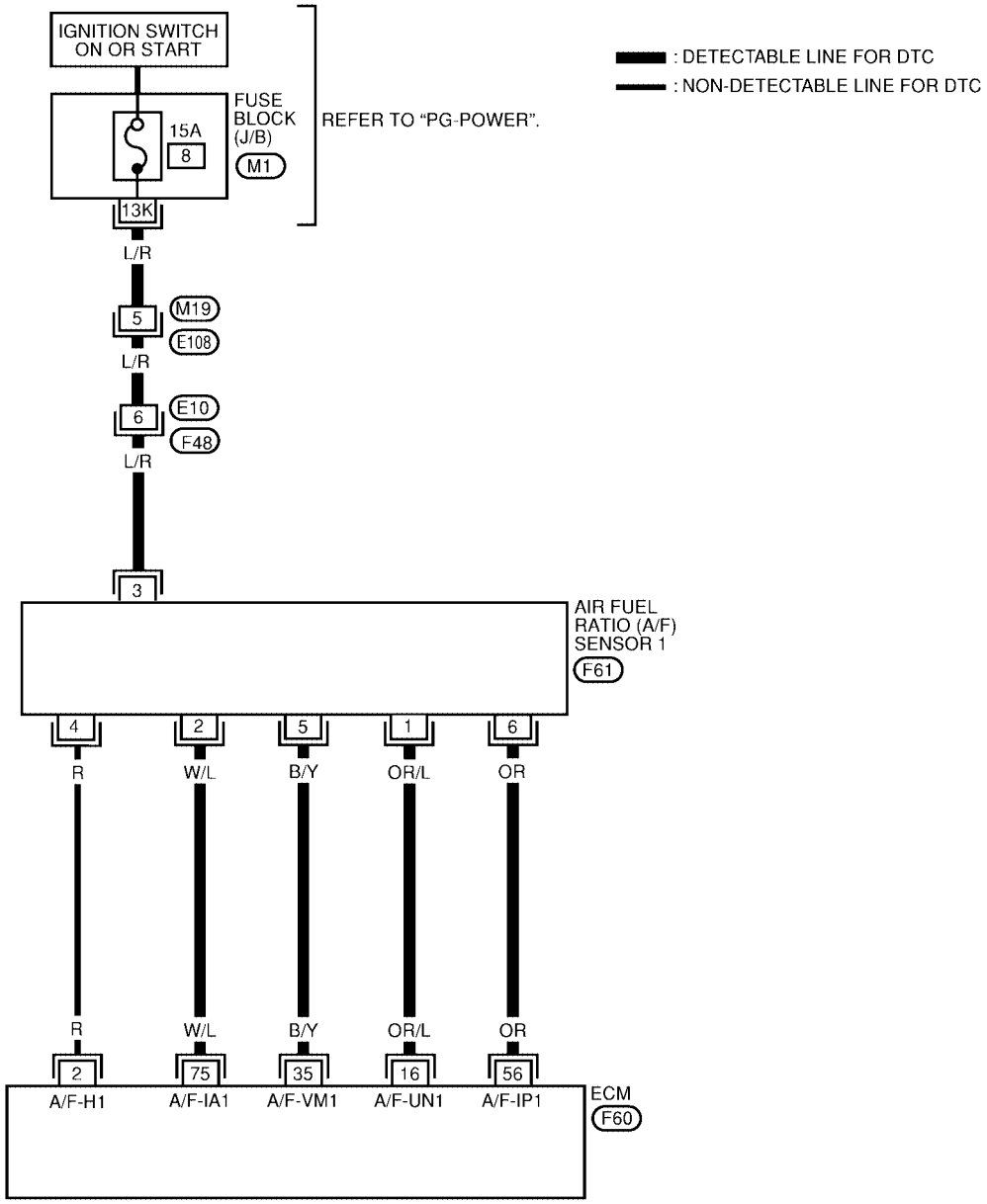
WITH GST

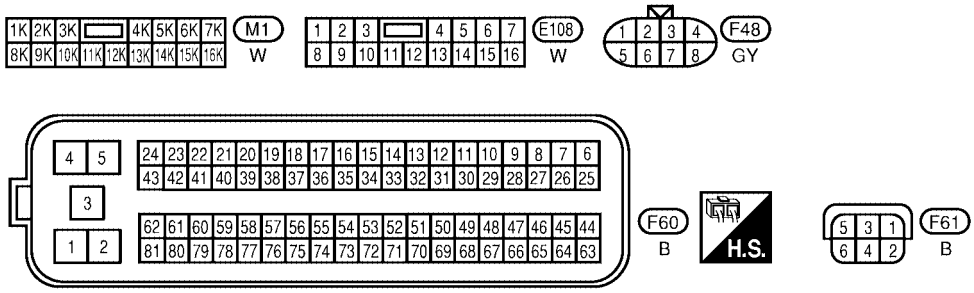
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JJN

EC-A/F-01





BBWA1478E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

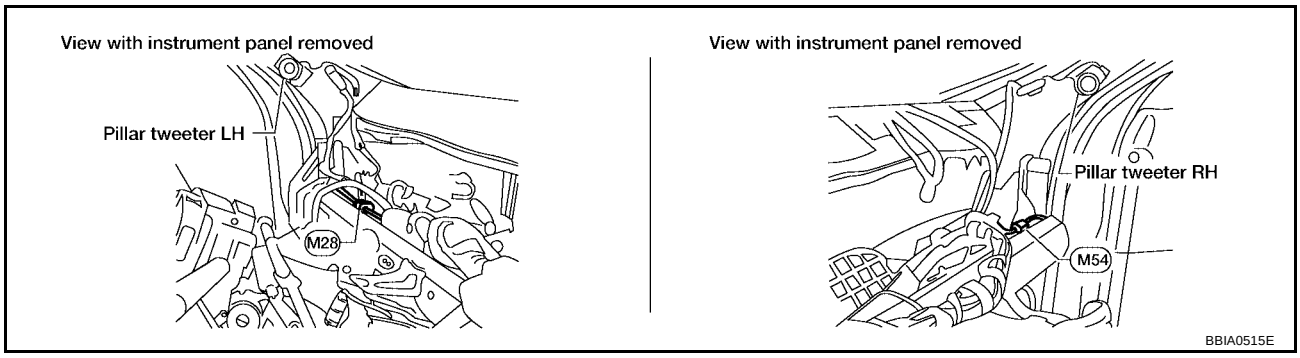
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	B/Y			Approximately 2.6V
56	OR			2 - 3V
75	W/L			2 - 3V

Diagnostic Procedure

UBS00JJO

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .

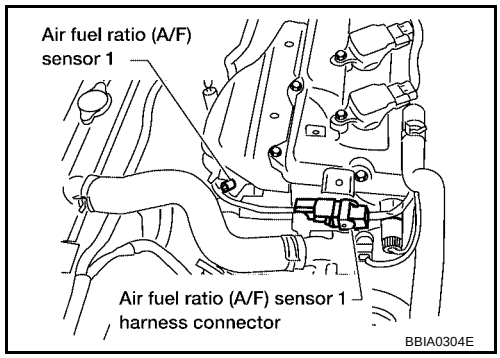


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.

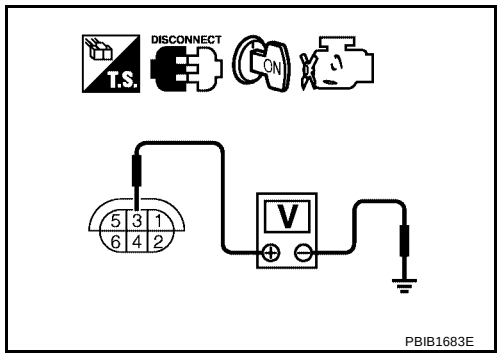


3. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E10, F48
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	16
5	35
6	56
2	75

Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00JJP

AIR FUEL RATIO SENSOR

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P1272 A/F SENSOR 1

PFP:22693

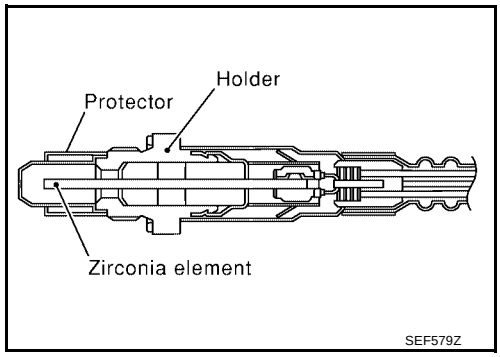
Component Description

UBS00JJQ

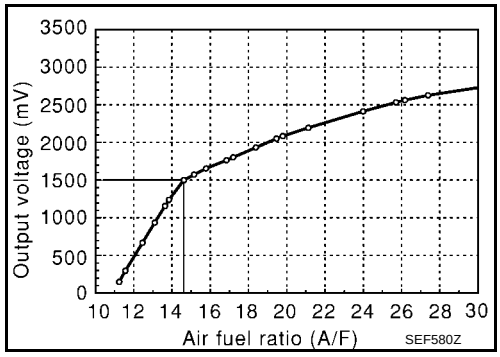
The A/F sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air-fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

UBS00JJR

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

UBS00JJS

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1272 1272	Air fuel ratio (A/F) sensor 1 circuit no activity detected	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 5V.	● Harness or connectors (The sensor circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

UBS00JJT

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

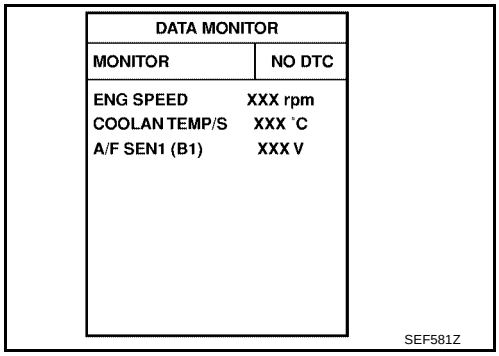
TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-II.

3. Check “A/F SEN1 (B1)” indication.
   If the indication is constantly approx. 5V, go to EC-1190, "Diagnostic Procedure" .
   If the indication is not constantly approx. 5V, go to next step.
4. Turn ignition switch OFF, wait at least 10 seconds and then restart engine.
5. Drive and accelerate vehicle to more than 40 km/h (25 MPH) within 20 seconds after restarting engine.
6. Maintain the following conditions for about 20 consecutive seconds.



ENG SPEED	1,000 - 3,200 rpm
VHCL SPEED SE	More than 40 km/h (25 MPH)
B/FUEL SCHDL	1.5 - 9.0 msec
COOLANT TEMP/S	Less than 70°C (158°F)
Shift lever	Suitable position

NOTE:
- **Keep the accelerator pedal as steady as possible during the cruising.**
- **If this procedure is not completed within 1 minute after restarting engine at step 4, return to step 4.**

7. If 1st trip DTC is displayed, go to EC-1190, "Diagnostic Procedure" .

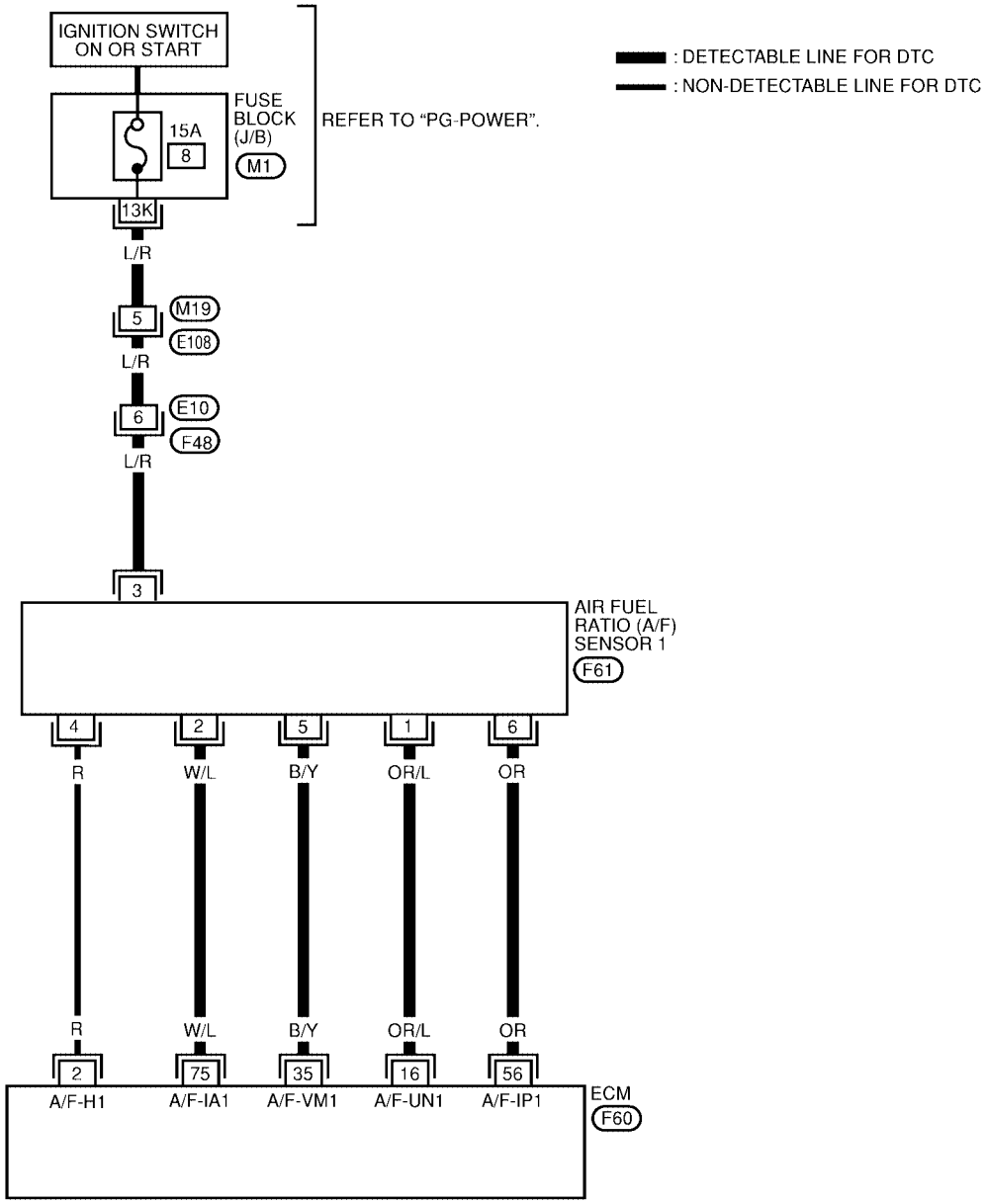
WITH GST

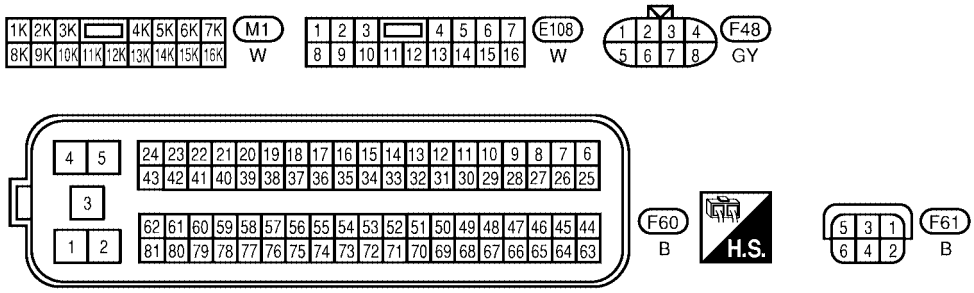
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JJU

EC-A/F-01





BBWA1478E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

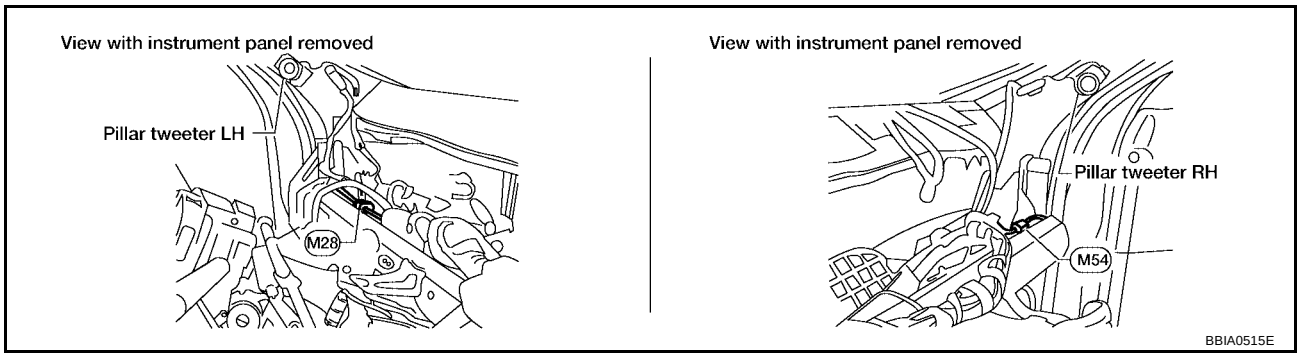
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	B/Y			Approximately 2.6V
56	OR			2 - 3V
75	W/L			2 - 3V

Diagnostic Procedure

UBS00JJV

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .

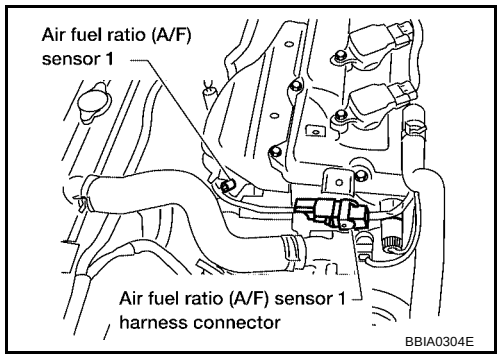


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.

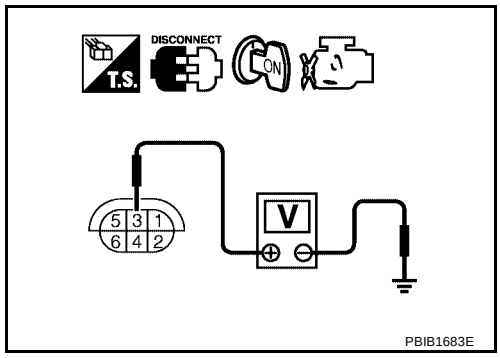


3. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E10, F48
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	16
5	35
6	56
2	75

Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00JJW

AIR FUEL RATIO SENSOR

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P1273 A/F SENSOR 1

PFP:22693

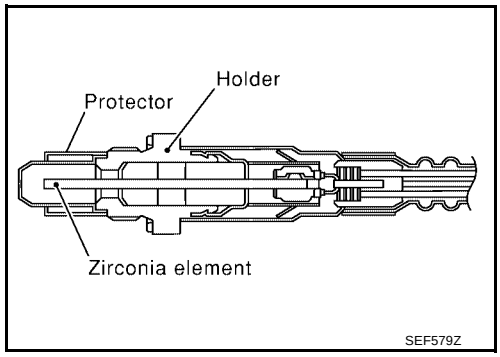
Component Description

UBS00JJX

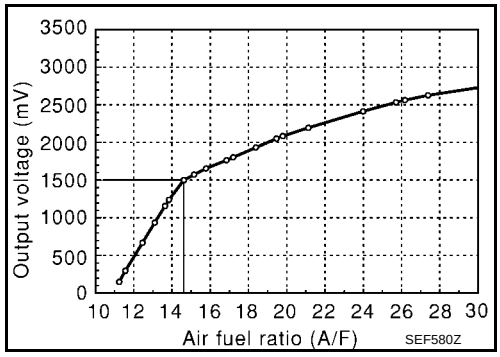
The A/F sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air-fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

UBS00JJY

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

UBS00JJZ

To judge the malfunction, the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is monitored not to be shifted lean side or rich side. When the A/F sensor 1 signal is shifting to the lean side, the malfunction will be detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1273 1273	Air fuel ratio (A/F) sensor 1 lean shift monitoring	The output voltage computed by ECM from the A/F sensor 1 signal is shifted to the lean side for a specified period.	● Air fuel ratio (A/F) sensor 1 ● Air fuel ratio (A/F) sensor heater 1 ● Fuel pressure ● Fuel injector ● Intake air leaks

DTC Confirmation Procedure

UBS00JK0

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

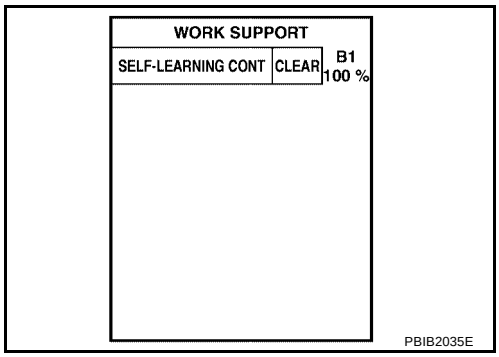
TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

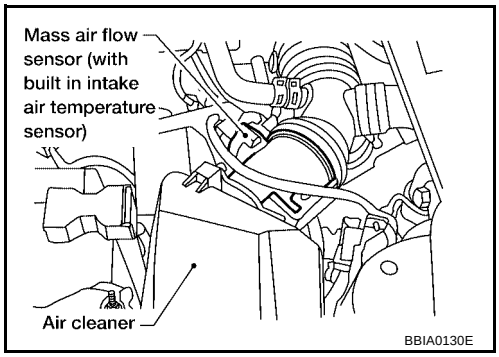
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning coefficient by touching “CLEAR”.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
7. Let engine idle for 1 minute.
8. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
9. If 1st trip DTC is detected, go to EC-1196, "Diagnostic Procedure" .



WITH GST

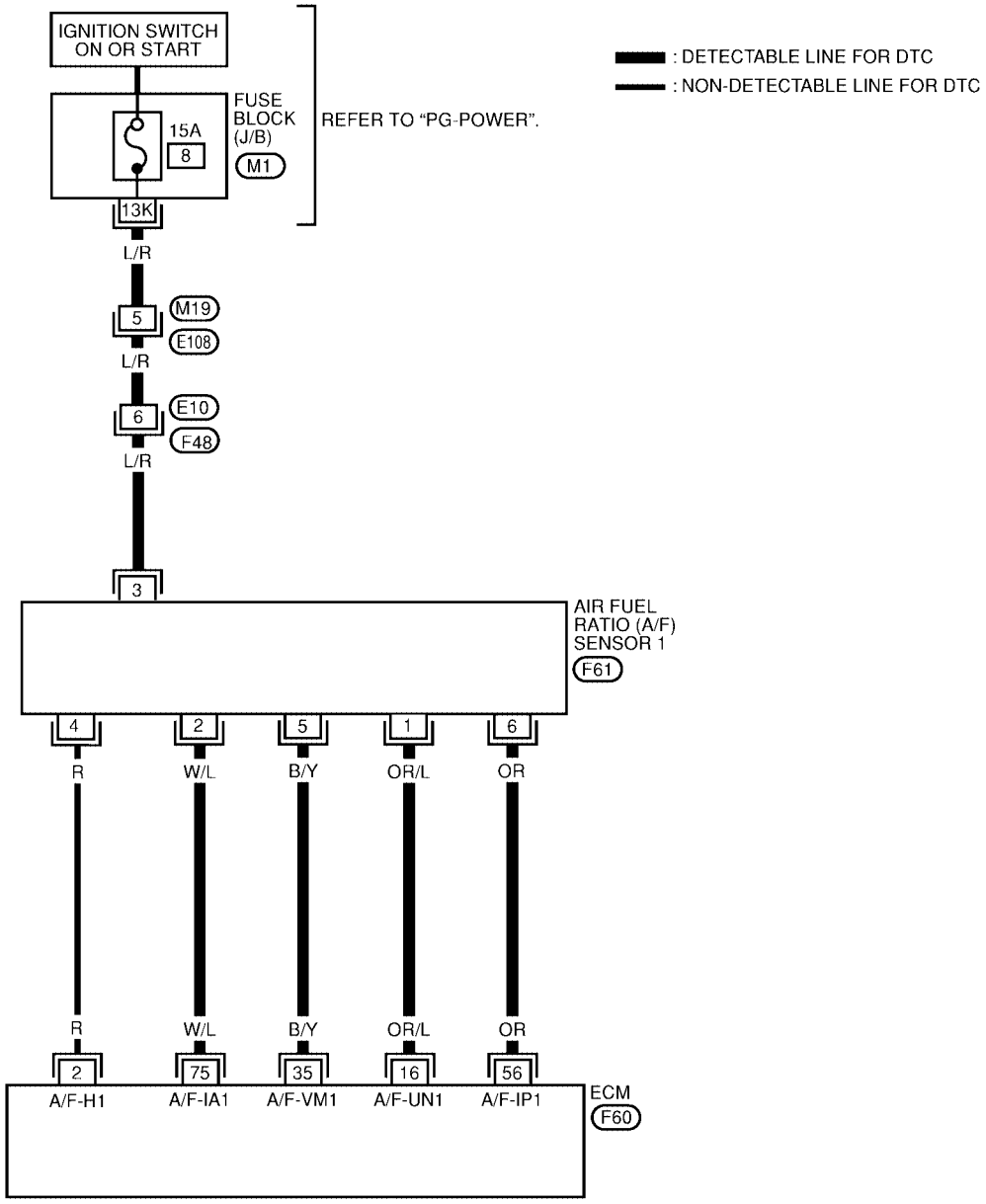
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Start engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST and make sure that DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
9. Let engine idle for 1 minute.
10. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
11. Select Service $07 with GST.
    If 1st trip DTC is detected, go to EC-1196, "Diagnostic Procedure" .

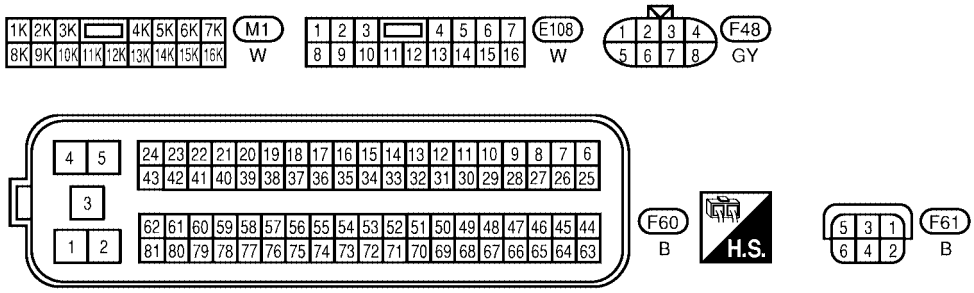


Wiring Diagram

UBS00JK1

EC-A/F-01





BBWA1478E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

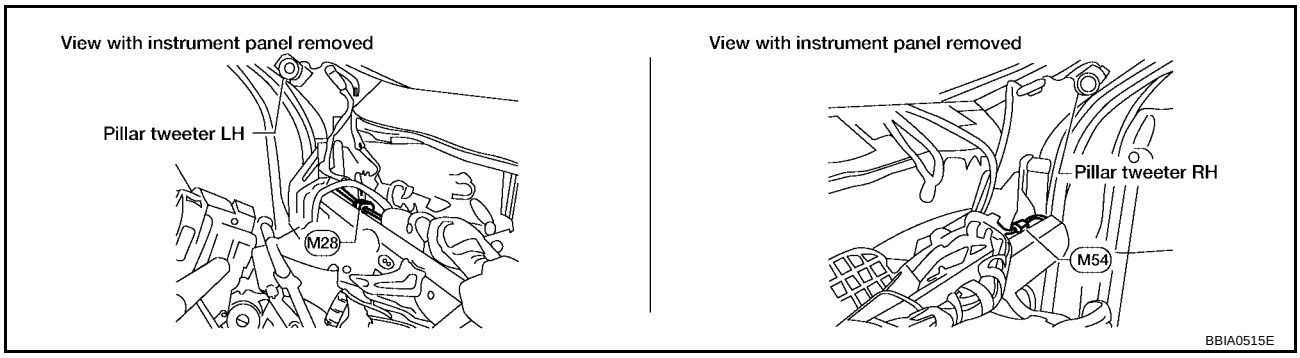
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	B/Y			Approximately 2.6V
56	OR			2 - 3V
75	W/L			2 - 3V

Diagnostic Procedure

UBS00JK2

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .



OK or NG

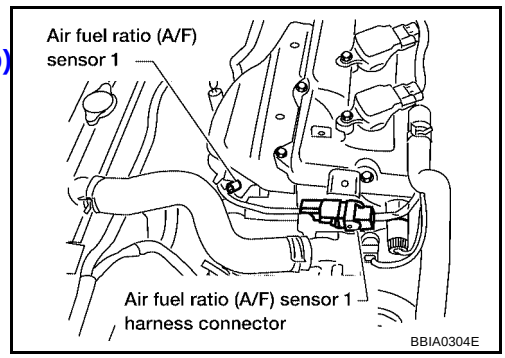
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.

Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

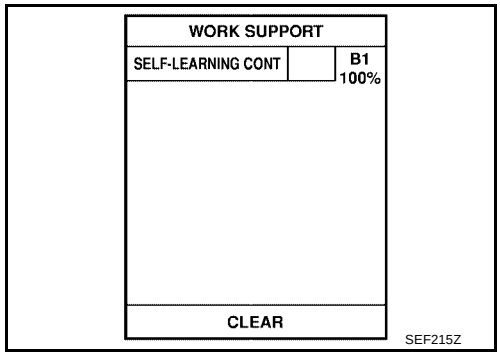
>> GO TO 3.



3. CLEAR THE SELF-LEARNING DATA.

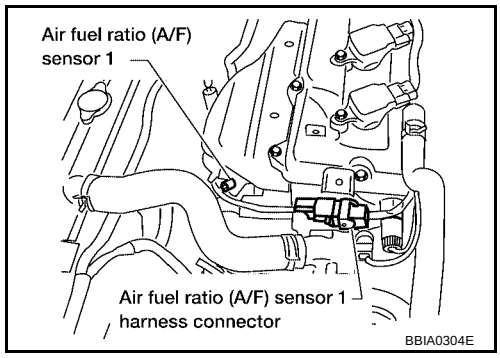
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected? Is it difficult to start engine?

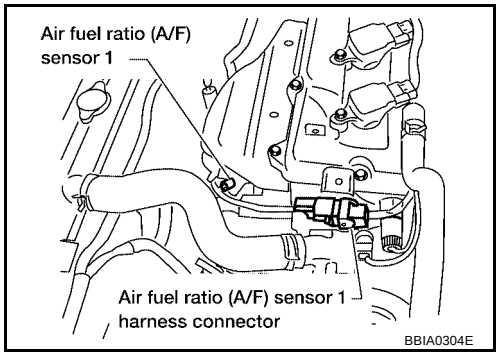


Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-941 .
No >> GO TO 4.

4. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Turn ignition switch ON.

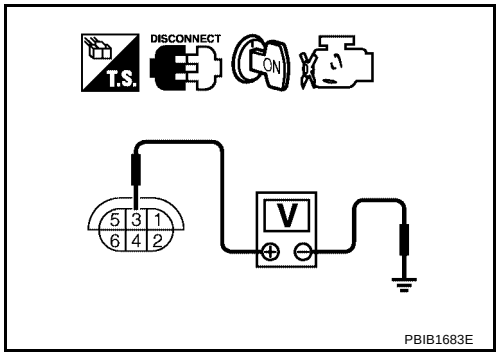


4. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E10, F48
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

6. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	16
5	35
6	56
2	75

Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK A/F SENSOR 1 HEATER

Refer to EC-1101, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace A/F sensor 1.

8. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00JK3

AIR FUEL RATIO SENSOR

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P1274 A/F SENSOR 1

PFP:22693

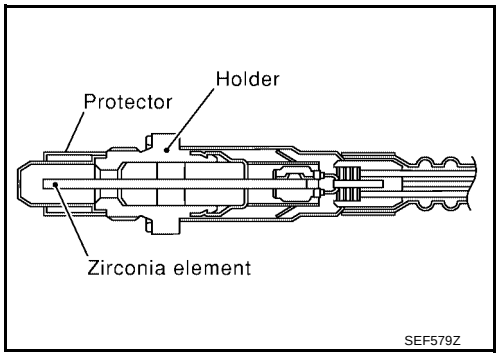
Component Description

UBS00JK4

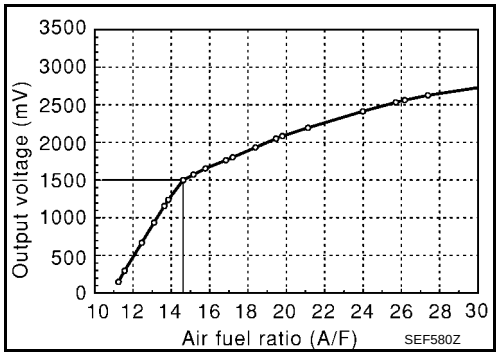
The A/F sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air-fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

UBS00JK5

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

UBS00JK6

To judge the malfunction, the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is monitored not to be shifted to the lean side or rich side. When the A/F sensor 1 signal is shifting to the rich side, the malfunction will be detected.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1274 1274	Air fuel ratio (A/F) sensor 1 rich shift monitoring	The A/F signal computed by ECM from the A/F sensor 1 signal is shifted to the rich side for a specified period.	● Air fuel ratio (A/F) sensor 1 ● Air fuel ratio (A/F) sensor heater 1 ● Fuel pressure ● Fuel injector

DTC Confirmation Procedure

UBS00JK7

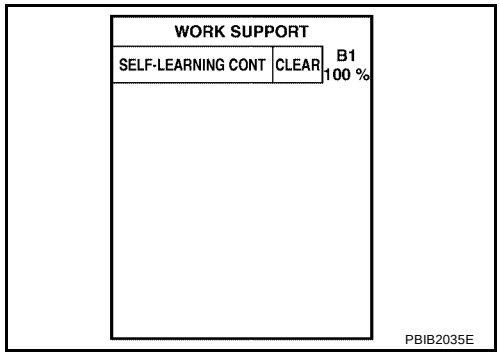
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

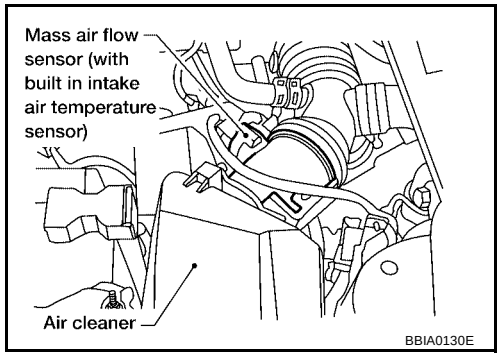
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.

4. Clear the self-learning coefficient by touching “CLEAR”.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
7. Let engine idle for 1 minute.
8. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
9. If 1st trip DTC is detected, go to EC-1203, "Diagnostic Procedure" .



WITH GST

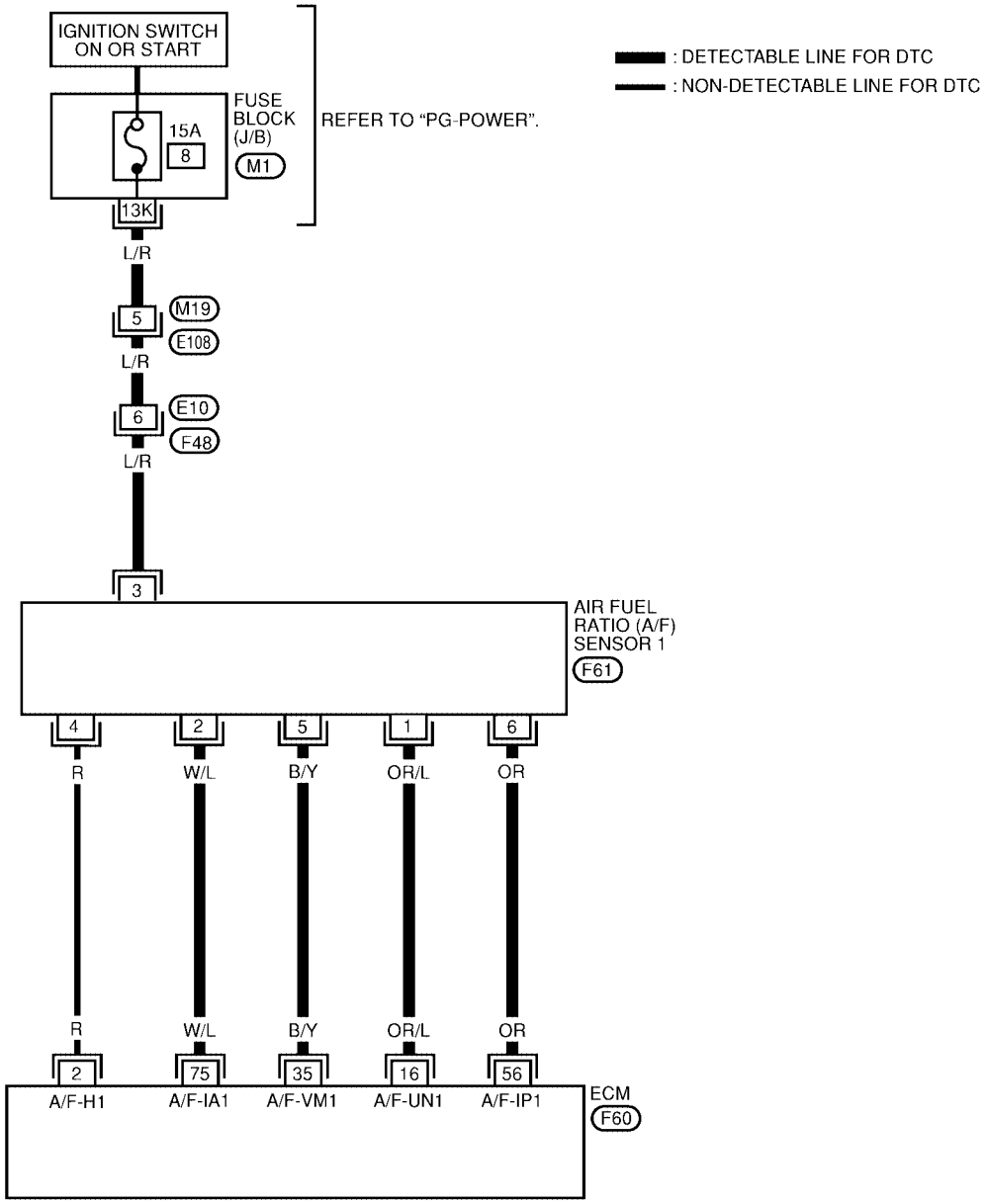
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Start engine and let it idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST and make sure that DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine and keep the engine speed between 3,500 and 4,000 rpm for 1 minute under no load.
9. Let engine idle for 1 minute.
10. Keep engine speed between 2,500 and 3,000 rpm for 20 minutes.
11. Select Service $07 with GST.
    If 1st trip DTC is detected, go to EC-1203, "Diagnostic Procedure" .

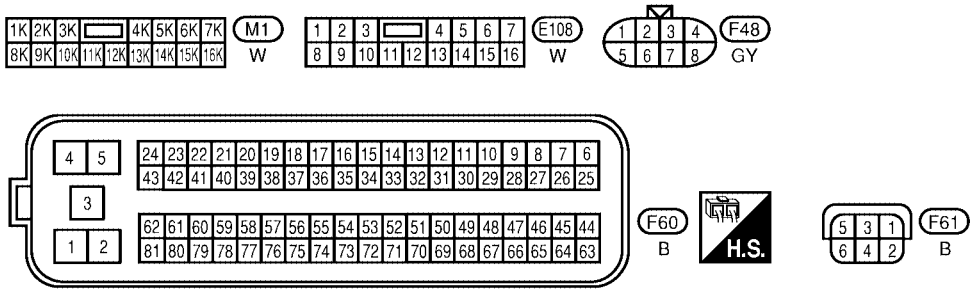


Wiring Diagram

UBS00JK8

EC-A/F-01





BBWA1478E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

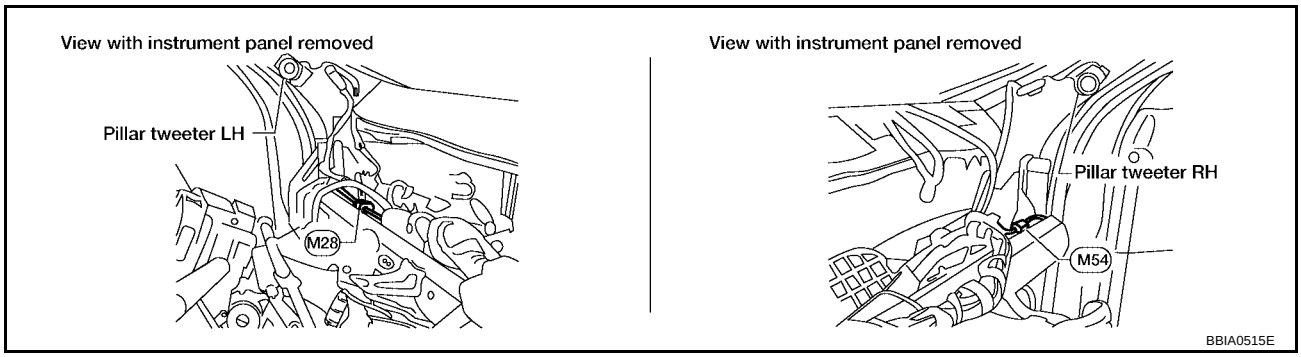
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	B/Y			Approximately 2.6V
56	OR			2 - 3V
75	W/L			2 - 3V

Diagnostic Procedure

UBS00JK9

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .



OK or NG

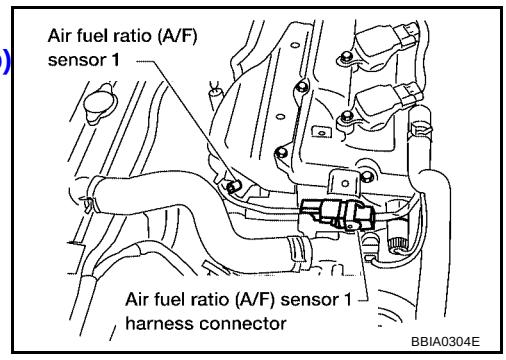
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.

Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

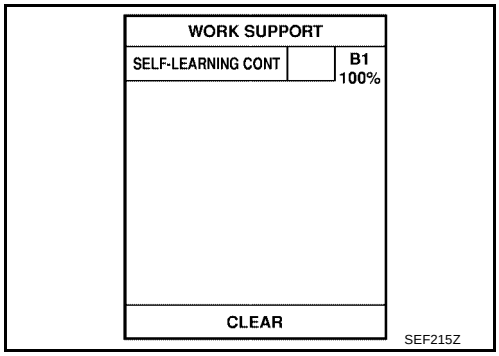
>> GO TO 3.



3. CLEAR THE SELF-LEARNING DATA

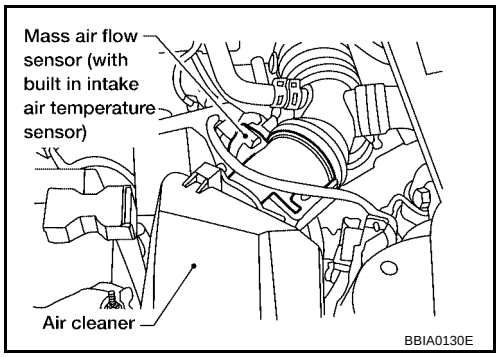
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected? Is it difficult to start engine?



Yes or No

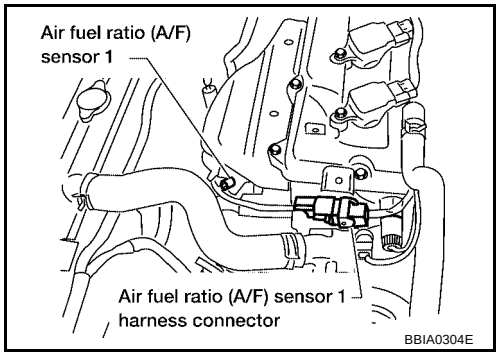
Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-952 .
No >> GO TO 4.

4. CHECK HARNESS CONNECTOR

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Check harness connector for water.
   Water should not exit.

OK or NG

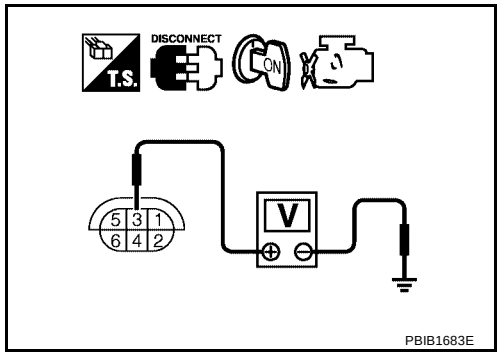
OK >> GO TO 5.
NG >> Repair or replace harness connector.



5. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E10, F48
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

7. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	16
5	35
6	56
2	75

Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK A/F SENSOR 1 HEATER

Refer to EC-1101, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace A/F sensor 1.

9. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00JKA

AIR FUEL RATIO SENSOR

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P1276 A/F SENSOR 1

PFP:22693

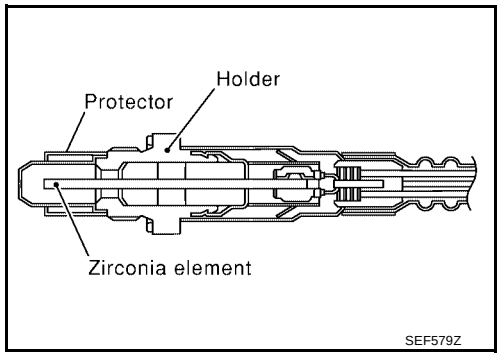
Component Description

UBS00JKB

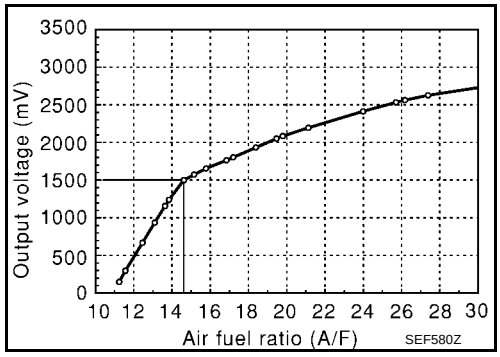
The A/F sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air-fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

UBS00JKC

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

UBS00JKD

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal fluctuates according to fuel feedback control.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1276 1276	Air fuel ratio (A/F) sensor 1 circuit high voltage	The A/F signal computed by ECM from the A/F sensor 1 signal is constantly approx. 1.5V.	● Harness or connectors (The sensor circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1

DTC Confirmation Procedure

UBS00JKE

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

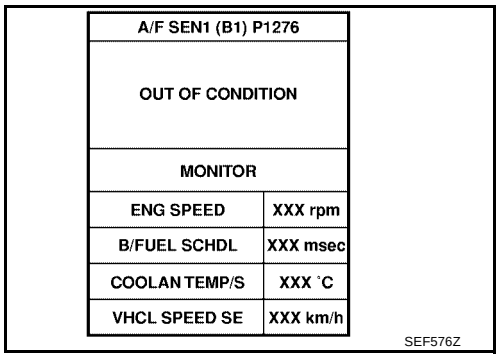
1. Start engine and warm it up to normal operating temperature.
2. Select “A/F SEN1 (B1)” in “DATA MONITOR” mode with CONSULT-II.
3. Check “A/F SEN1 (B1)” indication.

If the indication is constantly approx. 1.5V and does not fluctuates, go to EC-1211, "Diagnostic Procedure" .

If the indication fluctuates around 1.5V, go to next step.

4. Select “A/F SEN1 (B1) P1276” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-II.
5. Touch “START”.
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen.

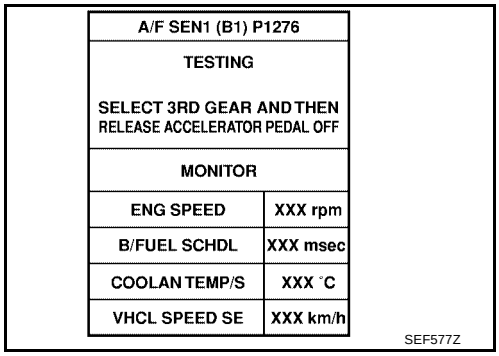
ENG SPEED	1,750 - 3,200 rpm
Vehicle speed	More than 64 km/h (40 MPH)
B/FUEL SCHDL	1.0 - 8.0 msec
COOLANT TEMP/S	More than 70°C (158°F)
Shift lever	D position with OD ON (A/T models)
	5th position (M/T models)



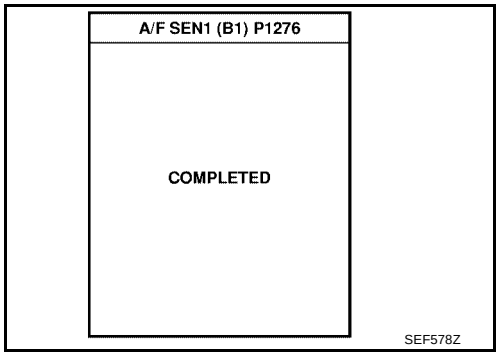
If “TESTING” is not displayed after 20 seconds, retry from step 2.

7. Release accelerator pedal fully.

   NOTE:
   Never apply brake during releasing the accelerator pedal.



8. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, retry from step 6.
9. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
   If “NG” is displayed, go to EC-1211, "Diagnostic Procedure" .



Overall Function Check

UBS00JKF

Use this procedure to check the overall function of the A/F sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Drive the vehicle at a speed of 80 km/h (50 MPH) for a few minutes in the suitable gear position.
3. Set D position with “OD” ON (A/T) or 5th position (M/T), then release the accelerator pedal fully until the vehicle speed decreases to 50 km/h (30 MPH).

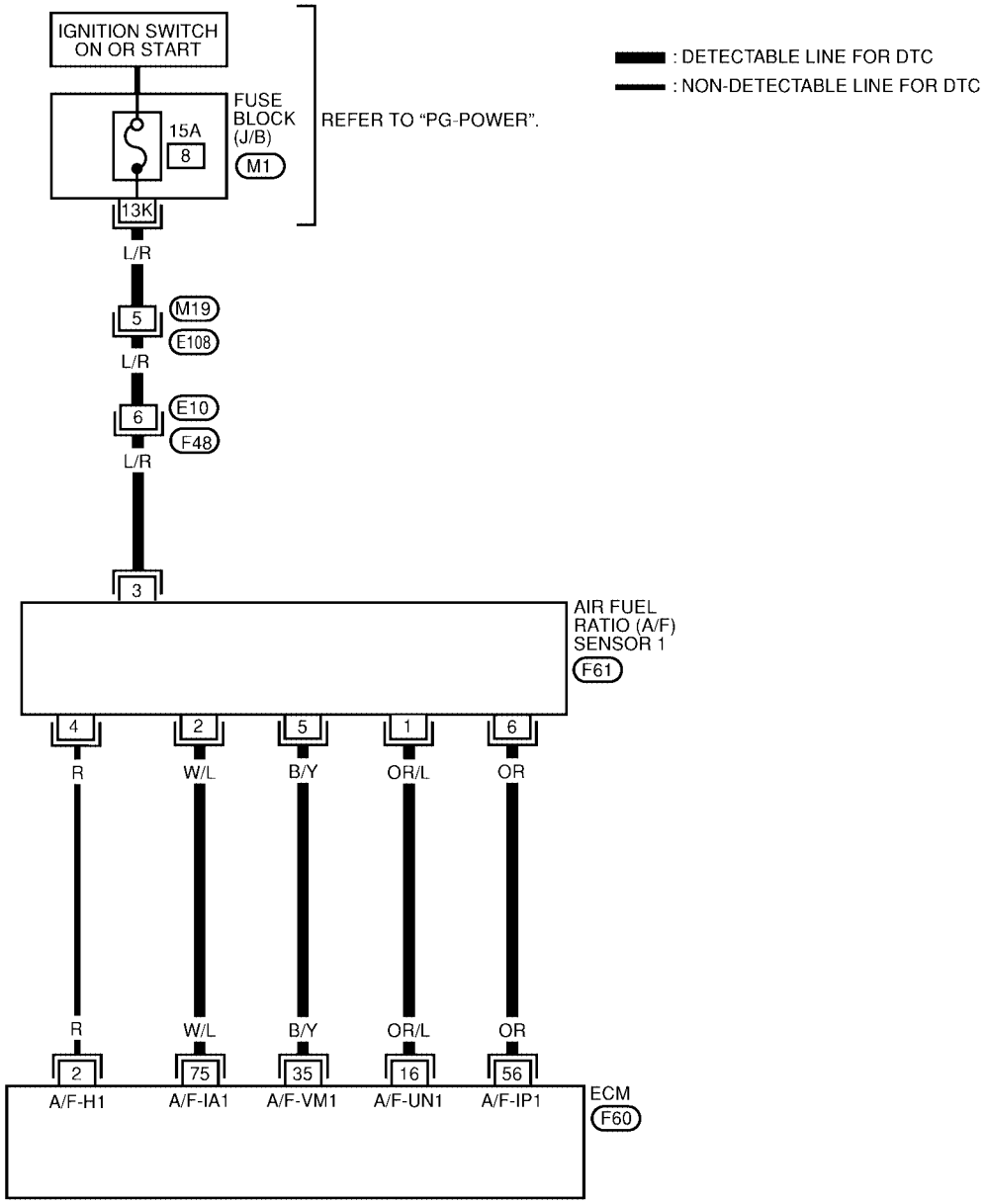
   NOTE:
   Never apply brake during releasing the accelerator pedal.
4. Repeat steps 2 to 3 for 5 times.
5. Stop the vehicle and turn ignition switch OFF.
6. Wait at least 10 seconds and restart engine.

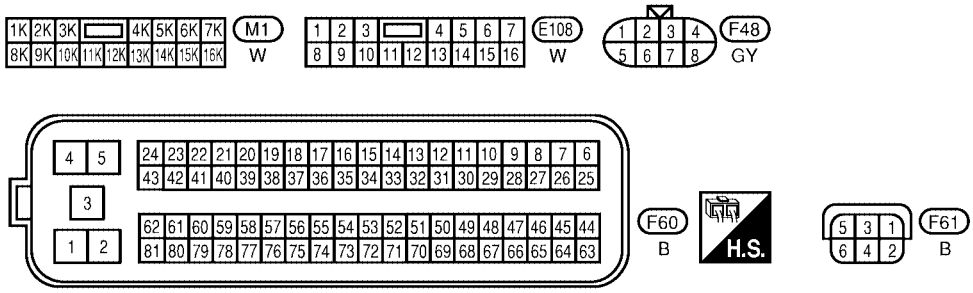
7. Repeat steps 2 to 3 for 5 times.
8. Stop the vehicle and connect GST to the vehicle.
9. Make sure that no 1st trip DTC is displayed.
   If the 1st trip DTC is displayed, go to EC-1211, "Diagnostic Procedure" .

Wiring Diagram

UBS00JKG

EC-A/F-01





BBWA1478E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

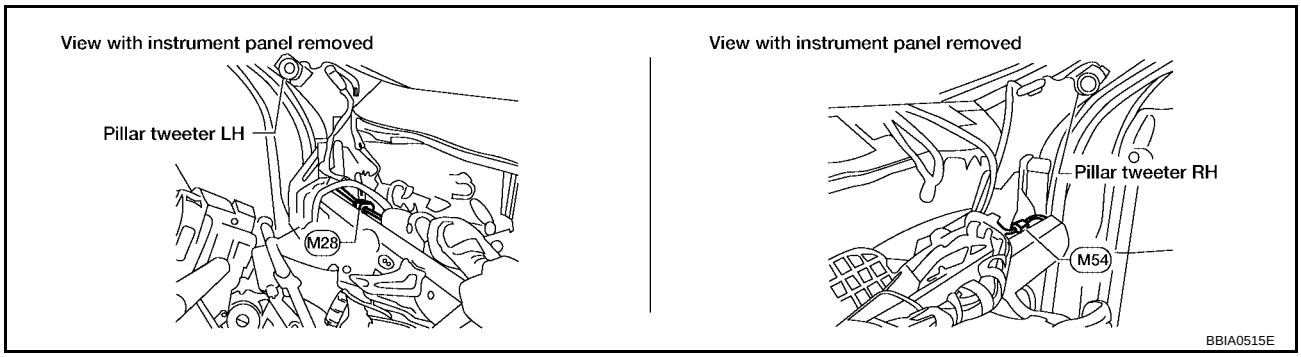
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	B/Y			Approximately 2.6V
56	OR			2 - 3V
75	W/L			2 - 3V

Diagnostic Procedure

UBS00JKH

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .

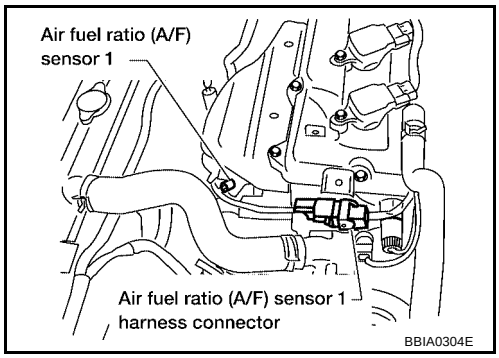


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

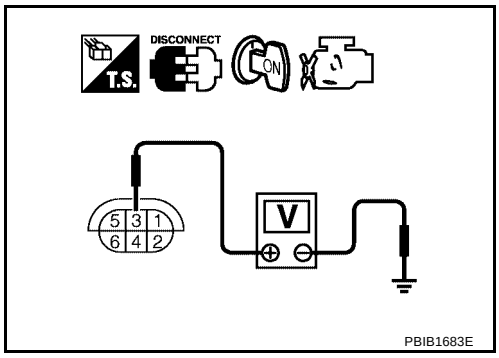
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect A/F sensor 1 harness connector.
2. Turn ignition switch ON.



3. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E10, F48
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

4. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	16
5	35
6	56
2	75

Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00JKI

AIR FUEL RATIO SENSOR

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST"

DTC P1278 A/F SENSOR 1

PFP:22693

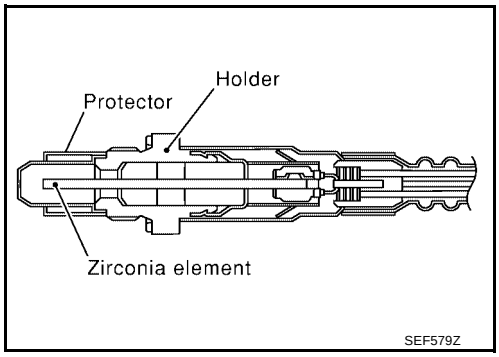
Component Description

UBS00JKJ

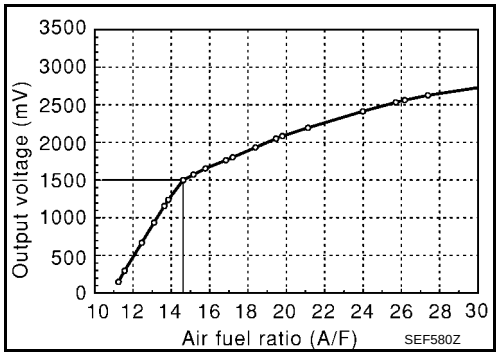
The A/F sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air-fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

UBS00JKK

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

UBS00JKL

To judge the malfunction of air fuel ratio (A/F) sensor 1, this diagnosis measures response time of the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the air fuel ratio (A/F) sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F sensor 1 signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1278 1278	Air fuel ratio (A/F) sensor 1 circuit slow response	The response (from RICH to LEAN) of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.	● Harness or connectors (The sensor circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1 ● Air fuel ratio (A/F) sensor heater 1 ● Fuel pressure ● Fuel injector ● Intake air leaks ● Exhaust gas leaks ● PCV ● Mass air flow sensor

DTC Confirmation Procedure

UBS00JKM

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
4. Let engine idle for 1 minute.
5. Select “A/F SEN1(B1) P1278/P1279” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-II.
6. Touch “START”.
   If “COMPLETED” appears on CONSULT-II screen, go to step 10.
   If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.

A/F SEN1 (B1) P1278/P1279	
OUT OF CONDITION	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

PBIB0756E

7. After perform the following procedure, “TESTING” will be displayed on the CONSULT-II screen.

a. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.

b. Fully release accelerator pedal and then let engine idle for about 10 seconds.
   If “TESTING” is not displayed after 10 seconds, refer to EC-813, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .

8. Wait for about 20 seconds at idle at under the condition that “TESTING” is displayed on the CONSULT-II screen.

A/F SEN1 (B1) P1278/P1279	
TESTING	
MONITOR	
ENG SPEED	XXX rpm
B/FUEL SCHDL	XXX msec
COOLAN TEMP/S	XXX °C
VHCL SPEED SE	XXX km/h

PBIB1925E

9. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, refer to EC-813, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .
10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
    If “NG” is displayed, go to EC-1218, "Diagnostic Procedure" .

A/F SEN1 (B1) P1278/P1279
COMPLETED

PBIB0758E

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Select Service $01 with GST.
3. Calculate the total value of “Short term fuel trim” and “Long term fuel trim” indications.
   Make sure that the total percentage should be within ±15%.
   If OK, go to the following step.
   If NG, check the following.
   - Intake air leaks

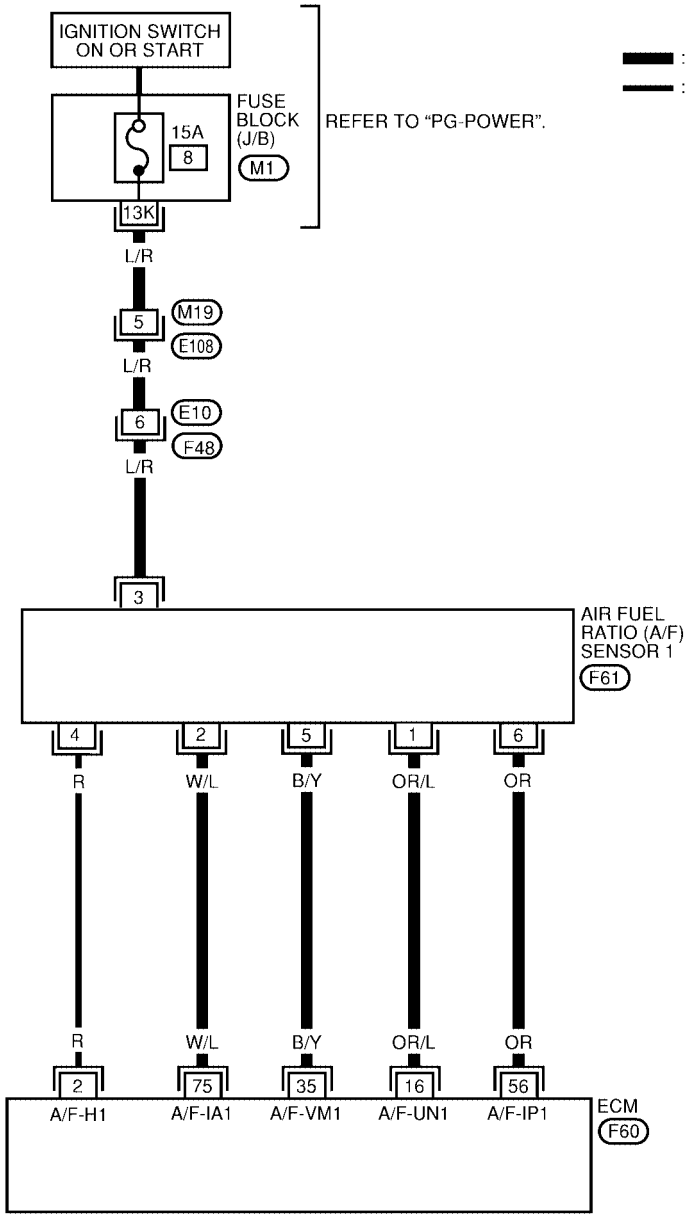
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Fuel injector
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

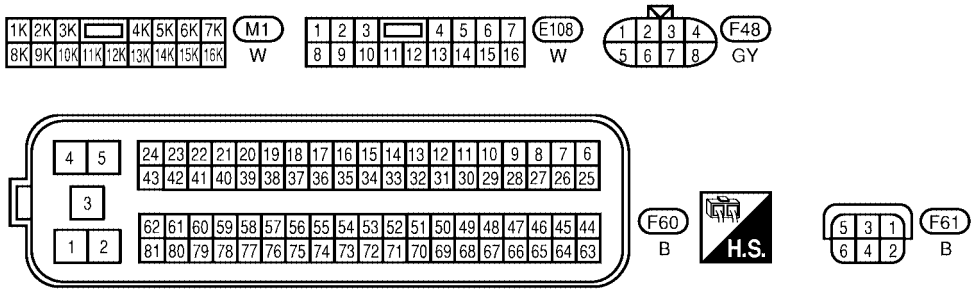
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Select Service $07 with GST.
   If 1st trip DTC is detected, go to EC-1218, "Diagnostic Procedure" .

Wiring Diagram

UBS00JKN

EC-A/F-01





BBWA1478E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

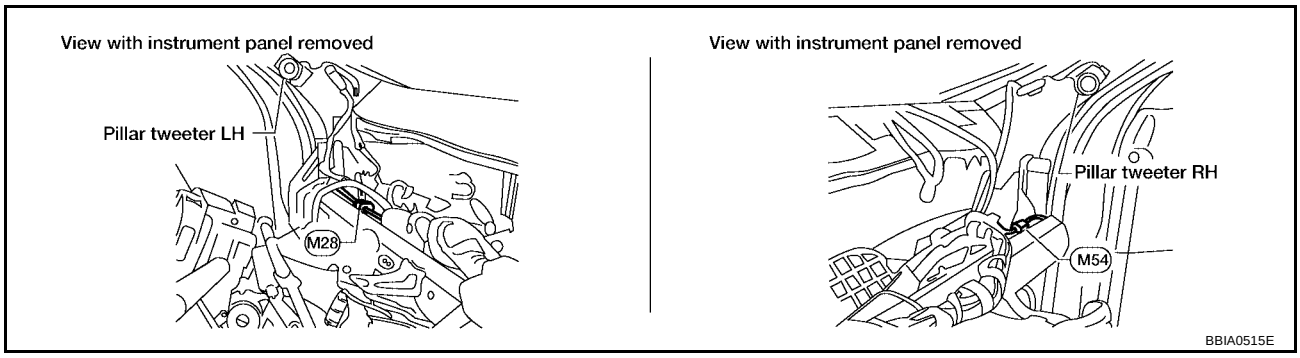
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	B/Y			Approximately 2.6V
56	OR			2 - 3V
75	W/L			2 - 3V

Diagnostic Procedure

UBS00JKO

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .



OK or NG

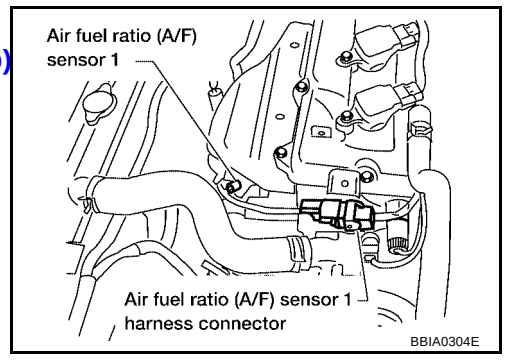
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.

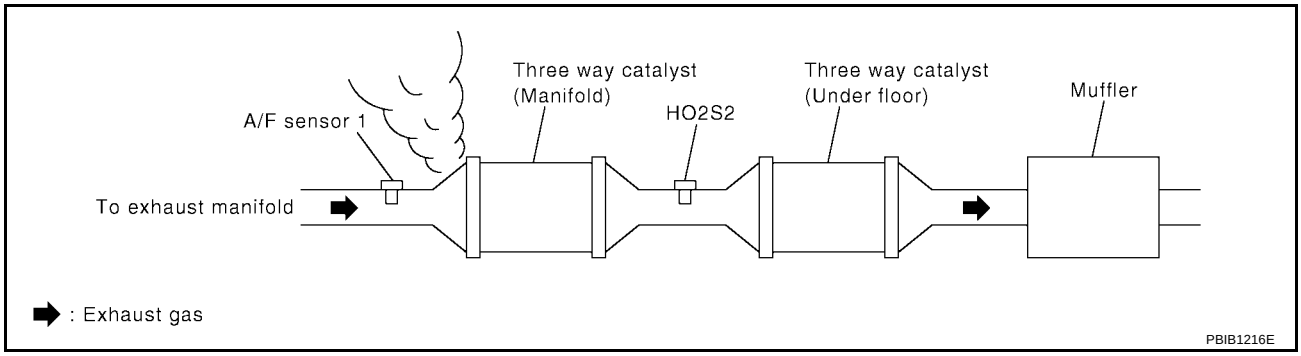
Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.



3. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

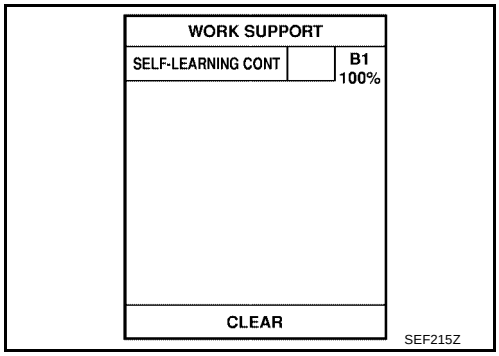
OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. CLEAR THE SELF-LEARNING DATA

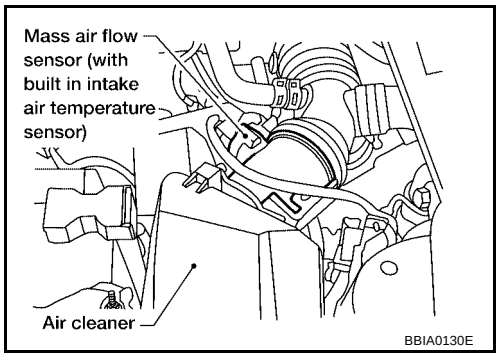
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR” or “START”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

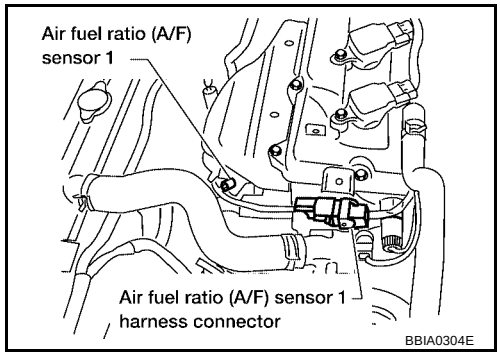


Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-941 , EC-952 .
No >> GO TO 6.

6. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Turn ignition switch ON.

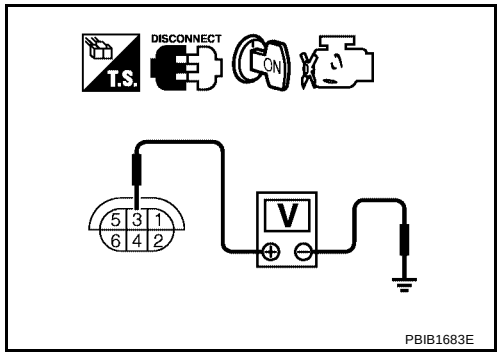


4. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E10, F48
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	16
5	35
6	56
2	75

Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-1101, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace A/F sensor 1.

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-866, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace mass air flow sensor.

11. CHECK PCV VALVE

Refer to EC-693, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00JKP

AIR FUEL RATIO SENSOR

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P1279 A/F SENSOR 1

PFP:22693

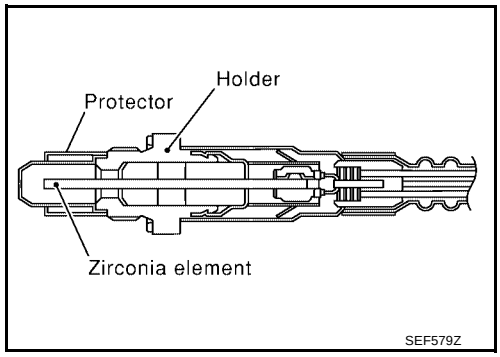
Component Description

UBS00JKQ

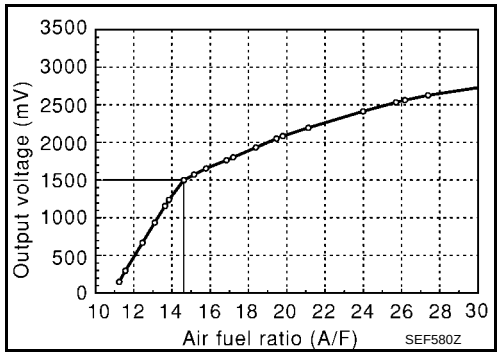
The A/F sensor 1 is a planar dual-cell limit current sensor. The sensor element of the A/F sensor 1 is the combination of a Nernst concentration cell (sensor cell) with an oxygen-pump cell, which transports ions. It has a heater in the element.

The sensor is capable of precise measurement $\lambda = 1$, but also in the lean and rich range. Together with its control electronics, the sensor outputs a clear, continuous signal throughout a wide λ range ($0.7 < \lambda <$ air).

The exhaust gas components diffuse through the diffusion gap at the electrode of the oxygen pump and Nernst concentration cell, where they are brought to thermodynamic balance.



An electronic circuit controls the pump current through the oxygen-pump cell so that the composition of the exhaust gas in the diffusion gap remains constant at $\lambda = 1$. Therefore, the A/F sensor 1 is able to indicate air-fuel ratio by this pumping of current. In addition, a heater is integrated in the sensor to ensure the required operating temperature of 700 - 800°C (1,292 - 1,472°F).



CONSULT-II Reference Value in Data Monitor Mode

UBS00JKR

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	Fluctuates around 1.5V

On Board Diagnosis Logic

UBS00JKS

To judge the malfunction of air fuel ratio (A/F) sensor 1, this diagnosis measures response time of the A/F signals computed by ECM from the air fuel ratio (A/F) sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and the air fuel ratio (A/F) sensor 1 temperature index. Judgment is based on whether the compensated time (the A/F sensor 1 signal cycling time index) is inordinately long or not.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P1279 1279	Air-fuel ratio (A/F) sensor 1 circuit slow response	The response (from LEAN to RICH) of the A/F signal computed by ECM from A/F sensor 1 signal takes more than the specified time.	● Harness or connectors (The sensor circuit is open or shorted.) ● Air-fuel ratio (A/F) sensor 1 ● Air-fuel ratio (A/F) sensor heater 1 ● Fuel pressure ● Fuel injector ● Intake air leaks ● Exhaust gas leaks ● PCV ● Mass air flow sensor

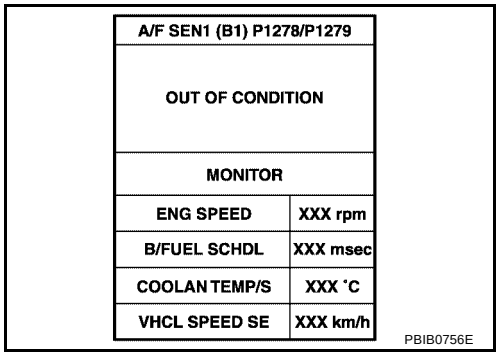
DTC Confirmation Procedure

UBS00JKT

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
4. Let engine idle for 1 minute.
5. Select “A/F SEN1(B1) P1278/P1279” of “A/F SEN1” in “DTC WORK SUPPORT” mode with CONSULT-II.
6. Touch “START”.
   If “COMPLETED” appears on CONSULT-II screen, go to step 10.
   If “COMPLETED” does not appear on CONSULT-II screen, go to the following step.

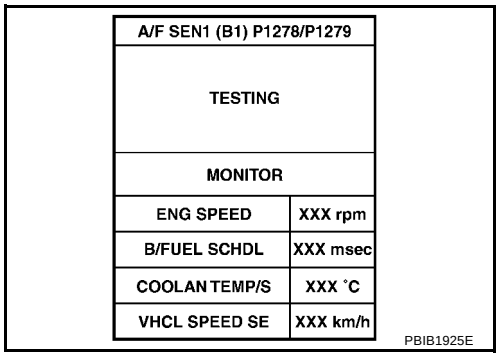


7. After perform the following procedure, “TESTING” will be displayed on the CONSULT-II screen.

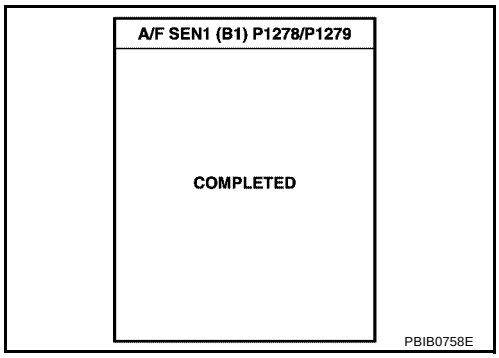
a. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.

b. Fully release accelerator pedal and then let engine idle for about 10 seconds.
   If “TESTING” is not displayed after 10 seconds, refer to EC-813, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .

8. Wait for about 20 seconds at idle at under the condition that “TESTING” is displayed on the CONSULT-II screen.



9. Make sure that “TESTING” changes to “COMPLETED”.
   If “TESTING” changed to “OUT OF CONDITION”, refer to EC-813, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .
10. Make sure that “OK” is displayed after touching “SELF-DIAG RESULT”.
    If “NG” is displayed, go to EC-1227, "Diagnostic Procedure" .



WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Select Service $01 with GST.
3. Calculate the total value of “Short term fuel trim” and “Long term fuel trim” indications.
   Make sure that the total percentage should be within ±15%.
   If OK, go to the following step.
   If NG, check the following.
   - Intake air leaks

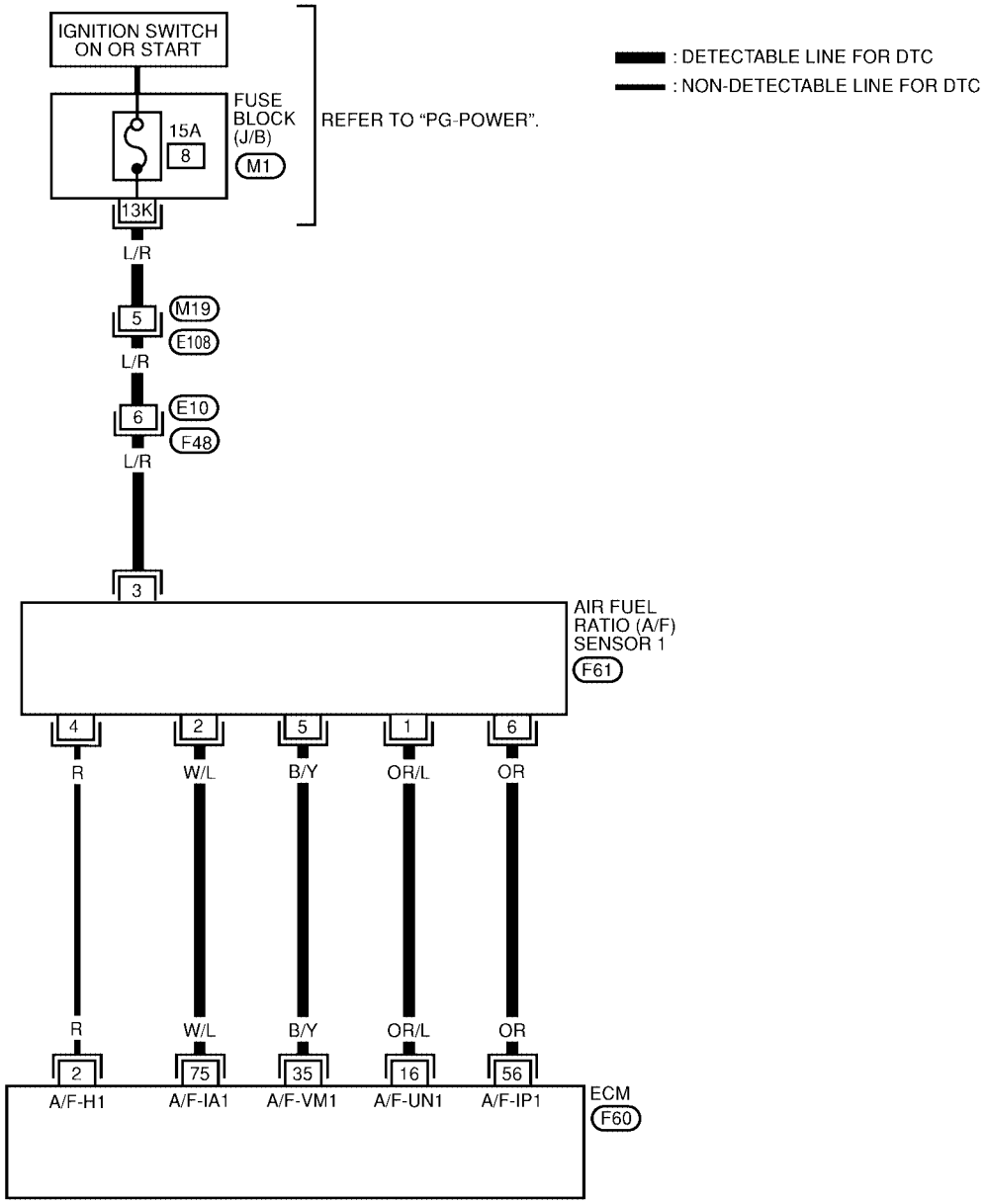
- Exhaust gas leaks
- Incorrect fuel pressure
- Lack of fuel
- Fuel injectors
- Incorrect PCV hose connection
- PCV valve
- Mass air flow sensor

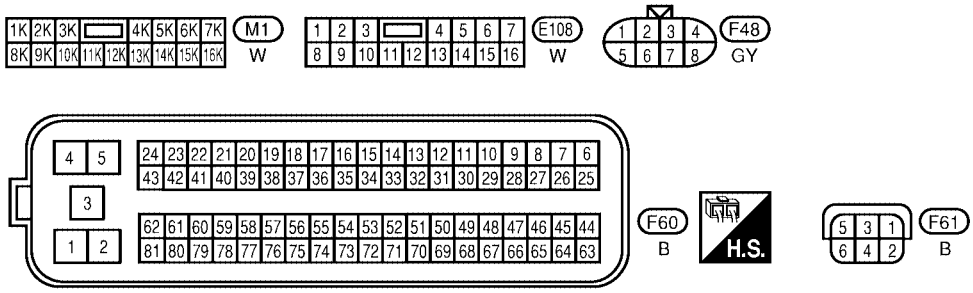
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1minute under no load.
6. Let engine idle for 1 minute.
7. Increase the engine speed up to 4,000 to 5,000 rpm and keep it for 10 seconds.
8. Fully release accelerator pedal and then let engine idle for about 1 minute.
9. Select Service $07 with GST.
   If 1st trip DTC is detected, go to EC-1227, "Diagnostic Procedure" .

Wiring Diagram

UBS00JKU

EC-A/F-01





BBWA1478E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

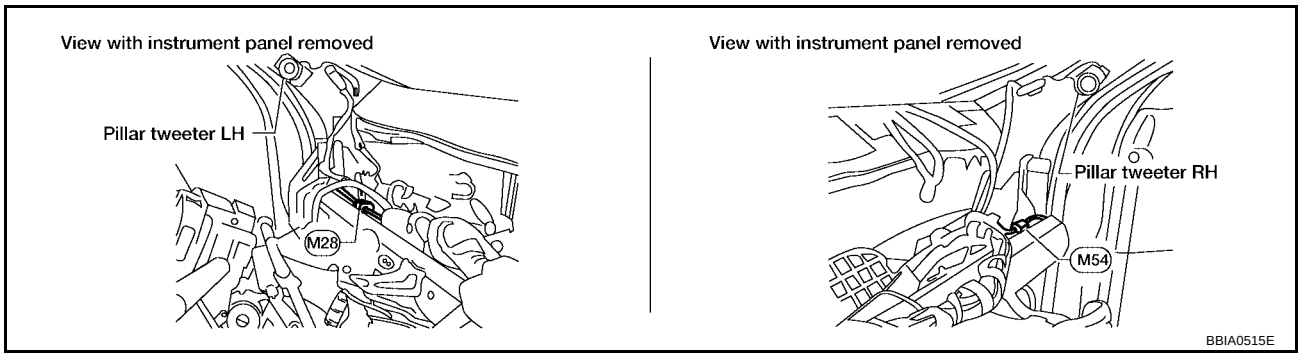
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/L	A/F sensor 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 3.1V
35	B/Y			Approximately 2.6V
56	OR			2 - 3V
75	W/L			2 - 3V

Diagnostic Procedure

UBS00JKV

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .



OK or NG

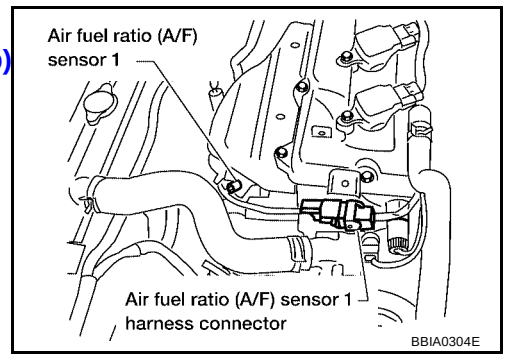
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN AIR FUEL RATIO (A/F) SENSOR 1

Loosen and retighten the air fuel ratio (A/F) sensor 1.

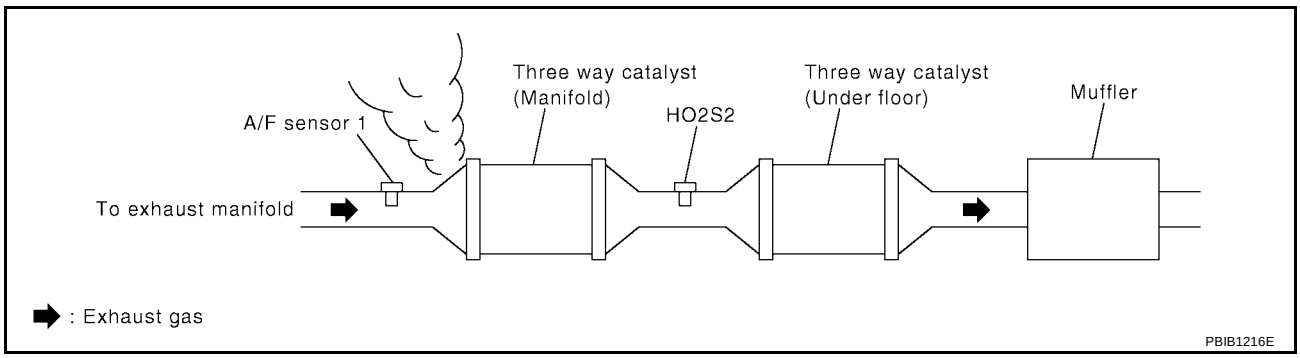
Tightening torque: 40 - 60 N-m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.



3. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

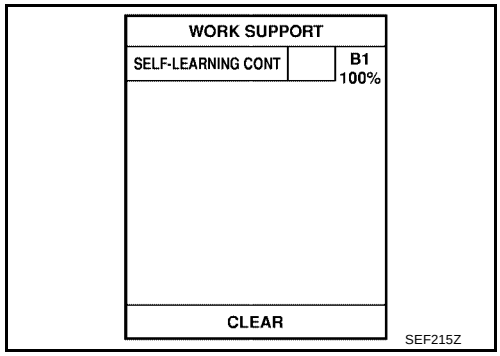
OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. CLEAR THE SELF-LEARNING DATA

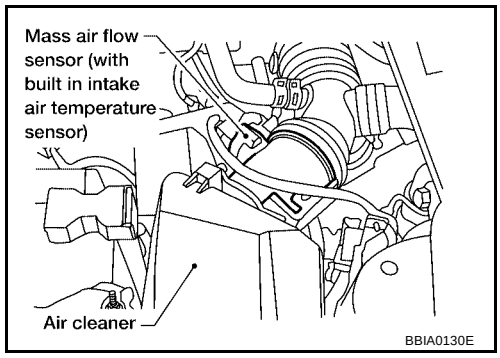
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR” or “START”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected? Is it difficult to start engine?

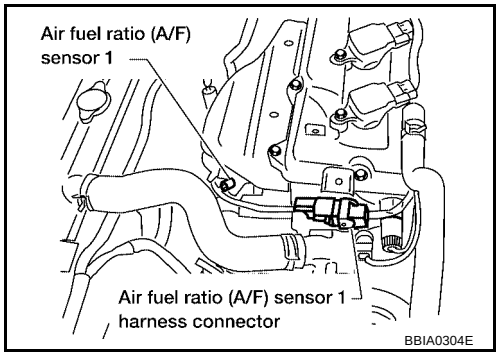


Yes or No

Yes >> Perform trouble diagnosis for DTC P0171, P0172. Refer to EC-941 , EC-952 .
No >> GO TO 6.

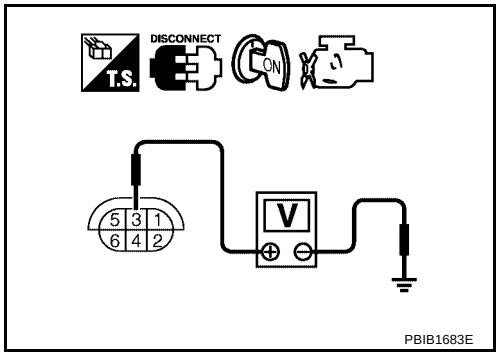
6. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect A/F sensor 1 harness connector.
3. Turn ignition switch ON.



4. Check voltage between A/F sensor 1 terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E10, F48
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between A/F sensor 1 and fuse

>> Repair or replace harness or connectors.

8. CHECK A/F SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	16
5	35
6	56
2	75

Continuity should exist.

4. Check harness continuity between ECM terminals 16, 35, 56, 75 or A/F sensor 1 terminals 1, 2, 5, 6 and ground. Refer to Wiring Diagram.

Continuity should not exist.

5. Also check harness for short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-1101, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace A/F sensor 1.

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-866, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace mass air flow sensor.

11. CHECK PCV VALVE

Refer to EC-693, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Repair or replace PCV valve.

12. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace A/F sensor 1.
NG >> Repair or replace.

Removal and Installation

UBS00JKW

AIR FUEL RATIO SENSOR

Refer to EM-113, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P1444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

UBS00JY3

SYSTEM DESCRIPTION

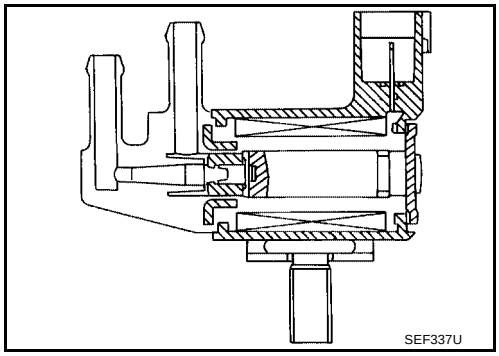
Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Heated oxygen sensor 1*3	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Air fuel ratio (A/F) sensor 1*4			
Fuel tank temperature sensor	Fuel temperature in fuel tank		
Vehicle speed sensor	Vehicle speed*2		

*1: ECM determines the start signal status by the signals of engine speed and battery voltage.
*2: This signal is sent to the ECM though CAN communication line.
*3: A/T models ULEV and M/T models.
*4: A/T models except ULEV.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JY4

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle (Accelerator pedal is not depressed even slightly, after engine starting)*3	0%
		2,000 rpm	20 - 30%

*: A/T models except ULEV

On Board Diagnosis Logic

UBS00JY5

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1444 1444	EVAP canister purge volume control solenoid valve	The canister purge flow is detected during the specified driving conditions, even when EVAP canister purge volume control solenoid valve is completely closed.	● EVAP control system pressure sensor ● EVAP canister purge volume control solenoid valve (The valve is stuck open.) ● EVAP canister vent control valve ● EVAP canister ● Hoses (Hoses are connected incorrectly or clogged.)

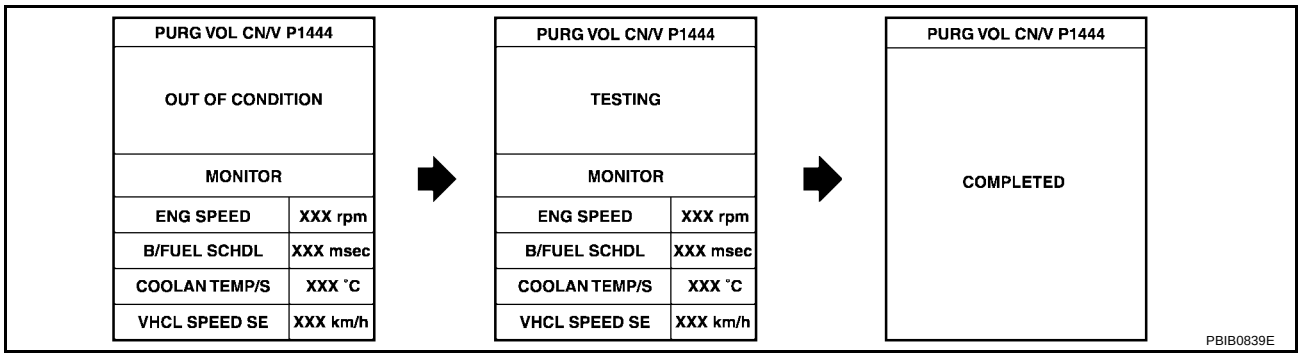
DTC Confirmation Procedure

UBS00JY6

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always perform test at a temperature of 5°C (41°F) or more.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “PURG VOL CN/V P1444” of “EVAPORATIVE SYSTEM” in “DTC WORK SUPPORT” mode with CONSULT-II.
5. Touch “START”.



6. Start engine and let it idle until “TESTING” on CONSULT-II changes to “COMPLETED”. (It will take approximately 10 seconds.)
   If “TESTING” is not displayed after 5 minutes, retry from step 2.
7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-1236, "Diagnostic Procedure" .

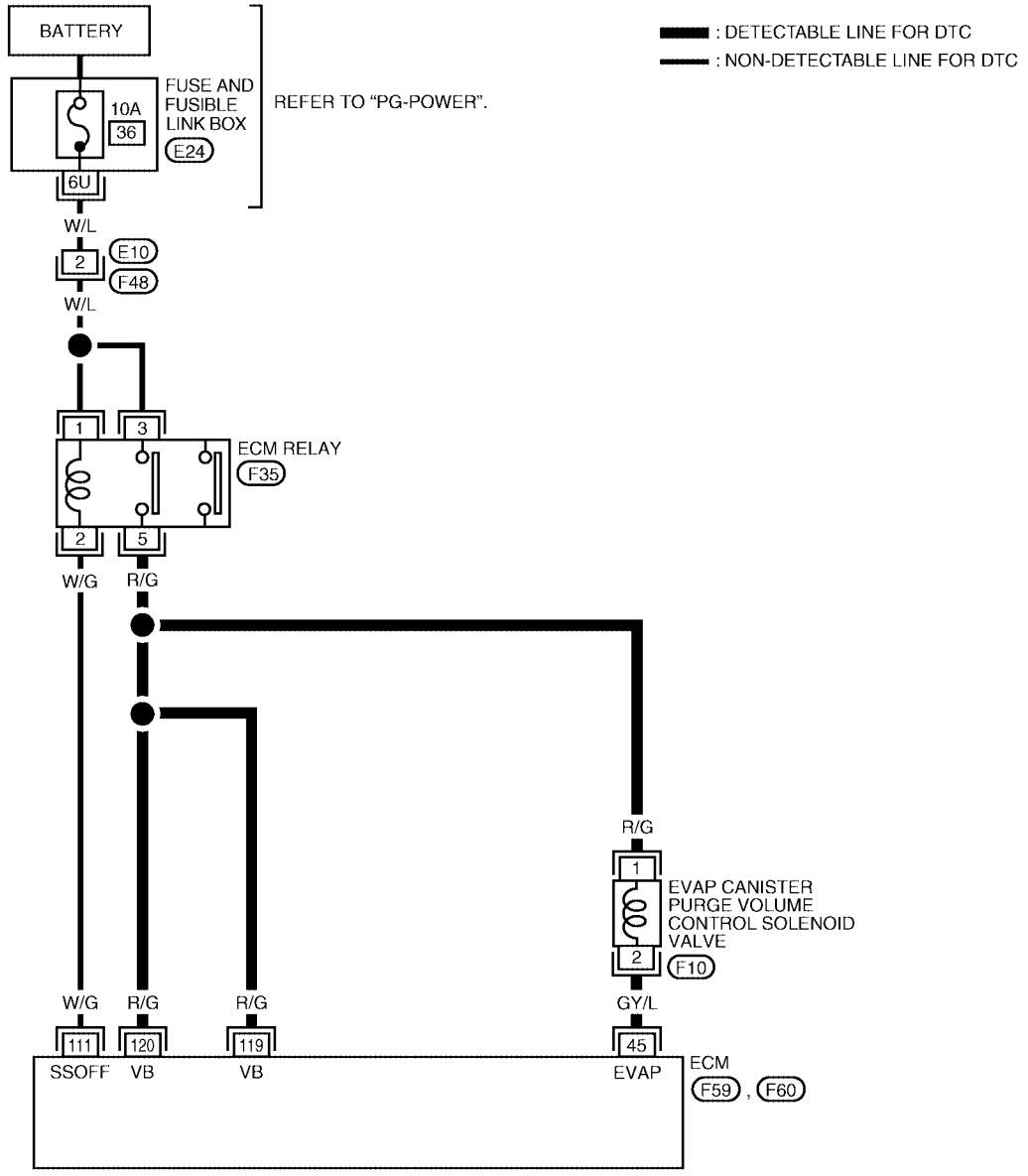
WITH GST

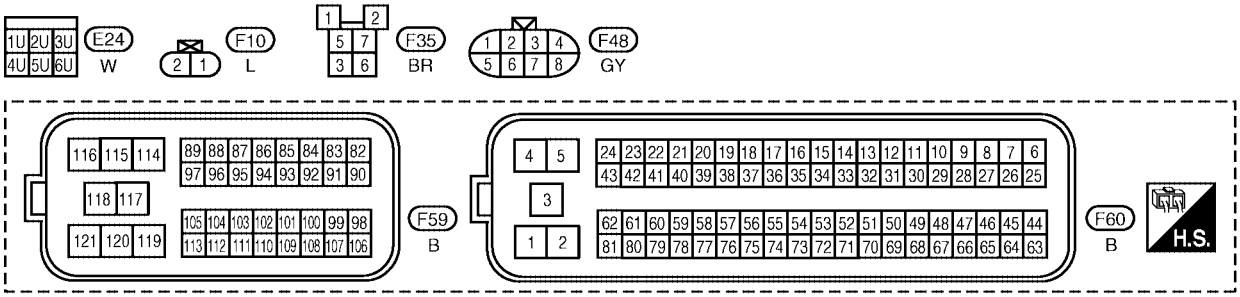
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and let it idle for at least 20 seconds.
4. Select Service $07 with GST.
5. If 1st trip DTC is detected, go to EC-1236, "Diagnostic Procedure" .

Wiring Diagram

UBS00JY7

EC-PGC/V-01



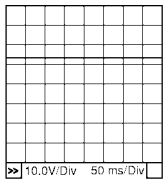
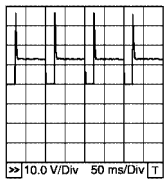


BBWA1418E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	GY/L	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed ● Accelerator pedal is not depressed even slightly, after engine starting*	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● A few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

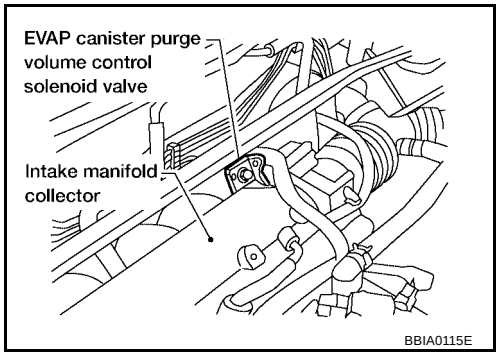
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*: A/T models except ULEV

Diagnostic Procedure

UBS00JY8

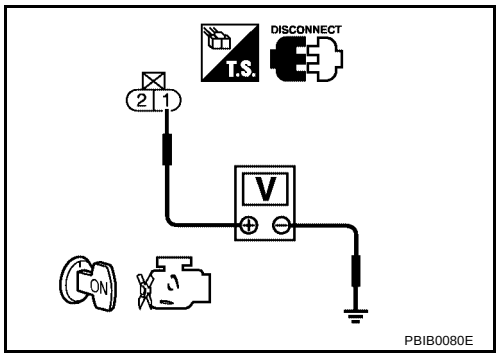
1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and engine ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 45 and EVAP canister purge volume control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

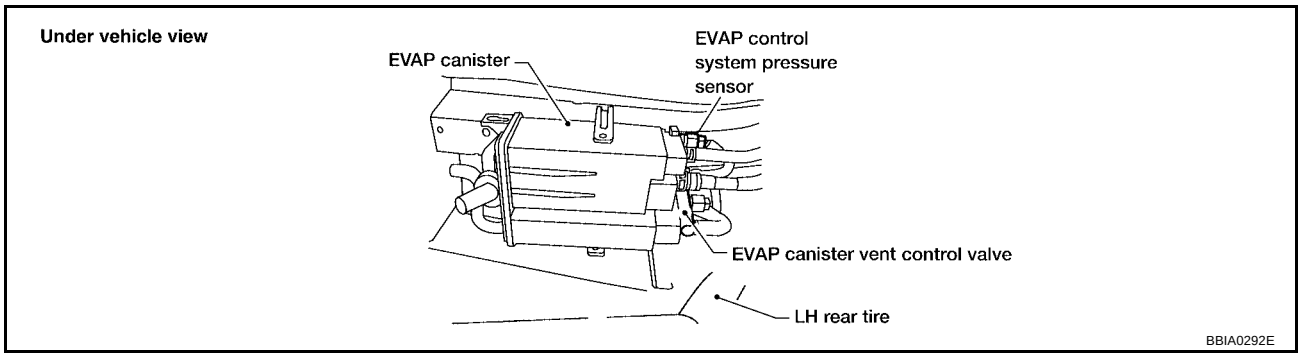
4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 5.
NG >> Replace EVAP control system pressure sensor.

5. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1045, "Component Inspection" .

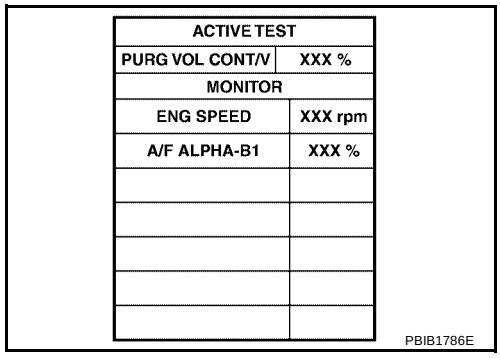
OK or NG

OK (With CONSULT-II)>>GO TO 6.
OK (Without CONSULT-II)>>GO TO 7.
NG >> Replace EVAP control system pressure sensor.

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Start engine.
4. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-1239, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP canister purge volume control solenoid valve.

8. CHECK RUBBER TUBE FOR CLOGGING

1. Disconnect rubber tube connected to EVAP canister vent control valve.
2. Check the rubber tube for clogging.

OK or NG

OK >> GO TO 9.
NG >> Clean the rubber tube using an air blower.

9. CHECK EVAP CANISTER VENT CONTROL VALVE

Refer to EC-683, "Component Inspection" .

OK or NG

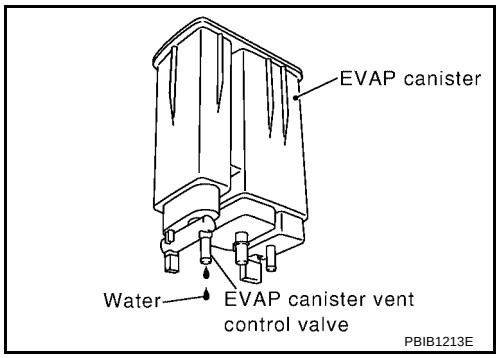
OK >> GO TO 10.
NG >> Replace EVAP canister vent control valve.

10. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.

YES or NO

YES >> GO TO 11.
NO >> GO TO 13.



11. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

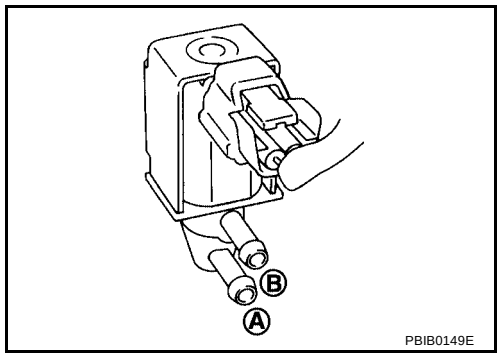
UBS00JY9

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

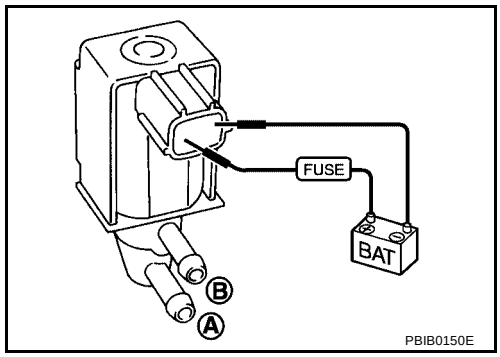
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

UBS00JYA

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-108, "INTAKE MANIFOLD" .

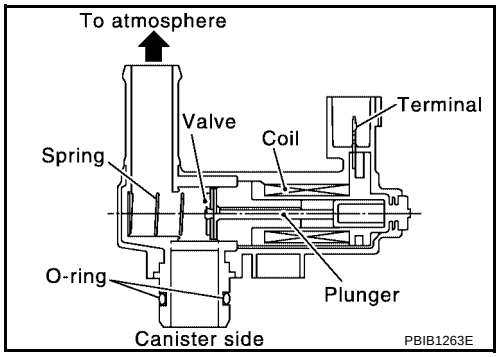
DTC P1446 EVAP CANISTER VENT CONTROL VALVE

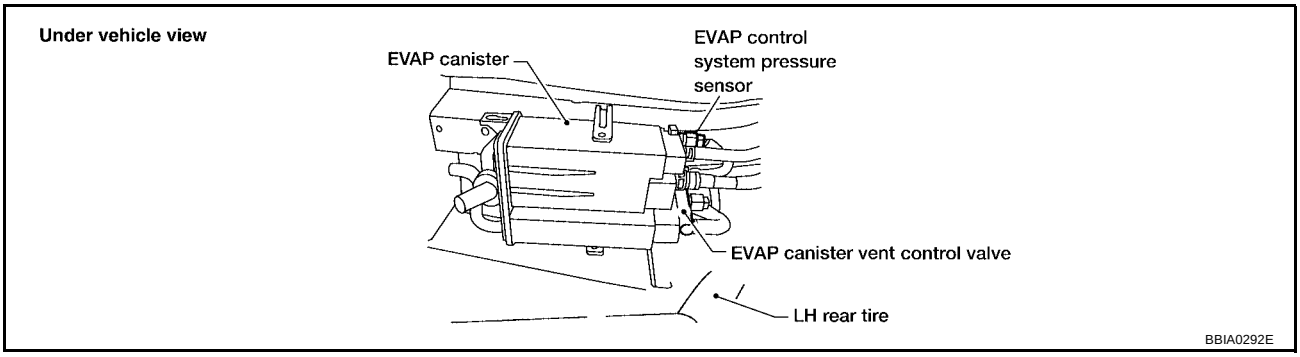
PFP:14935

Component Description

UBS00JYB

The EVAP canister vent control valve is located on the EVAP canister and is used to seal the canister vent.
This solenoid valve responds to signals from the ECM. When the ECM sends an ON signal, the coil in the solenoid valve is energized. A plunger will then move to seal the canister vent. The ability to seal the vent is necessary for the on board diagnosis of other evaporative emission control system components.
This solenoid valve is used only for diagnosis, and usually remains opened.
When the vent is closed, under normal purge conditions, the evaporative emission control system is depressurized and allows "EVAP Control System" diagnoses.





CONSULT-II Reference Value in Data Monitor Mode

UBS00JYC

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VENT CONT/V	● Ignition switch: ON	OFF

On Board Diagnosis Logic

UBS00JYD

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1446 1446	EVAP canister vent control valve close	EVAP canister vent control valve remains closed under specified driving conditions.	● EVAP canister vent control valve ● EVAP control system pressure sensor and the circuit ● Blocked rubber tube to EVAP canister vent control valve ● EVAP canister is saturated with water

DTC Confirmation Procedure

UBS00JYE

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and let it idle for at least 1 minute.
5. Repeat next procedures 3 times.

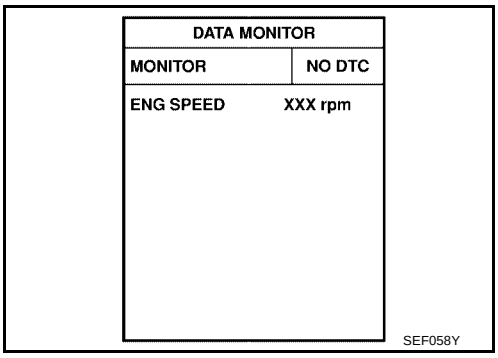
a. Increase the engine speed up to 3,000 to 3,500 rpm and keep it for 2 minutes and 50 seconds to 3 minutes.
Never exceed 3 minutes.

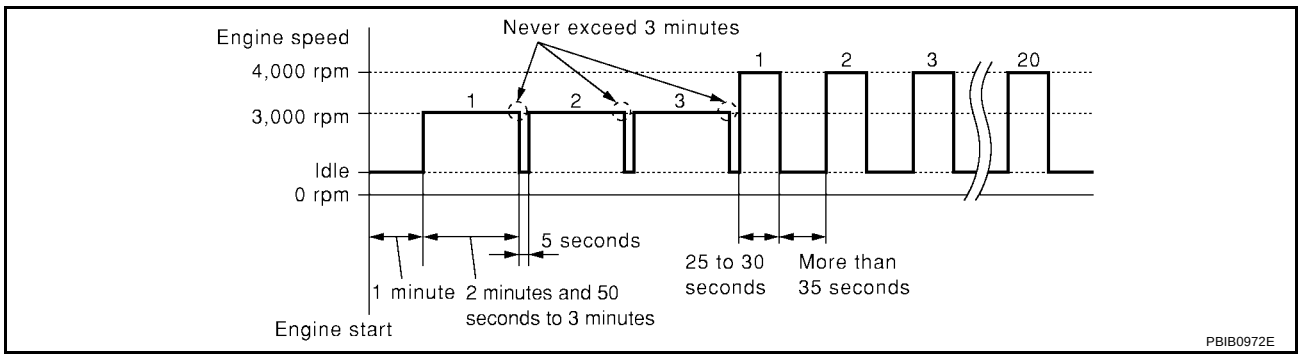
b. Fully released accelerator pedal and keep engine idle for about 5 seconds.

6. If 1st trip DTC is detected, go to EC-1145, "Diagnostic Procedure" .
If 1st trip DTC is not detected, go to the next step.
7. Repeat next procedure 20 times.

a. Quickly increase the engine speed up to 4,000 to 4,500 rpm or more and keep it for 25 to 30 seconds.

b. Fully released accelerator pedal and keep engine idle for at least 35 seconds.





8. If 1st trip DTC is detected, go to EC-1145, "Diagnostic Procedure" .

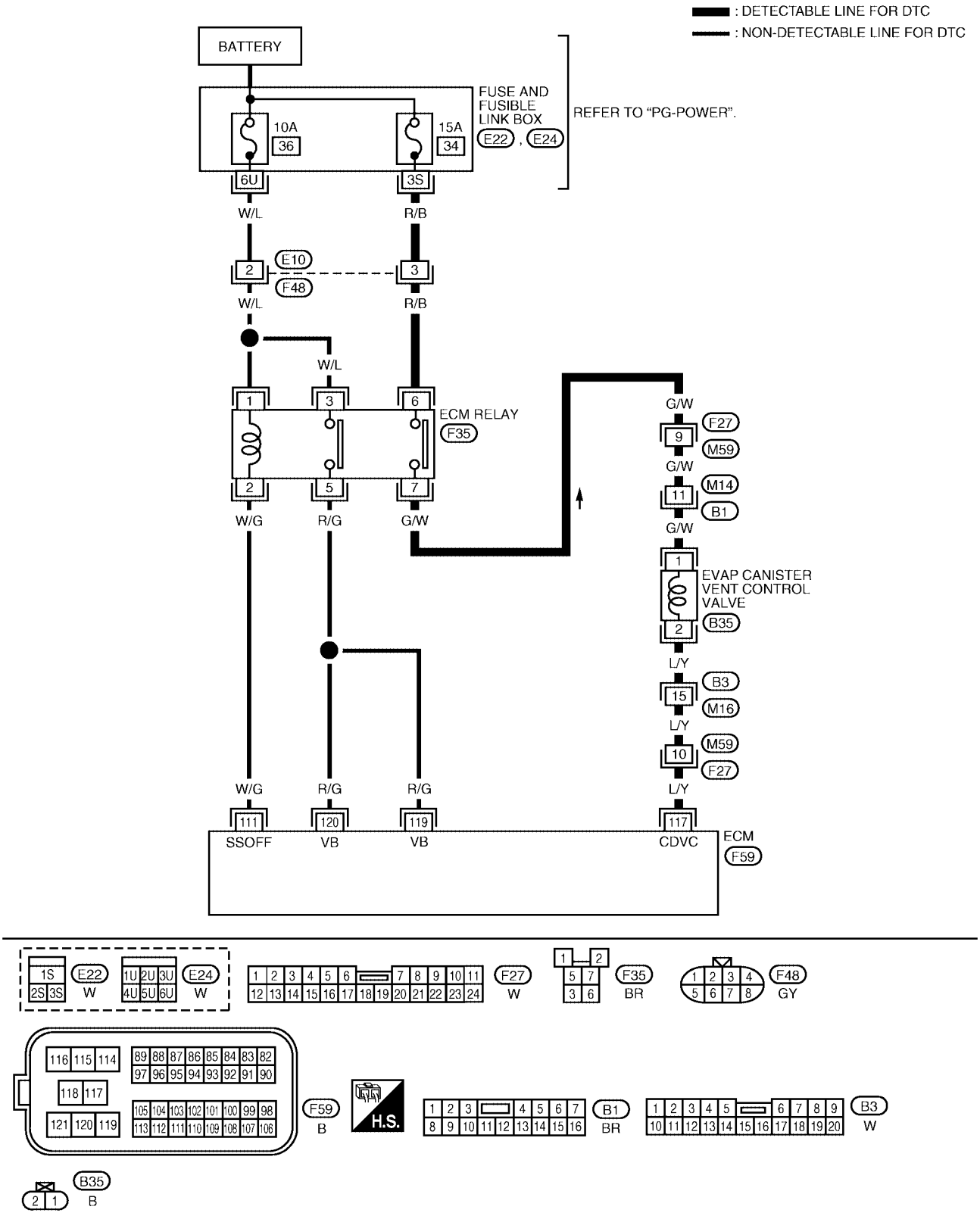
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JYF

EC-VENT/V-01



BBWA1419E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

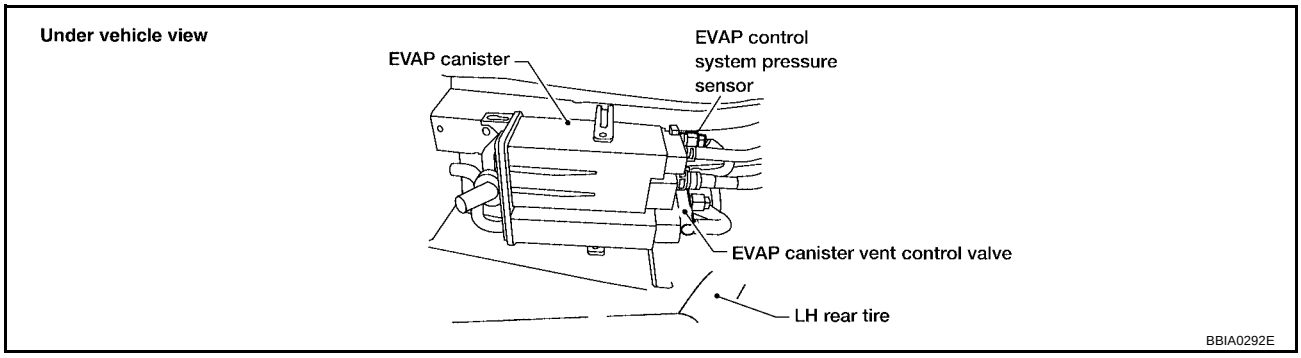
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	W/B	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● A few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
117	L/Y	EVAP canister vent control valve	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00JYG

1. CHECK RUBBER TUBE

1. Turn ignition switch OFF.
2. Disconnect rubber tube connected to EVAP canister vent control valve.
3. Check the rubber tube for clogging.



OK or NG

OK >> GO TO 2.
NG >> Clean rubber tube using an air blower.

2. CHECK EVAP CANISTER VENT CONTROL VALVE-I

Refer to EC-1147, "Component Inspection" .

OK or NG

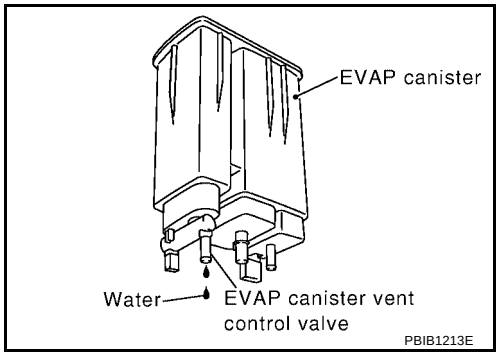
OK >> GO TO 3.
NG >> Replace EVAP canister vent control valve.

3. CHECK IF EVAP CANISTER SATURATED WITH WATER

1. Remove EVAP canister with EVAP canister vent control valve attached.
2. Check if water will drain from the EVAP canister.

Yes or No

Yes >> GO TO 4.
No >> GO TO 6.



4. CHECK EVAP CANISTER

Weigh the EVAP canister with the EVAP canister vent control valve and EVAP control system pressure sensor attached.

The weight should be less than 1.9 kg (4.2 lb).

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

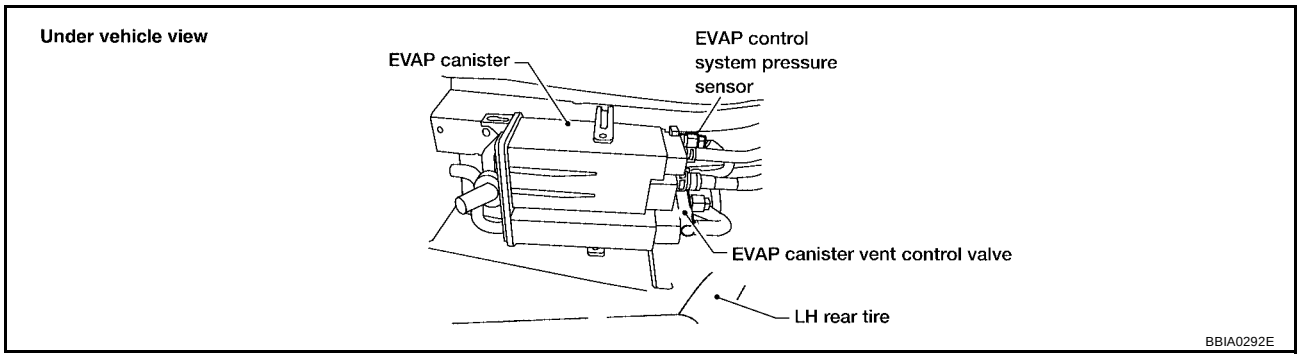
Check the following.

- EVAP canister for damage
- EVAP hose between EVAP canister and vehicle frame for clogging or poor connection

>> Repair hose or replace EVAP canister.

6. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR CONNECTOR

1. Disconnect EVAP control system pressure sensor harness connector.



2. Check connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 7.
NG >> Replace EVAP control system pressure sensor.

7. CHECK EVAP CONTROL SYSTEM PRESSURE SENSOR

Refer to EC-1045, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace EVAP control system pressure sensor.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

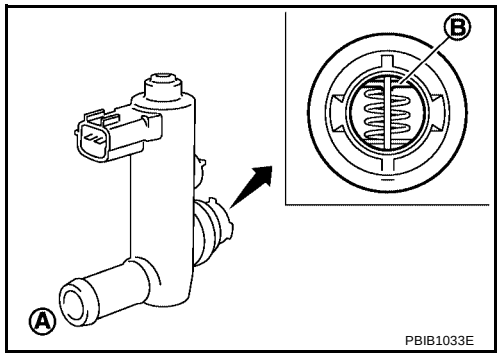
Component Inspection

UBS00JYH

EVAP CANISTER VENT CONTROL VALVE

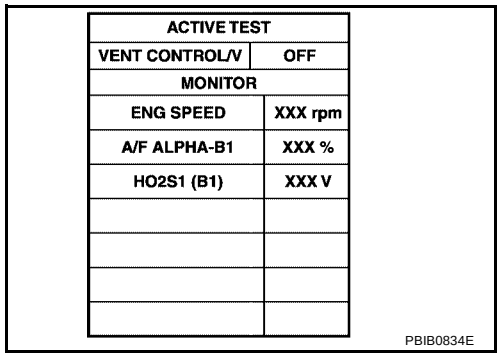
With CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.
   If NG, replace EVAP canister vent control valve.
   If OK, go to next step.
3. Reconnect harness connectors disconnected.
4. Turn ignition switch ON.



5. Perform “VENT CONTROL/V” in “ACTIVE TEST” mode.
6. Check air passage continuity and operation delay time.

Condition VENT CONTROL/V	Air passage continuity between A and B
ON	No
OFF	Yes

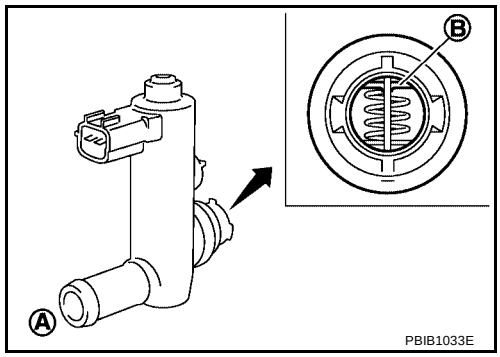


Operation takes less than 1 second.
Make sure new O-ring is installed properly.
If NG, replace EVAP canister vent control valve.
If OK, go to next step.

7. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
8. Perform step 5 again.

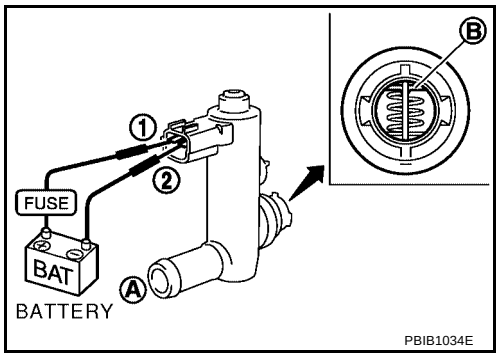
Without CONSULT-II

1. Remove EVAP canister vent control valve from EVAP canister.
2. Check portion **B** of EVAP canister vent control valve for being rusted.



3. Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	No
OFF	Yes



Operation takes less than 1 second.
Make sure new O-ring is installed properly.
If NG, replace EVAP canister vent control valve.
If OK, go to next step.

4. Clean the air passage (Portion **A** to **B**) of EVAP canister vent control valve using an air blower.
5. Perform step 3 again.

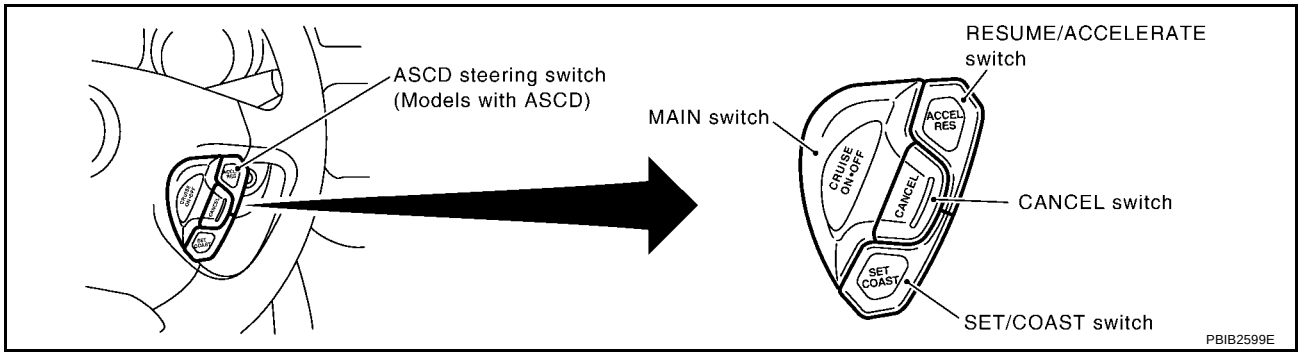
DTC P1564 ASCD STEERING SWITCH

PFP:25551

Component Description

UBS00JLC

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.



Refer to EC-677, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

CONSULT-II Reference Value in Data Monitor Mode

UBS00JLD

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN SW	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	● Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	● Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF

On Board Diagnosis Logic

UBS00JLE

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1094 .

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1564 1564	ASCD steering switch	● An excessively high voltage signal from the ASCD steering switch is sent to ECM. ● ECM detects that input signal from the ASCD steering switch is out of the specified range. ● ECM detects that the ASCD steering switch is stuck ON.	● Harness or connectors (The switch circuit is open or shorted.) ● ASCD steering switch ● ECM

DTC Confirmation Procedure

UBS00JLF

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
4. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. If DTC is detected, go to EC-1250, "Diagnostic Procedure" .

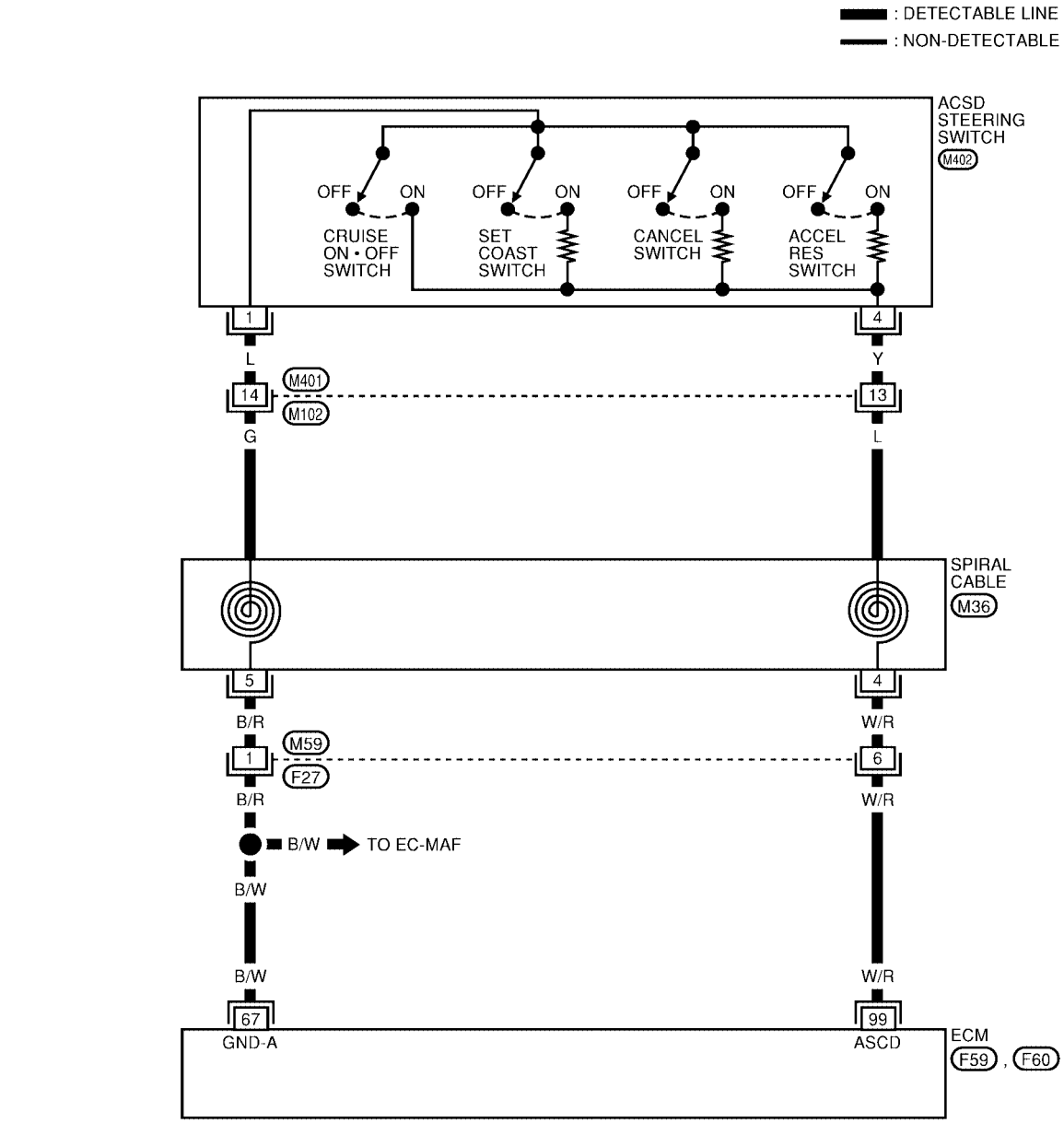
WITH GST

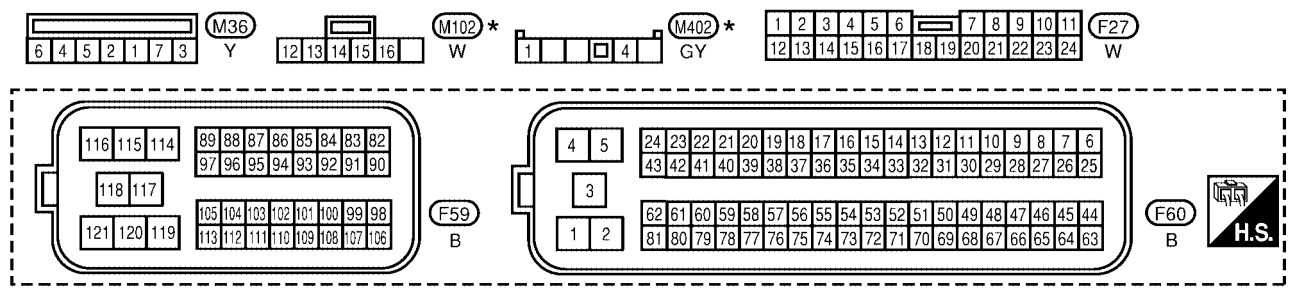
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JLG

EC-ASC/SW-01





*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.

BBWA1479E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

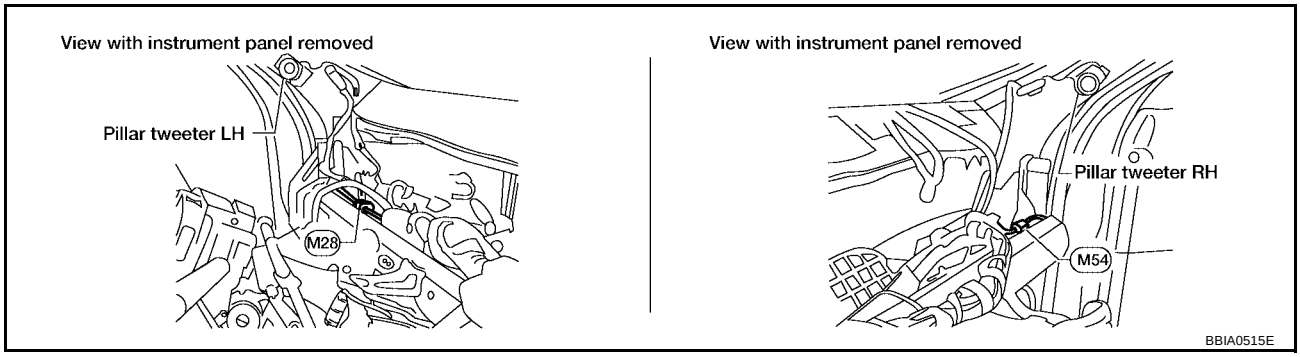
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
99	W/R	ASCD steering switch	**[Ignition switch: ON]** ● ASCD steering switch is OFF.	Approximately 4V
			[Ignition switch: ON] ● MAIN switch is ON.	Approximately 0V
			[Ignition switch: ON] ● CANCEL switch is ON.	Approximately 1V
			[Ignition switch: ON] ● RESUME/ACCELERATE switch is ON.	Approximately 3V
			[Ignition switch: ON] ● SET/COAST switch is ON.	Approximately 2V

Diagnostic Procedure

UBS00JLH

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .



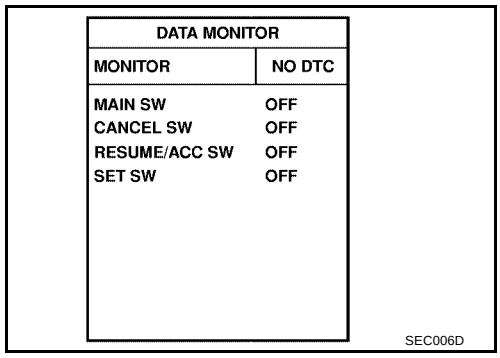
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-II

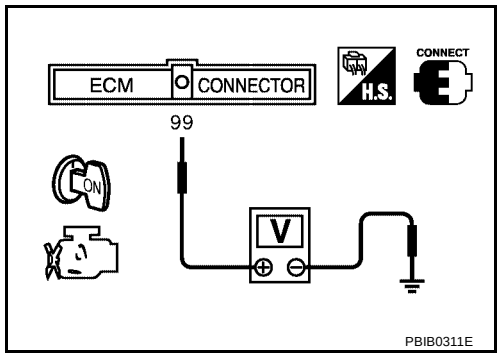
1. Turn ignition switch ON.
2. Select “MAIN SW”, “RESUME/ACC SW”, “SET SW and “CANCEL SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check each item indication under the following conditions.



Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF
RESUME/ ACCELERATE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 99 and ground with pressing each button.



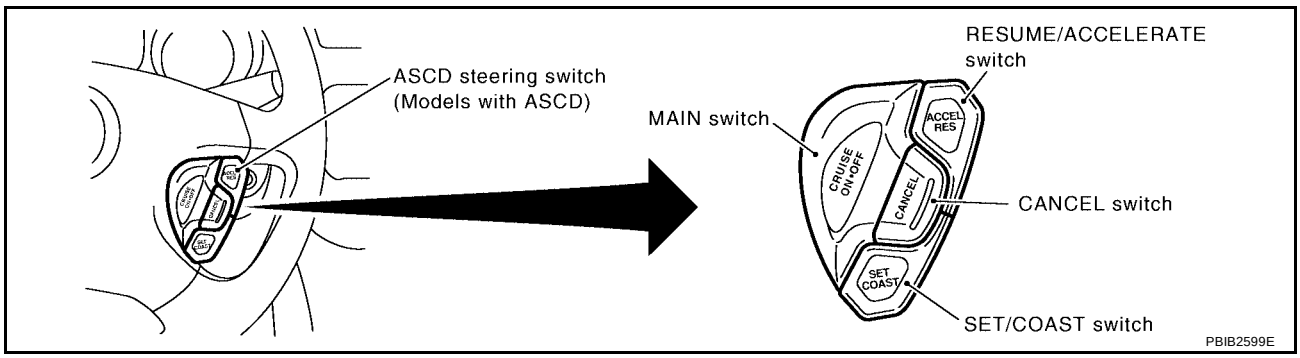
Switch	Condition	Voltage [V]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4.0
CANCEL switch	Pressed	Approx. 1.0
	Released	Approx. 4.0
RESUME/ACCELERATE switch	Pressed	Approx. 3.0
	Released	Approx. 4.0
SET/COAST switch	Pressed	Approx. 2.0
	Released	Approx. 4.0

OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ASCD steering switch harness connector.



3. Disconnect ECM harness connector.
4. Check harness continuity between ASCD steering switch terminal 1 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M401, M102
- Harness connectors M59, F27
- Spiral cable
- Harness for open or short between ECM and ASCD steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 99 and ASCD steering switch terminal 4. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M401, M102
- Harness connectors M59, F27
- Spiral cable
- Harness for open or short between ECM and ASCD steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-1253, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

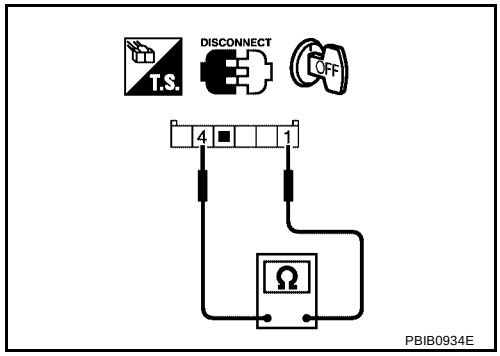
>> **INSPECTION END**

Component Inspection

UBS00JLI

ASCD STEERING SWITCH

1. Disconnect ASCD steering switch.
2. Check continuity between ASCD steering switch terminals 1 and 4 with pushing each switch.



Switch	Condition	Resistance [Ω]
MAIN SW	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL SW	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE SW	Pressed	Approx. 1,480
	Released	Approx. 4,000
COAST/SET SW	Pressed	Approx. 660
	Released	Approx. 4,000

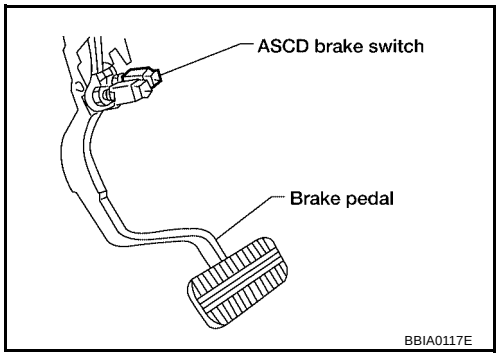
DTC P1572 ASCD BRAKE SWITCH

PFP:25320

Component Description

UBS00JLJ

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-677, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JLK

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	● Ignition switch: ON	● Clutch pedal (M/T) and brake pedal: Fully released	ON
		● Clutch (M/T) and/or brake pedal: Slightly depressed	OFF
BRAKE SW2 (STOP lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

UBS00JLL

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1094 .**
- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition		Possible Cause
P1572 1572	ASCD brake switch	A)	● When the vehicle speed is above 30km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to ECM at the same time.	● Harness or connectors (The stop lamp switch circuit is shorted.) ● Harness or connectors (The ASCD brake switch circuit is shorted.) ● Harness or connectors (The ASCD clutch switch circuit is shorted.) (M/T models) ● Stop lamp switch ● ASCD brake switch ● ASCD clutch switch (M/T models) ● Incorrect stop lamp switch installation ● Incorrect ASCD brake switch installation ● Incorrect ASCD clutch switch installation (M/T models) ● ECM
		B)	● ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving	

DTC Confirmation Procedure

UBS00JLM

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

TESTING CONDITION:

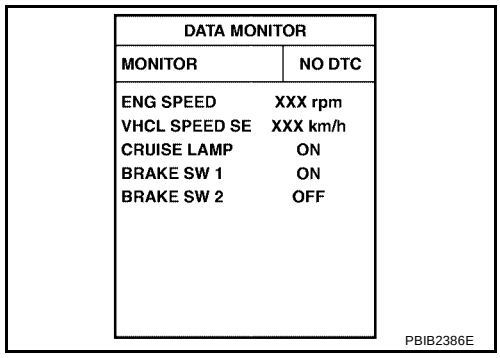
Steps 4 and 5 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Press MAIN switch and make sure that CRUISE indicator lights up.
4. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Shift lever	Suitable position

If 1st trip DTC is detected, go to EC-1258, "Diagnostic Procedure" .
If 1st trip DTC is not detected, go to the following step.



5. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Shift lever	Suitable position
Driving location	Depress the brake pedal for more than 5 seconds so as not to come off from the above-mentioned vehicle speed.

6. If 1st trip DTC is detected, go to EC-1258, "Diagnostic Procedure" .

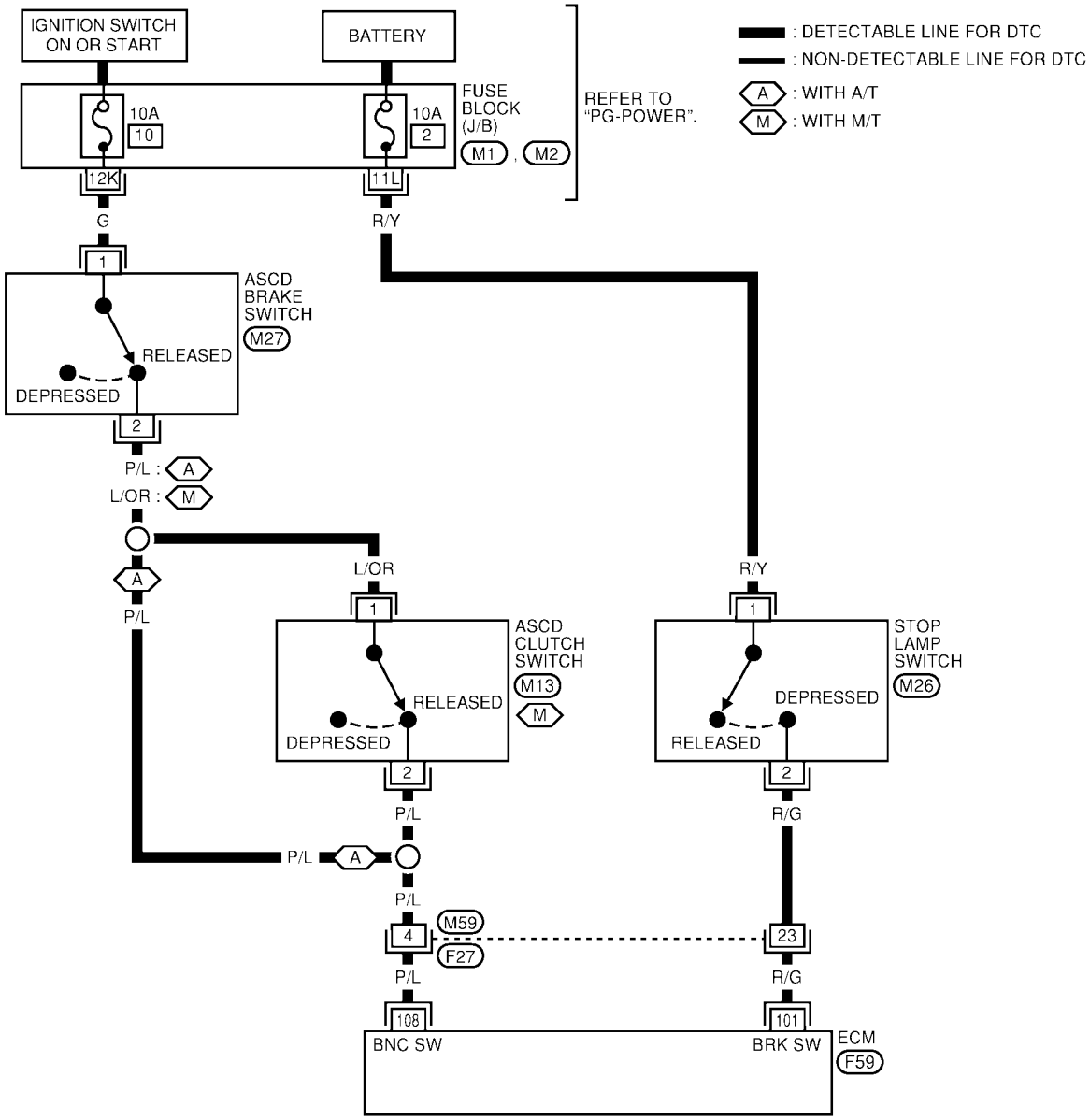
WITH GST

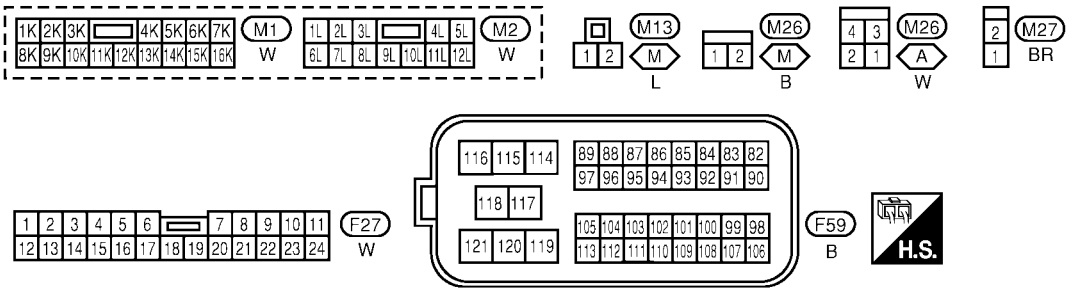
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JLN

EC-ASC/BS-01





BBWA1394E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/G	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	P/L	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal: Slightly depressed (A/T) ● Brake pedal and/or clutch pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Fully released (A/T) ● Brake pedal and clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00JLO

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

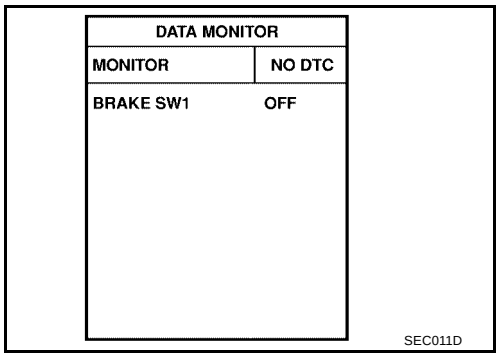
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

A/T models

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

M/T models

CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON



Without CONSULT-II

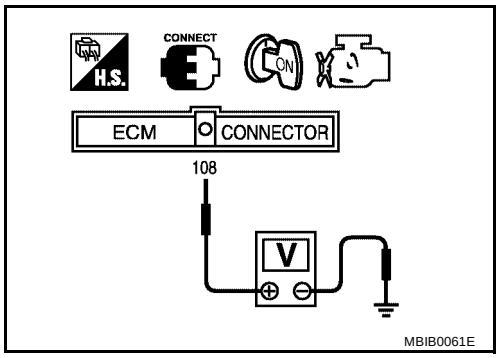
1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

A/T models

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage

M/T models

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



OK or NG

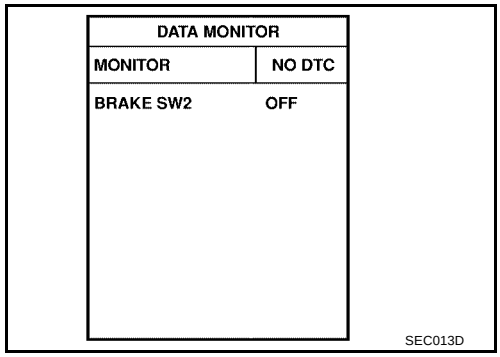
OK >> GO TO 2.
NG (M/T models) >>GO TO 3.
NG (A/T models) >>GO TO 4.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

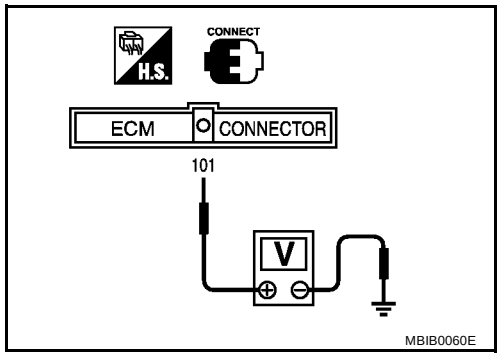
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

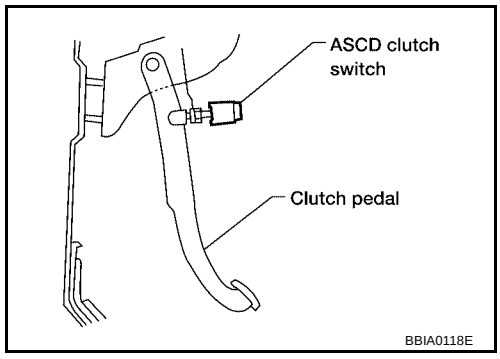


OK or NG

OK >> GO TO 18.
NG >> GO TO 13.

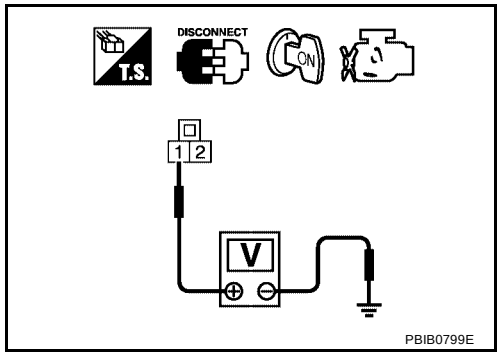
3. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD clutch switch terminal 1 and ground under the following conditions with CONSULT-II or tester.

CONDITION	VOLTAGE
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approx. 0V

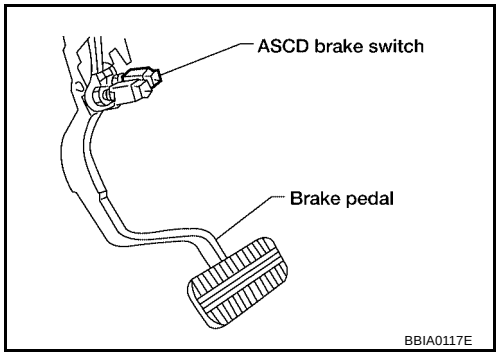


OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

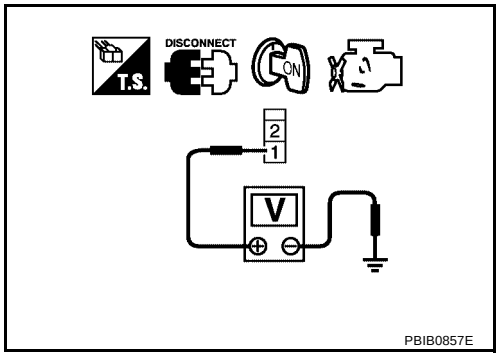
4. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK (M/T models)>>GO TO 6.
OK (A/T models)>>GO TO 7.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and ASCD brake switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ASCD BRAKE SWITCH

Refer to EC-1263, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace ASCD brake switch.

10. CHECK ASCD CLUTCH SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and ASCD clutch switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK ASCD CLUTCH SWITCH

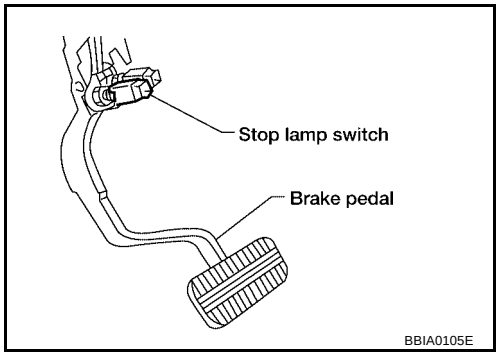
Refer to EC-1263, "Component Inspection" .

OK or NG

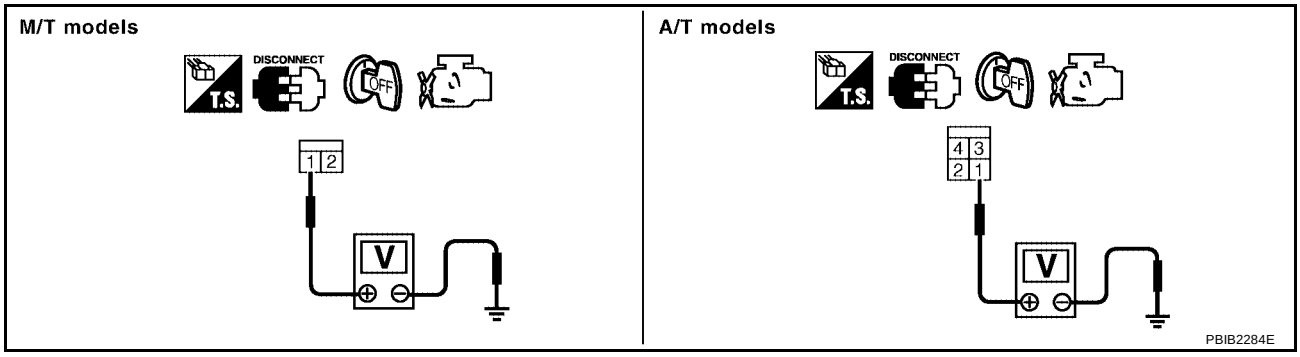
OK >> GO TO 18.
NG >> Replace ASCD clutch switch.

13. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between stop lamp switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

17. CHECK STOP LAMP SWITCH

Refer to EC-1263, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace stop lamp switch.

18. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

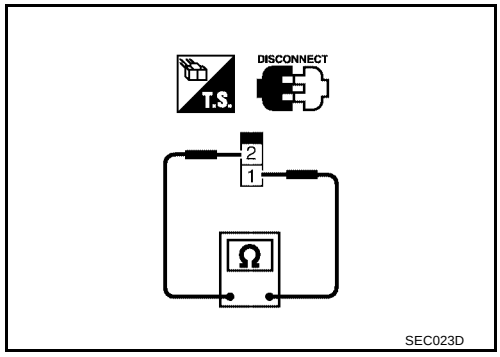
UBS00JLP

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check harness continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released.	Should exist.
Brake pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD brake switch installation, refer to BR-11, "BRAKE PEDAL AND BRACKET" , and perform step 3 again.

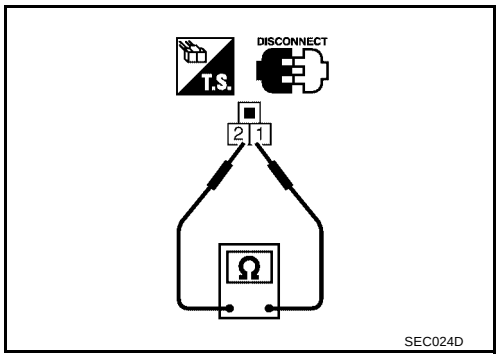


ASCD CLUTCH SWITCH (FOR M/T MODELS)

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check harness continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

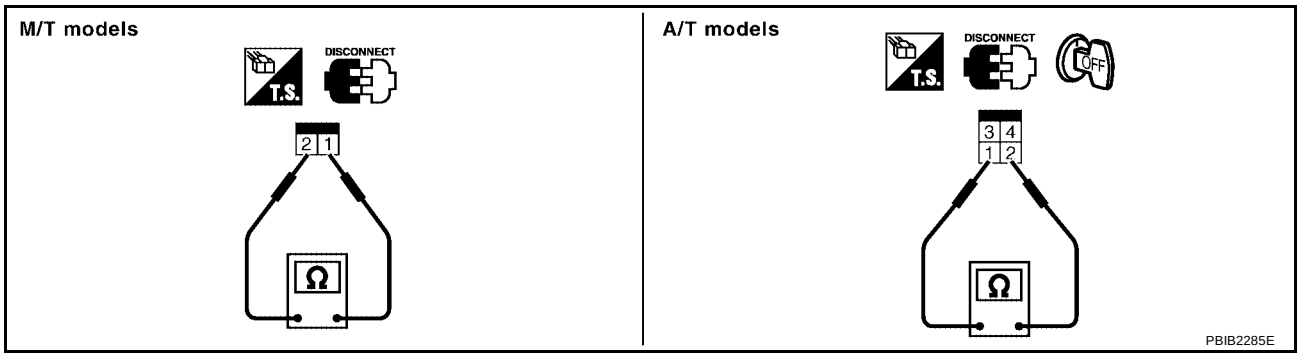
Condition	Continuity
Clutch pedal: Fully released.	Should exist.
Clutch pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD clutch switch installation, refer to CL-23, "CLUTCH SYSTEM" , and perform step 3 again.



STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check harness continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released.	Should not exist.
Brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-11, "BRAKE PEDAL AND BRACKET" , and perform step 3 again.

DTC P1574 ASCD VEHICLE SPEED SENSOR

PFP:31036

Component Description

UBS00JLQ

The ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from combination meter, and the other is from TCM (Transmission control module). The ECM uses these signals for ASCD control. Refer to EC-677, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

On Board Diagnosis Logic

UBS00JLR

This self-diagnosis has the one trip detection logic.
The MIL will not light up for this diagnosis.

NOTE:

- **If DTC P1574 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-840, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-1083, "DTC P0500 VSS"**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-1094, "DTC P0605 ECM"**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1574 1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	● Harness or connectors (The CAN communication line is open or shorted.) ● TCM (A/T models) ● Combination meter ● Vehicle speed sensor ● ECM

DTC Confirmation Procedure

UBS00JLS

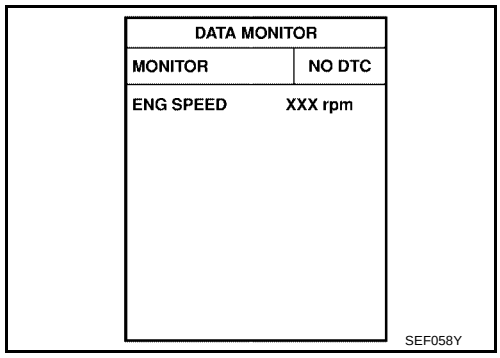
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at more than 40 km/h (25MPH).
4. If DTC is detected, go to EC-1266, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

UBS00JLT

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-426, "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" .

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-16, "Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode" .

>> **INSPECTION END**

DTC P1706 PNP SWITCH

PFP:32006

Component Description

UBS00KKM

When the shift position is P or N (A/T), Neutral (M/T) park/neutral position (PNP) switch is ON.
ECM detects the park/neutral position when continuity with ground exists.

CONSULT-II Reference Value in Data Monitor Mode

UBS00KKN

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above position	OFF

On Board Diagnosis Logic

UBS00KKO

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706 1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	● Harness or connectors [The park/neutral position (PNP) switch circuit is open or shorted.] ● Park/neutral position (PNP) switch

DTC Confirmation Procedure

UBS00KKP

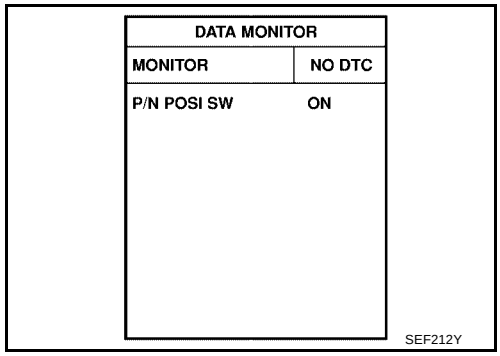
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II. Then check the “P/N POSI SW” signal under the following conditions.

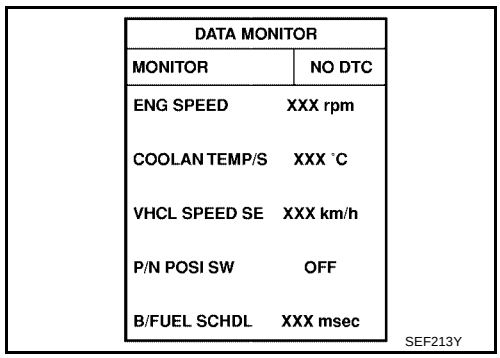
Position (Selector lever)	Known good signal
P or N position (A/T) Neutral position (M/T)	ON
Except above position	OFF



If NG, go to EC-1270, "Diagnostic Procedure" .
If OK, go to following step.

3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 50 consecutive seconds.

ENG SPEED	More than 1,500 rpm
COOLANT TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.0 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Shift lever	Suitable position



6. If 1st trip DTC is detected, go to EC-1270, "Diagnostic Procedure" .

Overall Function Check

UBS00KKQ

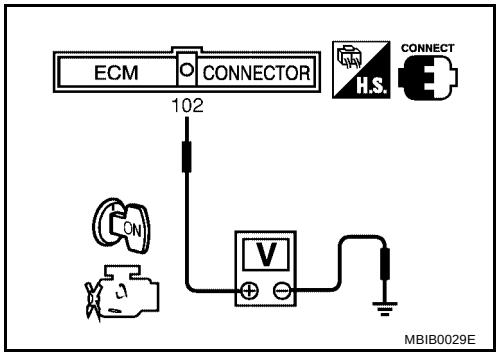
Use this procedure to check the overall function of the park/neutral position switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 102 (PNP switch signal) and ground under the following conditions.

Condition (Gear position)	Voltage (V) (Known-good data)
P or N position (A/T) Neutral position (M/T)	Approx. 0
Except above position	Battery voltage

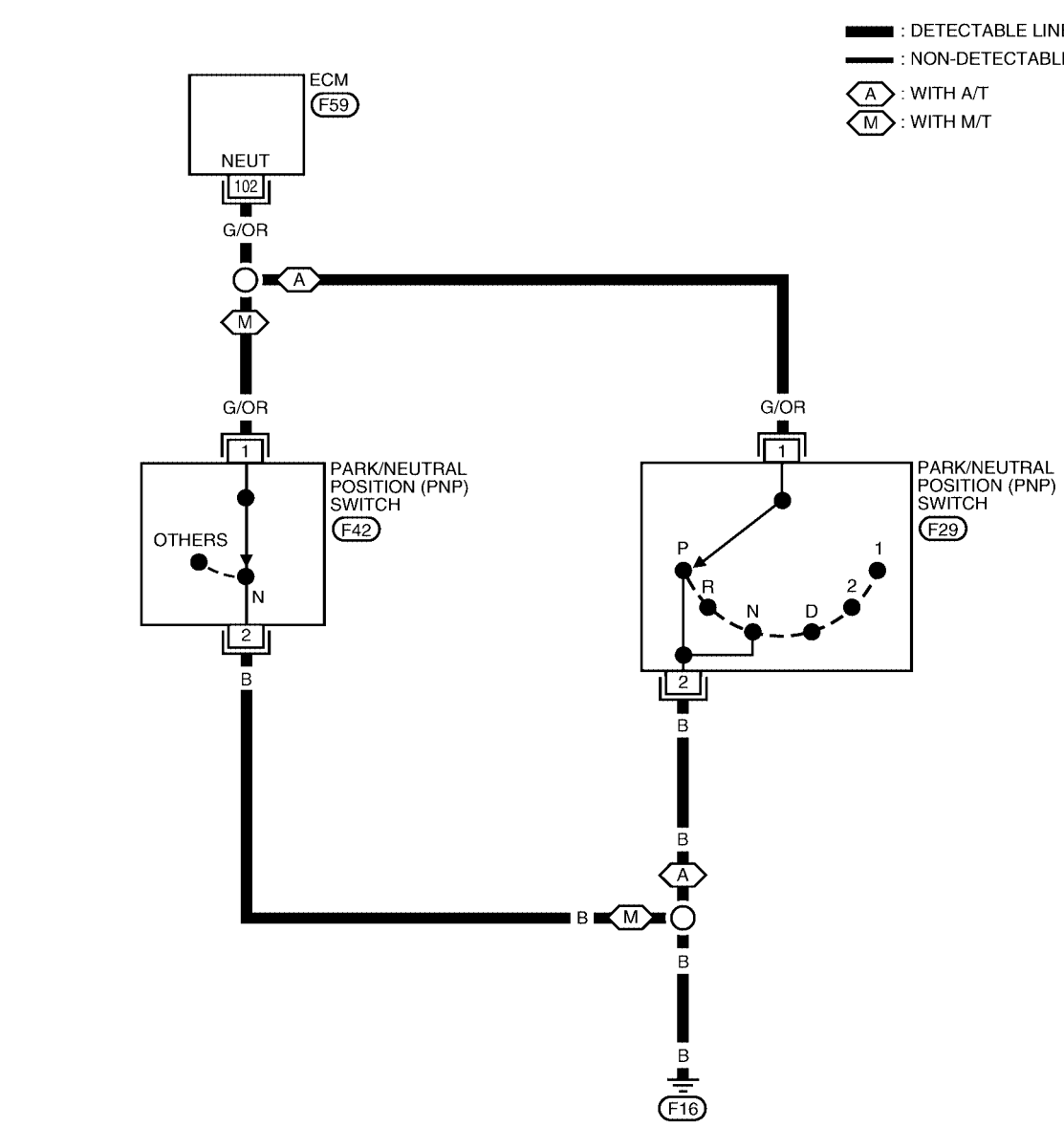
3. If NG, go to EC-1270, "Diagnostic Procedure" .

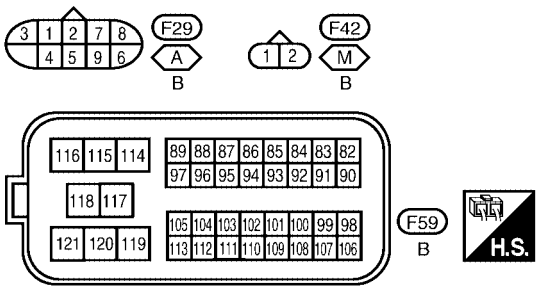


Wiring Diagram

UBS00KKR

EC-PNP/SW-01





BBWA0749E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	G/OR	PNP switch	**[Ignition switch: ON]** ● Shift lever: P or D (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above gear position	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00KKS

1. CHECK GROUND CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect PNP switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to power in harness or connectors.

2. CHECK INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 102 and PNP switch terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK PNP SWITCH

Refer to AT-487, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" (A/T models), MT-75, "POSITION SWITCH" (M/T models).

OK or NG

OK >> GO TO 4.
NG >> Replace PNP switch.

4. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

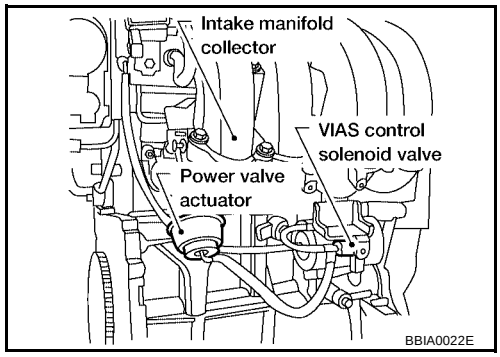
DTC P1800 VIAS CONTROL SOLENOID VALVE

PFP:14955

Component Description

UBS00KK7

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve actuator. It responds to ON/OFF signals from the ECM. When the solenoid is OFF, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.



CONSULT-II Reference Value in Data Monitor Mode

UBS00KK8

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
VIAS S/V	● Engine: After warming up	Idle	OFF
		More than 5,000 rpm	ON

On Board Diagnosis Logic

UBS00KK9

The MIL will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1800 1800	VIAS control solenoid valve circuit	An excessively low or high voltage signal is sent to ECM through the valve	● Harness or connectors (The solenoid valve circuit is open or shorted.) ● VIAS control solenoid valve

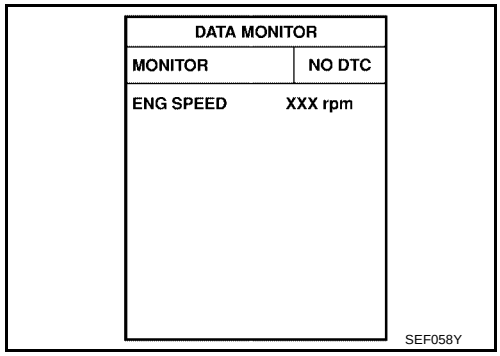
DTC Confirmation Procedure

UBS00KKA

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 11V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1273, "Diagnostic Procedure" .



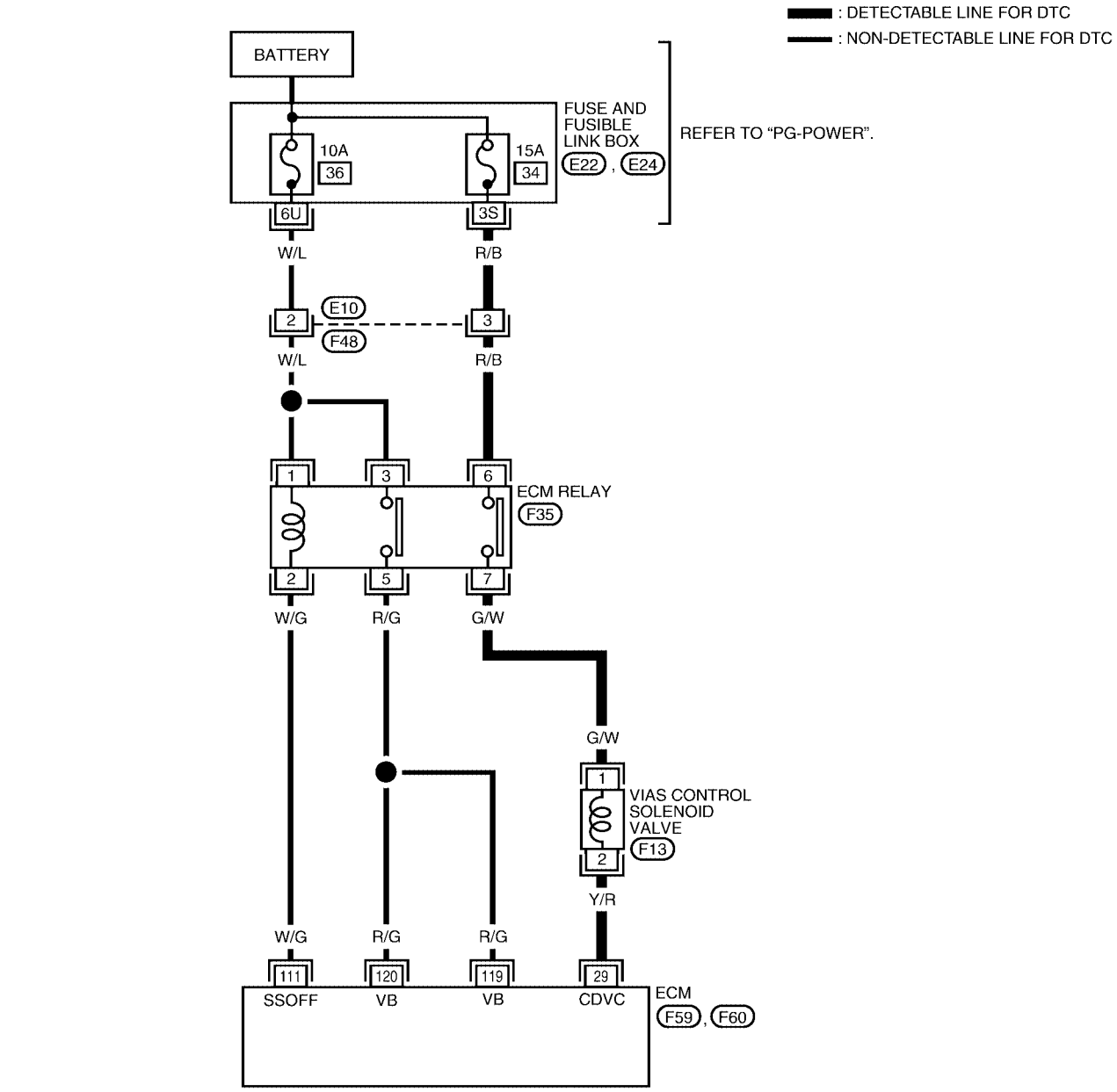
WITH GST

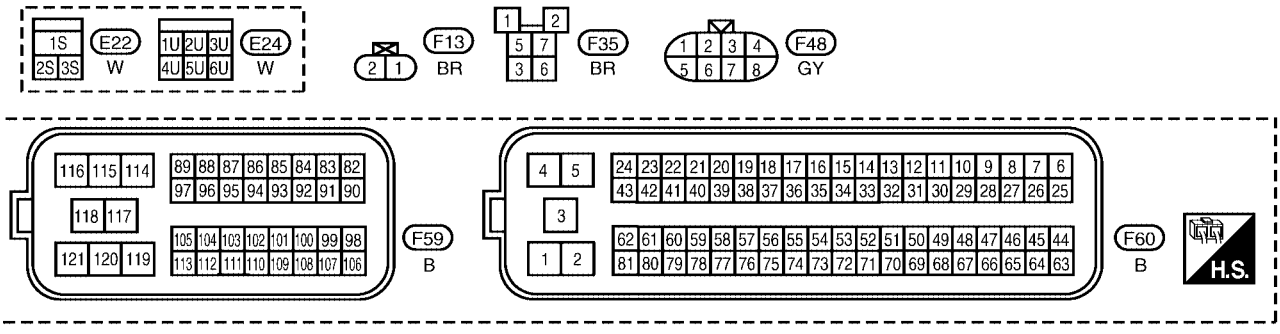
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00KKB

EC-VIAS/V-01





BBWA1658E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

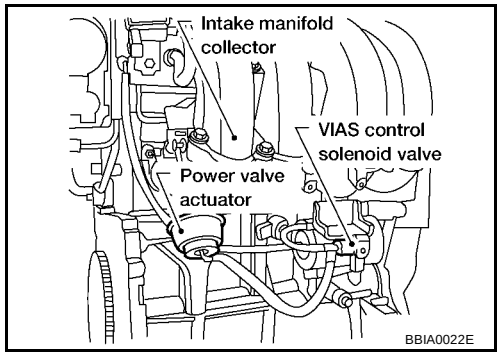
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	Y/R	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm	0 - 1.0V
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● A few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00KKC

1. CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT–I

1. Turn ignition switch OFF.
2. Disconnect VIAS control solenoid valve harness connector.
3. Turn ignition switch ON.

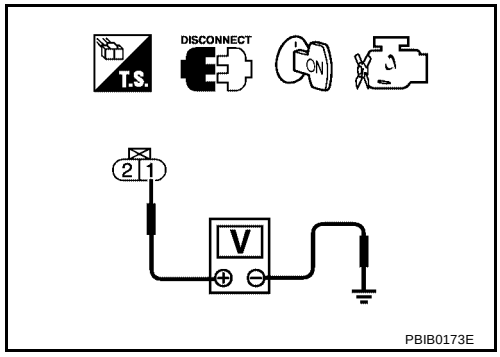


4. Check voltage between terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 6.
NG >> GO TO 2.

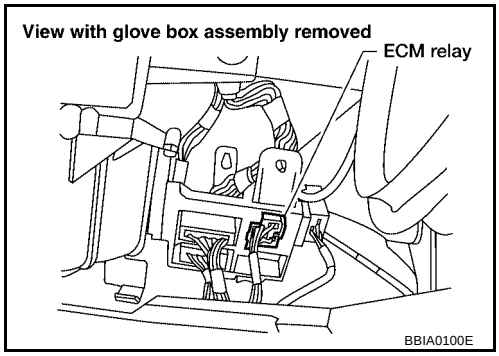


2. CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM relay.
3. Check harness continuity between ECM relay terminal 7 and VIAS control solenoid valve terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



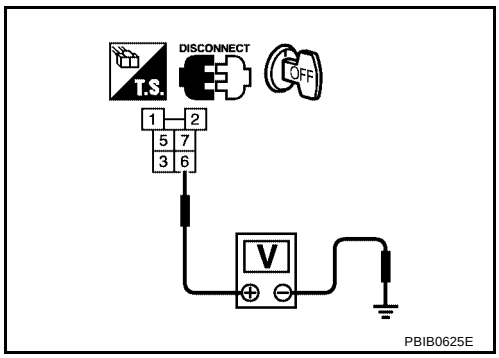
OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT-III

Check voltage between ECM relay terminal 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Fuse and fusible link box connector E22
- 15A fuse
- Harness for open or short between ECM relay and battery

>> Repair or replace harness or connectors.

5. CHECK ECM RELAY

Refer to EC-1322, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace ECM relay.

6. CHECK VIAS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 29 and VIAS control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK VIAS CONTROL SOLENOID VALVE

Refer to EC-1275, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace VIAS control solenoid valve.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00KKD

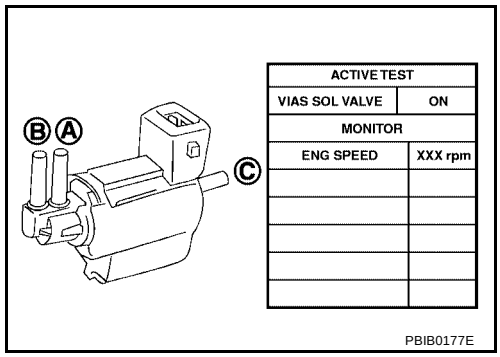
VIAS CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time under the following conditions.

Condition VIAS SOL VALVE	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

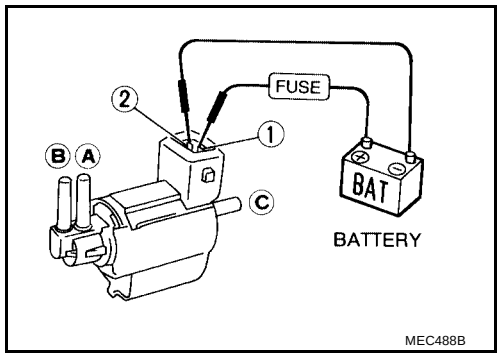


With GST

Check air passage continuity and operation delay time under the following conditions.

Condition	Air passage continuity between A and B	Air passage continuity between A and C
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

Operation takes less than 1 second.



Removal and Installation

UBS00KKE

VIAS CONTROL SOLENOID VALVE

Refer to EM-108, "INTAKE MANIFOLD" .

DTC P1805 BRAKE SWITCH

PFP:25320

Description

UBS00KKF

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

CONSULT-II Reference Value in Data Monitor Mode

UBS00KKG

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

UBS00KKH

The MIL will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for an extremely long time while the vehicle is driving.	● Harness or connectors (Stop lamp switch circuit is open or shorted.) ● Stop lamp switch

FALI-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode.

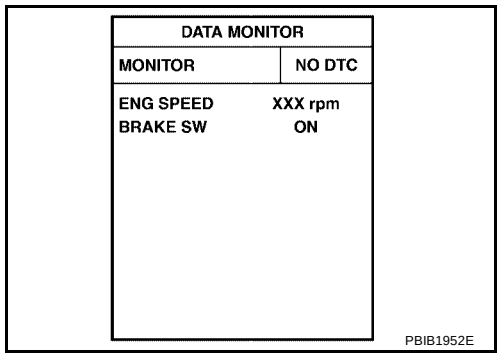
Engine operating condition in fail-safe mode	
ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.	
Vehicle condition	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration

DTC Confirmation Procedure

UBS00KKI

WITH CONSULT-II

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-II.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If 1st trip DTC is detected, go to EC-1279, "Diagnostic Procedure" .



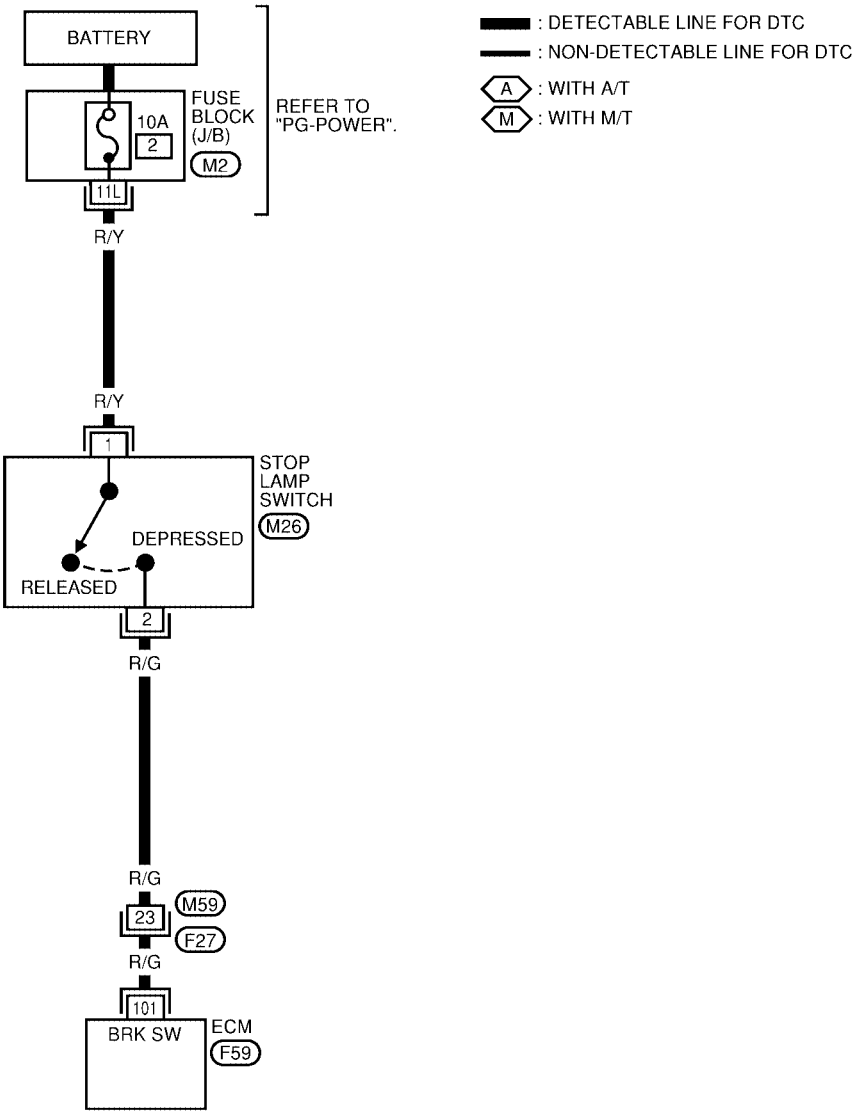
WITH GST

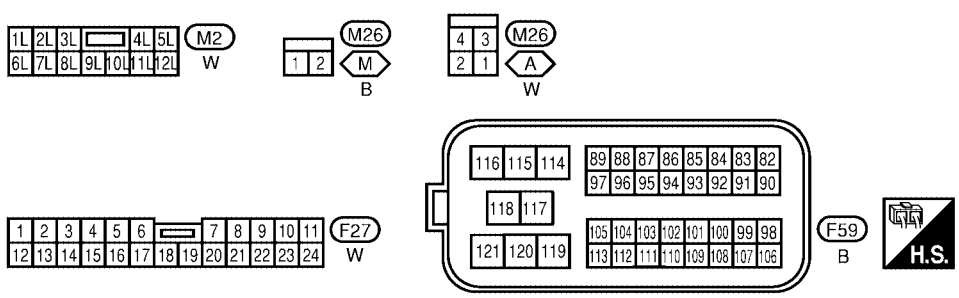
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00KKJ

EC-BRK/SW-01





BBWA1392E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/G	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00KKK

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

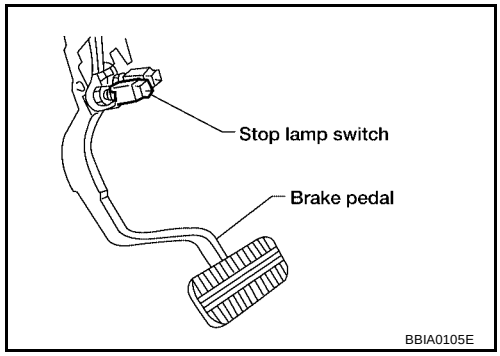
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

OK or NG

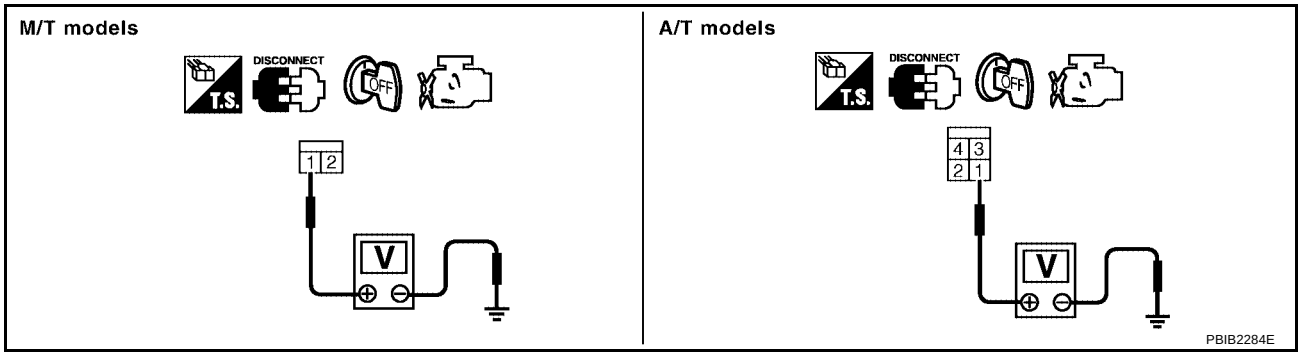
OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.



2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connector M2
- Harness for open or short between stop lamp switch and battery

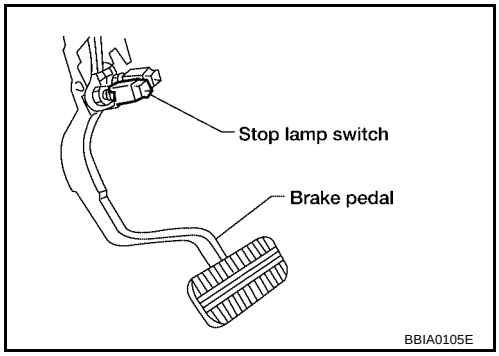
>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect stop lamp switch harness connector.
3. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK STOP LAMP SWITCH

Refer to EC-1281, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace stop lamp switch.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

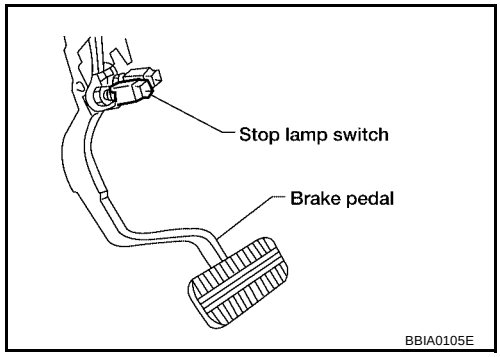
>> **INSPECTION END**

Component Inspection

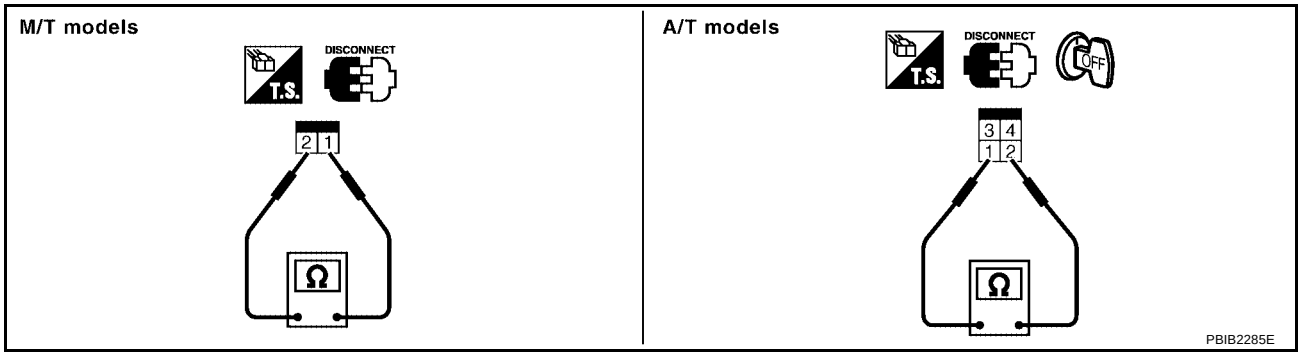
UBS00KKL

STOP LAMP SWITCH

1. Disconnect stop lamp switch harness connector.



2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Conditions	Continuity
Brake pedal: Fully released	Should not exist.
Brake pedal: Slightly depressed	Should exist.

If NG, adjust brake pedal installation, refer to BR-11, "BRAKE PEDAL AND BRACKET" , and perform step 2 again.

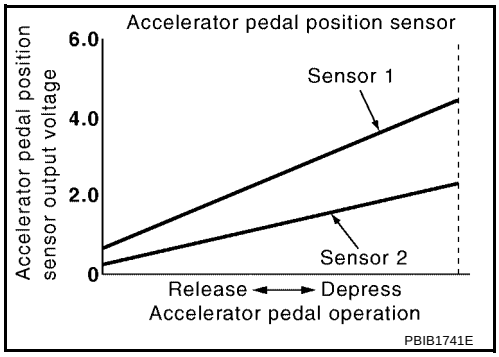
DTC P2122, P2123 APP SENSOR

PFP:18002

Component Description

UBS00JMG

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JMH

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1 ACCEL SEN2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1ST (M/T)	Accelerator pedal: Fully released	0.41 - 0.96V
		Accelerator pedal: Fully depressed	More than 4.2V
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differ from ECM terminals voltage signal.

On Board Diagnosis Logic

UBS00JMI

These self-diagnoses have the one trip detection logic.

NOTE:
If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-1176 .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122 2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	● Harness or connectors (The APP sensor 1 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P2123 2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

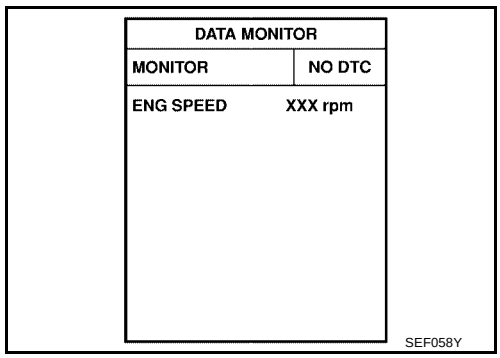
DTC Confirmation Procedure

UBS00JMJ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-1285, "Diagnostic Procedure" .



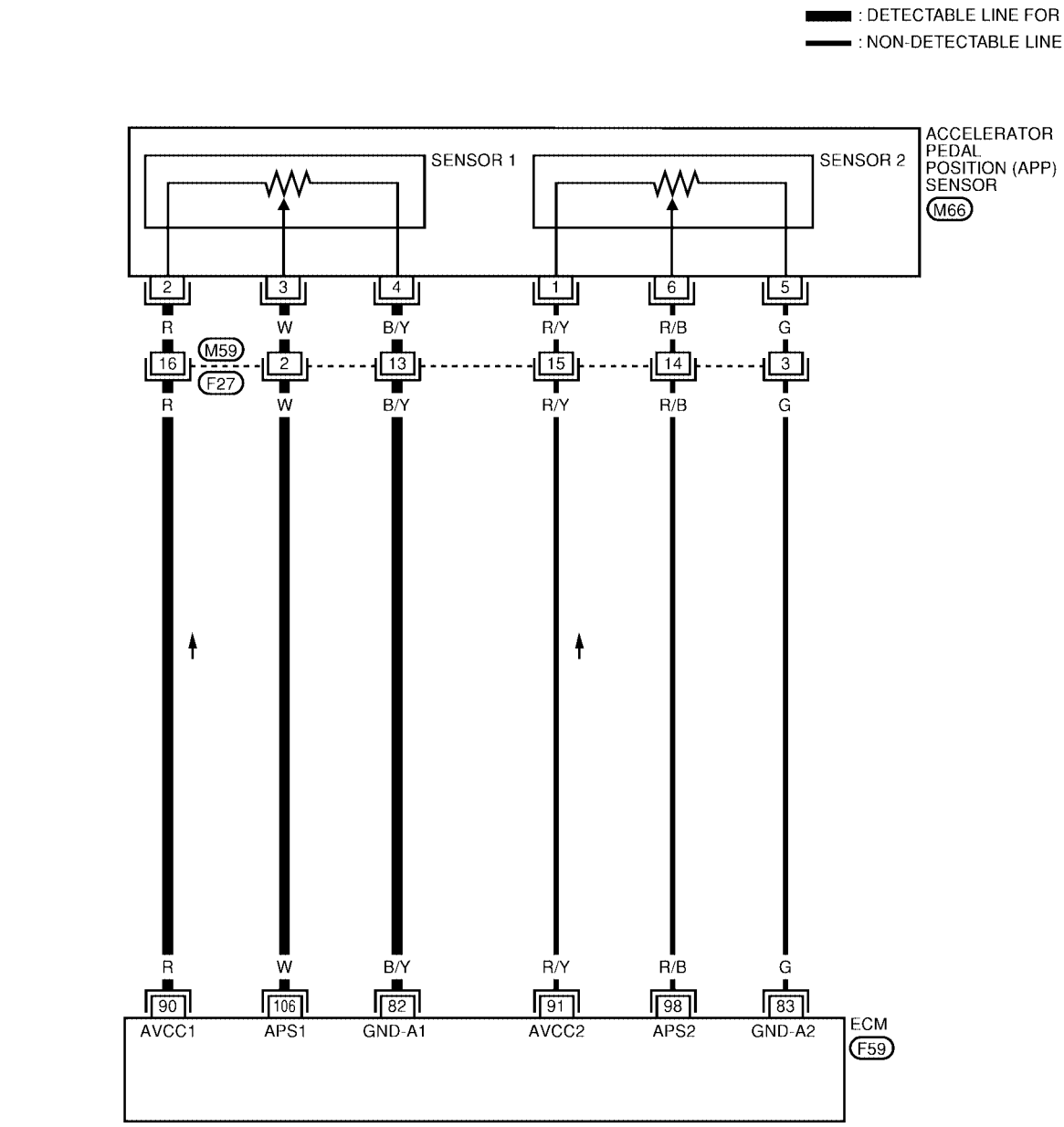
WITH GST

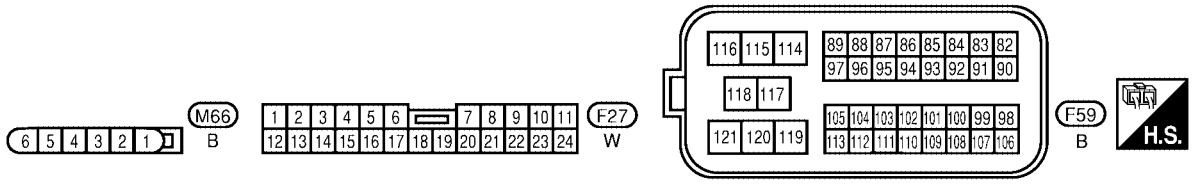
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JMK

EC-APPS1-01





BBWA1399E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

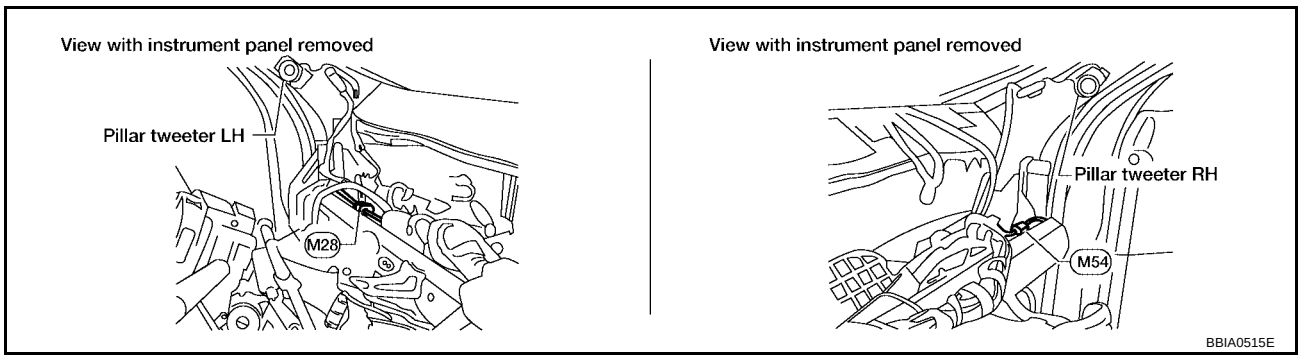
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	B/Y	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	G	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	R/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	R/B	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.28 - 0.48V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 2.0V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.65 - 0.87V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 4.3V

Diagnostic Procedure

UBS00JML

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .

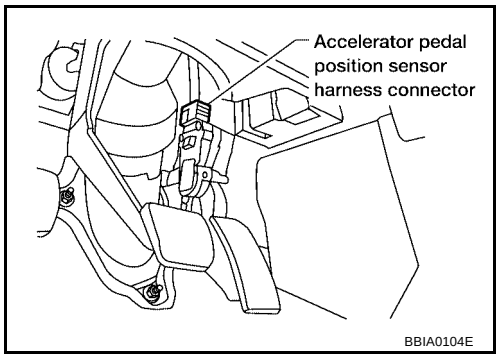


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

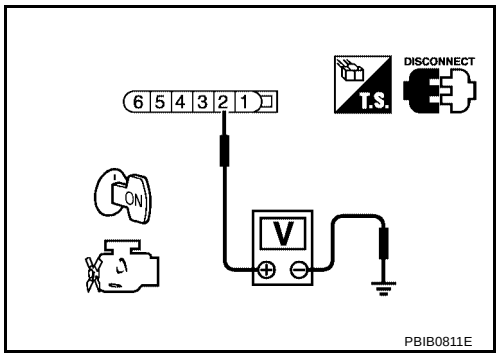
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 82. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 106 and APP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK APP SENSOR

Refer to EC-1287, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-748, "Accelerator Pedal Released Position Learning" .
3. Perform EC-748, "Throttle Valve Closed Position Learning" .
4. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

10. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

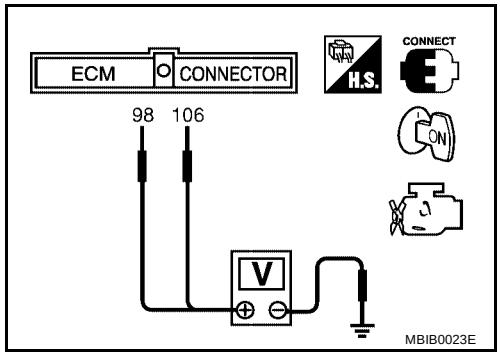
Component Inspection

UBS00JMM

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.65 - 0.87V
	Fully depressed	More than 4.3V
98 (Accelerator pedal position sensor 2)	Fully released	0.28 - 0.48V
	Fully depressed	More than 2.0V



4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-748, "Accelerator Pedal Released Position Learning" .
6. Perform EC-748, "Throttle Valve Closed Position Learning" .
7. Perform EC-749, "Idle Air Volume Learning" .

Removal and Installation

UBS00JMN

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

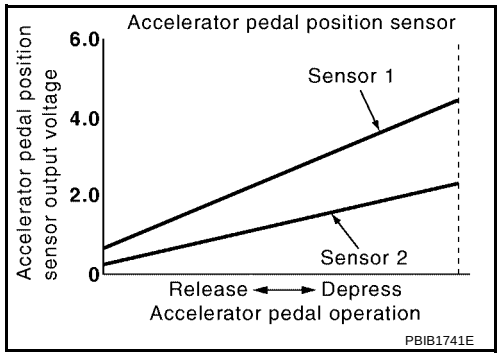
DTC P2127, P2128 APP SENSOR

PFP:18002

Component Description

UBS00JMO

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JMP

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1 ACCEL SEN2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1ST (M/T)	Accelerator pedal: Fully released	0.41 - 0.96V
		Accelerator pedal: Fully depressed	More than 4.2V
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differ from ECM terminals voltage signal.

On Board Diagnosis Logic

UBS00JMQ

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127 2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	● Harness or connectors (The APP sensor 2 circuit is open or shorted.) (TP sensor circuit is shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 2) ● Electric throttle control actuator (TP sensor 1 and 2)
P2128 2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

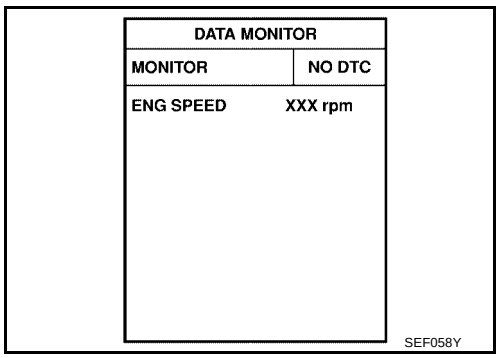
DTC Confirmation Procedure

UBS00JMR

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-1292, "Diagnostic Procedure" .



WITH GST

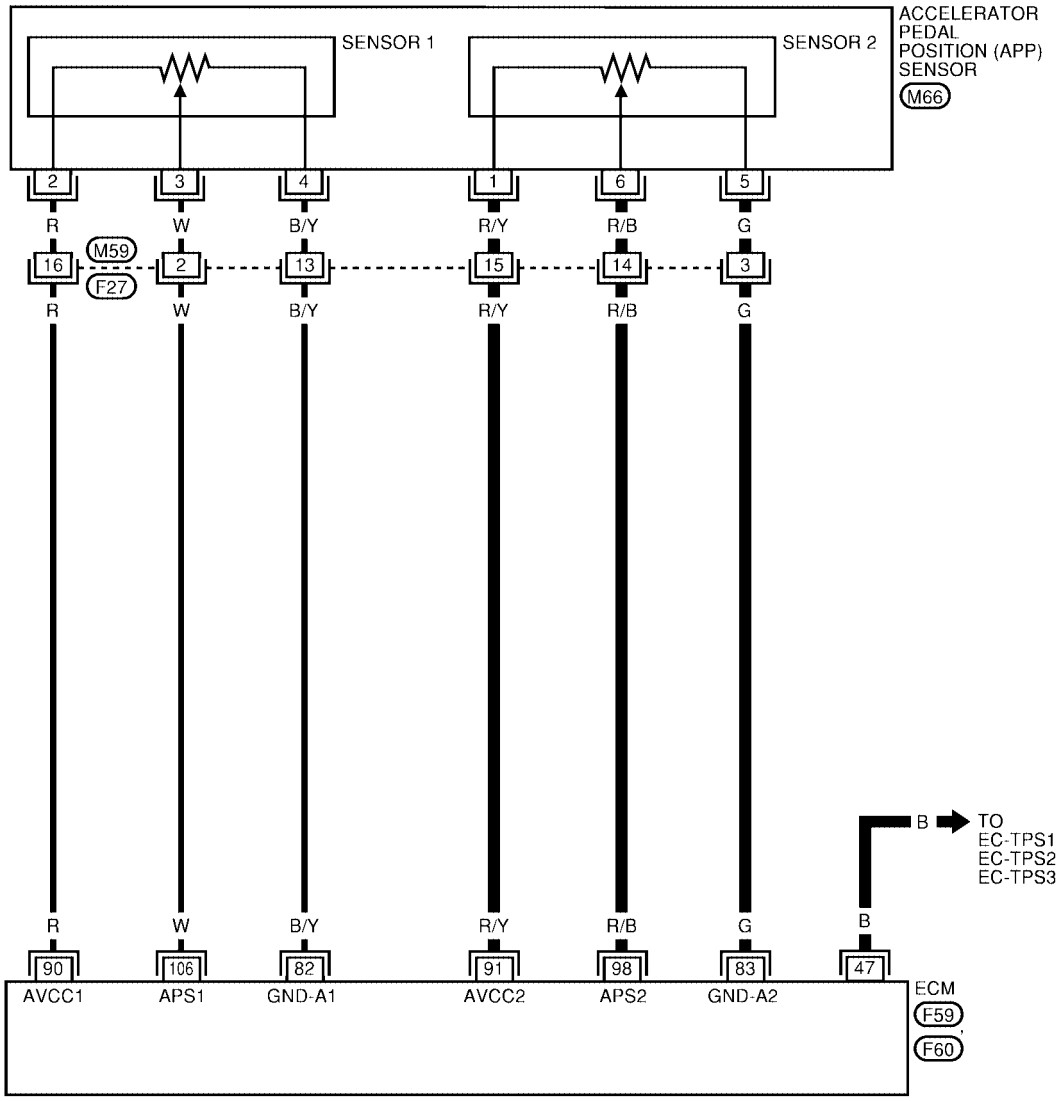
Follow the procedure “WITH CONSULT-II” above.

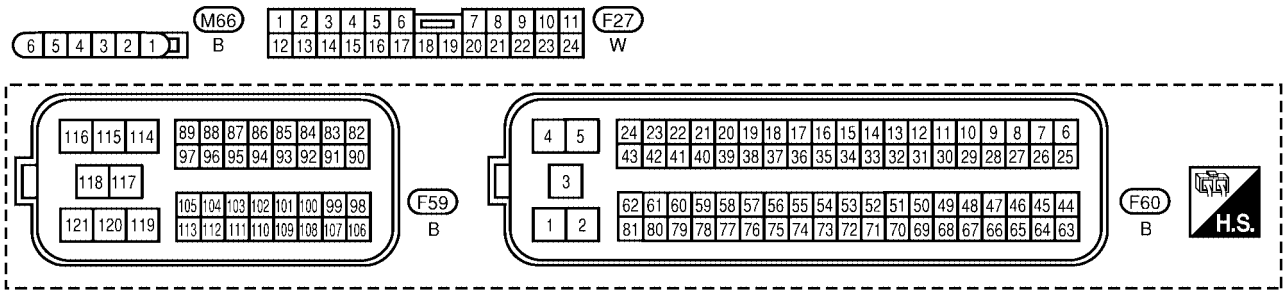
Wiring Diagram

UBS00JMS

EC-APPS2-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





BBWA1400E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

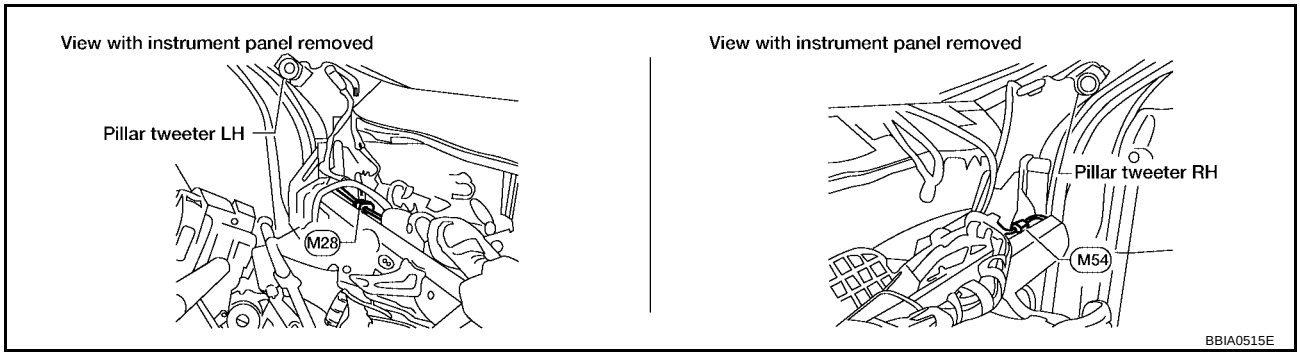
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	B	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
82	B/Y	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	G	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	R/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	R/B	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.28 - 0.48V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 2.0V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.65 - 0.87V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 4.3V

Diagnostic Procedure

UBS00JMT

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .

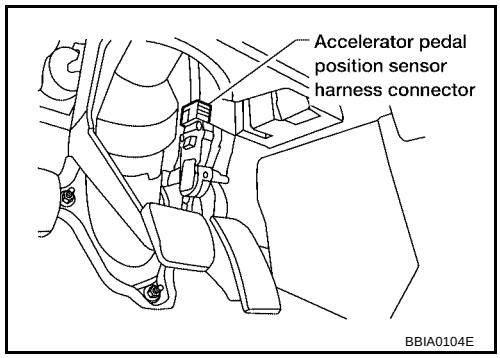


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

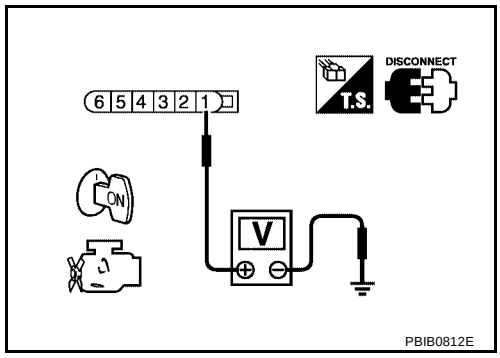
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 91. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open between ECM and accelerator pedal position sensor

>> Repair or replace open circuit.

5. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check the following.

- Harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 1	EC-1291
47	Electric throttle control actuator terminal 1	EC-1299

OK or NG

OK >> GO TO 6.
NG >> Repair short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR

Refer to EC-1303, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> GO TO 7.

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-748, "Throttle Valve Closed Position Learning" .
3. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

8. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 5 and ECM terminal 83.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 98 and APP sensor terminal 6.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK APP SENSOR

Refer to EC-1296, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-748, "Accelerator Pedal Released Position Learning" .
3. Perform EC-748, "Throttle Valve Closed Position Learning" .
4. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

14. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

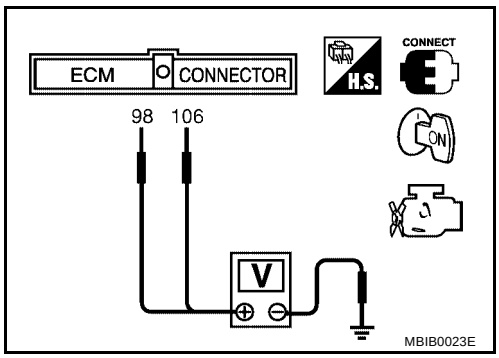
>> **INSPECTION END**

Component Inspection

UBS00JMU

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.65 - 0.87V
	Fully depressed	More than 4.3V
98 (Accelerator pedal position sensor 2)	Fully released	0.28 - 0.48V
	Fully depressed	More than 2.0V

4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-748, "Accelerator Pedal Released Position Learning" .
6. Perform EC-748, "Throttle Valve Closed Position Learning" .
7. Perform EC-749, "Idle Air Volume Learning" .

Remove and Installation

UBS00JMV

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

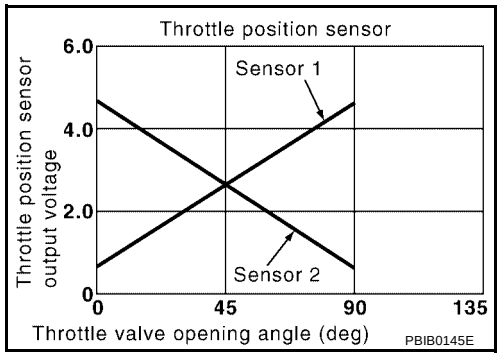
DTC P2135 TP SENSOR

PFP:16119

Component Description

UBS00JMW

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JMX

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN1 THRTL SEN2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1ST (M/T)	Accelerator pedal: Fully released	More than 0.36V
		Accelerator pedal: Fully depressed	Less than 4.75V

*:Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminals voltage signal.

On Board Diagnosis Logic

UBS00JMY

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Throttle position sensor circuit range/performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	● Harness or connector (The TP sensor 1 and 2 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 1 and 2) ● Accelerator pedal position sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

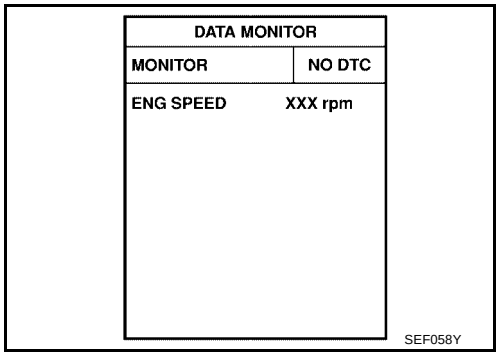
UBS00JMZ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-1300, "Diagnostic Procedure" .



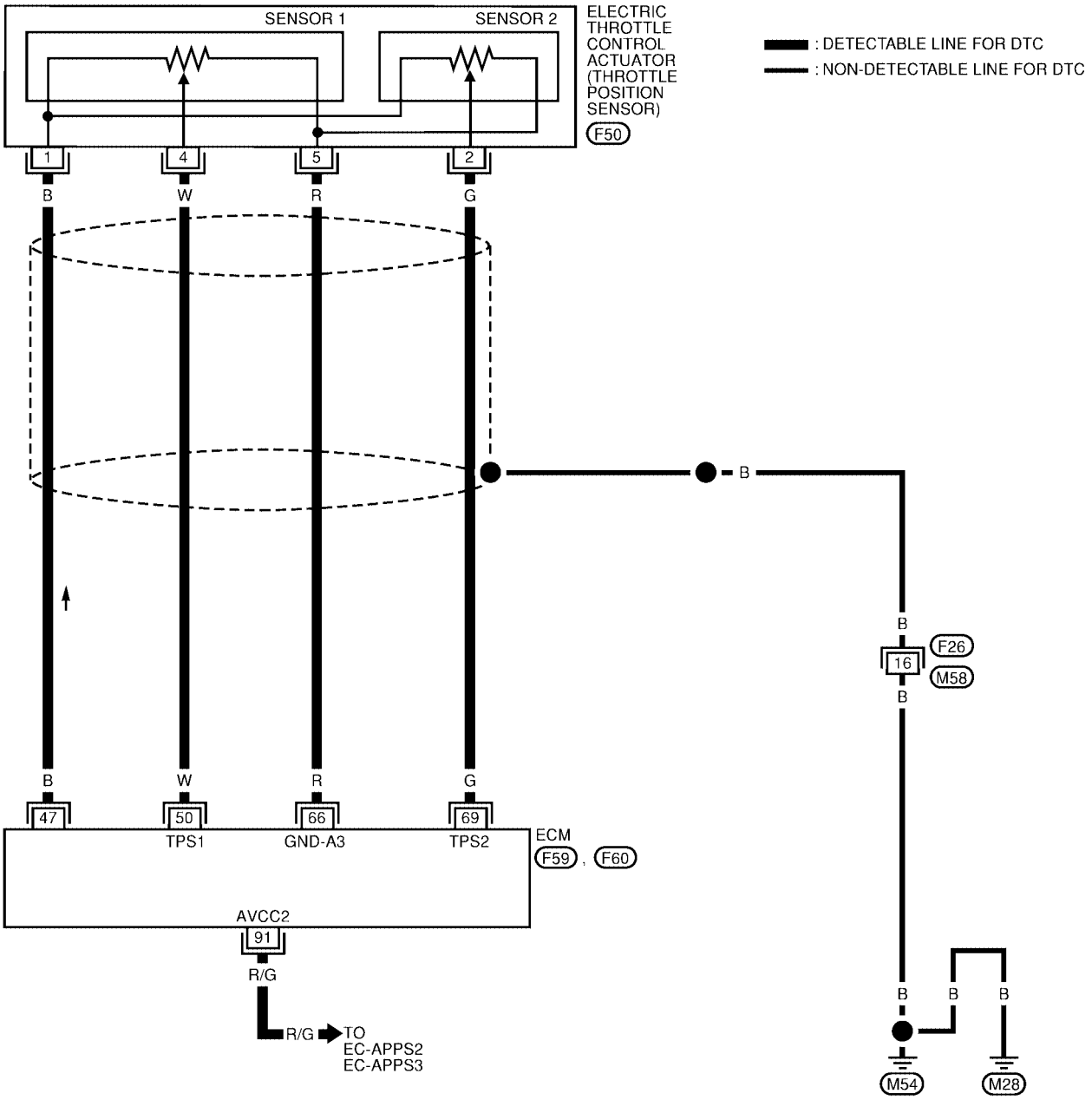
WITH GST

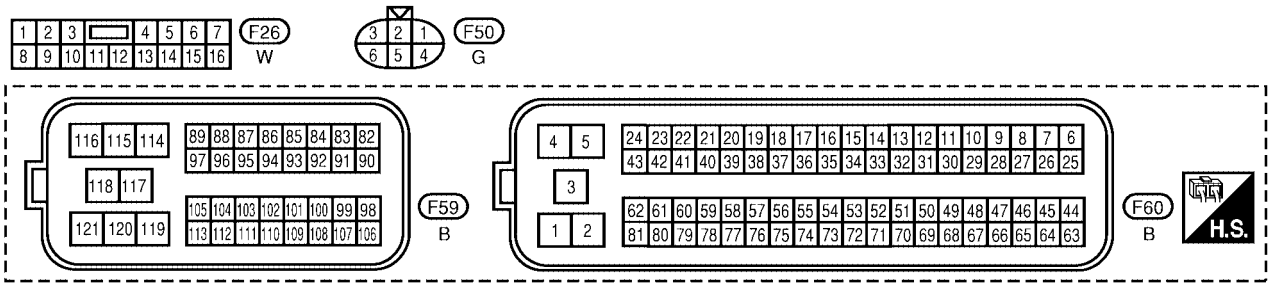
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JN0

EC-TPS3-01





BBWA1657E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

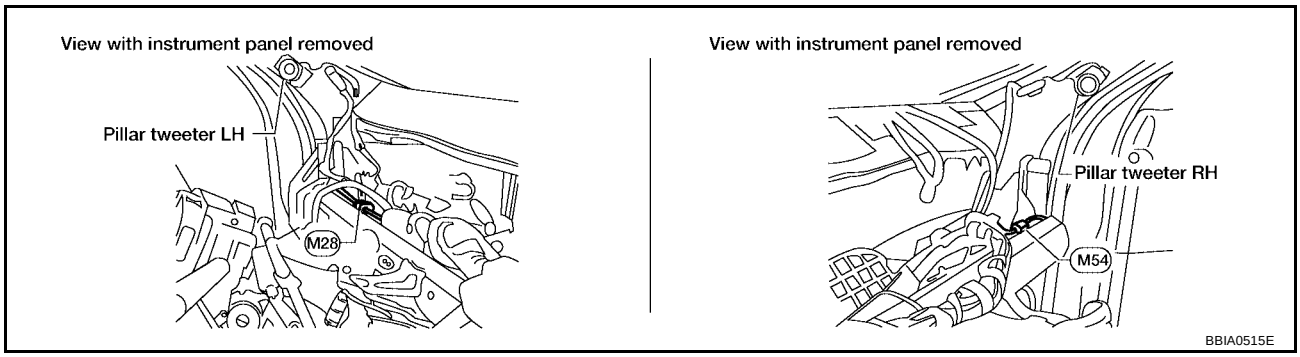
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	B	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
50	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
66	R	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
69	G	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1ST (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
91	R/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

UBS00JN1

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .

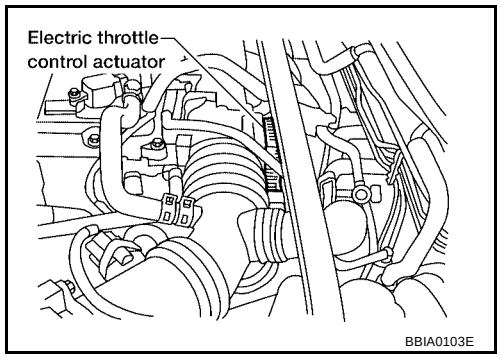


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.

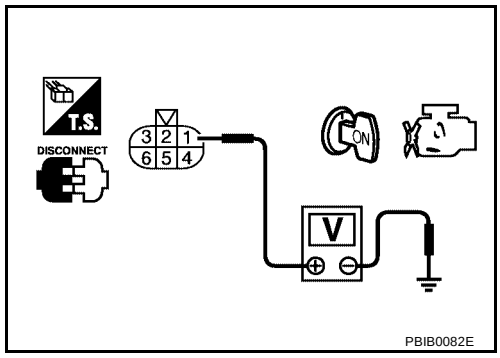


3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 7.
NG >> GO TO 3.



3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace open circuit.

4. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-III

Check the following.

- Harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 1	EC-1299
91	APP sensor terminal 1	EC-1291

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1296, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-748, "Accelerator Pedal Released Position Learning" .
3. Perform EC-748, "Throttle Valve Closed Position Learning" .
4. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 5 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following;
   ECM terminal 50 and electric throttle control actuator terminal 4,
   ECM terminal 69 and electric throttle control actuator terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-1303, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-748, "Throttle Valve Closed Position Learning" .
3. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

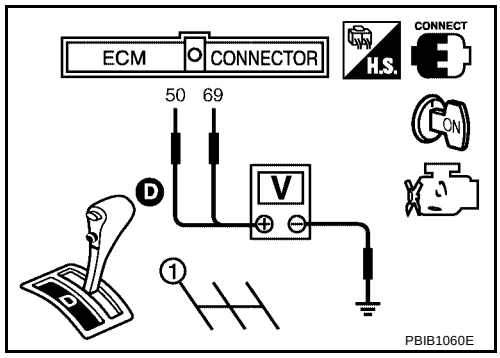
Component Inspection

UBS00JN2

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-748, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set shift lever to D position (A/T models) or 1st position (M/T models).
5. Check voltage between ECM terminals 50 (TP sensor 1), 69 (TP sensor 2) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
50 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
69 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-748, "Throttle Valve Closed Position Learning" .
8. Perform EC-749, "Idle Air Volume Learning" .

Remove and Installation

UBS00JN3

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-108, "INTAKE MANIFOLD" .

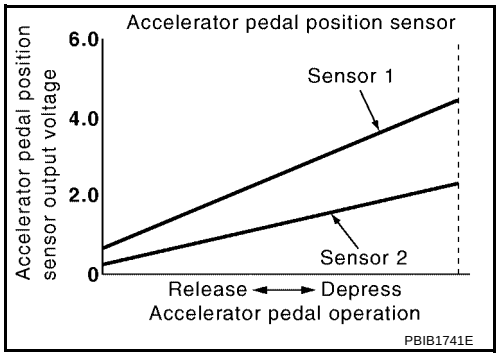
DTC P2138 APP SENSOR

PFP:18002

Component Description

UBS00JN4

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JN5

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN1 ACCEL SEN2*	● Ignition switch: ON (Engine stopped) ● Shift lever: D (A/T), 1ST (M/T)	Accelerator pedal: Fully released	0.41 - 0.96V
		Accelerator pedal: Fully depressed	More than 4.2V
CLSD THL POS	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminals voltage signal.

On Board Diagnosis Logic

UBS00JN6

This self-diagnosis has the one trip detection logic.

NOTE:
If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-1176 .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138 2138	Accelerator pedal position sensor circuit range/performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	● Harness or connector (The APP sensor 1 and 2 circuit is open or shorted.) (TP sensor circuit is shorted.) ● Accelerator pedal position sensor 1 and 2 ● Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MIL lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

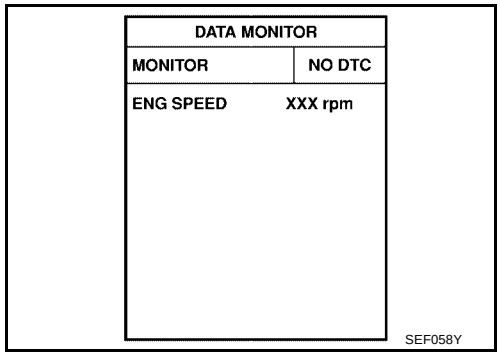
UBS00JN7

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:

Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-1307, "Diagnostic Procedure" .



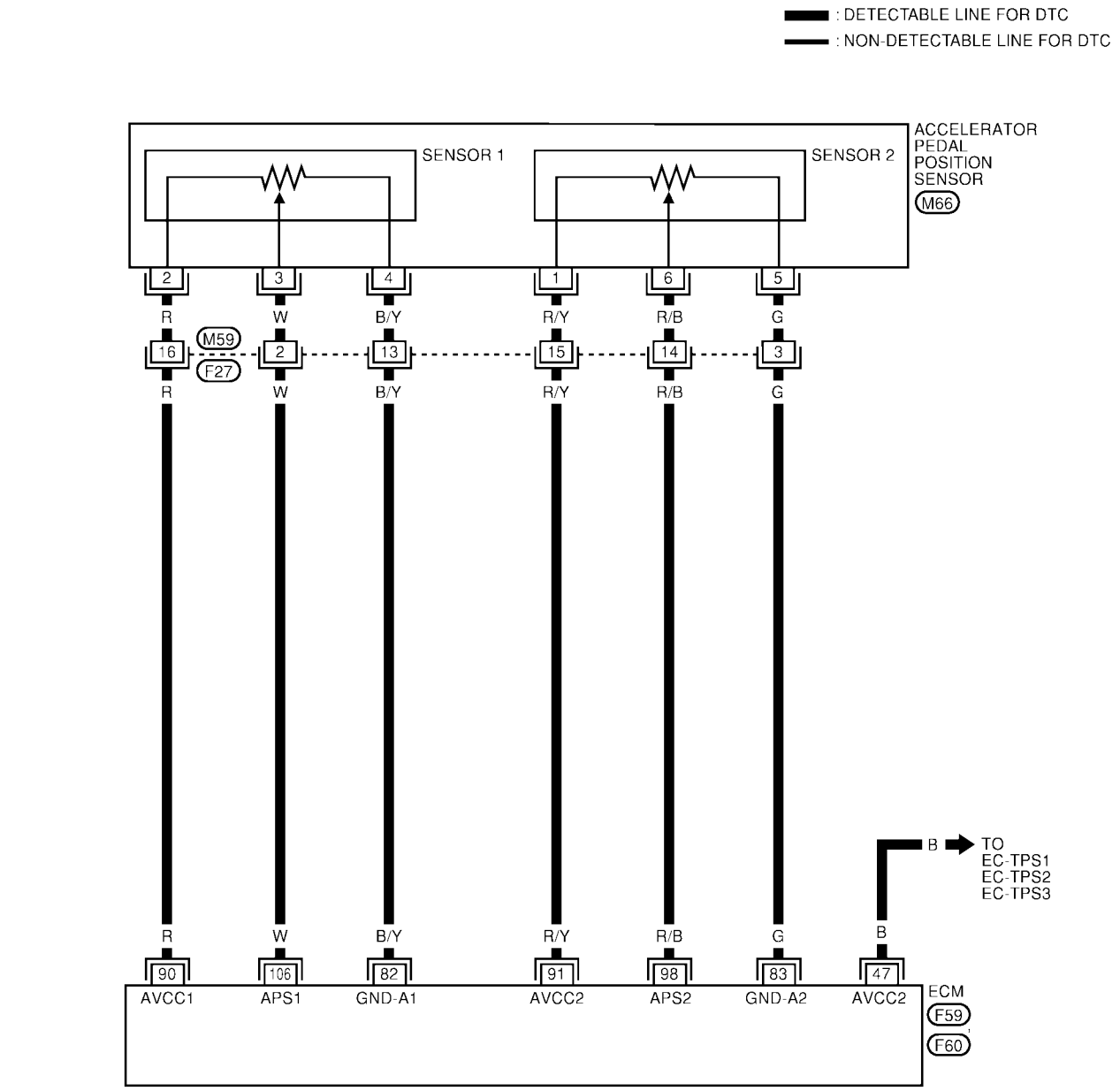
WITH GST

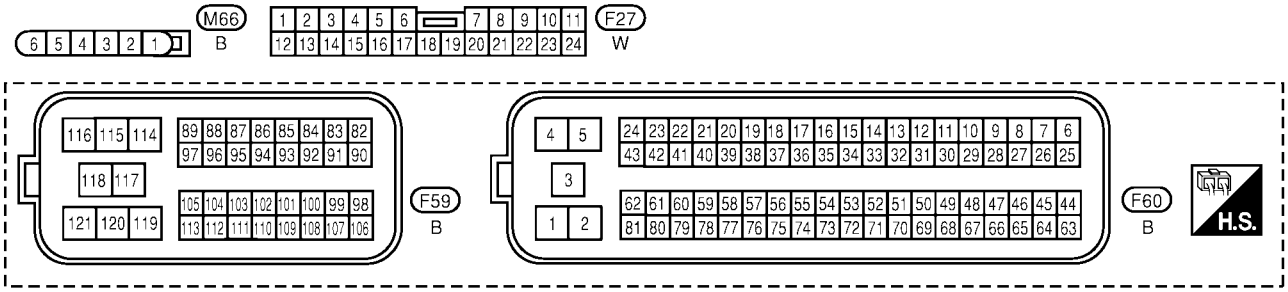
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

UBS00JN8

EC-APPS3-01





BBWA1401E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

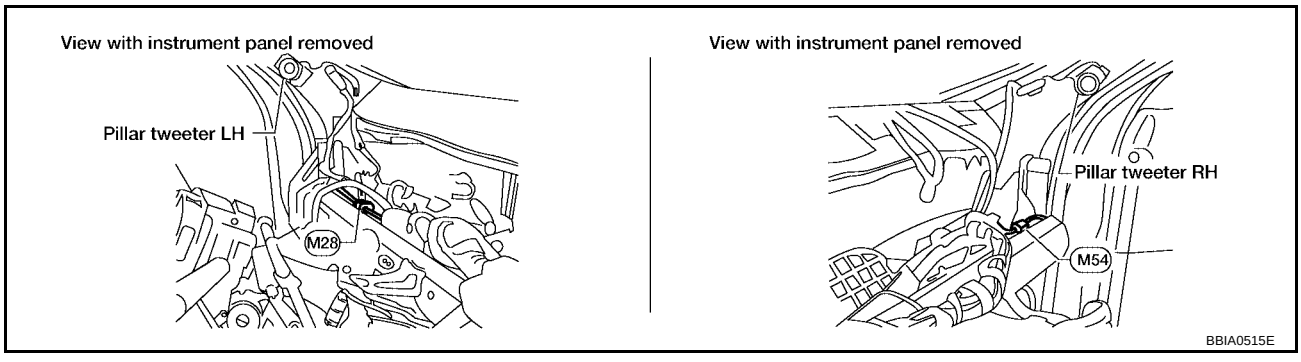
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	B	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
82	B/Y	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	G	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	R/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	R/B	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.28 - 0.48V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 2.0V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.65 - 0.87V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	More than 4.3V

Diagnostic Procedure

UBS00JN9

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten engine two screws on the body.
   Refer to EC-839, "Ground Inspection" .

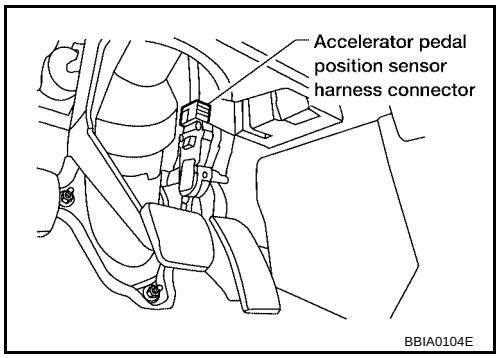


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.

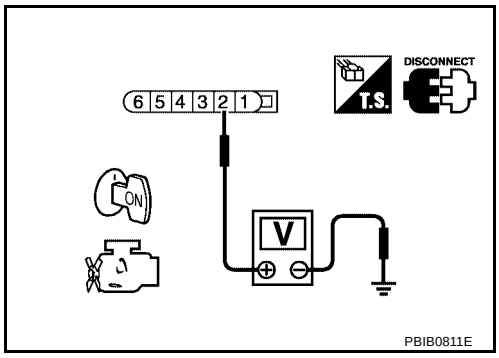


3. Check voltage between APP sensor terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

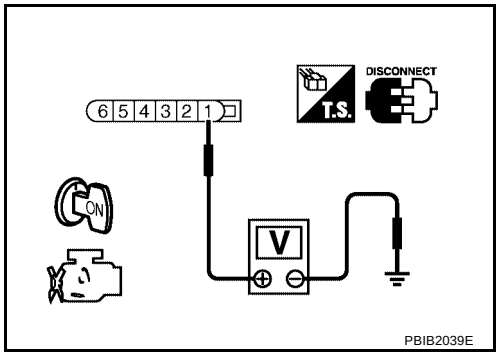
4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

Check voltage between APP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V

OK or NG

OK >> GO TO 10.
NG >> GO TO 5.



5. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 91. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open between ECM and accelerator pedal position sensor

>> Repair or replace open circuit.

7. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check the following.

- Harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 1	EC-1306
47	Electric throttle control actuator terminal 1	EC-1299

OK or NG

OK >> GO TO 8.
NG >> Repair short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR

Refer to EC-1303, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> GO TO 9.

9. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-748, "Throttle Valve Closed Position Learning" .
3. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

10. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following;
   APP sensor terminal 4 and ECM terminal 82,
   APP sensor terminal 5 and ECM terminal 83.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following;
   ECM terminal 106 and APP sensor terminal 3,
   ECM terminal 98 and APP sensor terminal 6.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and accelerator pedal position sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK APP SENSOR

Refer to EC-1311, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-748, "Accelerator Pedal Released Position Learning" .
3. Perform EC-748, "Throttle Valve Closed Position Learning" .
4. Perform EC-749, "Idle Air Volume Learning" .

>> **INSPECTION END**

16. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

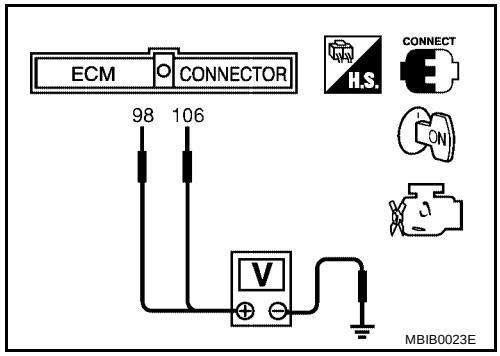
Component Inspection

UBS00JNA

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.65 - 0.87V
	Fully depressed	More than 4.3V
98 (Accelerator pedal position sensor 2)	Fully released	0.28 - 0.48V
	Fully depressed	More than 2.0V



4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-748, "Accelerator Pedal Released Position Learning" .
6. Perform EC-748, "Throttle Valve Closed Position Learning" .
7. Perform EC-749, "Idle Air Volume Learning" .

Remove and Installation

UBS00JNB

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

IGNITION SIGNAL

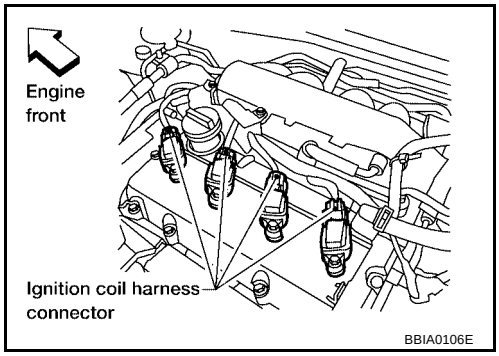
PFP:22448

Component Description

UBS00JYN

IGNITION COIL & POWER TRANSISTOR

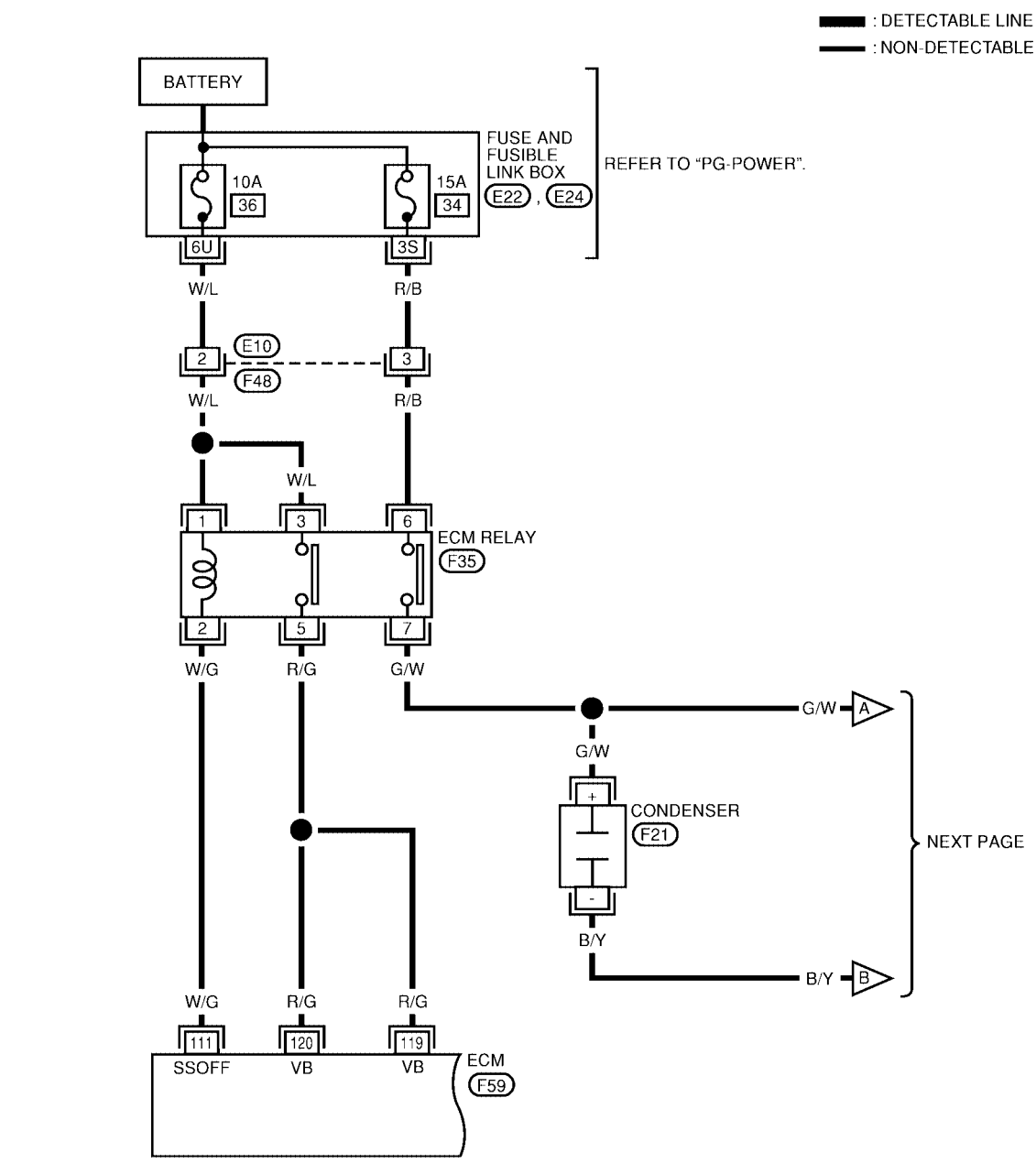
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON-OFF operation induces the proper high voltage in the coil secondary circuit.

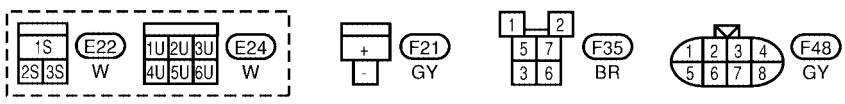


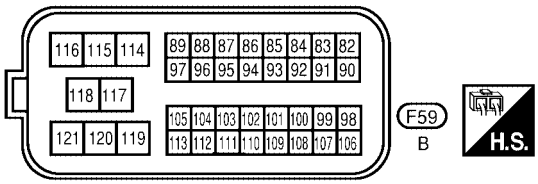
Wiring Diagram

UBS00JYO

EC-IGNSYS-01







BBWA1402E

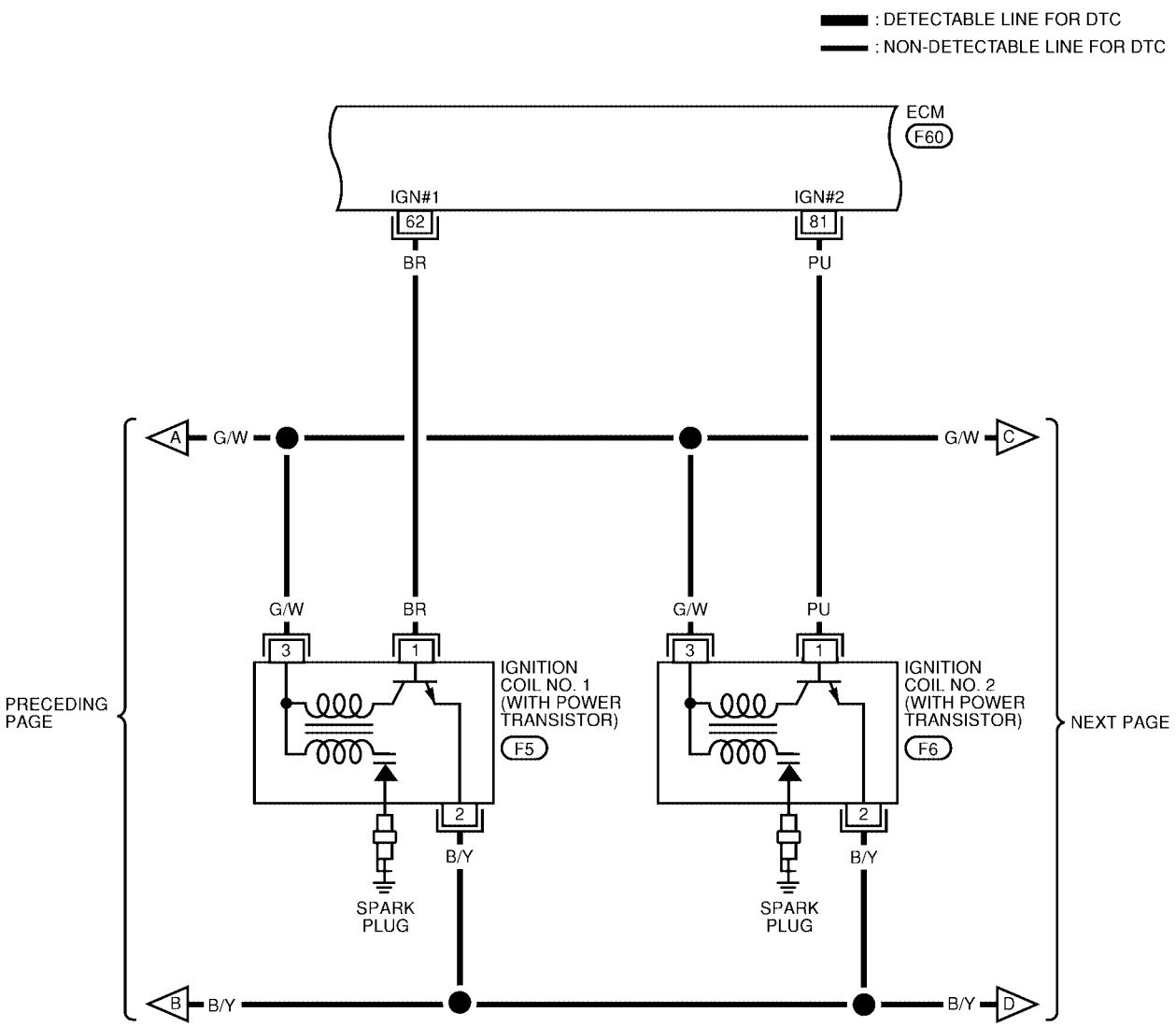
Specification data are reference values and are measured between each terminal and ground.

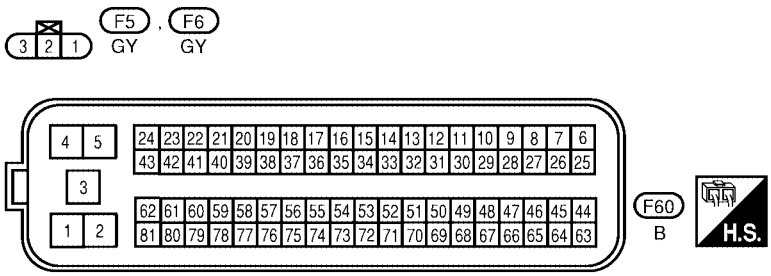
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	W/G	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● A few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	R/G	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

EC-IGNSYS-02



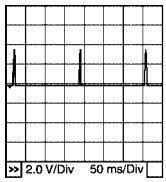
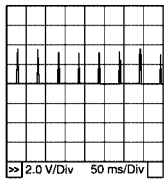


BBWA1480E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

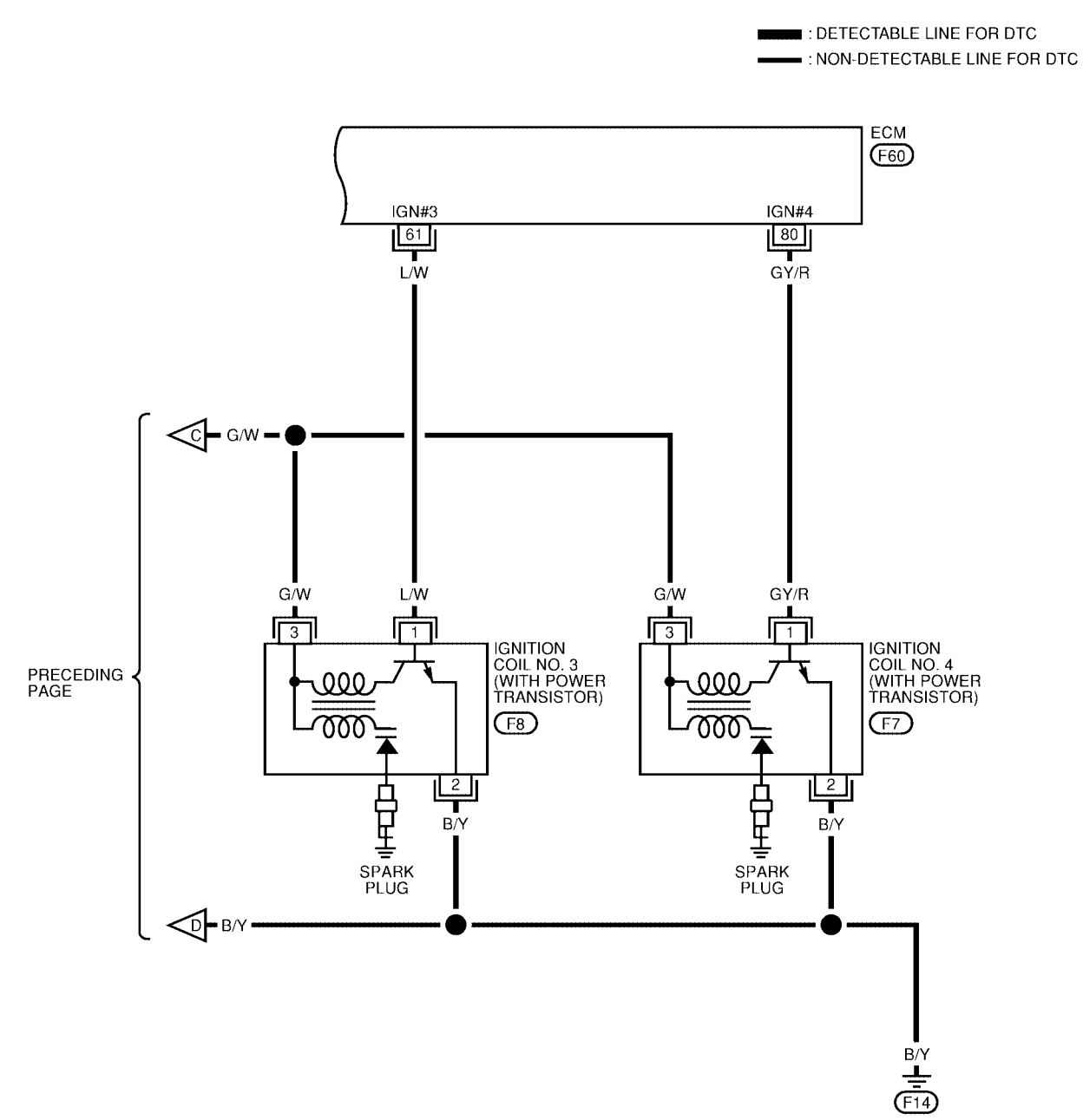
CAUTION:

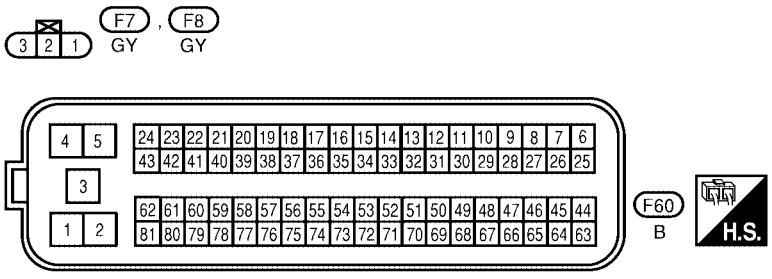
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62 81	BR PU	Ignition signal No. 1 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

EC-IGNSYS-03



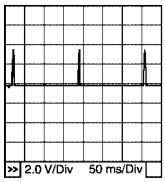
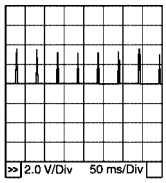


BBWA1403E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
61 80	L/W GY/R	Ignition signal No. 3 Ignition signal No. 4	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm.	0 - 0.2V★  PBIB0522E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00JYP

1. CHECK ENGINE START

Turn ignition switch OFF, and restart engine.
Is engine running?

Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 3.
No >> GO TO 4.

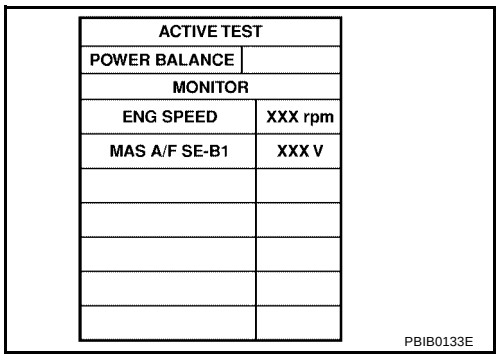
2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Make sure that all circuits do not produce a momentary engine speed drop.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 12.



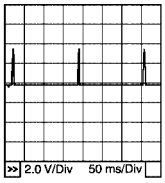
PBIB0133E

3. CHECK OVERALL FUNCTION

Without CONSULT-II

1. Let engine idle.
2. Read the voltage signal between ECM terminals 61, 62, 80, 81 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.

NOTE:
The pulse cycle changes depending on rpm at idle.



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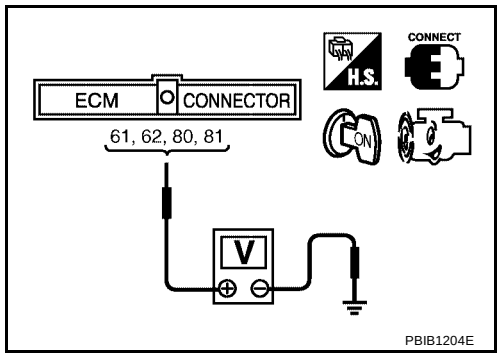


PBIB1204E

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 12.

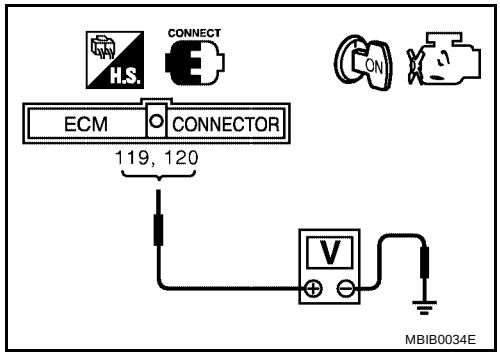
4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> Go to EC-833, "POWER SUPPLY AND GROUND CIRCUIT" .



MBIB0034E

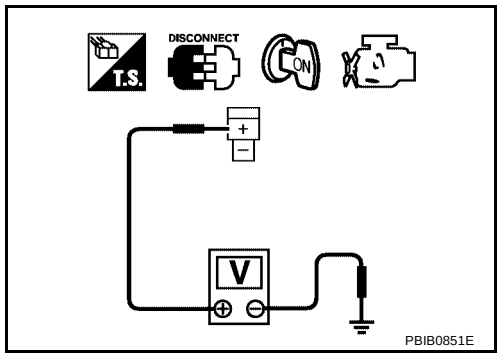
5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.
4. Check voltage between condenser terminal + and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 6.



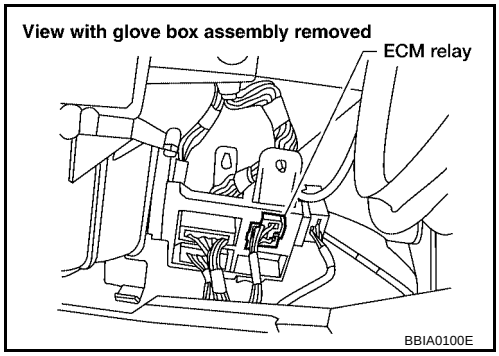
PBIB0851E

6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF.
2. Disconnect ECM relay.
3. Check harness continuity between ECM relay terminal 7 and condenser terminal +.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



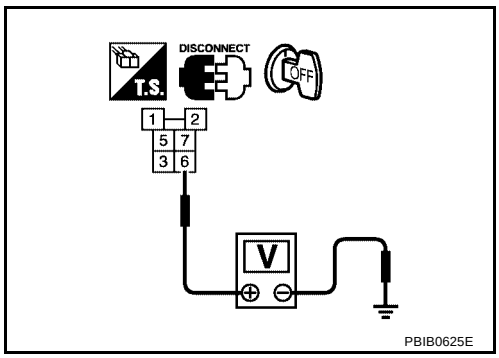
OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

Check voltage between ECM relay terminal 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Fuse and fusible link box connector E22
- 15A fuse
- Harness for open or short between ECM relay and battery

>> Repair or replace harness or connectors.

9. CHECK ECM RELAY

Refer to EC-1322, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace ECM relay.

10. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check harness continuity between condenser terminal - and ground.
   Refer to Wiring diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to power in harness or connector.

11. CHECK CONDENSER

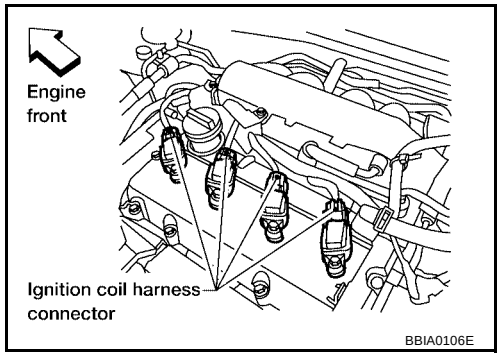
Refer to EC-1322, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace condenser.

12. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Turn ignition switch ON.

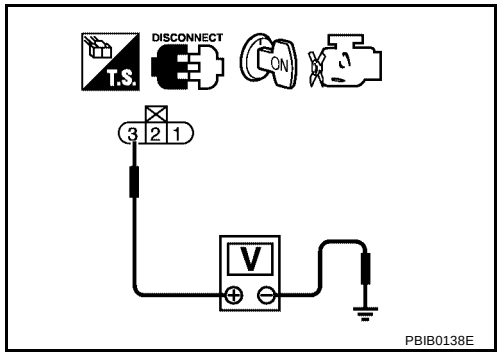


4. Check voltage between ignition coil terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



13. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ignition coil terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to power in harness or connectors.

14. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 61, 62, 80, 81 and ignition coil terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 15.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-1322, "Component Inspection" .

OK or NG

OK >> GO TO 16.
NG >> Replace ignition coil with power transistor.

16. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

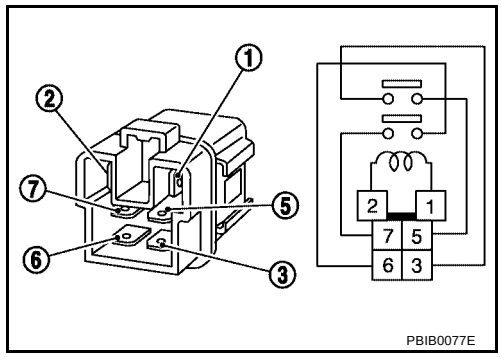
UBS00JYQ

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.

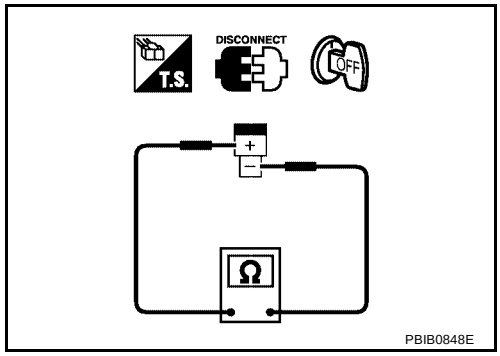


CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.

3. Check resistance between condenser terminals + and -.

Resistance: Above 1 MΩ [at 25°C (77°F)]



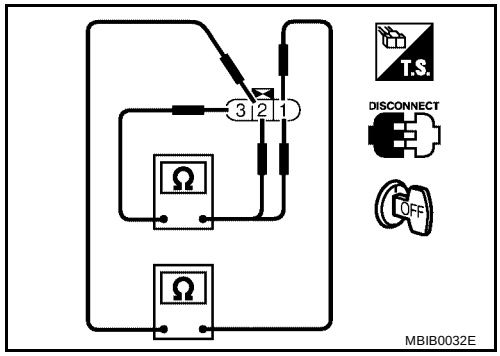
IGNITION COIL WITH POWER TRANSISTOR

CAUTION:

Do the following procedure in the place where ventilation is good without the combustible.

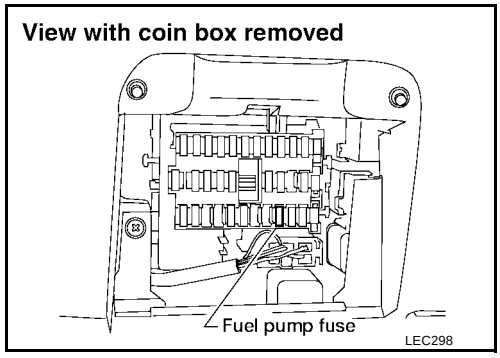
1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 and 2	Except 0 or ∞
1 and 3	Except 0
2 and 3	



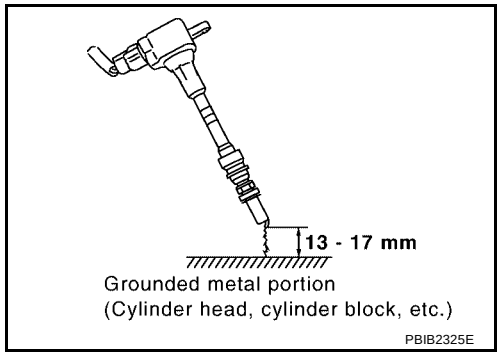
4. If NG, Replace ignition coil with power transistor.
   If OK, go to next step.
5. Turn ignition switch OFF.
6. Reconnect all harness connectors disconnected.
7. Remove fuel pump fuse in located in fuse box to release fuel pressure.

   NOTE:
   Do not use CONSULT-II to release fuel pressure, or fuel pressure applies again during the following procedure.
8. Start engine.
9. After engine stalls, crank it two or three times to release all fuel pressure.
10. Turn ignition switch OFF.
11. Remove ignition coil harness connectors to avoid the electrical discharge from the ignition coils.



12. Remove ignition coil and spark plug of the cylinder to be checked.
13. Crank engine for five seconds or more to remove combustion gas in the cylinder.
14. Connect spark plug and harness connector to ignition coil.
15. Fix ignition coil using a rope etc. with gap of 13 - 17 mm between the edge of the spark plug and grounded metal portion as shown in the figure.
16. Crank engine for about three seconds, and check whether spark is generated between the spark plug and the grounded part.

    Spark should be generated.



CAUTION:

- **Do not approach to the spark plug and the ignition coil within 50cm. Be careful not to get an electrical shock while checking, because the electrical discharge voltage becomes 20kV or more.**
- **It might cause to damage the ignition coil if the gap of 17 mm or more is taken.**

NOTE:
When the gap is 13 mm or less, the spark might be generated even if the coil is malfunctioning.

17. If NG, Replace ignition coil with power transistor.

Removal and Installation

UBS00JYR

IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-118, "IGNITION COIL" .

VIAS

PFP:14956

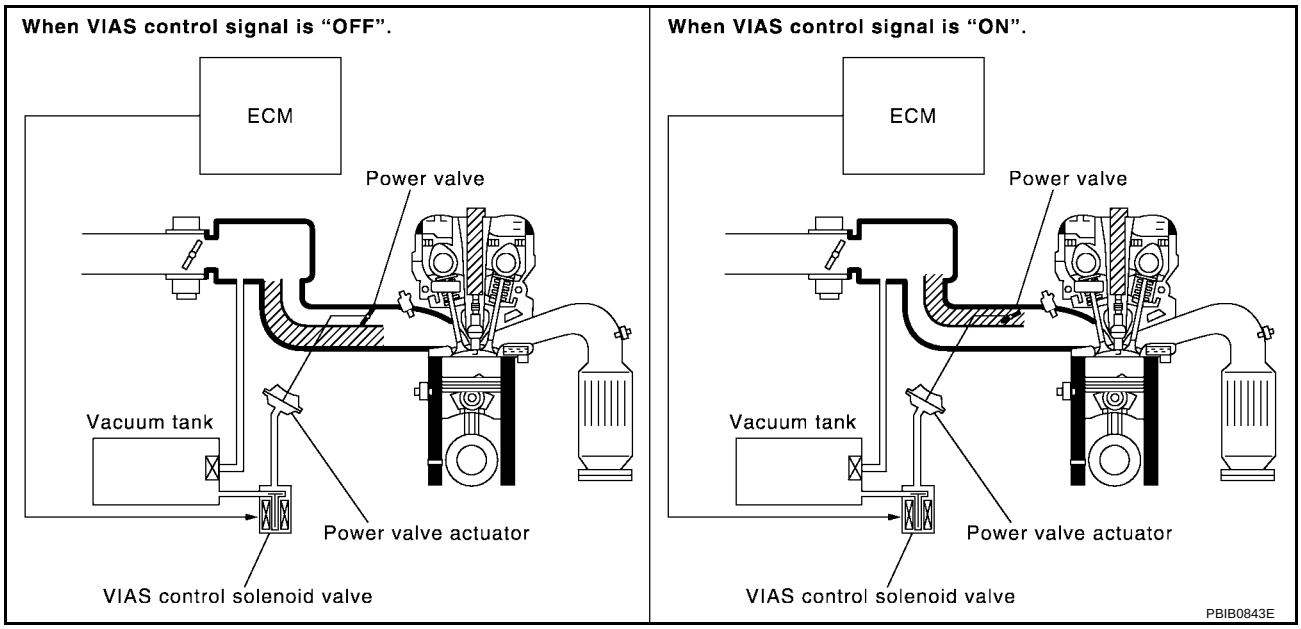
Description

UBS00JYS

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Mass air flow sensor	Amount of intake air	VIAS control	VIAS control solenoid valve
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Closed throttle position		
Battery	Battery voltage*		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*		
Engine coolant temperature sensor	Engine coolant temperature		

*: ECM determines the start signal status by the signals of engine speed and battery voltage.



When the engine is running at low or medium speed, the power valve is fully closed. Under this condition, the effective suction port length is equivalent to the total length of the intake manifold collector's suction port including the intake valve. This long suction port provides increased air intake which results in improved suction efficiency and higher torque generation.

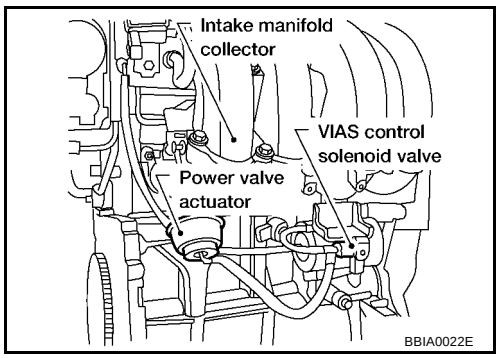
The surge tank and one-way valve are provided. When engine is running at high speed, the ECM sends the signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore opens the power valve to two suction passages together in the collector.

Under this condition, the effective port length is equivalent to the length of the suction port provided independently for each cylinder. This shortened port length results in enhanced engine output with reduced suction resistance under high speeds.

COMPONENT DESCRIPTION

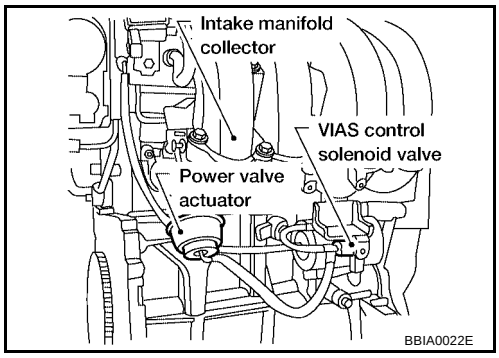
Power Valve

The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.



VIAS Control Solenoid Valve

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve actuator. It responds to ON/OFF signals from the ECM. When the solenoid is OFF, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.



CONSULT-II Reference Value in Data Monitor Mode

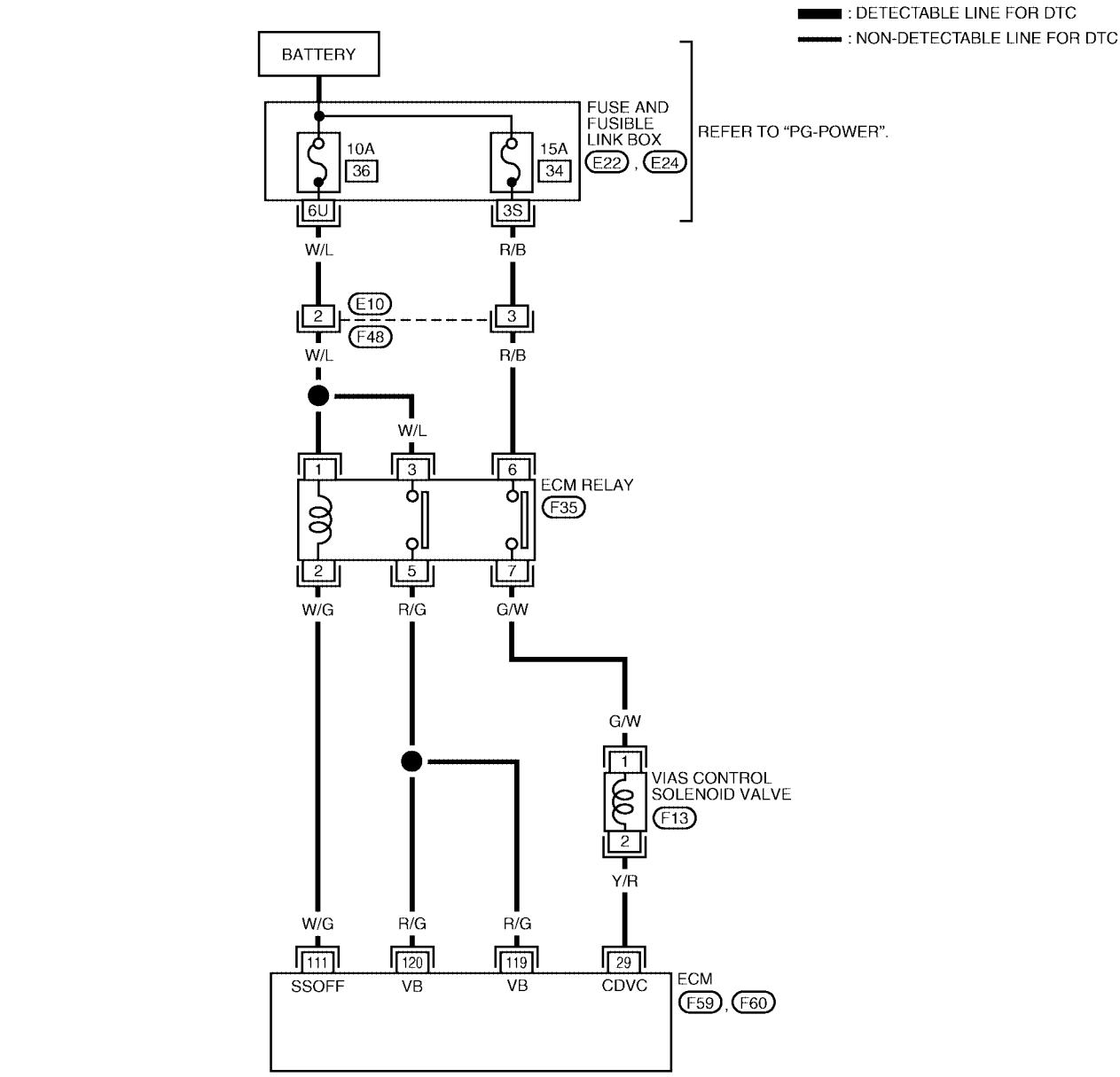
UBS00JYT

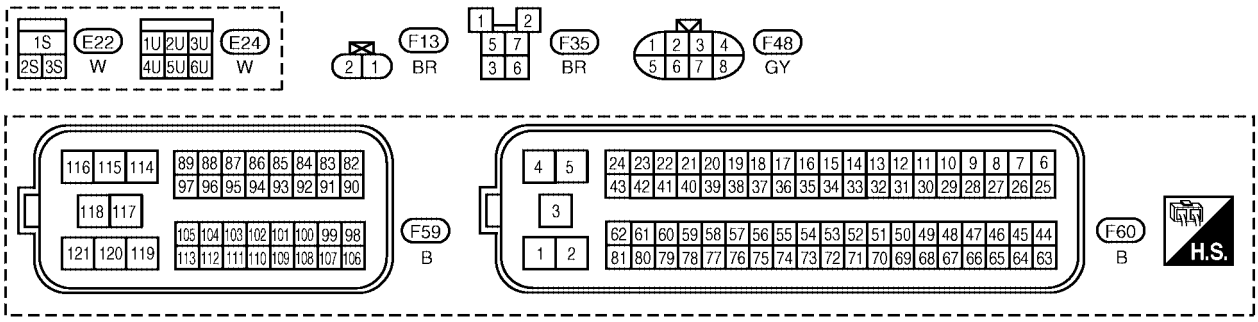
MONITOR ITEM	CONDITION		SPECIFICATION
VIAS S/V	● Engine: After warming up	Idle	OFF
		More than 5,000 rpm	ON

Wiring Diagram

UBS00JYU

EC-VIAS-01





BBWA1410E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
29	Y/R	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm	0 - 1.0V

Diagnostic Procedure

UBS00JYV

1. CHECK OVERALL FUNCTION

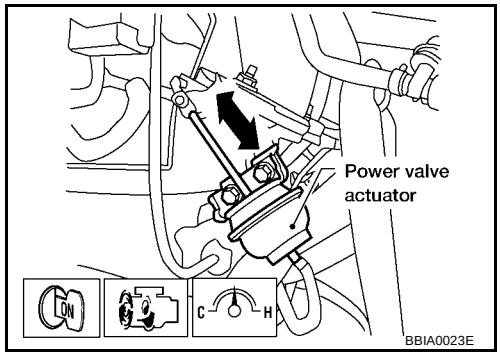
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.

ACTIVE TEST	
VIAS SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm

PBIB0844E

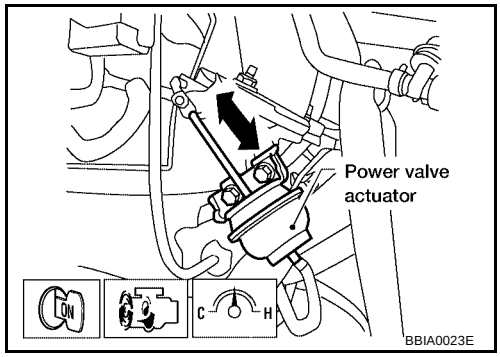
3. Turn VIAS control solenoid valve ON and OFF, and make sure that power valve actuator rod moves.



BBIA0023E

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Rev engine quickly up to above 5,000 rpm and make sure that power valve actuator rod moves.



BBIA0023E

OK or NG

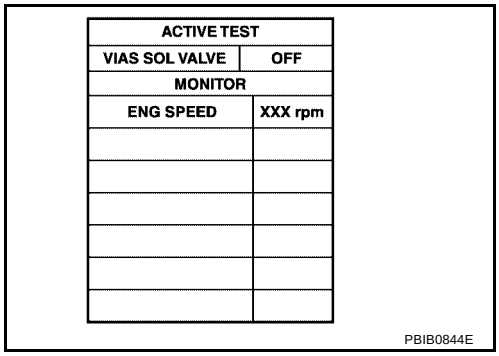
OK >> **INSPECTION END**
NG (With CONSULT-II)>>GO TO 2.
NG (Without CONSULT-II)>>GO TO 3.

2. CHECK VACUUM EXISTENCE

With CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Start engine and let it idle.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
4. Turn VIAS control solenoid valve “ON” and “OFF”, and check vacuum existence under the following conditions.

VIAS SOL VALVE	Vacuum
ON	Should exist.
OFF	Should not exist.



OK or NG

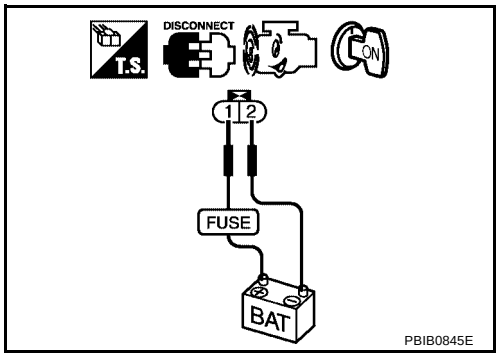
OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

3. CHECK VACUUM EXISTENCE

Without CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Disconnect VIAS control solenoid valve harness connector.
3. Start engine and let it idle.
4. Apply 12V of direct current between VIAS control solenoid valve terminals 1 and 2.
5. Check vacuum existence under the following conditions.

Condition	Vacuum
12V direct current supply	Should exist.
No supply	Should not exist.



OK or NG

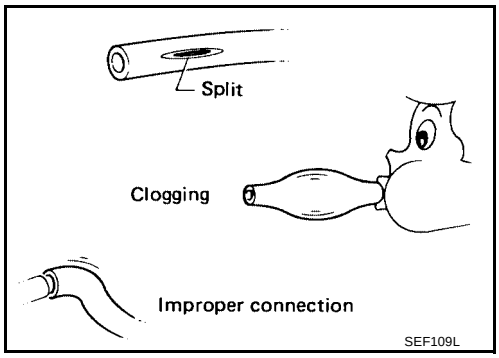
OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

4. CHECK VACUUM HOSE

1. Stop engine.
2. Check hoses and tubes between intake manifold and power valve actuator for crack, clogging, improper connection or disconnection. Refer to EC-777, "Vacuum Hose Drawing" .

OK or NG

OK >> GO TO 5.
NG >> Repair hoses or tubes.



5. CHECK VACUUM TANK

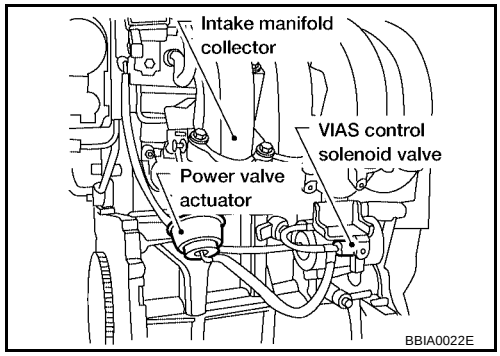
Refer to EC-1332, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace vacuum tank.

6. CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect VIAS control solenoid valve harness connector.
3. Turn ignition switch ON.

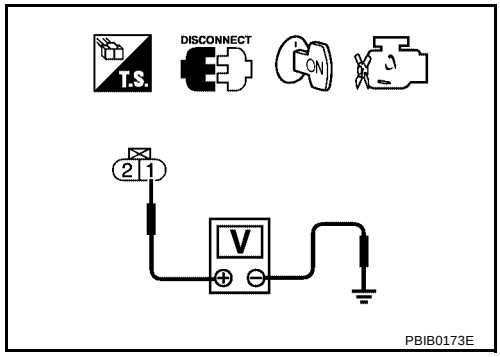


4. Check voltage between VIAS control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.



7. CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT-II

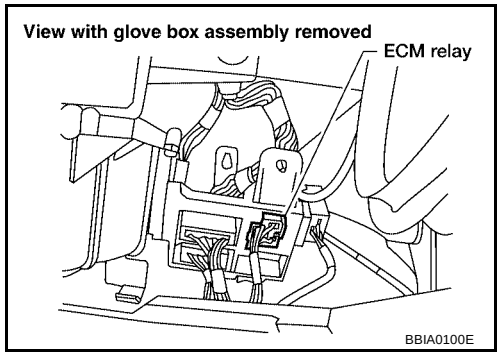
1. Turn ignition switch OFF.
2. Disconnect ECM relay.
3. Check harness continuity between ECM relay terminal 7 and VIAS control solenoid valve terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



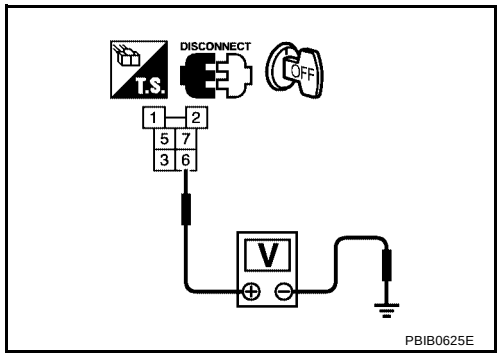
8. CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT-III

Check voltage between ECM relay terminal 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.



9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Fuse and fusible link box connector E22
- 15A fuse
- Harness for open or short between ECM relay and battery

>> Repair or replace harness or connectors.

10. CHECK ECM RELAY

Refer to EC-1322, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace ECM relay.

11. CHECK VIAS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 29 and VIAS control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK VIAS CONTROL SOLENOID VALVE

Refer to EC-1332, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace VIAS control solenoid valve.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00JYW

VIAS CONTROL SOLENOID VALVE

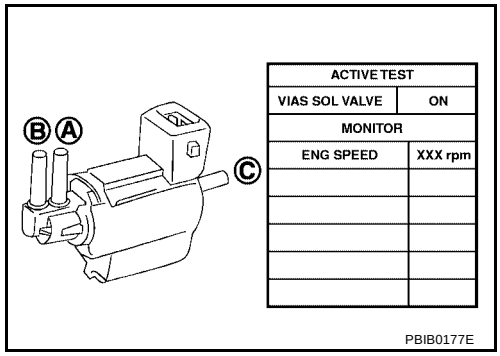
With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode.

4. Check air passage continuity and operation delay time under the following conditions.

Condition VIAS SOL VALVE	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

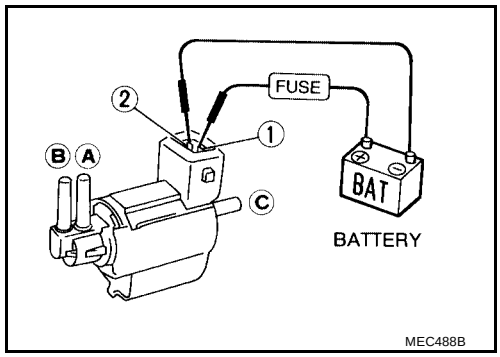


With GST

Check air passage continuity and operation delay time under the following conditions.

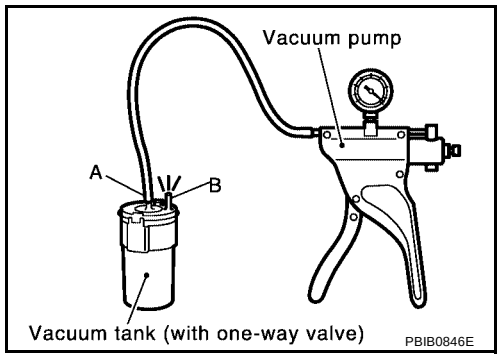
Condition	Air passage continuity between **A** and **B**	Air passage continuity between **A** and **C**
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

Operation takes less than 1 second.



VACUUM TANK

1. Disconnect vacuum hose connected to vacuum tank.
2. Connect a vacuum pump to the port **A** of vacuum pump.
3. Apply vacuum and make sure that vacuum exists at the port **B** .



Removal and Installation

VIAS CONTROL SOLENOID VALVE

Refer to EM-108, "INTAKE MANIFOLD" .

UBS00JYX

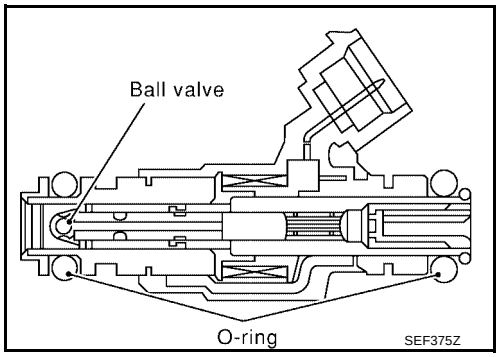
INJECTOR CIRCUIT

PFP:16600

Component Description

UBS00JYY

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JYZ

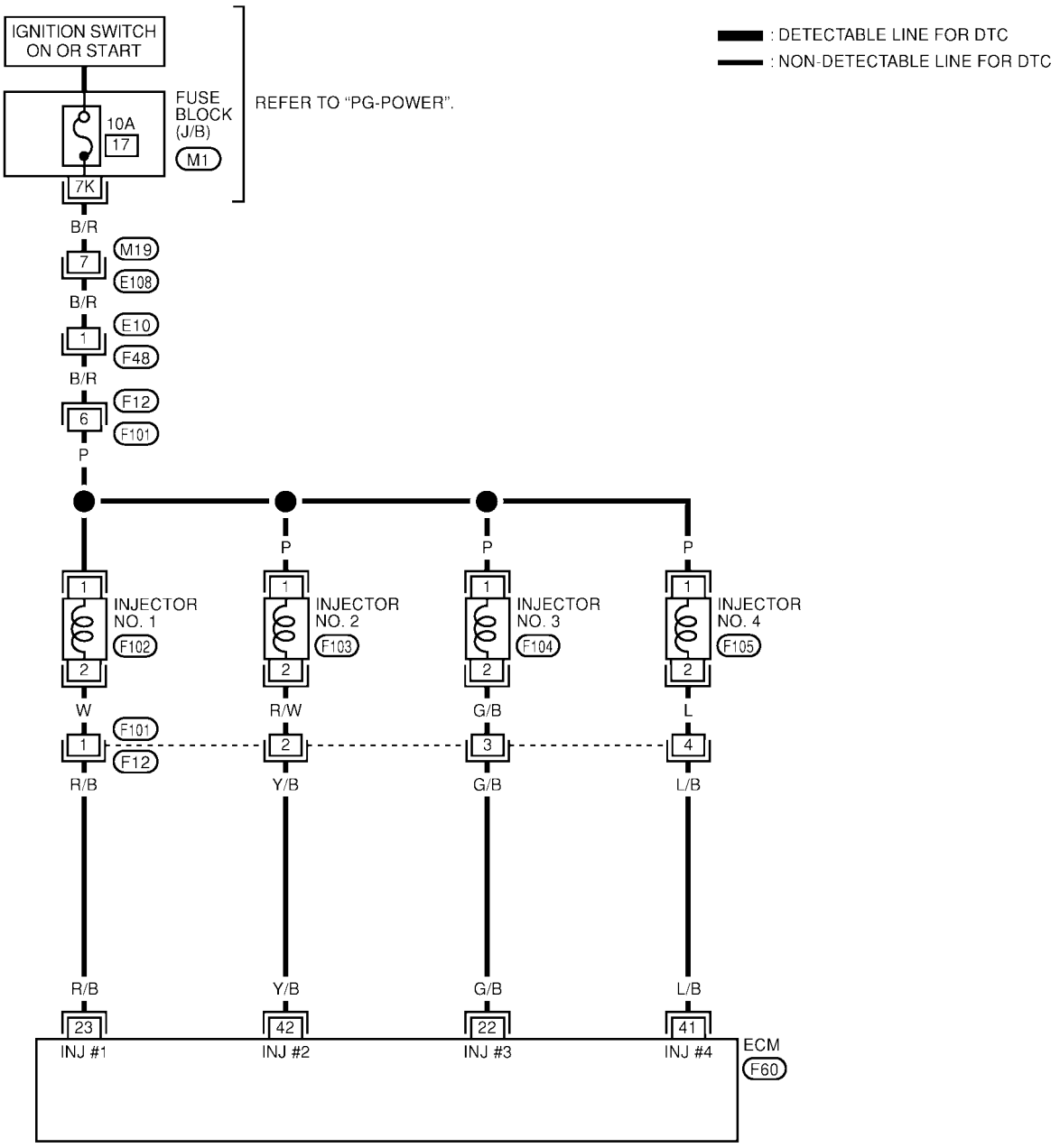
Specification data are reference values.

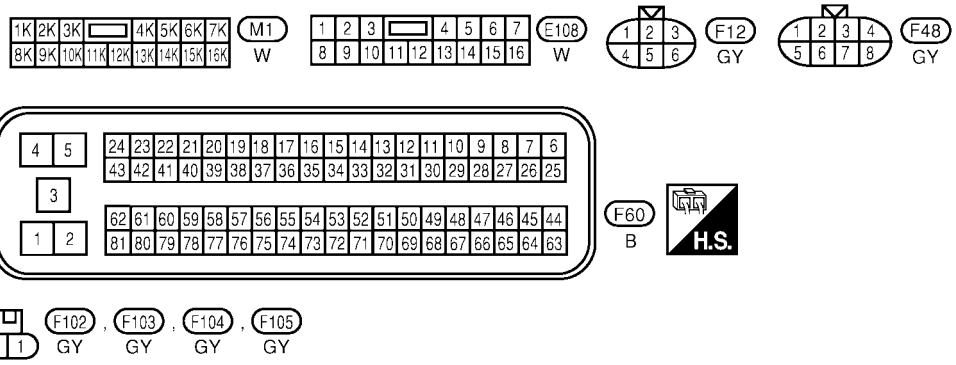
MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	● See EC-813, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
INJ PULSE-B1	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No-load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec

Wiring Diagram

UBS00JZ0

EC-INJECT-01



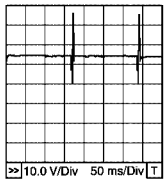
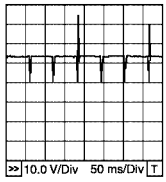


BBWA1404E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22 23 41 42	G/B R/B L/B Y/B	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

UBS00JZ1

1. INSPECTION START

Turn ignition switch to START.

Is any cylinder ignited?

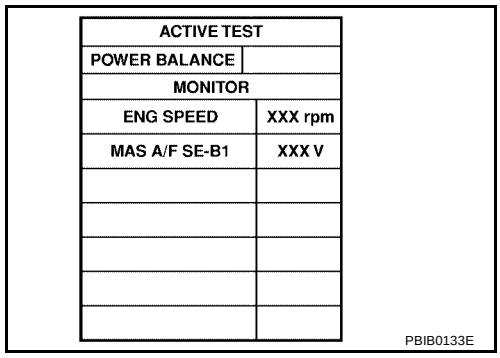
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

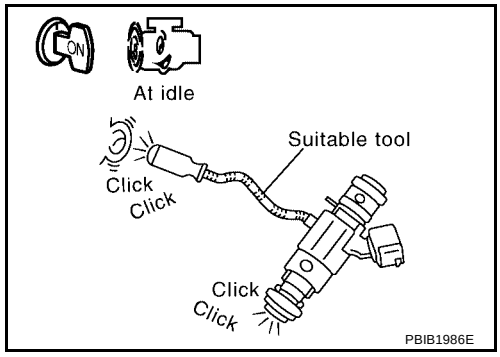
With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.
   Clicking noise should be heard.

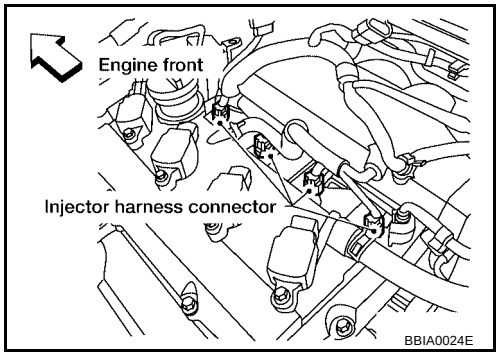


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

3. CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect injector harness connector.
3. Turn ignition switch ON.

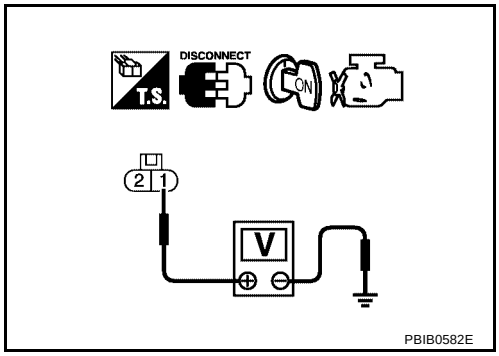


4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M19, E108
- Harness connectors E10, F48
- Harness connectors F12, F101
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 22, 23, 41, 42. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F12, F101
- Harness for open or short between injector and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INJECTOR

Refer to EC-1339, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace injector.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

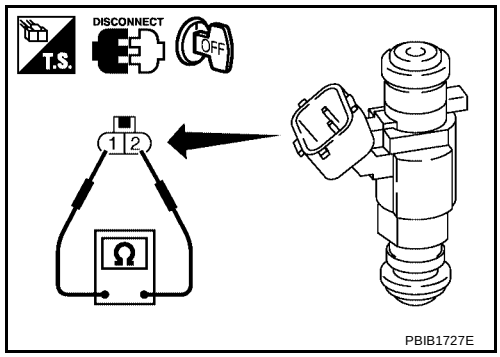
Component Inspection

UBS00JZ2

INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 11.6 - 14.9Ω [at 10 - 60°C (50 - 140°F)]



Removal and Installation

UBS00JZ3

INJECTOR

Refer to EM-121, "FUEL INJECTOR AND FUEL TUBE" .

FUEL PUMP CIRCUIT

PFP:17042

Description

UBS00JZ4

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay
Battery*	Battery voltage*		

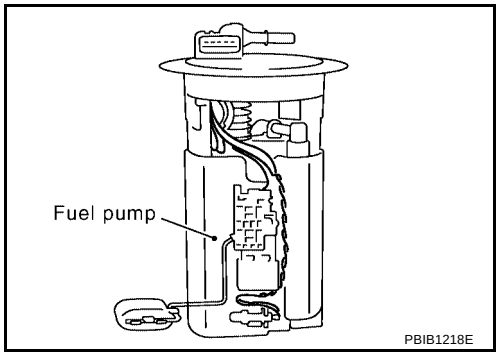
*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for 1 seconds after the ignition switch is turned ON to improve engine start ability. If the ECM receives a engine speed signal from the crankshaft position sensor (POS) and camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON	Operates for 1 second
Engine running or cranking	Operates
When engine is stopped	Stops in 1.5 seconds
Except as shown above	Stops

COMPONENT DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JZ5

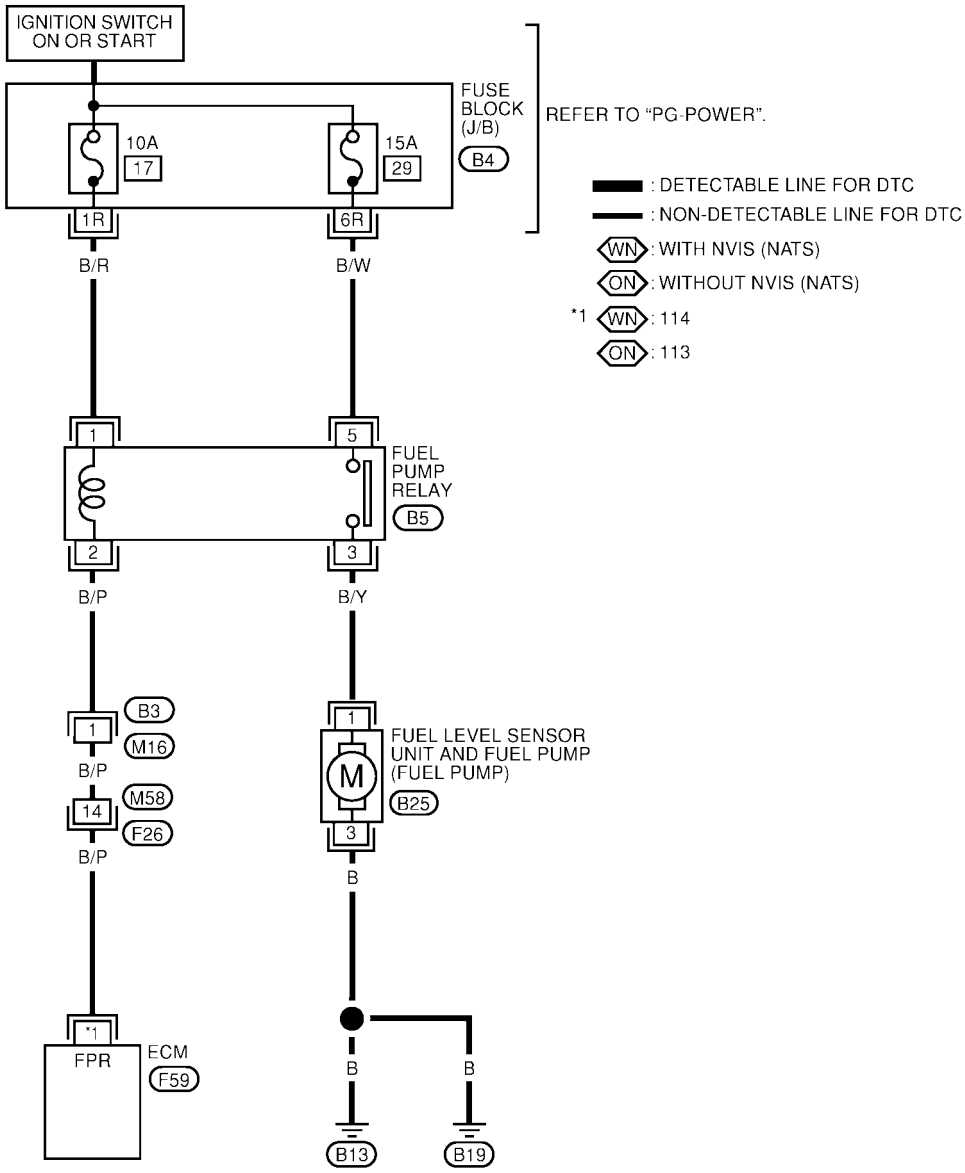
Specification data are reference values.

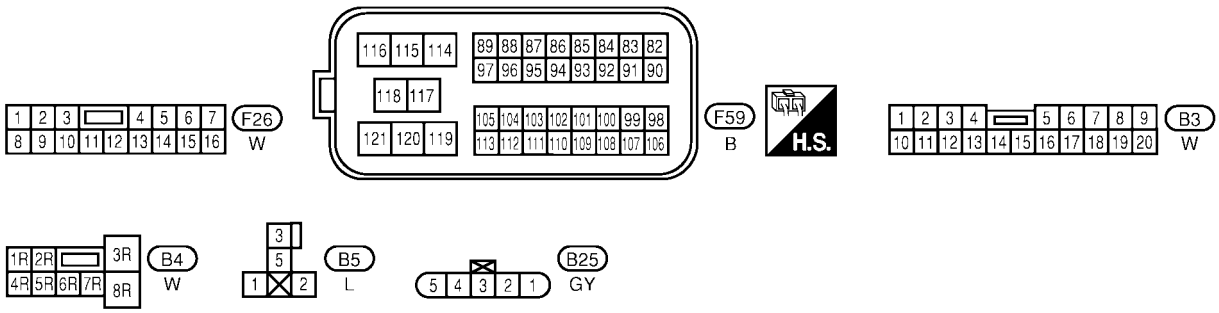
MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● For 1 seconds after turning ignition switch ON ● Engine running or cranking	ON
	● Except above conditions	OFF

Wiring Diagram

UBS00JZ6

EC-F/PUMP-01





BBWA1405E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

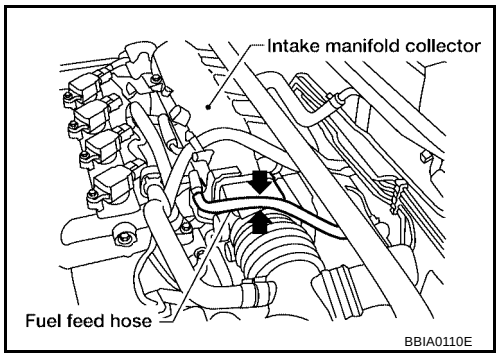
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
113 (Without NVIS)	B/P	Fuel pump relay	**[Ignition switch: ON]** ● For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.0V
114 (With NVIS)			**[Ignition switch: ON]** ● More than 1 second after turning ignition switch ON.	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

UBS00JZ7

1. CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.
   Fuel pressure pulsation should be felt on the fuel hose for 1 second after ignition switch is turned ON.

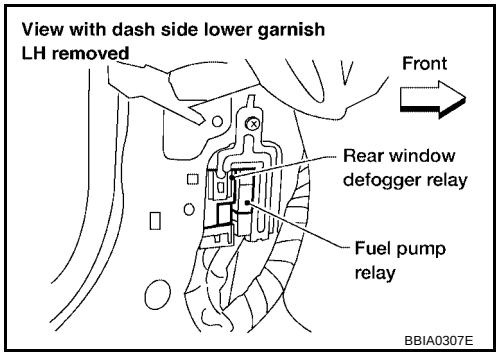


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

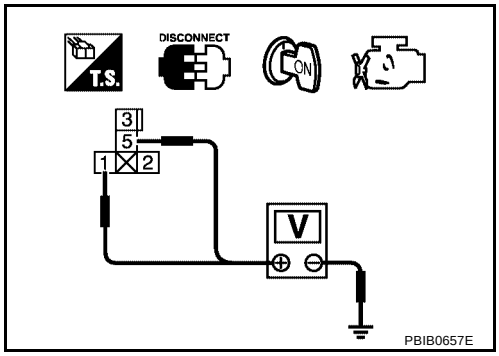
2. CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel pump relay.
3. Turn ignition switch ON.



4. Check voltage between fuel pump relay terminals 1, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector B4
- 10A fuse
- 15A fuse
- Harness for open or short between fuse and fuel pump relay

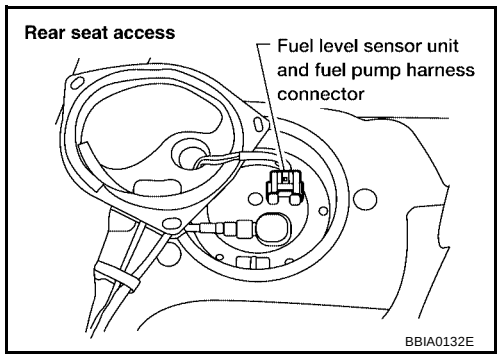
>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect “fuel level sensor unit and fuel pump” harness connector.
3. Check harness continuity between the following;
   fuel pump relay terminal 3 and fuel pump terminal 1,
   fuel pump terminal 3 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 113 [without NVIS (NATS)] or 114 [with NVIS (NATS)] and fuel pump relay terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B3, M16
- Harness connectors M58, F26
- Harness for open or short between ECM and fuel pump relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK FUEL PUMP RELAY

Refer to EC-1344, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace fuel pump relay.

8. CHECK FUEL PUMP

Refer to EC-1344, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace fuel pump.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

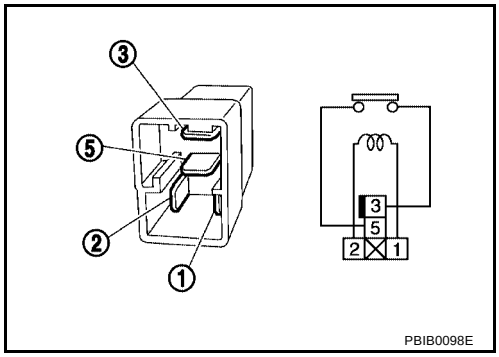
Component Inspection

UBS00JZ8

FUEL PUMP RELAY

Check continuity between terminals 3 and 5 under the following conditions.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

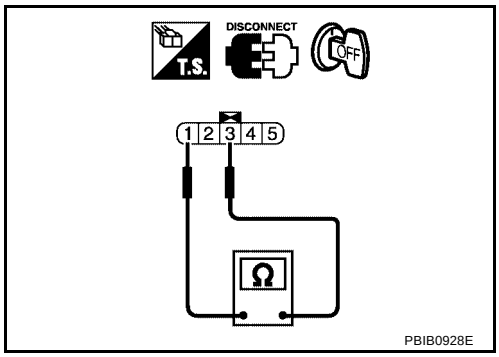


PBIB0098E

FUEL PUMP

1. Disconnect fuel level sensor unit and fuel pump harness connector.
2. Check resistance between “fuel level sensor unit and fuel pump” terminals 1 and 3.

Resistance: 0.2 - 5.0Ω [at 25°C (77°F)]



PBIB0928E

Removal and Installation

UBS00JZ9

FUEL PUMP

Refer to FL-3, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

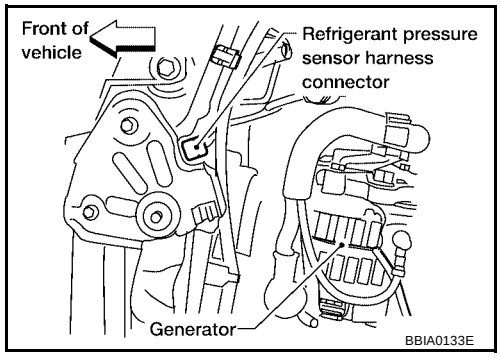
REFRIGERANT PRESSURE SENSOR

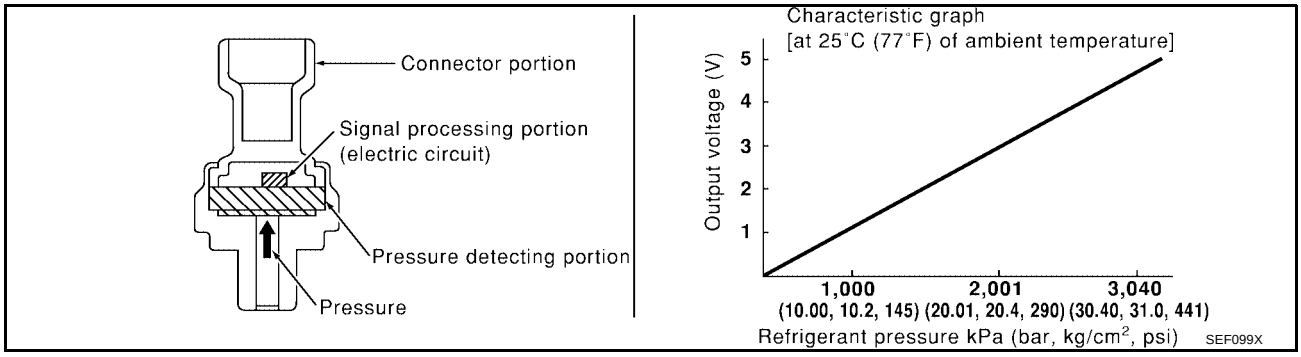
PFP:92136

Component Description

UBS00JZA

The refrigerant pressure sensor is installed at the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

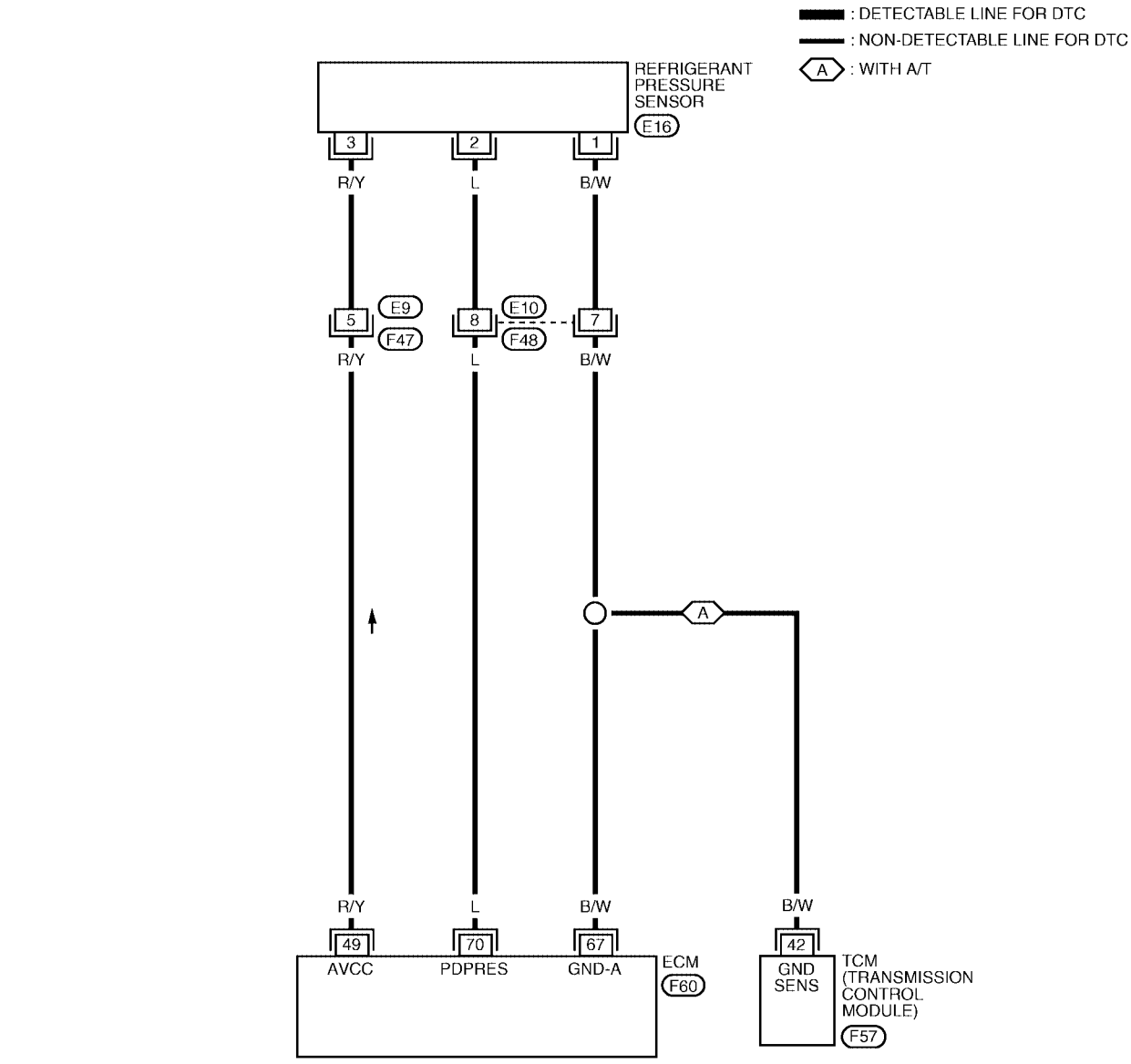


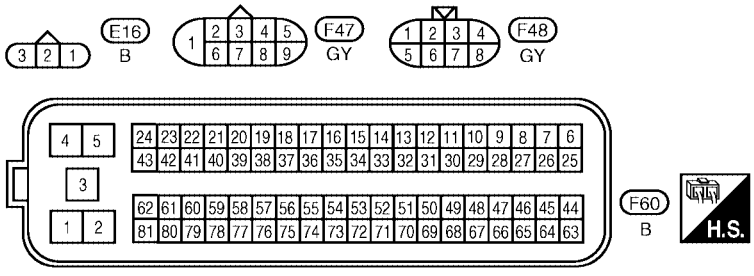


Wiring Diagram

UBS00JZB

EC-RP/SEN-01





REFER TO THE FOLLOWING.
F57 - ELECTRICAL UNITS

BBWA1452E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
49	R/Y	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
67	B/W	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
70	L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are ON (Compressor operates.)	1.0 - 4.0V

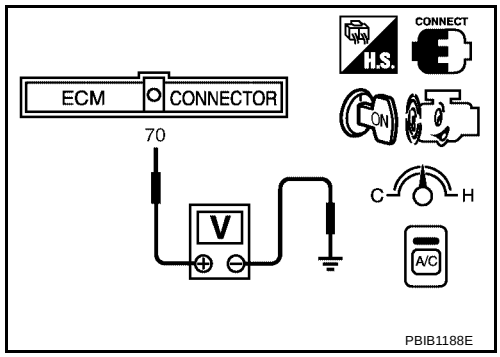
Diagnostic Procedure

UBS00JZC

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch ON.
3. Check voltage between ECM terminal 70 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

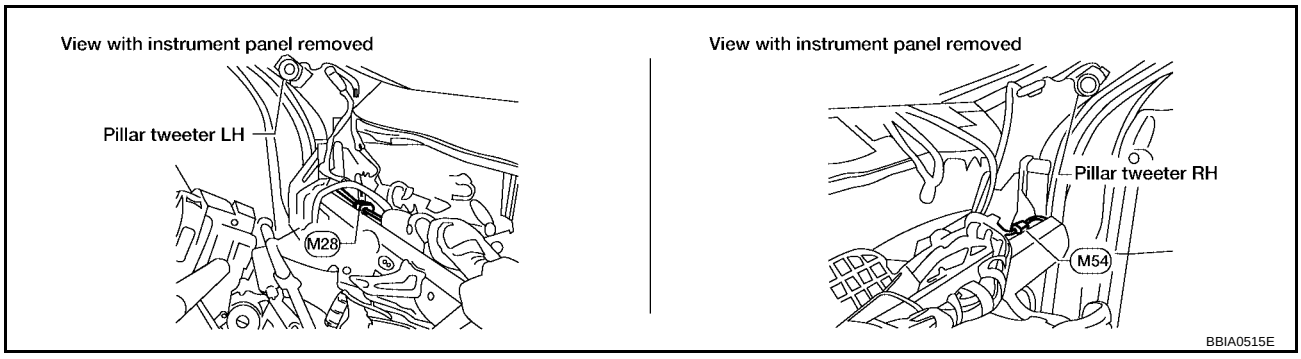


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK GROUND CONNECTIONS

1. Turn A/C switch and blower switch OFF.
2. Stop engine and turn ignition switch OFF.
3. Loosen and retighten engine two screws on the body.
Refer to EC-839, "Ground Inspection" .

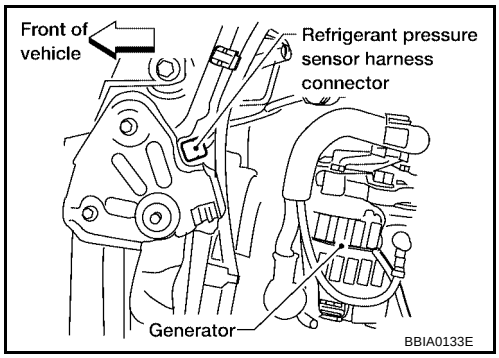


OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

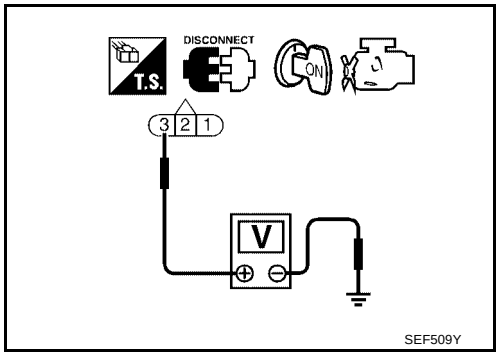
3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E9, F47
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect TCM harness connector (A/T models).
4. Check harness continuity between refrigerant pressure sensor terminal 1 and ECM terminal 67, TCM terminal 42.
   Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between ECM and refrigerant pressure sensor
- Harness for open or short between TCM and refrigerant pressure sensor (A/T models)

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 70 and refrigerant pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E10, F48
- Harness for open or short between ECM and refrigerant pressure sensor

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

Removal and Installation

UBS00JZD

REFRIGERANT PRESSURE SENSOR

Refer to MTC-78, "REFRIGERANT LINES" .

ELECTRICAL LOAD SIGNAL

PFP:25350

CONSULT-II Reference Value in Data Monitor Mode

UBS00JZE

Specification data are reference values.

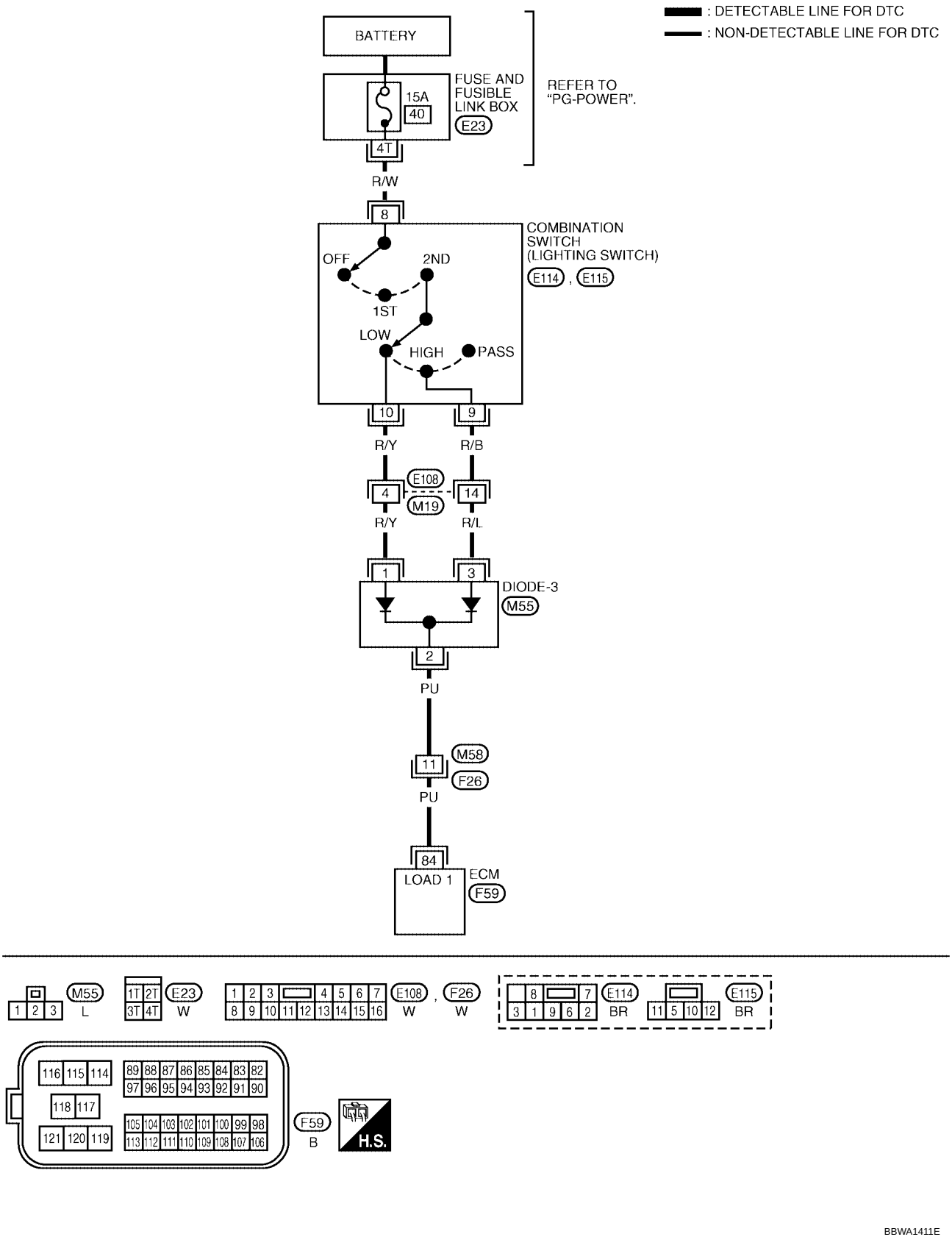
MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd and/or heater fan switch is ON.	ON
		Rear window defogger switch is OFF and lighting switch is OFF and heater fan switch ON.	OFF

Wiring Diagram

UBS00JZF

A/T MODELS ULEV AND M/T MODELS

EC-LOAD-01



BBWA1411E

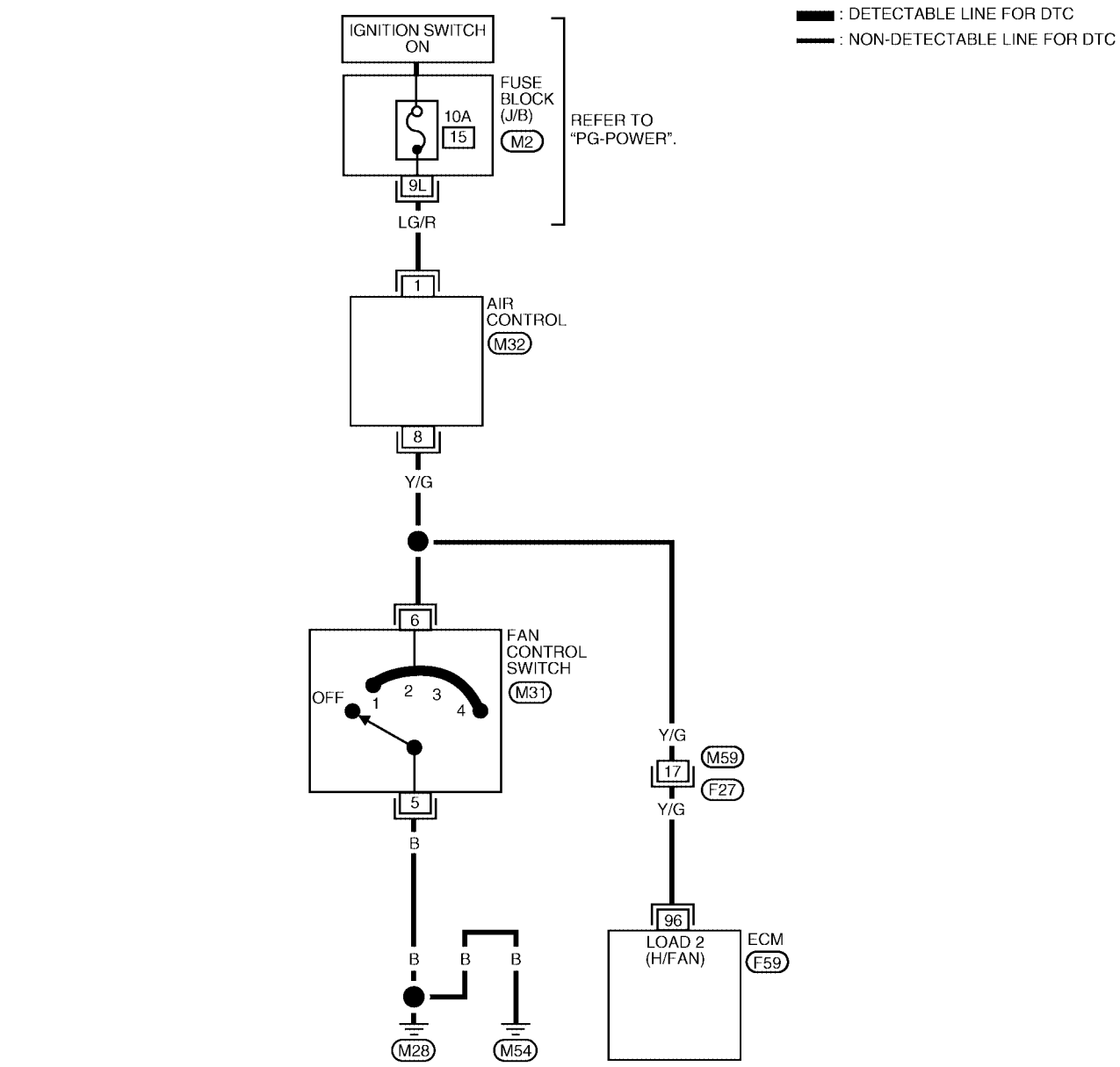
Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	PU	Electrical load signal (Headlamp signal)	**[Lighting switch: ON]** ● Lighting switch: 2nd position	BATTERY VOLTAGE (11 - 14V)
			[Lighting switch: ON] ● Lighting switch: OFF	Approximately 0V

EC-LOAD-02



BBWA1412E

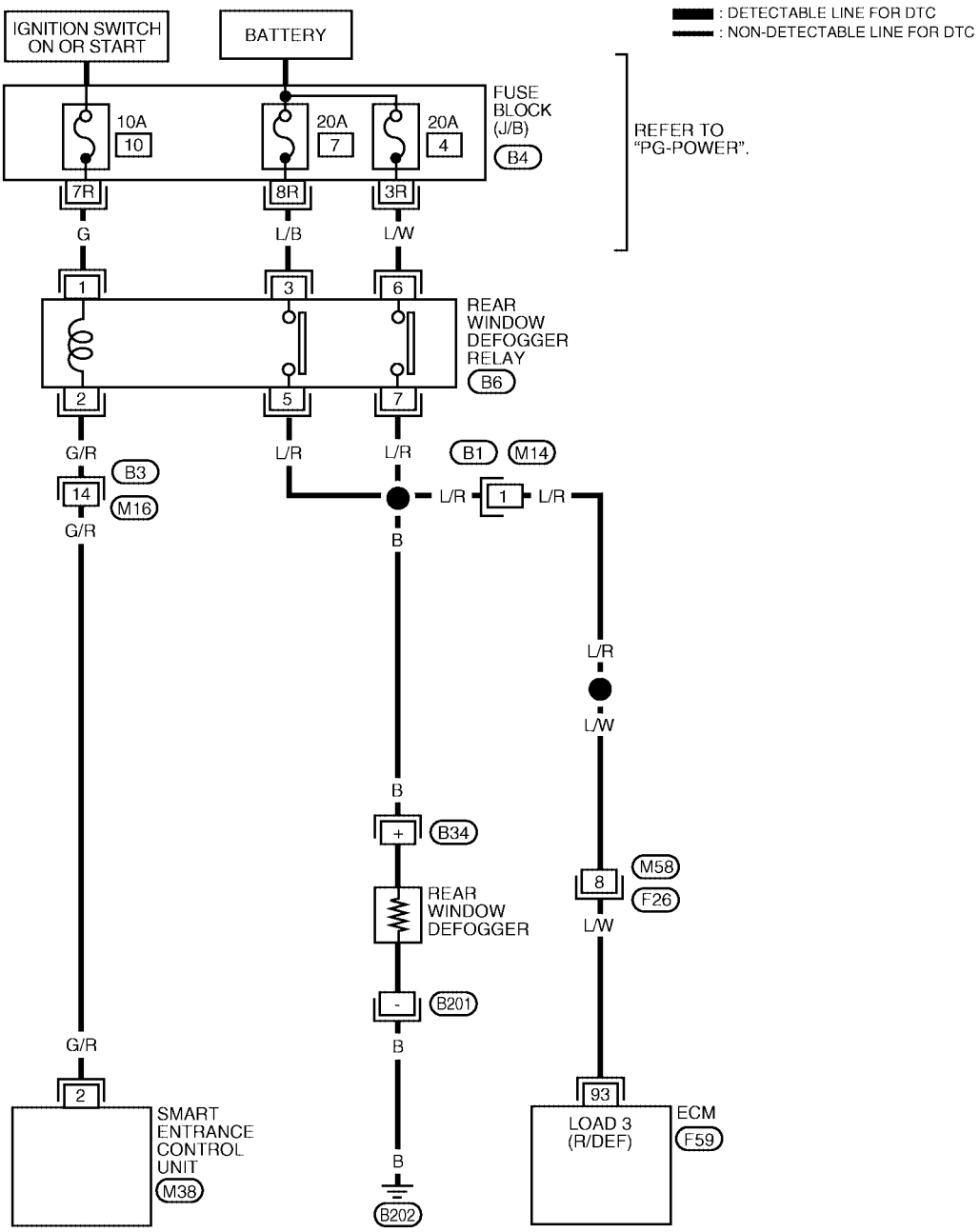
Specification data are reference values and are measured between each terminal and ground.

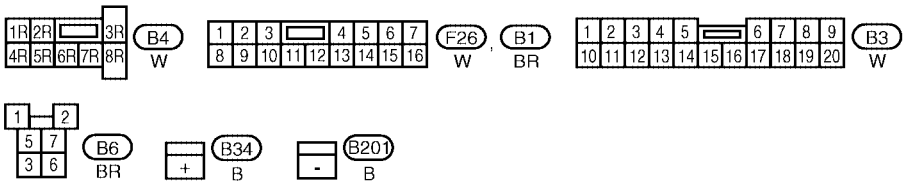
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
96	Y/G	Heater fan switch	**[Engine is running]** ● Heater fan switch: ON	Approximately 0V
			[Engine is running] ● Heater fan switch: OFF	Approximately 5V

EC-LOAD-03





REFER TO THE FOLLOWING.
M38 , F59
- ELECTRICAL UNITS

BBWA1413E

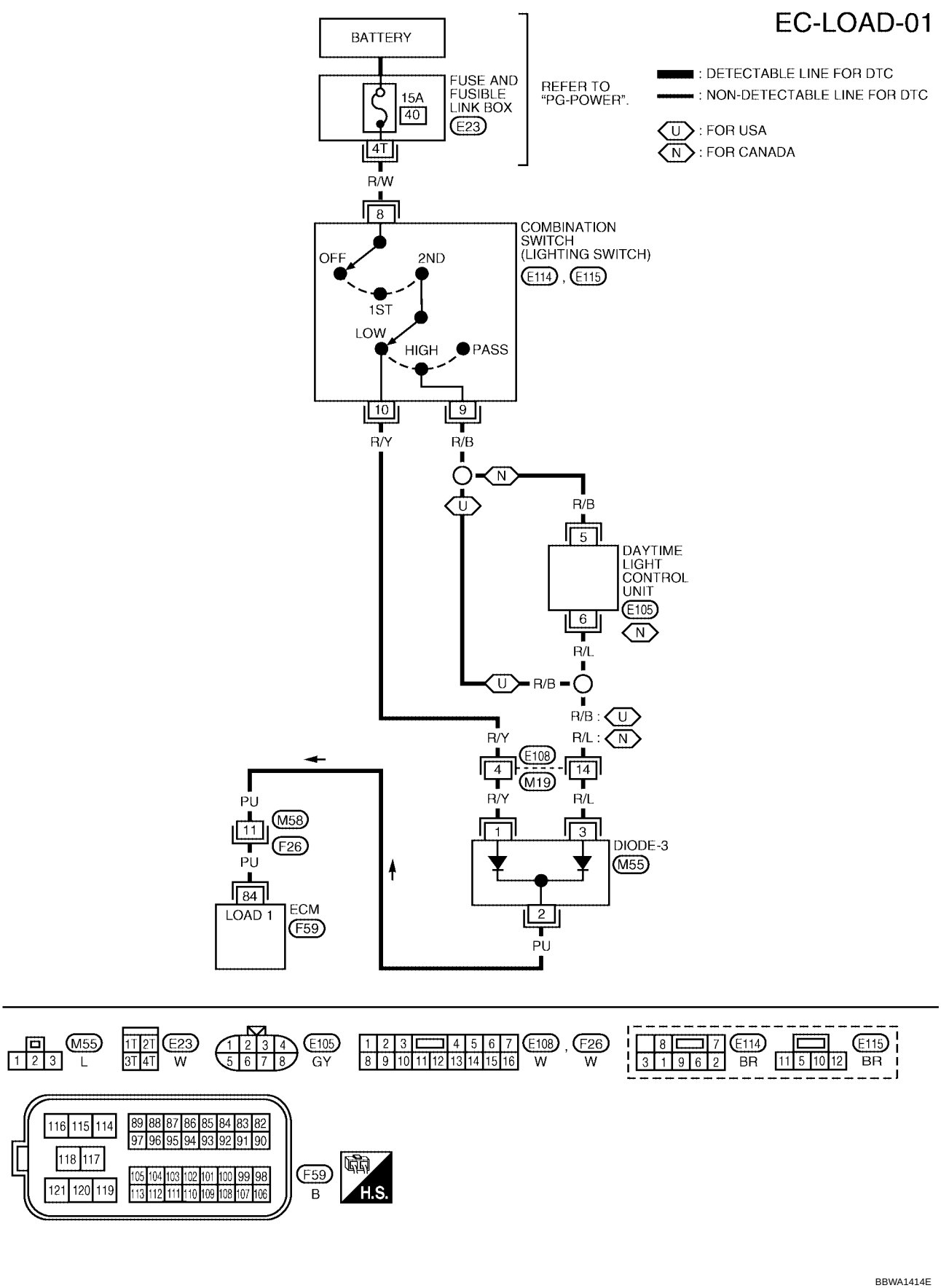
Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
93	L/W	Electrical load signal (Rear window defogger signal)	**[Ignition switch: ON]** ● Rear window defogger switch: ON	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Rear window defogger switch: OFF	Approximately 0V

A/T MODELS EXCEPT ULEV



BBWA1414E

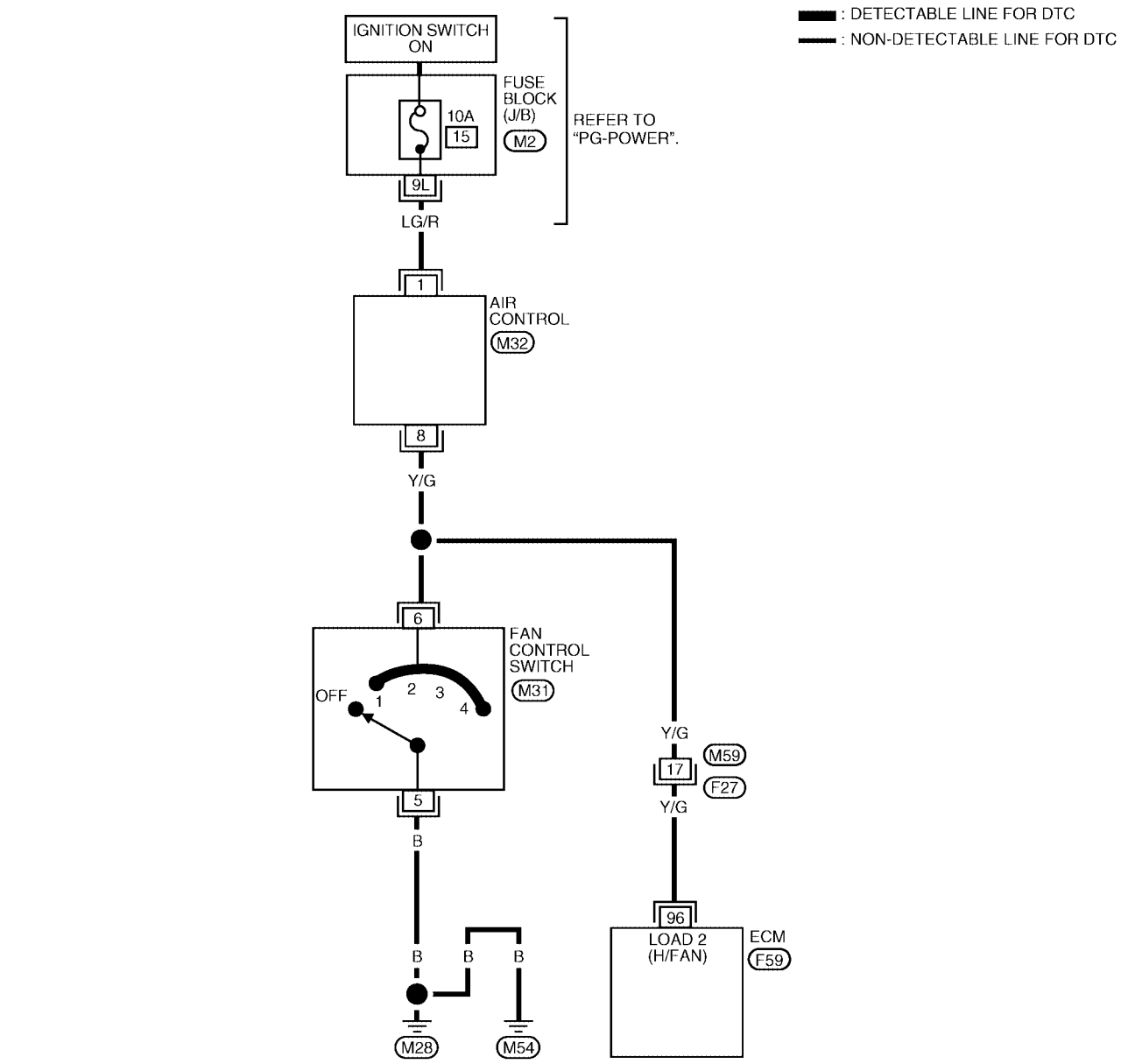
Specification data are reference values and are measured between each terminal and ground.

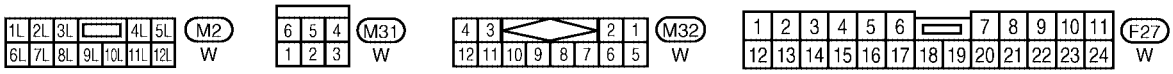
CAUTION:

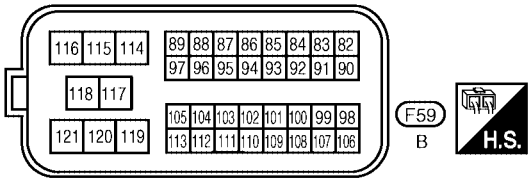
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	PU	Electrical load signal (Headlamp signal)	**[Lighting switch: ON]** ● Lighting switch: 2nd position	BATTERY VOLTAGE (11 - 14V)
			[Lighting switch: ON] ● Lighting switch: OFF	Approximately 0V

EC-LOAD-02







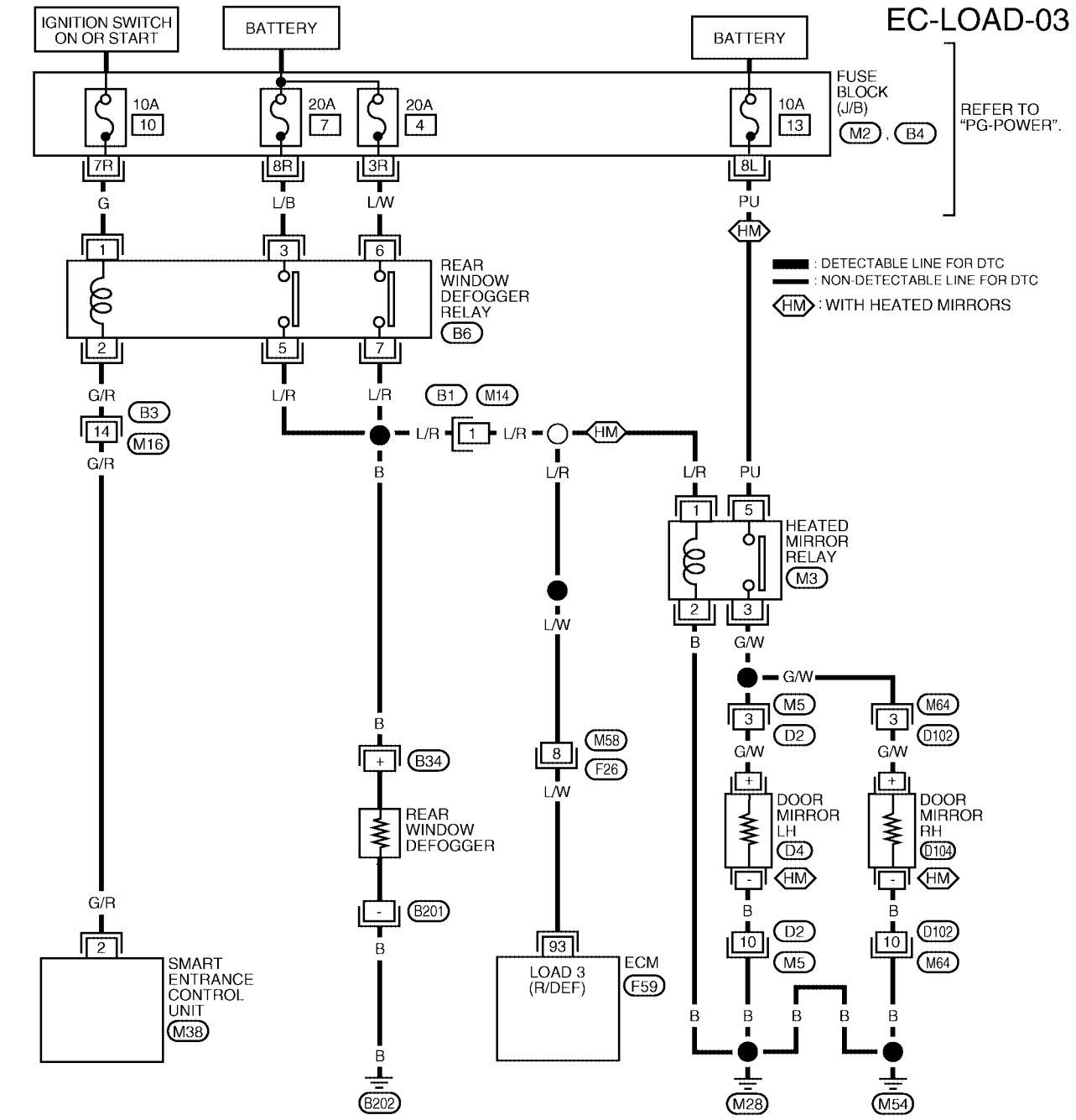
BBWA1412E

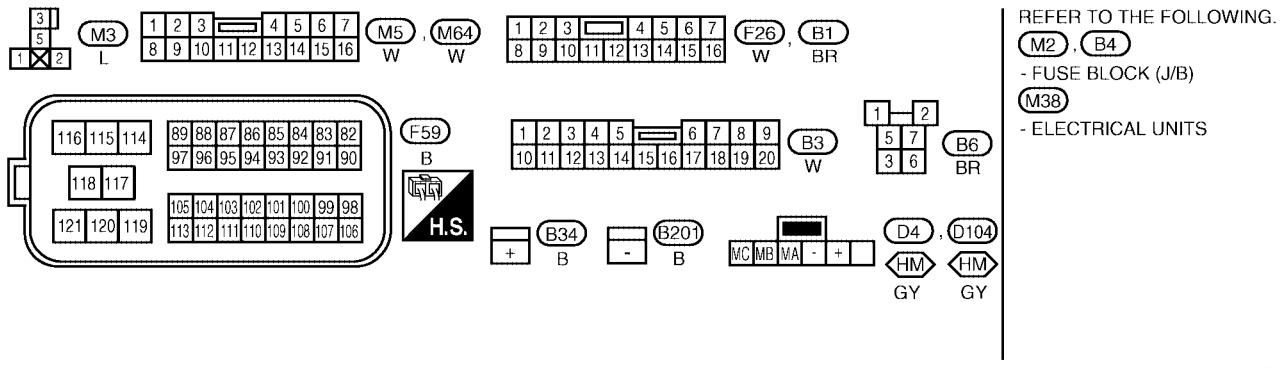
Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
96	Y/G	Heater fan switch	**[Engine is running]** ● Heater fan switch: ON	Approximately 0V
			[Engine is running] ● Heater fan switch: OFF	Approximately 5V


EC-LOAD-03
IGNITION SWITCH ON OR START
BATTERY
BATTERY
FUSE BLOCK (J/B)
M2 , B4
REFER TO "PG-POWER".
10A 10
20A 7
20A 4
10A 13
7R
8R
3R
8L
G
L/B
L/W
PU
HM
: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
HM : WITH HEATED MIRRORS
REAR WINDOW DEFOGGER RELAY
B6
G/R
L/R
L/R
B1
M14
B3
M16
L/R
HM
L/R
PU
HEATED MIRROR RELAY
M3
L/W
G/W
G/W
M5
D2
M64
D102
B34
M58
F26
REAR WINDOW DEFOGGER
DOOR MIRROR LH
D4
DOOR MIRROR RH
D104
B201
SMART ENTRANCE CONTROL UNIT
M38
LOAD 3 (R/DEF)
ECM
F59
B202
M28
M54


M3
L
M5 , M64
W W
F26 , B1
W BR
F59
B
H.S.
B3
W
B6
BR
B34
B
B201
B
D4 , D104
HM HM
GY GY
REFER TO THE FOLLOWING.
M2 , B4
- FUSE BLOCK (J/B)
M38
- ELECTRICAL UNITS

BBWA1415E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
93	L/W	Electrical load signal (Rear window defogger signal)	**[Ignition switch: ON]** ● Rear window defogger switch: ON	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Rear window defogger switch: OFF	Approximately 0V

Diagnostic Procedure

UBS00JZG

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

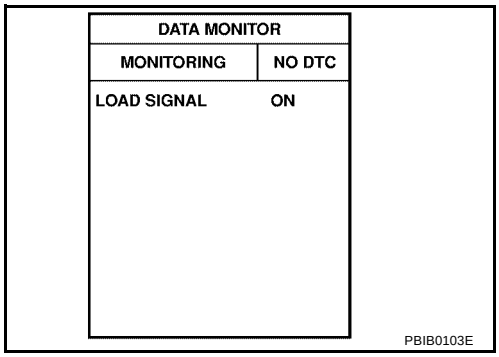
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-1

With CONSULT-II

1. Turn ignition switch ON.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Lighting switch: ON at 2nd position	ON
Lighting switch: OFF	OFF



OK or NG

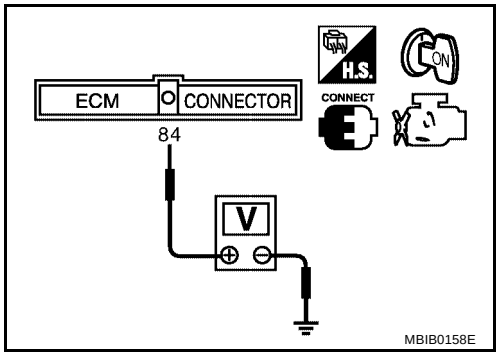
OK >> GO TO 4.
NG >> GO TO 8.

3. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-1

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 84 and ground under the following conditions.

Condition	Voltage
Lighting switch: ON at 2nd position	BATTERY VOLTAGE
Lighting switch: OFF	0V



OK or NG

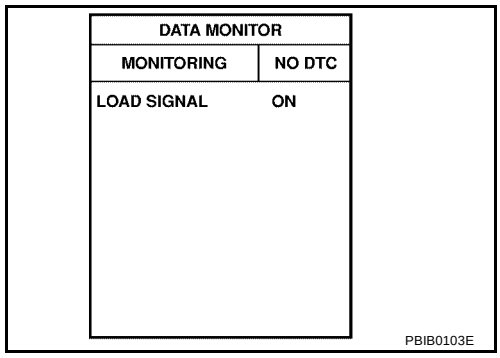
OK >> GO TO 5.
NG >> GO TO 8.

4. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-2

With CONSULT-II

1. Turn ignition switch ON.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
FAN control switch: ON in any position	ON
FAN control switch: OFF	OFF



OK or NG

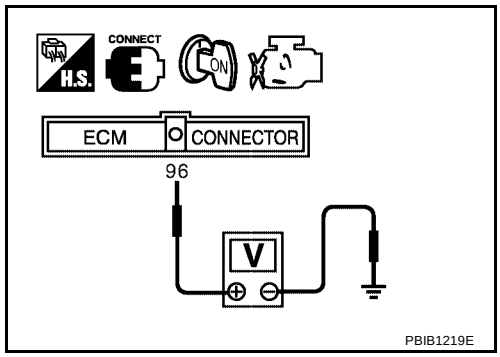
OK >> GO TO 6.
NG >> GO TO 13.

5. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-2

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 96 and ground under the following conditions.

Condition	Voltage
FAN control switch: ON in any position	Approximately 0V
FAN control switch: OFF	Approximately 5V



OK or NG

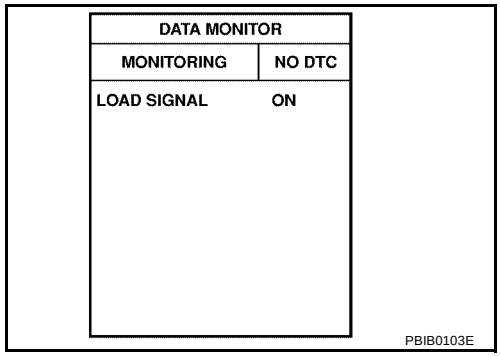
OK >> GO TO 7.
NG >> GO TO 13.

6. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-3

With CONSULT-II

1. Turn ignition switch ON.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF



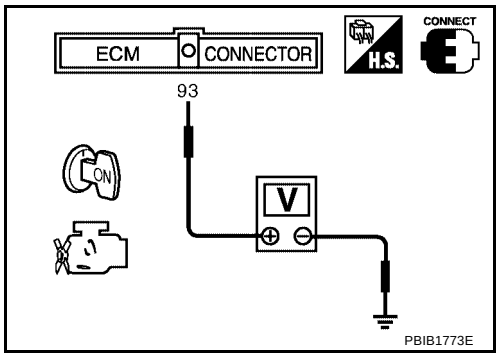
OK or NG

OK >> INSPECTION END.
NG >> GO TO 16.

7. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-3

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 93 and ground under the following conditions.



Condition	Voltage
Rear window defogger switch: ON	BATTERY VOLTAGE
Rear window defogger switch: OFF	Approximately 0V

OK or NG

OK >> INSPECTION END.
NG >> GO TO 16.

8. CHECK HEADLAMP FUNCTION

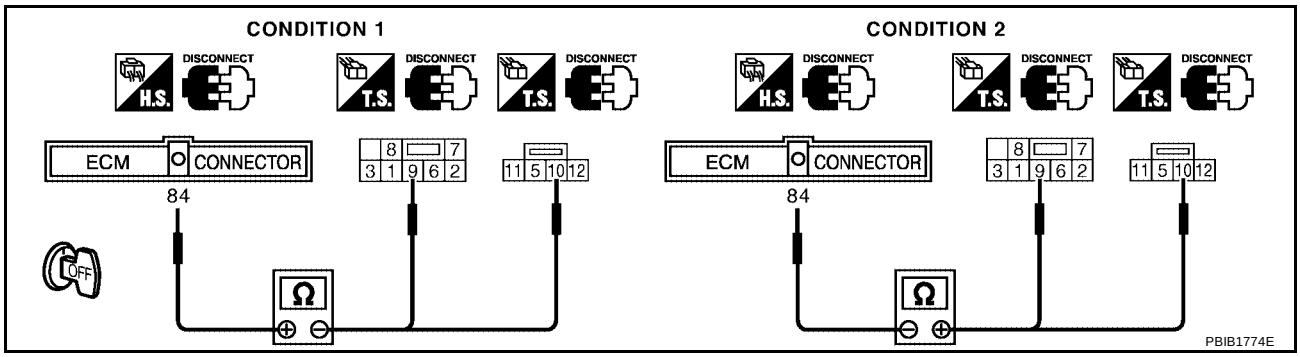
1. Start engine.
2. Turn the lighting switch ON at 2nd position.
3. Check that headlamps are illuminated.

OK or NG

OK (Models for USA)>>GO TO 9.
OK (Models for Canada)>>GO TO 11.
NG >> Refer to LT-6, "HEADLAMP (FOR USA)" or LT-10, "HEADLAMP (FOR CANADA) — DAYTIME LIGHT SYSTEM —" .

9. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Stop engine and turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connectors.
4. Check harness continuity between ECM terminal 84 and lighting switch terminal 9, 10 under the following conditions.



Condition	Continuity
1	Should exist
2	Should not exist

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 19.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

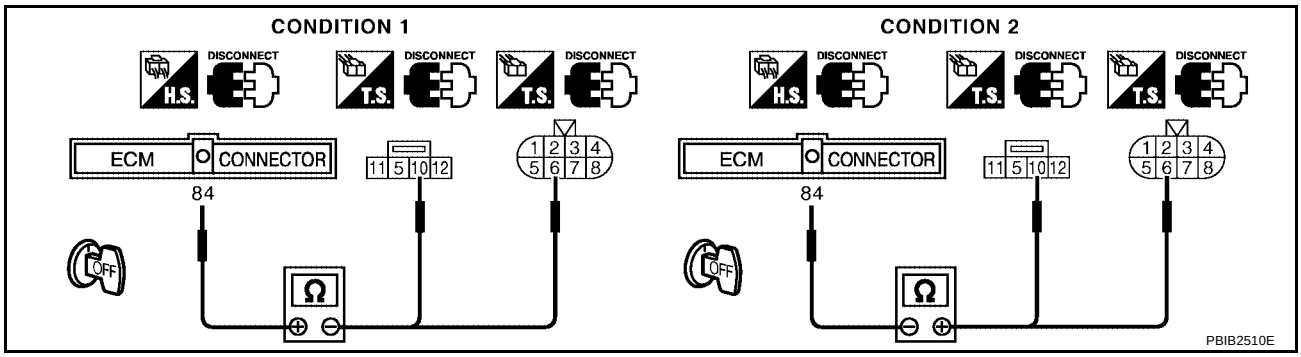
Check the following.

- Harness connectors E108, M19
- Harness connectors M58, F26
- Diode M55
- Harness for open and short between ECM and lighting switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Stop engine and turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connector E115.
   Disconnect daytime light control unit harness connector.
4. Check harness continuity between ECM terminal 84 and lighting switch terminal 10, daytime light control unit terminal 6 under the following conditions.



Condition	Continuity
1	Should exist
2	Should not exist

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 19.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E108, M19
- Harness connectors M58, F26
- Diode M55
- Harness for open and short between ECM and lighting switch
- Harness for open and short between ECM and daytime light control unit
- Harness for open and short between daytime light control unit and lighting switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK HEATER FAN SWITCH FUNCTION

1. Turn the fan control switch ON in any position.
2. Check that heater fan turns properly.

OK or NG

OK >> GO TO 14.
NG >> Refer to MTC-19, "TROUBLE DIAGNOSIS"

14. CHECK HEATER FAN INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect air control harness connector.
4. Check harness continuity between ECM terminal 96 and air control terminal 8, fan control switch terminal 6.
   Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 19.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and air control.
- Harness for open or short between ECM and fan control switch.

>> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK REAR WINDOW DEFOGGER FUNCTION

1. Turn ignition switch OFF.
2. Turn ON the rear window defogger switch.
3. Check the rear windshield. Is the rear windshield and door mirror (with heated mirror models) heated up?

Yes or No

Yes >> GO TO 17.
No >> Refer to GW-17, "REAR WINDOW DEFOGGER"

17. CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect rear window defogger relay.
3. Check harness continuity between ECM terminal 93 and rear window defogger relay terminals 5, 7.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 19.
NG >> GO TO 18.

18. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M14
- Harness connectors M58, F26
- Harness for open or short between ECM and rear window defogger relay.

>> Repair open circuit or short to ground or short to power in harness or connectors.

19. CHECK INTERMITTENT INCIDENT

Perform EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

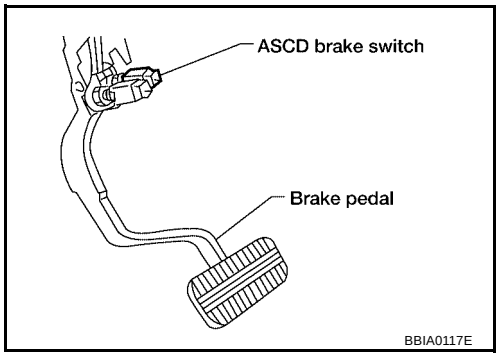
ASCD BRAKE SWITCH

PFP:25320

Component Description

UBS00JZH

When depress on the brake pedal, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal)
Refer to EC-677, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

UBS00JZI

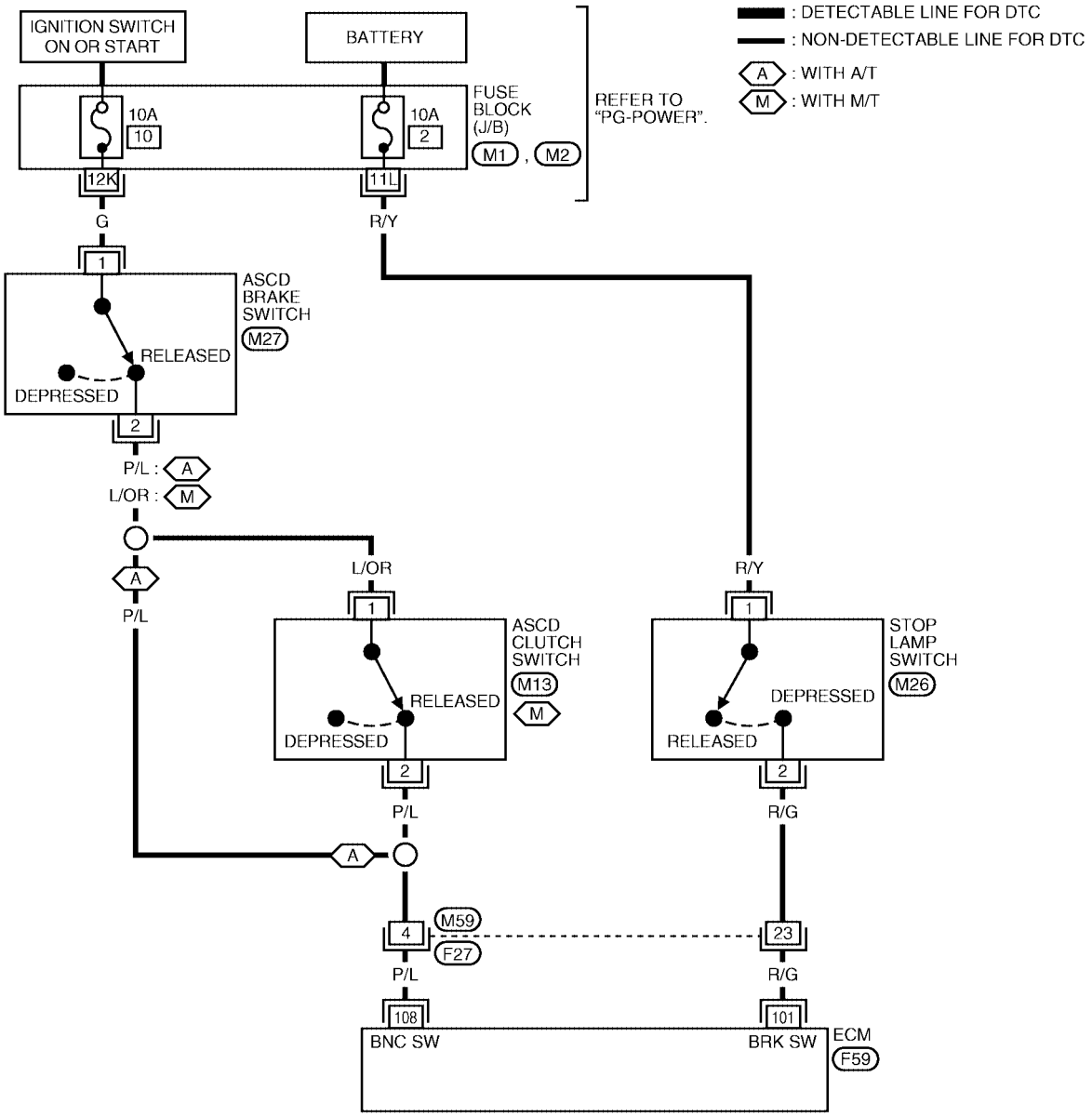
Specification data are reference values.

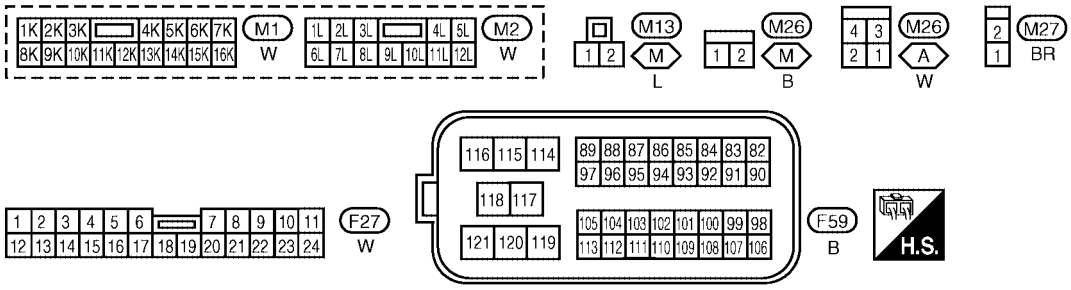
MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	● Ignition switch: ON	Brake pedal: Fully released (A/T) ● Brake pedal and/or clutch pedal: Slightly depressed	ON
		Brake pedal: Slightly depressed (A/T) ● Brake pedal and clutch pedal: Fully released	OFF
BRAKE SW2 (STOP lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

Wiring Diagram

UBS00JZJ

EC-ASCBOF-01





BBWA1416E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	R/G	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	P/L	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal: Slightly depressed (A/T) ● Brake pedal and/or clutch pedal: Sightly depressed	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Fully released (A/T) ● Brake pedal and cluch pedal: Fully released	BATTERY VOLTAGE (11 - 14V)

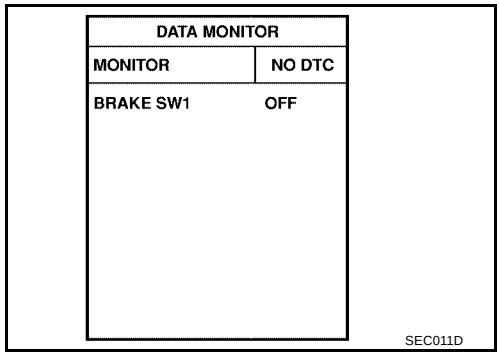
Diagnostic Procedure

UBS00JZK

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.



M/T models

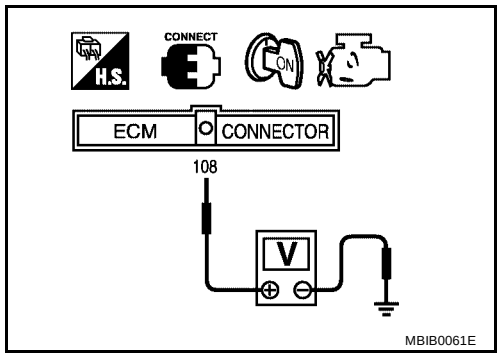
CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON

A/T models

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.



M/T models

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage

A/T models

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage

OK or NG

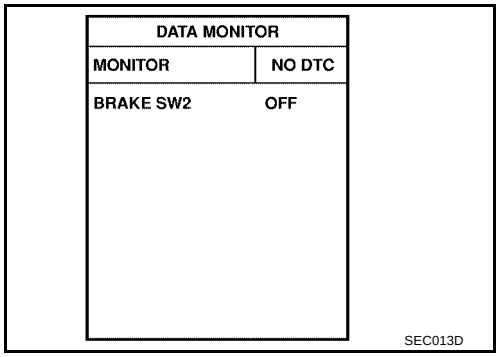
OK >> GO TO 2.
NG (M/T models) >>GO TO 3.
NG (A/T models) >>GO TO 4.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

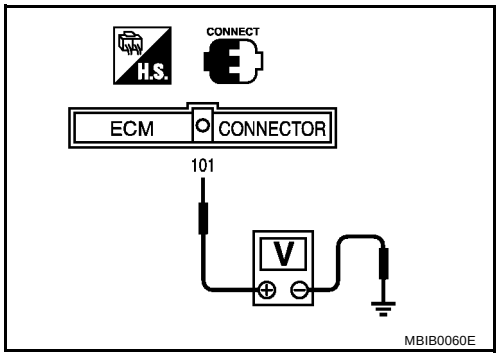
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

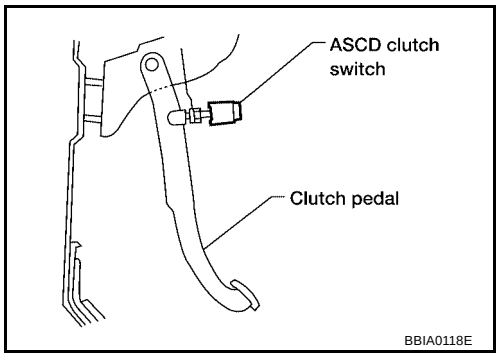


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 13.

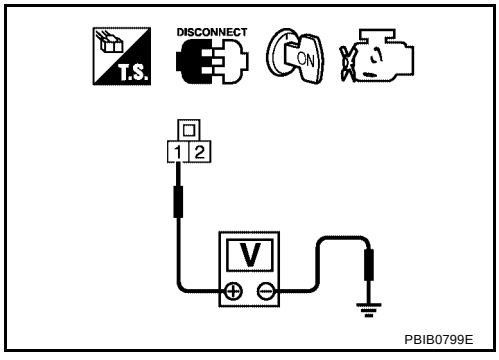
3. CHECK ASCD BRAKE SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD clutch switch terminal 1 and ground under the following conditions with CONSULT-II or tester.

CONDITION	VOLTAGE
Brake pedal: Fully released	Battery voltage
Brake pedal: Slightly depressed	Approx. 0V

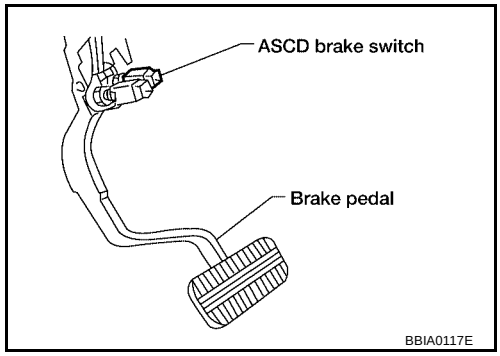


OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.

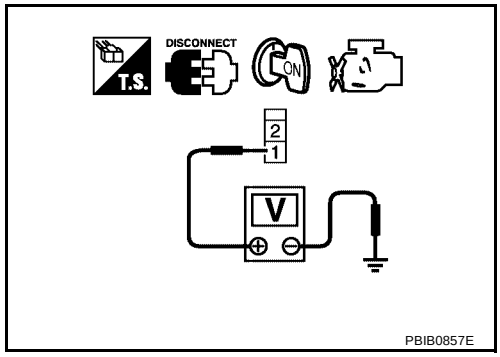


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK (M/T models)>>GO TO 6.
OK (A/T models)>>GO TO 7.
NG >> GO TO 5.



5. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD brake switch terminal 2 and ASCD clutch switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and ASCD brake switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK ASCD BRAKE SWITCH

Refer to EC-1376, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace ASCD brake switch.

10. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 108 and ASCD clutch switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and ASCD clutch switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK ASCD CLUTCH SWITCH

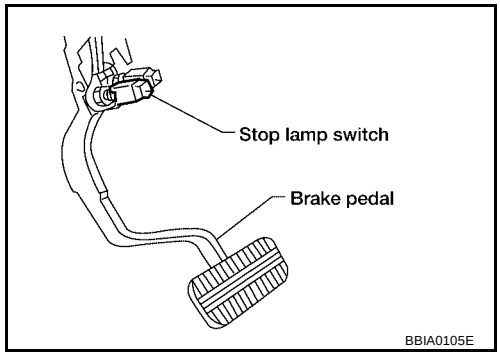
Refer to EC-1376, "Component Inspection" .

OK or NG

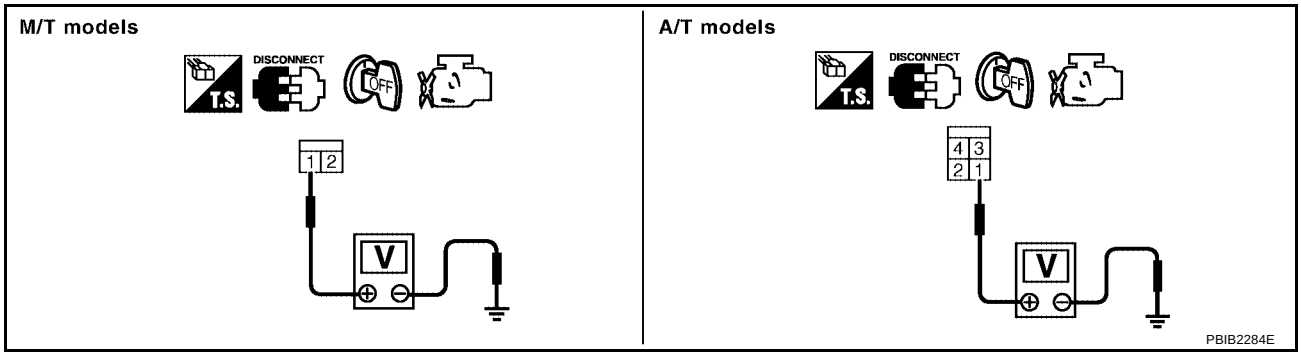
OK >> GO TO 18.
NG >> Replace ASCD clutch switch.

13. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -II or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 15.
NG >> GO TO 14.

14. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between stop lamp switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

15. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 17.
NG >> GO TO 16.

16. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M59, F27
- Harness for open or short between ECM and stop lamp switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

17. CHECK STOP LAMP SWITCH

Refer to EC-1376, "Component Inspection" .

OK or NG

OK >> GO TO 18.
NG >> Replace stop lamp switch.

18. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

UBS00KQJ

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check harness continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released.	Should exist.
Brake pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD brake switch installation, refer to BR-11, "BRAKE PEDAL AND BRACKET" , and perform step 3 again.

ASCD CLUTCH SWITCH (FOR M/T MODELS)

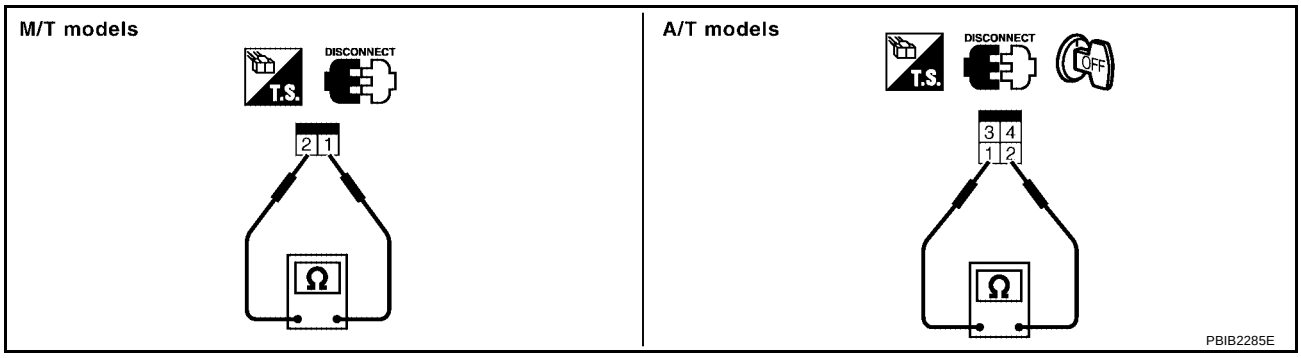
1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check harness continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Clutch pedal: Fully released.	Should exist.
Clutch pedal: Slightly depressed.	Should not exist.

If NG, adjust ASCD clutch switch installation, refer to CL-23, "CLUTCH SYSTEM" , and perform step 3 again.

STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check harness continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released.	Should not exist.
Brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-11, "BRAKE PEDAL AND BRACKET" , and perform step 3 again.

ASCD INDICATOR

PFP:24814

Component Description

UBS00JZL

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicate that ASCD system is ready for operation.
SET indicator illuminates when following conditions are met.

- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET indicator remains lit during ASCD control.
Refer to EC-677, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

UBS00JZM

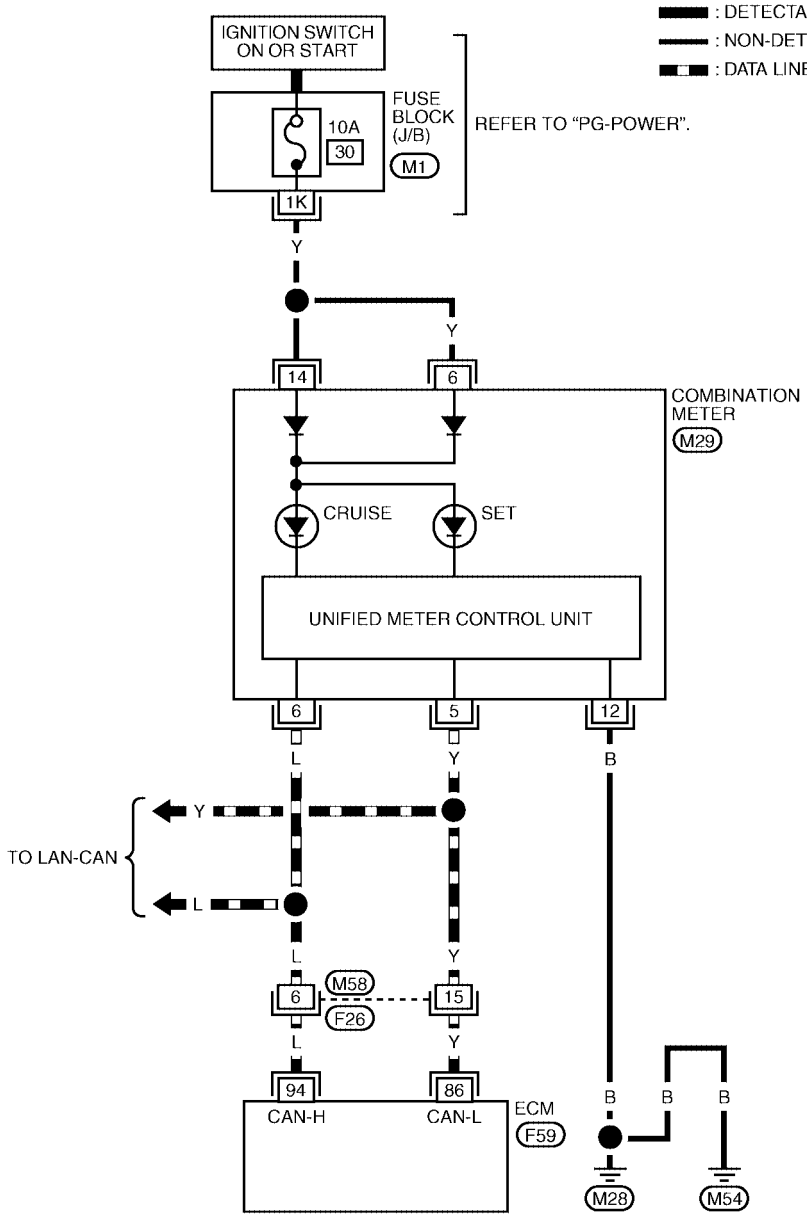
Specification data are reference value.

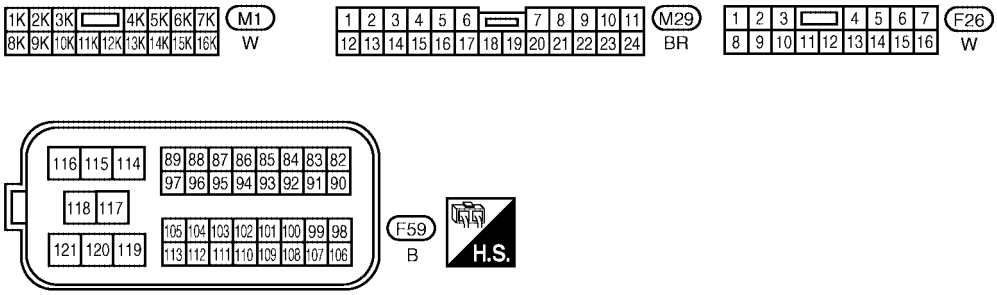
MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	MAIN switch is pressed at 1st time → 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● When vehicle is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD is operating	ON
		ASCD is not operating	OFF

Wiring Diagram

UBS00JZN

EC-ASCIND-01





BBWA1421E

Diagnostic Procedure

UBS00JZO

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	MAIN switch is pressed at 1st time → 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● When vehicle is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD is operating	ON
		ASCD is not operating	OFF

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK DTC

Check that DTC U1000 or U1001 is not displayed.

Yes or No

Yes >> Perform trouble diagnoses for DTC U1000, U1001, refer to EC-840, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
No >> GO TO 3.

3. CHECK COMBINATION METER OPERATION

Does combination meter operate normally?

Yes or No

Yes >> GO TO 4.
No >> Check combination meter circuit. Refer to DI-16, "Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode" .

4. CHECK INTERMITTENT INCIDENT

Refer to EC-832, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

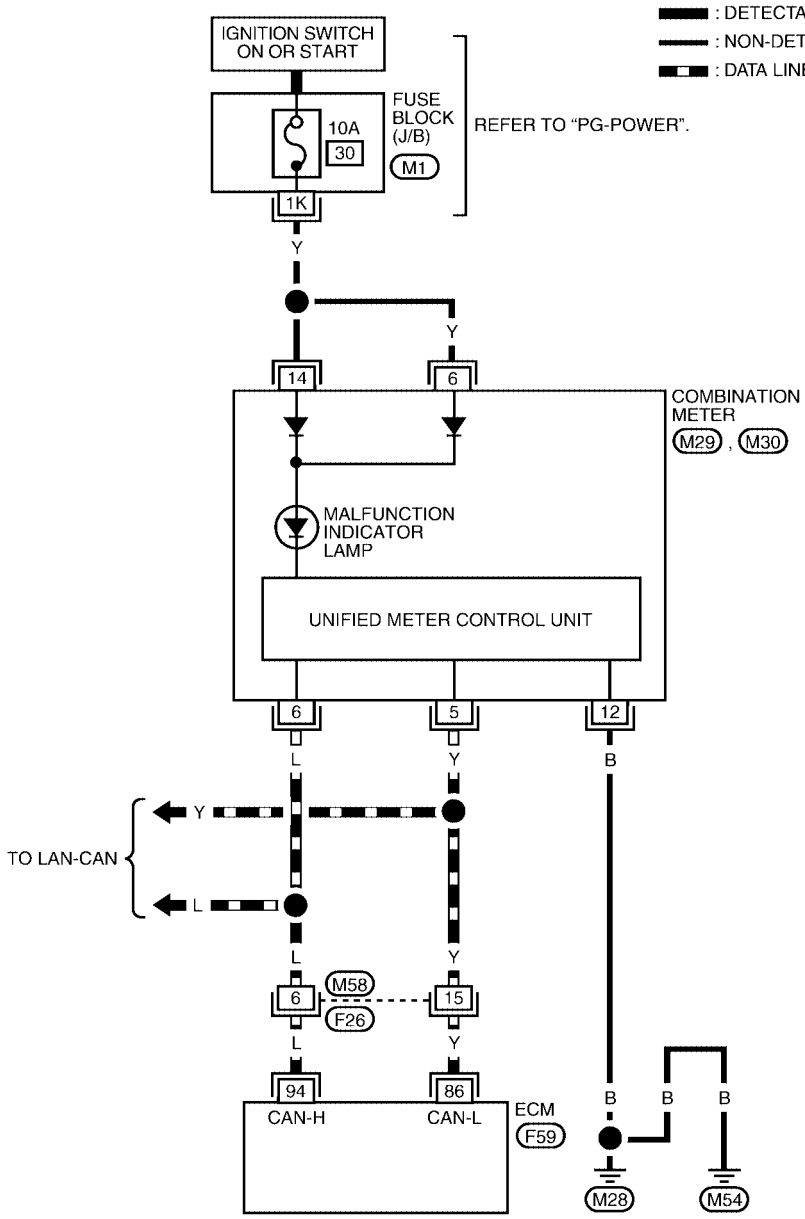
MIL AND DATA LINK CONNECTOR

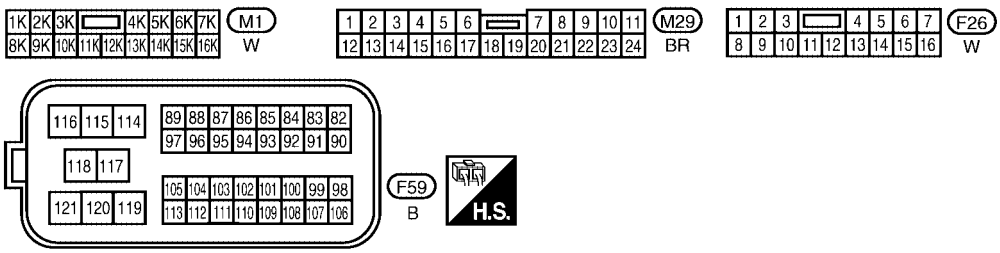
PFP:24814

Wiring Diagram

UBS00JOD

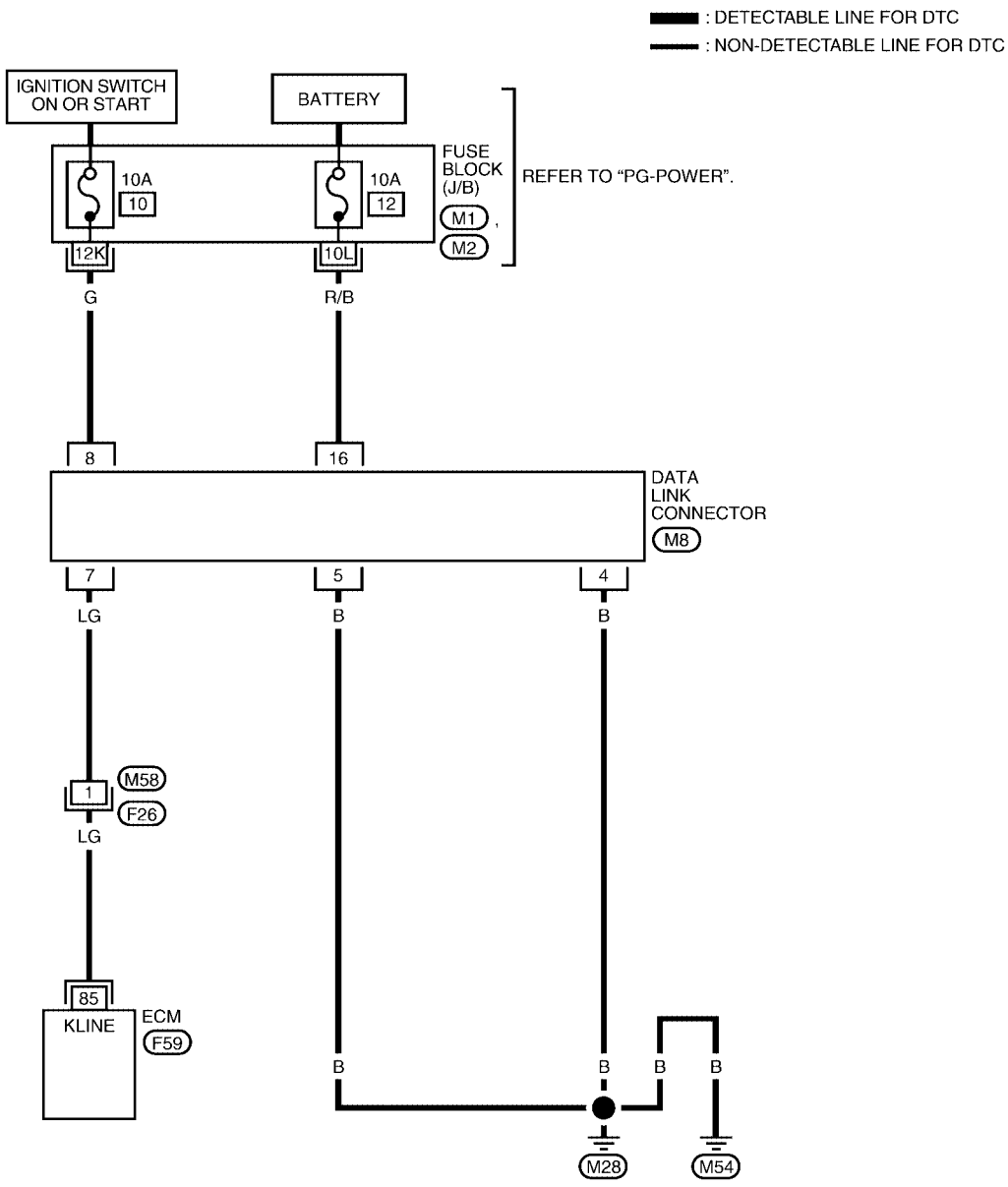
EC-MIL/DL-01

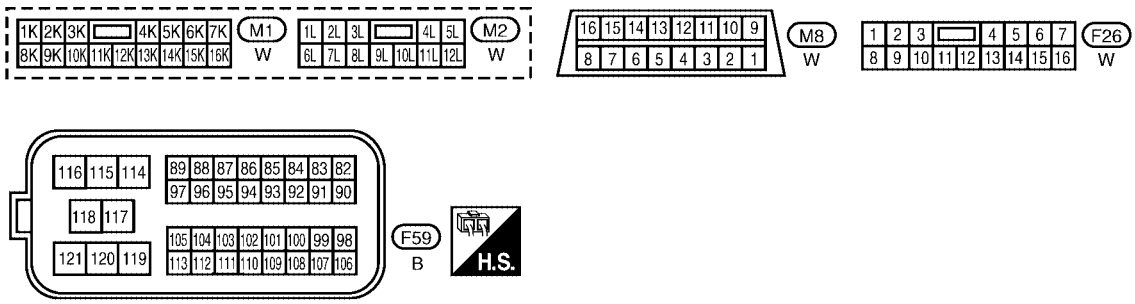




BBWA1407E

EC-MIL/DL-02





BBWA1460E

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Fuel Pressure

UBS00JZP

Fuel pressure at idle	Approximately 350 kPa (3.57kg/cm^2 , 51psi)

Idle Speed and Ignition Timing

UBS00JZQ

Target idle speed	No-load*1 (in P or N position)	700±50 rpm
Air conditioner: ON	In P or N position	800 rpm or more
Ignition timing	In P or N position	15°±5° BTDC

*1: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

UBS00JZR

	Calculated load value % (Using CONSULT-II or GST)
At idle	10 - 35
At 2,500 rpm	10 - 35

Mass Air Flow Sensor

UBS00JZS

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	0.9 - 1.1*V
Mass air flow (Using CONSULT-II or GST)	1.0 - 4.0 g·m/sec at idle* 4.0 - 10.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no-load.

Intake Air Temperature Sensor

UBS00JZT

Temperature °C (°F)	Resistance kΩ
25 (77)	1.94 - 2.06
80 (176)	0.295 - 0.349

Engine Coolant Temperature Sensor

UBS00JZU

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Heated Oxygen Sensor 1 Heater

UBS00JZV

Resistance [at 25°C (77°F)]	3.3 - 4.0Ω

Air Fuel Ratio (A/F) Sensor 1 Heater

UBS00JZW

Resistance [at 25°C (77°F)]	2.3 - 4.3Ω

Heated Oxygen Sensor 2 Heater

UBS00JZX

Resistance [at 25°C (77°F)]	5.0 - 7.0Ω

Crankshaft Position Sensor (POS)

UBS00JZZ

Refer to EC-995, "Component Inspection" .

Camshaft Position Sensor (PHASE)

UBS00K00

Refer to EC-1002, "Component Inspection" .

Throttle Control Motor

UBS00K01

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Injector

UBS00K02

Resistance [at 10 - 60°C (50 - 140°F)]	11.6 - 14.9Ω

Fuel Pump

UBS00K03

Resistance [at 25°C (77°F)]	0.2 - 5.0Ω

SECTION FL
FUEL SYSTEM

CONTENTS

FUEL SYSTEM 2
Checking Fuel Lines 2
General Precautions 2
FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY 3
Removal and Installation 3
REMOVAL 3
INSTALLATION 6
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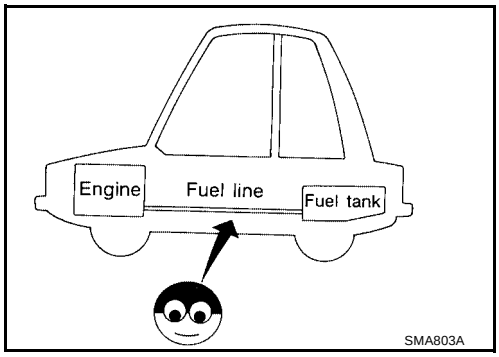
FUEL SYSTEM

PFP:17503

Checking Fuel Lines

EBS00DTF

Inspect the fuel lines, filler cap, and fuel tank for incorrect attachment, leaks, cracks, damage, loose connections, chafing, and deterioration.
If necessary, repair or replace the faulty parts.



General Precautions

EBS00DTG

WARNING:
When replacing the fuel line parts, observe the following:

- **Place a "CAUTION: INFLAMMABLE" sign in the workshop.**
- **Do not smoke while servicing the fuel system. Keep open flames and sparks away from the work area.**
- **Have a CO_2 fire extinguisher in the workshop.**

CAUTION:

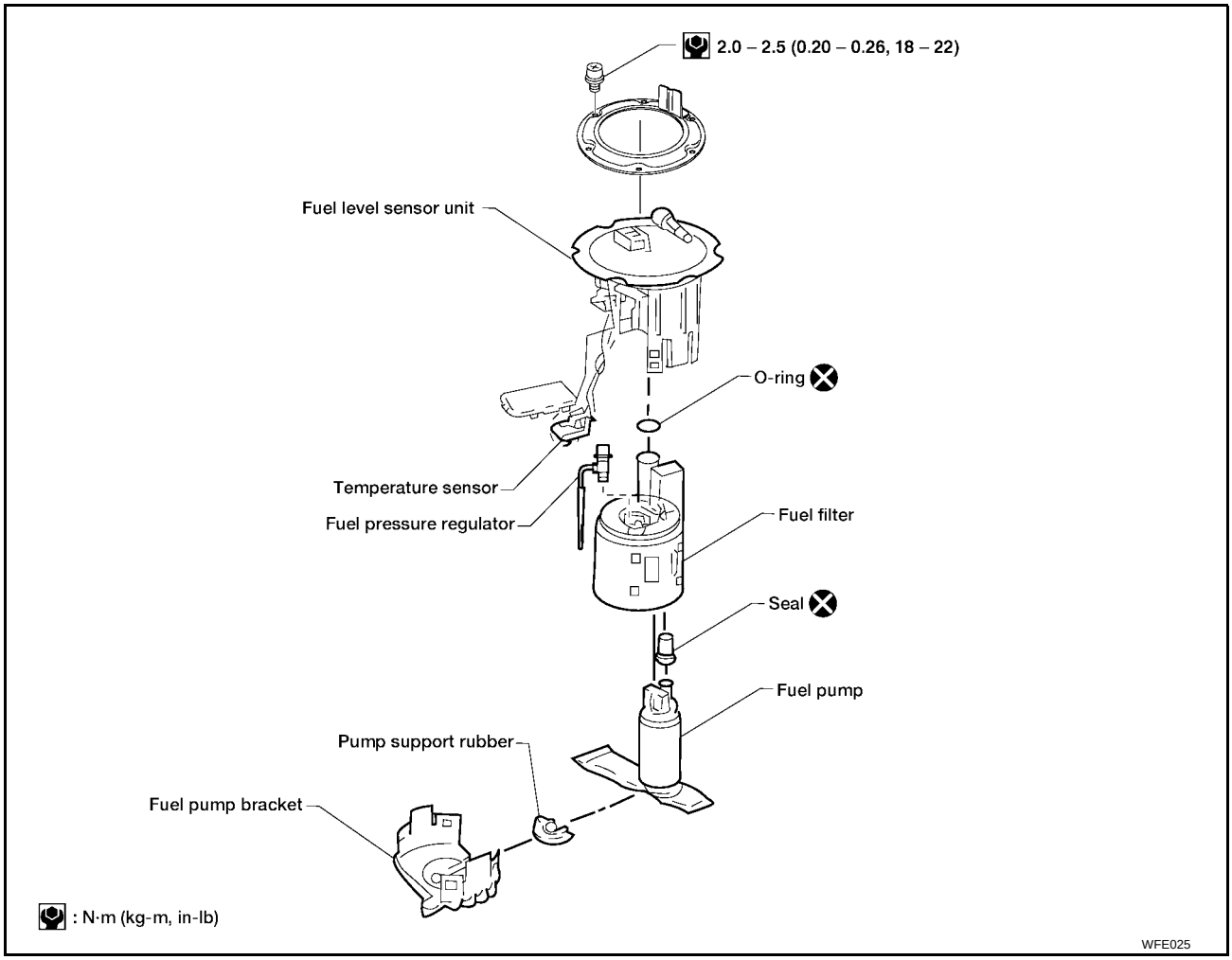
- **Before removing the fuel line parts, use the following procedures:**
  - **Store the drained fuel in an explosion-proof container and put the lid on securely.**
  - **Release the fuel pressure from the fuel system. Refer to EC-94, "FUEL PRESSURE RELEASE" (QG18DE), EC-751, "FUEL PRESSURE RELEASE" (QR25DE).**
  - **Disconnect the battery ground cable.**
- **Always replace the O-ring seals with new ones.**
- **Do not kink or twist any of the hoses and tubes during removal and installation.**
- **Do not over tighten the hose clamps to avoid damaging the hoses.**
- **After installation, run the engine and check for fuel leaks at the connections.**
- **Use only a genuine NISSAN fuel filler cap as a replacement. If an incorrect fuel filler cap is used, the MIL may come on.**
- **For inspection and installation of EVAP system parts, refer to EC-36, "EVAPORATIVE EMISSION SYSTEM" (QG18DE), EC-680, "EVAPORATIVE EMISSION SYSTEM" (QR25DE).**
- **For inspection and installation of ORVR system parts, refer to EC-43, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" (QG18DE), EC-687, "ON BOARD REFUELING VAPOR RECOVERY (ORVR)" (QR25DE).**

FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY

PFP:17042

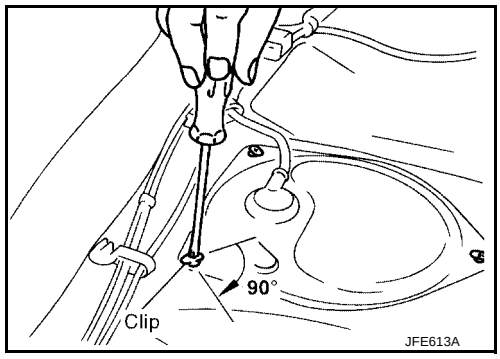
Removal and Installation

EBS00DTH

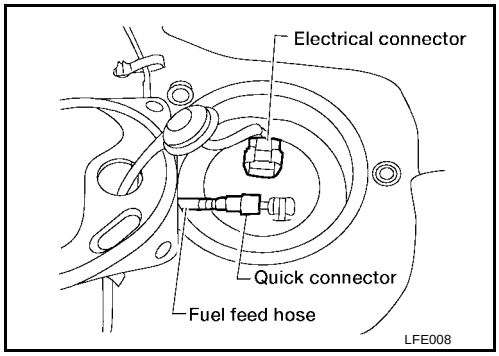


REMOVAL

1. Release the fuel pressure from the fuel system. Refer to EC-94, "FUEL PRESSURE RELEASE" (QG18DE), EC-751, "FUEL PRESSURE RELEASE" (QR25DE).
2. Disconnect the battery ground cable.
3. Open the fuel filler lid and remove the fuel filler cap to relieve the pressure in the fuel tank.
4. Remove the rear seat cushion. Refer to SE-5, "Removal and Installation" .
5. Remove the inspection hole cover located under the rear seat cushion by rotating the attaching clips 90° as shown.



6. Disconnect the fuel pump assembly electrical connector.



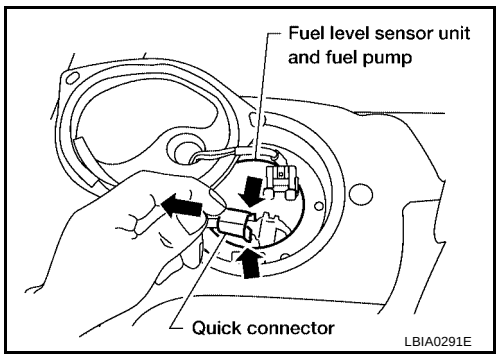
7. Disconnect the fuel feed hose quick connector as follows:

a. Apply mating marks on the fuel pump outlet and the quick connector for installation.

b. Hold the quick connector and push in the tabs, then pull out from the fuel pump outlet that is inserted in the quick connector.

CAUTION:

- **The quick connector can be removed when the tabs are completely depressed. Do not twist the fuel feed hose more than necessary.**
- **Do not use any tools to remove the quick connector.**

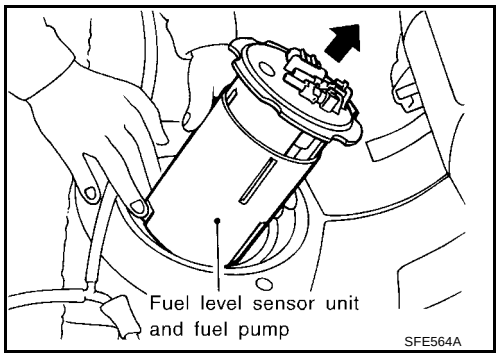


8. Remove the six fuel level sensor and fuel pump assembly retainer ring screws.

9. To remove, pull up on the fuel level sensor and fuel pump assembly as shown.

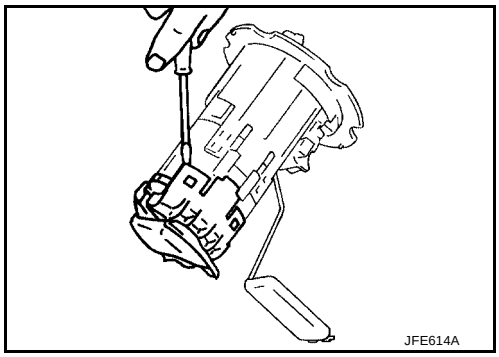
CAUTION:

Do not damage the arm of the fuel level sensor and fuel tank temperature sensor when removing.

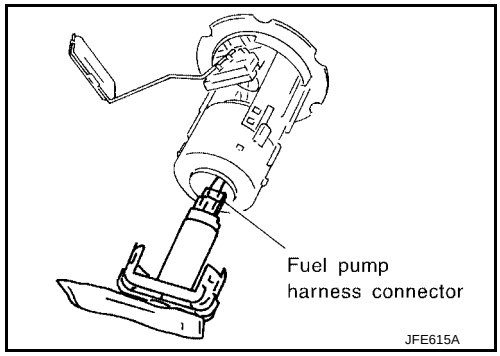


10. Remove the fuel pump by gently releasing the tabs using a suitable tool as shown.

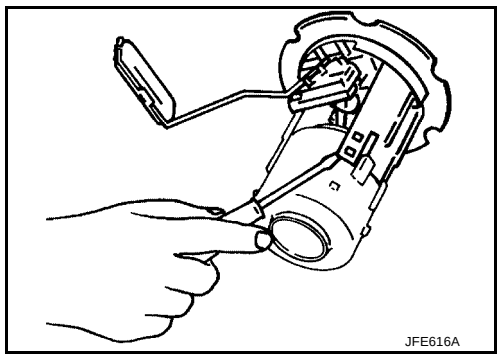
- Apply mating marks on the fuel pump and fuel filter for proper alignment for installation.



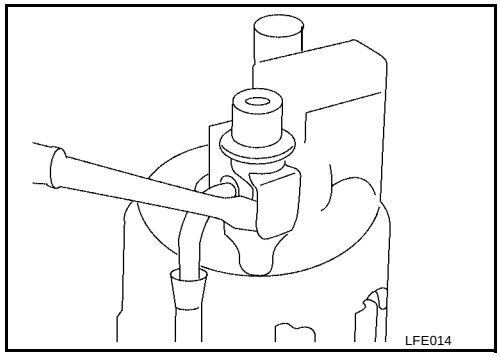
11. Disconnect the fuel pump harness connector as shown.



12. Remove the fuel filter from fuel level sensor unit by gently releasing the tabs using a suitable tool as shown.
    - Apply mating marks on fuel filter and fuel level sensor unit for proper alignment for installation.



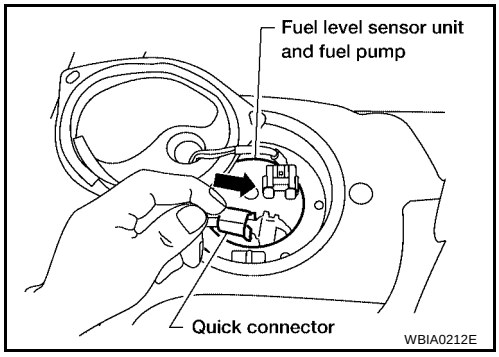
13. Remove the fuel pressure regulator from the fuel filter by pulling off the retaining clip using a suitable tool as shown.



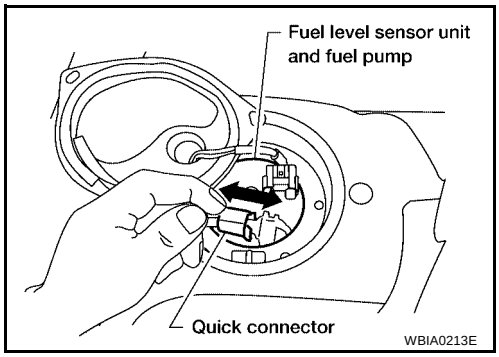
INSTALLATION

Installation is in reverse order of removal.

- Connect the quick connector in the order as follows:
  - Align the mating marks on the fuel pump outlet and quick connector for installation.
  - Align the push tabs with the quick connector slots.
  - Insert the fuel pump outlet into the center of the quick connector until you hear a click.



- After connecting the quick connector, make sure the connection is fully seated in the order as follows:
  - Pull on the quick connector to make sure it is firmly connected.
  - Apply fuel pressure to the fuel lines by turning the ignition switch ON (without starting the engine). Then check for fuel leaks at the connections
  - Start the engine and increase the engine speed, verify there are no fuel leaks.

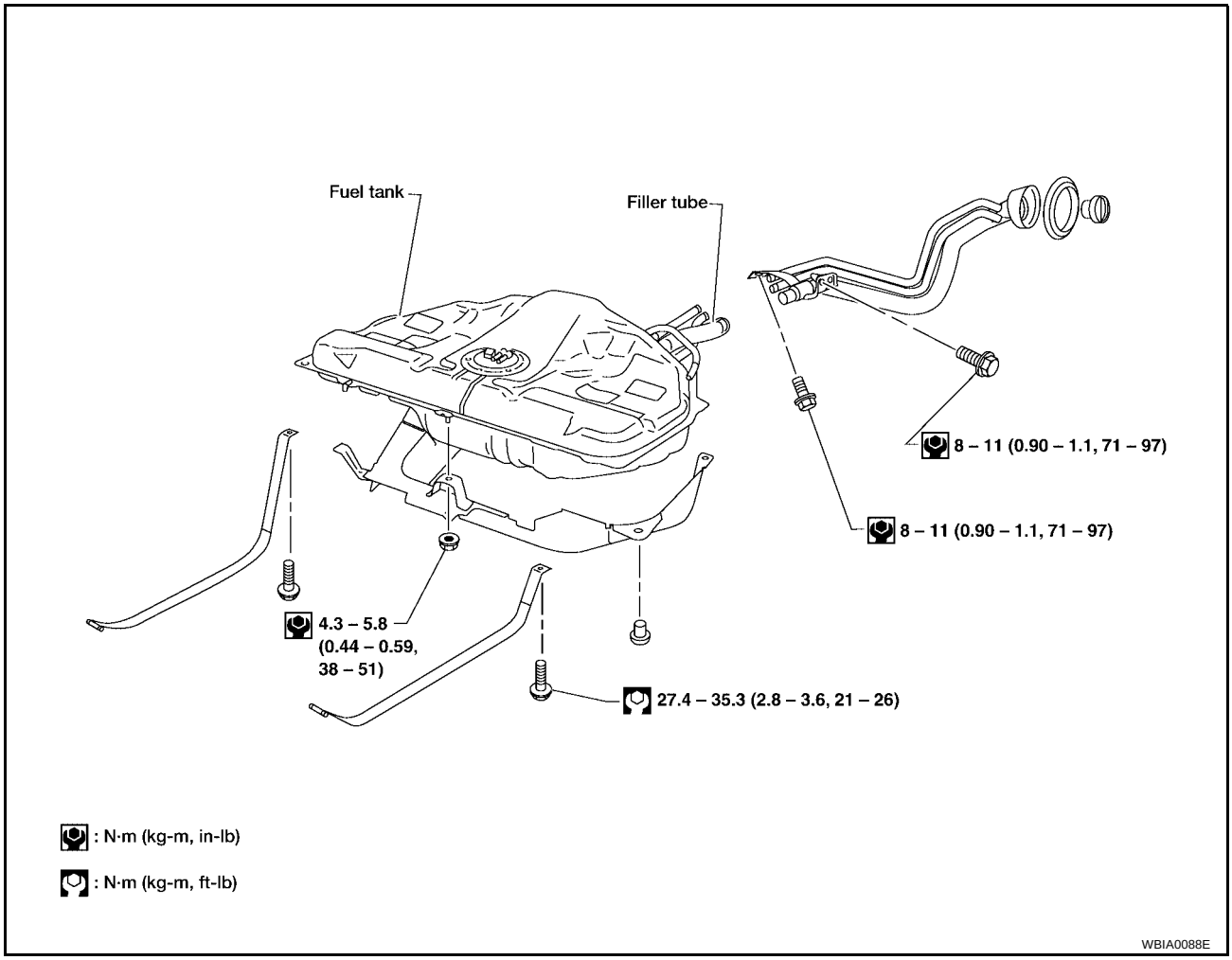


FUEL TANK

PFP:17202

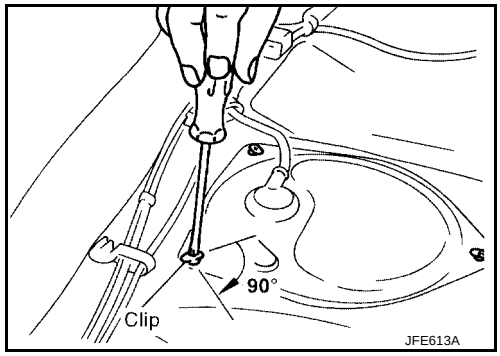
Removal and Installation

EBS00DTI

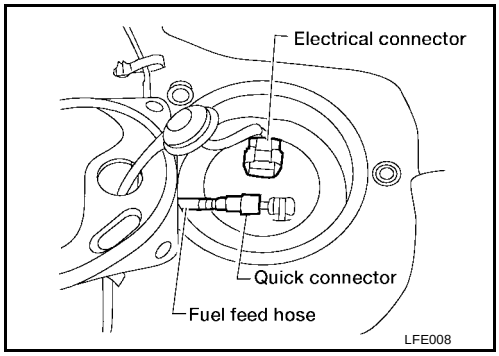


REMOVAL

1. Release the fuel pressure from the fuel system. Refer to EC-94, "FUEL PRESSURE RELEASE" (QG18DE), EC-751, "FUEL PRESSURE RELEASE" (QR25DE).
2. Disconnect the battery ground cable.
3. Open the fuel filler lid and remove the filler cap to relieve the pressure in the fuel tank.
4. Drain the fuel from the fuel tank. Refer to FL-2, "General Precautions" .
5. Remove the rear seat cushion. Refer to SE-5, "Removal and Installation" .
6. Remove the inspection hole cover located under the rear seat cushion by rotating the attaching clips 90° as shown.



7. Disconnect the fuel pump assembly electrical connector.



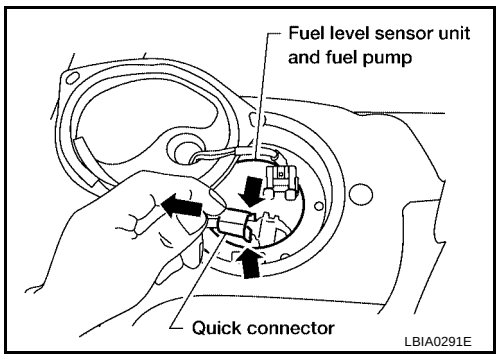
8. Disconnect the fuel feed hose quick connector as follows:

a. Apply mating marks on the fuel pump outlet and the quick connector for installation.

b. Hold the quick connector and push in the tabs, then pull out from of the fuel pump outlet that is inserted in the quick connector.

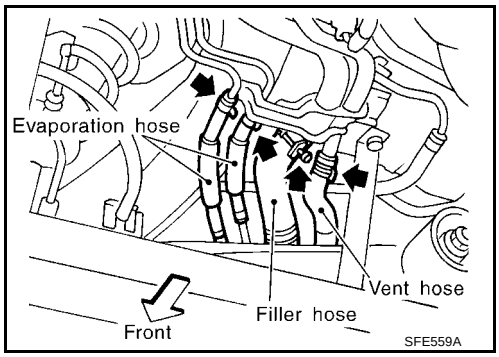
CAUTION:

- **The quick connector can be removed when the tabs are completely depressed. Do not twist the fuel feed hose more than necessary.**
- **Do not use any tools to remove the quick connector.**



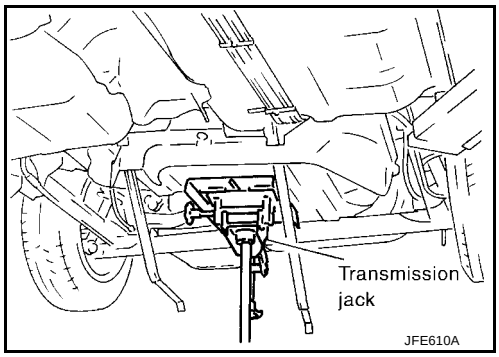
9. Remove the center exhaust tube. Refer to EX-3, "Removal and Installation" .

10. From the rear left area of the fuel tank, remove the filler hose, vent hose, and evaporation hoses as shown.

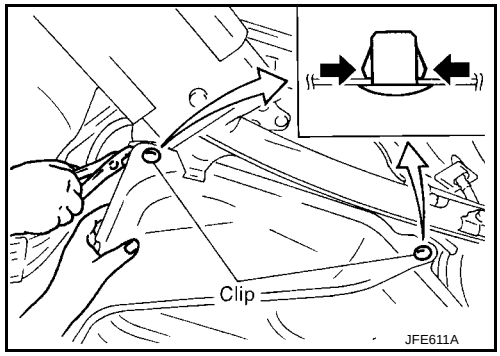


11. Support the fuel tank with a suitable transmission jack as shown.

12. Remove the fuel tank mounting band bolts while supporting the fuel tank.



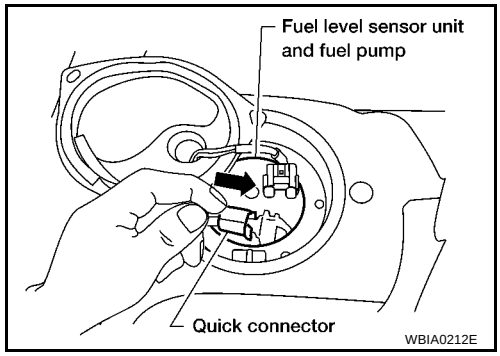
13. Lower the fuel tank by 70 – 80 mm (2.76 – 3.15 in), then remove the nuts and clips holding the fuel tank protector, and remove the protector.
    - To remove the clips, use pliers to squeeze the extensions as shown by the arrows, and then remove the clip.
14. Remove the fuel tank.



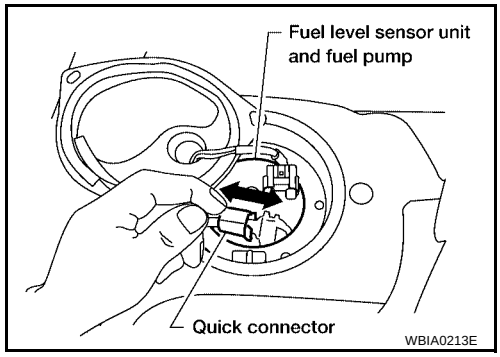
INSTALLATION

Installation is in the reverse order of removal.

- Connect the quick connector in the order as follows:
  - Align mating marks on the fuel pump outlet and the quick connector for correct installation.
  - Align the push tabs with the quick connector slots.
  - Insert the fuel pump outlet into the center of the quick connector until you hear a click.



- After connecting the quick connector, check that the quick connector is fully seated in the order as follows:
  - Pull on the quick connector to make sure it is firmly connected.
  - Apply fuel pressure to the fuel lines by turning the ignition switch ON (without starting the engine). Then check for fuel leaks at the hose connections.
  - Start the engine and increase engine speed, verify that there are no fuel leaks.



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Standard and Limit

EBS00DTJ

Fuel Tank

Fuel tank capacity	50 ℓ (13 1/4 US gal, 11 Imp gal)

SECTION EX
EXHAUST SYSTEM

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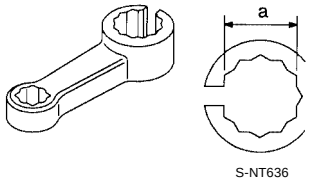
PREPARATION

PFP:00002

Special Service Tool

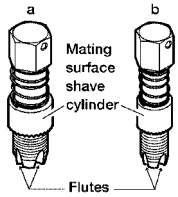
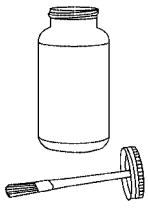
EBS00DTK

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV10114400 (J-38365-A) Heated oxygen sensor wrench  S-NT636	Loosening or tightening front and rear heated oxygen sensors **a: 22 mm (0.87 in)**

Commercial Service Tools

EBS00DTL

(Kent-Moore No.) Tool name	Description
(J-43897–18) (J-43897–12) Oxygen sensor thread cleaner  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor (Use with anti-seize lubricant shown below.) **a: J-43897-18 (18 mm) for zirconia oxygen sensor** **b: J-43897-12 (12 mm) for titania oxygen sensor**
Anti-seize lubricant (Permatex 133AR or equivalent meeting MIL specification MIL-A-907)  AEM489	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads

EXHAUST SYSTEM

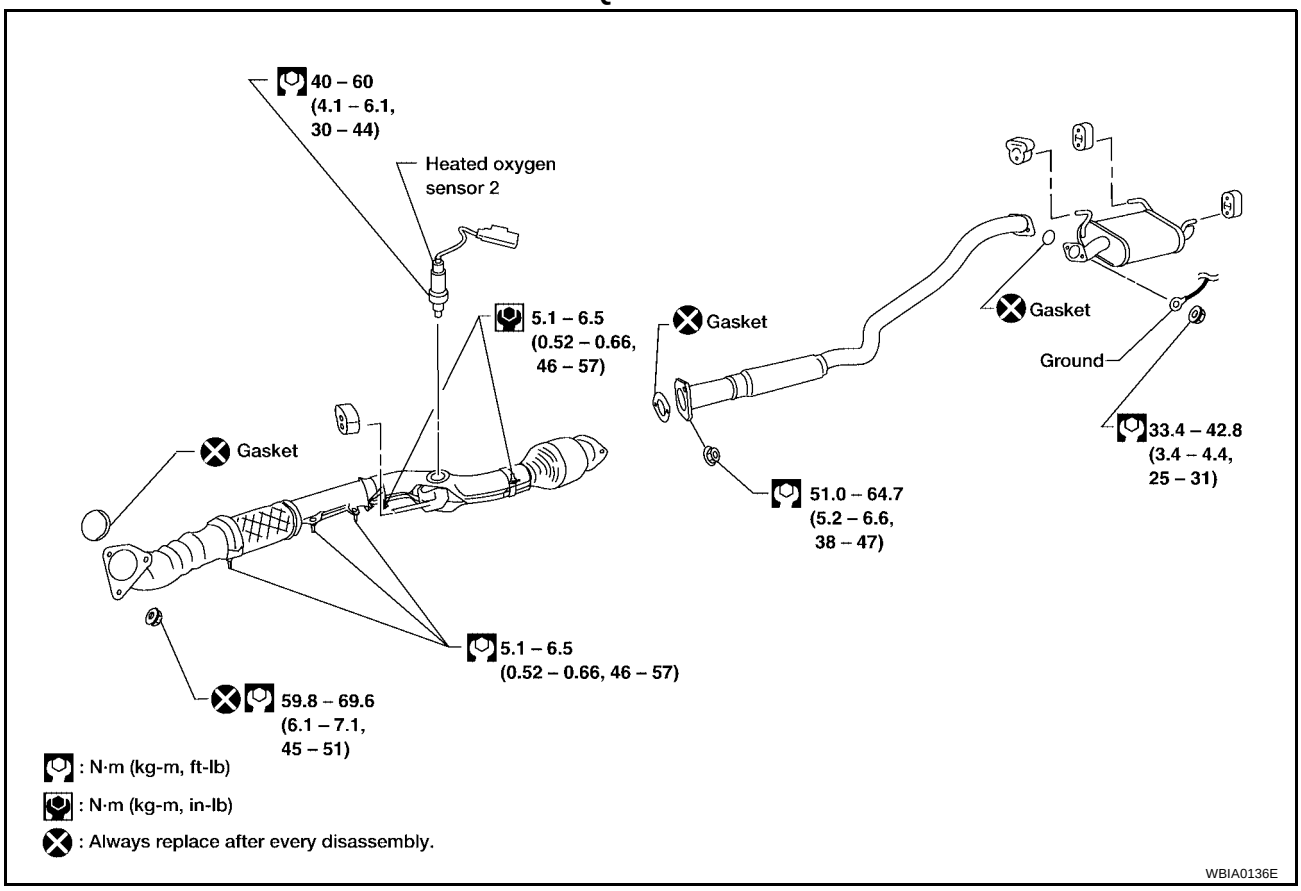
PFP:20100

Removal and Installation

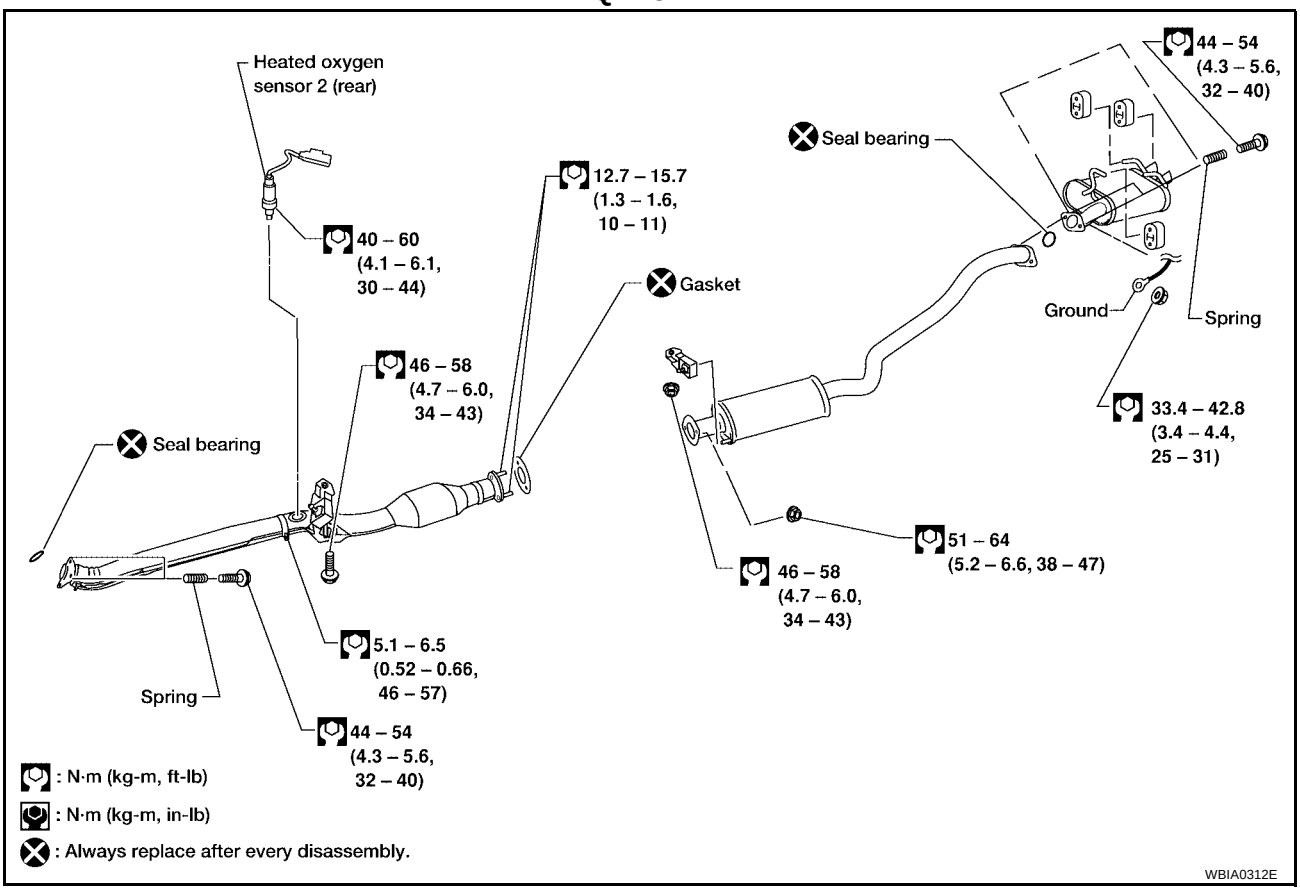
EBS00DTM

Refer to the following figures for removal and installation.

QG18DE

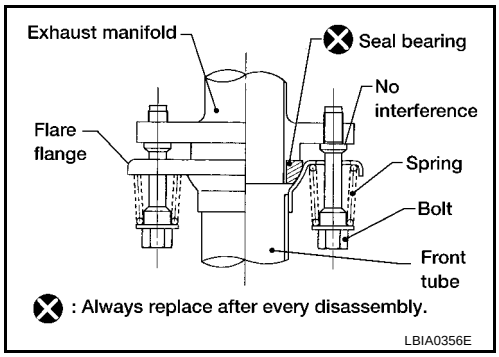


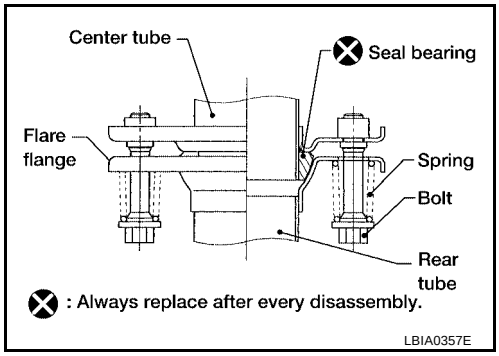
QR25DE



CAUTION:

- **Always replace the exhaust gaskets and seal bearings with new ones when reassembling.**
- **For the QR25DE engine, install the two seal bearings as shown. Position the conical spring so that the wide end is against the flare flange as shown.**





- **With engine running, check all tube connections for exhaust gas leaks, and entire system for unusual noises.**
- **Check to ensure that mounting brackets and mounting insulators are installed properly and free from undue stress. Improper installation could result in excessive noise or vibration.**

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; replace it with a new one.**
- **Before installing a new heated oxygen sensor, clean the exhaust tube sensor threads (using oxygen sensor thread cleaner) Tool, J-43897-18 or J-43897-12, and apply anti-seize lubricant.**
- **Do not over-tighten the heated oxygen sensor. Doing so may cause damage to the heated oxygen sensor, resulting in the MIL coming on.**

SECTION ACC

ACCELERATOR CONTROL SYSTEM

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ACCELERATOR CONTROL SYSTEM

PFP:18005

Removal and Installation

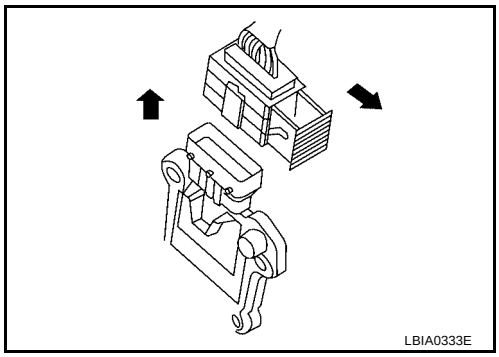
EBS00DTP

REMOVAL

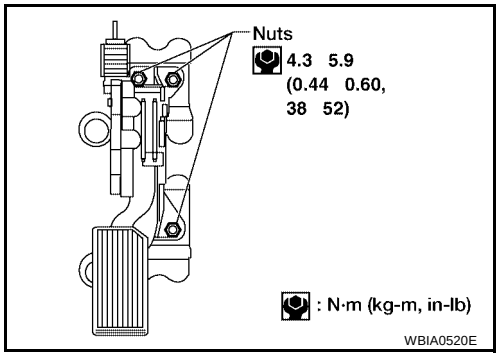
1. Disconnect the accelerator pedal position sensor electrical connector.

a. Pull the connector lock back to unlock the connector from the accelerator pedal position sensor.

b. Pull up on the connector to disconnect it from the accelerator pedal position sensor.



2. Remove the two upper and one lower accelerator pedal assembly nuts.



3. Remove the accelerator pedal assembly.
   - For electrical inspection of the accelerator pedal position sensor. Refer to EC-572, "DTC P2122, P2123 APP SENSOR" and EC-579, "DTC P2127, P2128 APP SENSOR" (QG18DE) or EC-1282, "DTC P2122, P2123 APP SENSOR" and EC-1289, "DTC P2127, P2128 APP SENSOR" (QR25DE).

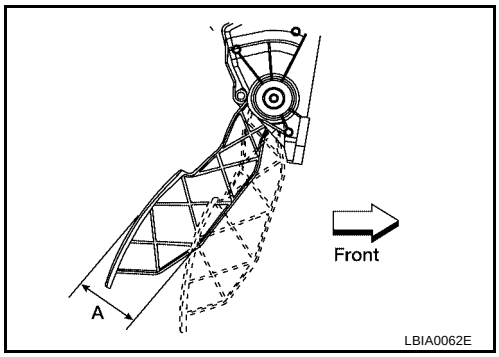
CAUTION:
- **Do not disassemble the accelerator pedal assembly. Do not remove the accelerator pedal position sensor from the accelerator pedal assembly.**
- **Avoid impact from dropping the accelerator pedal assembly during handling.**
- **Keep the accelerator pedal assembly away from water.**

INSTALLATION

Installation is in the reverse order of removal.

- Check the accelerator pedal for smooth operation. There should be no binding or sticking when applying or releasing the accelerator pedal.
- Check that the accelerator pedal moves through the full specified distance of the specified pedal travel “A”.

Pedal Travel “A” : 52.6 - 58.2 mm (2.07 - 2.29 in)



CAUTION:
When the accelerator pedal position sensor harness connector is disconnected, perform the “Accelerator Pedal Released Position Learning”. Refer to EC-748, "Accelerator Pedal Released Position Learning" .

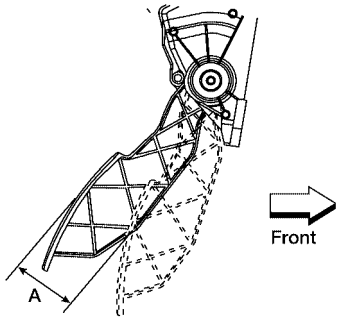
SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Accelerator Control

EBS00EWA

PEDAL TRAVEL



LBIA0062E

Accelerator pedal - total travel “A”	52.6 - 58.2 mm (2.07 - 2.29 in)

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CLUTCH

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QG18DE

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QR25DE

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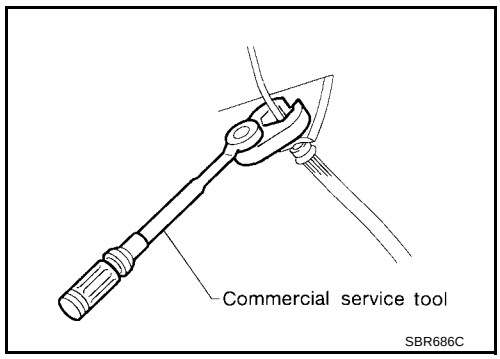
PRECAUTIONS

PFP:00001

Precautions

ECS005RJ

- **The recommended clutch system hydraulic fluid is brake fluid “DOT 3”.**
- **Do not reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If any brake fluid is splashed on painted areas, wash it away with water immediately.**
- **Use a flare nut wrench (commercial service tool) when removing or installing the clutch hydraulic tubes.**
- **Use new brake fluid to clean or wash any parts of the clutch master cylinder and operating cylinder.**
- **Never use any type of mineral oil such as gasoline or kerosene to clean or wash any parts of the clutch system. It will ruin the rubber parts of the hydraulic system.**



WARNING:
After cleaning the clutch disc, wipe it with a dust collector. Do not use compressed air.

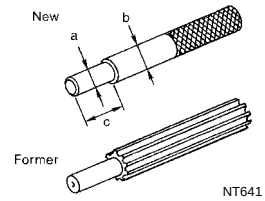
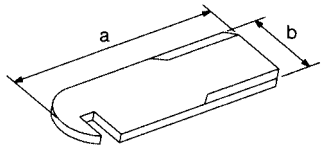
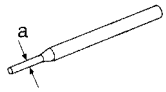
PREPARATION

PFP:00002

Special Service Tools

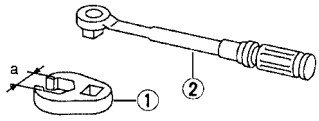
ECS005RK

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV30101600 (New) KV30101000 (Former) (J33213) Clutch aligning bar  NT641	Installing clutch cover and clutch disc **a: 15.9 mm (0.626 in) dia.** **b: 17.9 mm (0.705 in) dia.** **c: 40 mm (1.57 in)**
ST20050240 (—) Diaphragm spring adjusting wrench  S-NT404	Adjusting unevenness of diaphragm spring of clutch cover **a: 150 mm (5.91 in)** **b: 25 mm (0.98 in)**
KV32101000 (J25689-A) Pin punch  S-NT410	Removing and installing spring pin **a: 4 mm (0.16 in) dia.**

Commercial Service Tools

ECS005RL

Tool name	Description
1. Flare nut crowfoot 2. Torque wrench  S-NT360	Removing and installing clutch piping **a: 10 mm (0.39 in)**

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

ECS005RM

Use the chart below to help you find the cause of the symptom. The numbers indicate the order of inspection. Check each part in order. If necessary, repair or replace these parts.

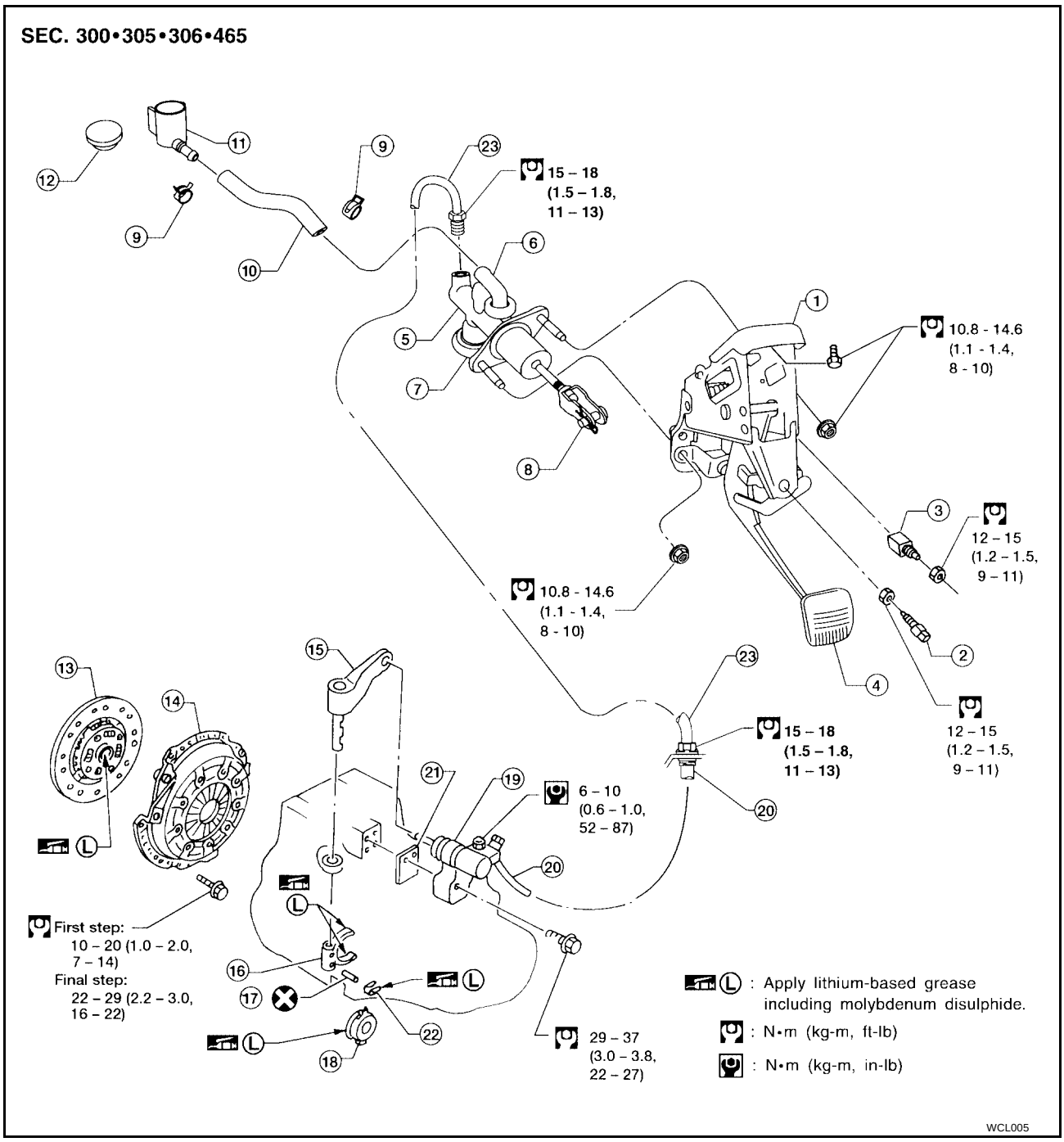
		Reference page	CL-7	CL-7	CL-9	CL-11	EM-65, "Removal and Installation"	CL-14	CL-17							CL-17	CL-18			CL-18
		Suspected parts (Possible cause)	Clutch pedal (Inspection and adjustment)	Clutch line (Air in line)	Master cylinder piston cup (Damaged)	Operating cylinder piston cup (Damaged)	Engine mounting (Loose)	Release bearing (Worn, dirty or damaged)	Clutch disc (Out of true)	Clutch disc (Runout is excessive)	Clutch disc (Lining broken)	Clutch disc (Dirty or burned)	Clutch disc (Oily)	Clutch disc (Worn out)	Clutch disc (Hardened)	Clutch disc (Lack of spline grease)	Diaphragm spring (Damaged)	Diaphragm spring (Out of tip alignment)	Clutch cover (Distortion)	Flywheel (Distortion)
Symptom		Clutch grabs/chatters					1			2			2	2	2			2		
		Clutch pedal spongy		1	2	2														
		Clutch noisy						1												
		Clutch slips	1										2	2			3		4	5
		Clutch does not disengage	1	2	3	4			5	5	5	5	5			5	6	6	7	

CLUTCH SYSTEM

PFP:30502

Components

ECS005RN



1. Clutch pedal bracket
2. ASCD clutch switch (if equipped)
3. Clutch interlock switch
4. Clutch pedal
5. Clutch master cylinder
6. Nipple
7. Clutch damper (not serviceable)
8. Clevis
9. Hose clamp
10. Reservoir hose
11. Reservoir tank
12. Reservoir cap
13. Clutch disc
14. Clutch cover
15. Withdrawal lever
16. Clutch lever
17. Spring pin
18. Release bearing
19. Operating cylinder
20. Clutch hose
21. Spacer
22. Release bearing spring
23. Clutch tube

Inspection and Adjustment

ECS005RO

CLUTCH PEDAL INSPECTION AND ADJUSTMENT

1. Check to see if the clutch pedal clevis pin floats freely in the bore of the clutch pedal. It should not be bound by the clevis or clutch pedal.

a. If the pin is not free, check that the ASCD switch or pedal stopper bolt is not applying pressure to the clutch pedal causing the pin to bind. To adjust, loosen the ASCD switch or pedal stopper bolt lock nut and turn the ASCD switch or pedal stopper bolt.

b. Tighten the lock nut.

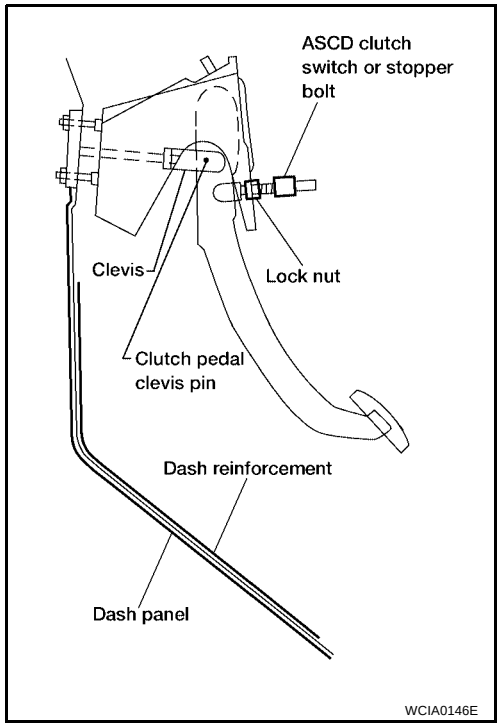
c. Verify that the clutch pedal clevis pin floats freely in the bore of the clutch pedal. It should not be bound by the clevis or clutch pedal.

d. If the pin is still not free, remove the pin and check for deformation or damage. Replace the pin if necessary. Leave the pin removed for step 2.

2. Check the clutch pedal stroke for free range of movement.

a. With the clutch pedal clevis pin removed, manually move the pedal up and down to determine if it moves freely.

b. If any sticking is noted, replace the related parts (clutch pedal, pedal bracket, assist spring, bushing, etc.). Reassemble the pedal and re-verify that the clevis pin floats freely in the bore of the pedal.



3. Adjust the clearance “C” while fully depressing the clutch pedal (with the clutch interlock switch) as shown.

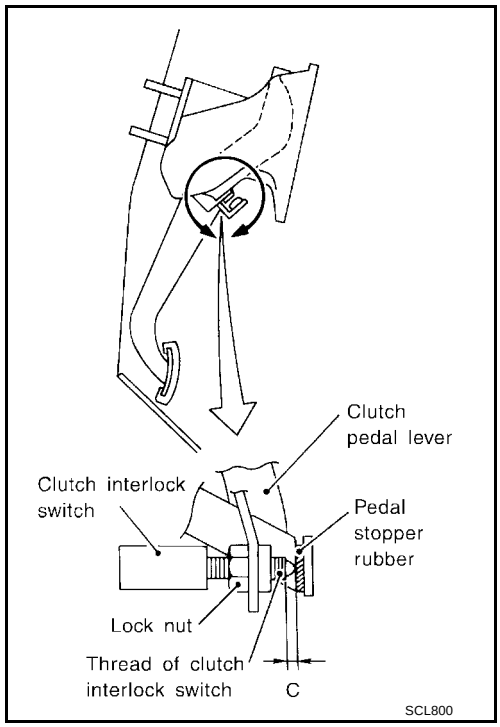
Clearance "C" : 0.1 - 1.0 mm (0.004 - 0.039 in)

4. Check the clutch hydraulic system components (clutch master cylinder, clutch operating cylinder, Clutch withdrawal lever, clutch release bearing, etc.) for sticking or binding.

a. If any sticking or binding is noted, repair or replace the related parts as necessary.

b. If any hydraulic system repair was necessary, bleed the clutch hydraulic system. Refer to CL-7, "BLEEDING PROCEDURE" .

NOTE:
Do not use a vacuum assist or any other type of power bleeder on this system. Use of a vacuum assist or power bleeder will not purge all of the air from the system.



BLEEDING PROCEDURE

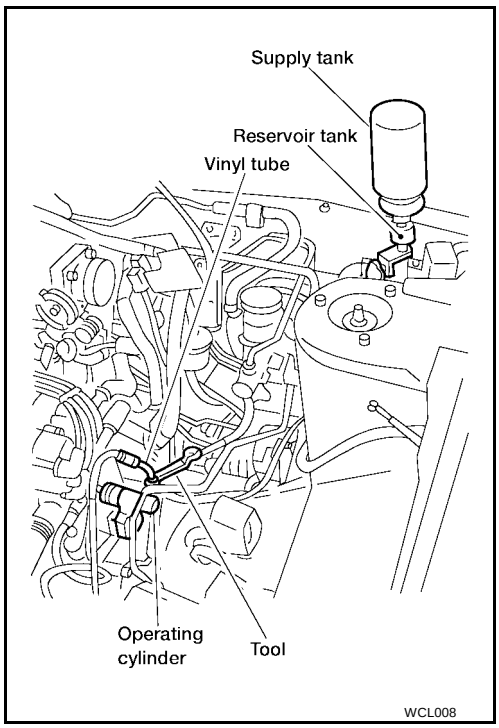
CAUTION:
Carefully monitor the fluid level at the clutch master cylinder during the bleeding operation.

NOTE:
Do not use a vacuum assist or any other type of power bleeder on this system. Use of a vacuum assist or power bleeder will not purge all of the air from the system.

1. Top off the clutch master cylinder reservoir with the recommended brake fluid. Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" . Then attach the additional supply tank as shown.

   CAUTION:

   Do not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.
2. Connect a transparent vinyl tube to the air bleeder valve as shown.
3. Slowly depress the clutch pedal to its full stroke and release it completely. Repeat this operation several times at 2 to 3 seconds intervals.
4. Open the air bleeder valve with the clutch pedal fully depressed.



5. Close the air bleeder valve and tighten to specification.

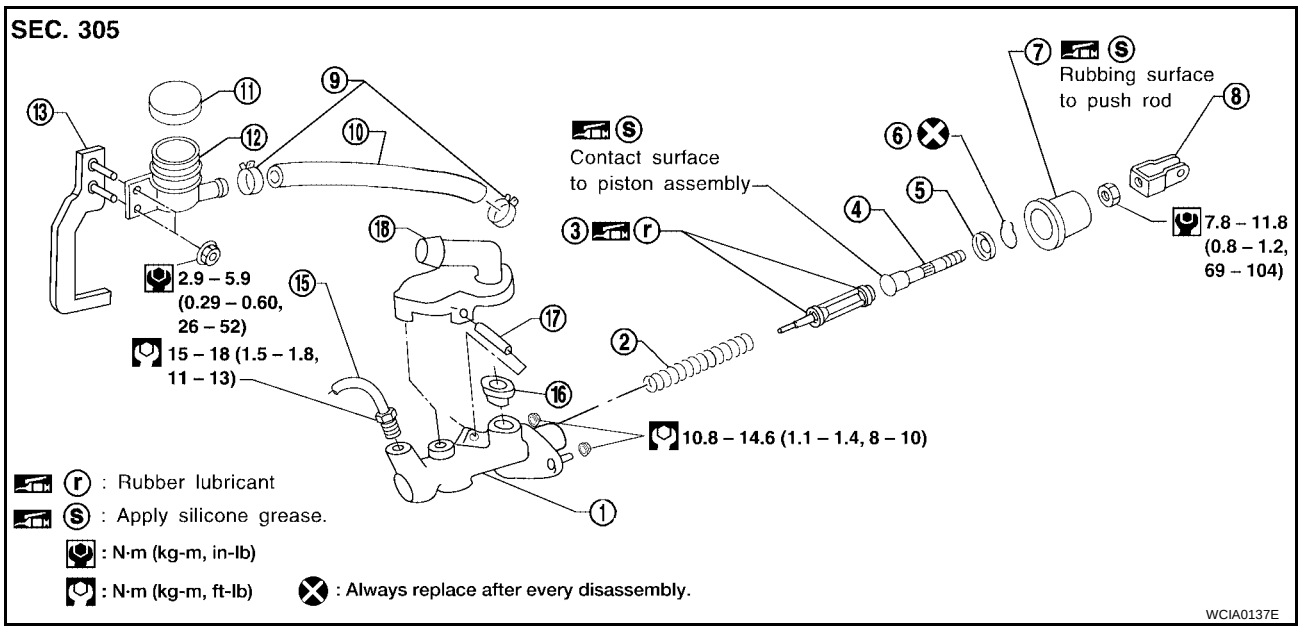
   Air bleeder valve : 5.9 - 9.8 N·m (0.6 - 1.0 kg-m, 52 - 87 in-lb)
6. Release the clutch pedal and wait at least 5 seconds.
7. Repeat steps 3 through 6 above until no more air bubbles are in the brake fluid coming out of the vinyl tube attached to the air bleeder valve.

CLUTCH MASTER CYLINDER

PFP:30610

Components

ECS005RP



1. Cylinder body	2. Return spring	3. Piston assembly seals
4. Push rod	5. Stopper	6. Stopper ring
7. Dust cover	8. Clevis	9. Hose clamps
10. Reservoir hose	11. Reservoir cap	12. Reservoir tank
13. Bracket	14. Clutch damper (not serviceable)	15. Clutch tube
16. Seal	17. Pin	18. Nipple

Removal

ECS005RQ

1. Drain the brake fluid from the clutch hydraulic system.

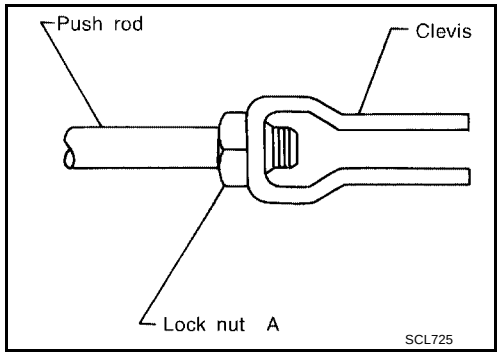
   CAUTION:
   Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.
2. Remove the clutch tube flare nut using a flare nut wrench.
3. Remove the reservoir hose.
4. Remove the snap pin from the clevis pin and remove the clutch pedal from the clevis.
5. Remove the master cylinder assembly mounting nuts and reservoir tank bracket mounting nuts to remove master cylinder assembly.

Disassembly

ECS005RS

1. Loosen the push rod lock nut "A" to remove the clevis and the lock nut "A".
2. Remove the dust cover.
3. Remove the stopper ring and stopper, then remove the push rod from the cylinder body. During removal, keep the push rod depressed, to prevent the piston inside the master cylinder from popping out.

   NOTE:
   Discard the stopper ring and use a new ring for assembly.
4. Remove the piston assembly from the cylinder body.
5. Remove the return spring.
6. Remove the pin using a pin punch, then remove the nipple and seal.



Inspection

ECS005RT

Inspect for the following conditions and replace any parts as necessary.

- Damage, wear, rust, and pinholes on the cylinder inner wall
- Damage and deformation of the reservoir tank
- Weak return spring
- Crack or deformation of the dust cover

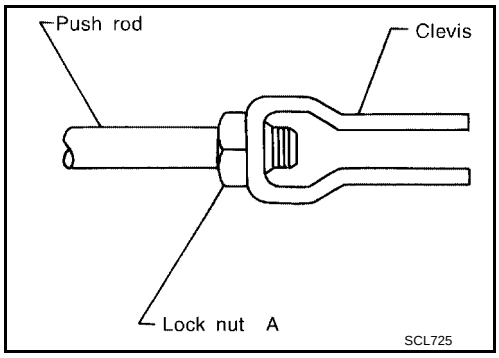
Assembly

ECS005RU

1. Install the return spring.
2. Apply rubber lubricant to the sliding parts of the piston assembly, and insert the piston assembly into the cylinder body.
3. After installing the stopper to push rod, install a new stopper ring while keeping the piston assembly depressed by hand, so that the piston assembly will not pop out.

   CAUTION:
   The stopper ring cannot be reused. Always use a new stopper ring for assembly.
4. Apply silicone grease, and install the dust cover.
5. Install the clevis to push rod, and tighten lock nut "A" to specification.

   Lock nut "A" : 7.8 - 11.8 N·m (0.8 - 1.2 kg-m, 69 - 104 in-lb)
6. Install the seal and nipple to the cylinder body, and install the pin using a pin punch.



Installation

ECS005RR

1. Install the reservoir hose.
2. Connect the clutch tube to the master cylinder assembly, and hand-tighten the flare nut.
3. Install the master cylinder assembly to the cowl, and tighten the mounting nuts to specification.

   Master cylinder mounting nuts : 10.8 - 14.6 N·m (1.1 - 1.4 kg-m, 8 - 10 ft-lb)
4. Tighten the reservoir tank bracket mounting nuts to specification.

   Reservoir tank bracket mounting nuts : 2.9 - 5.9 N·m (0.29 - 0.60 kg-m, 26 - 52 in-lb)
5. Tighten the clutch tube flare nut to specification, using a flare nut torque wrench.

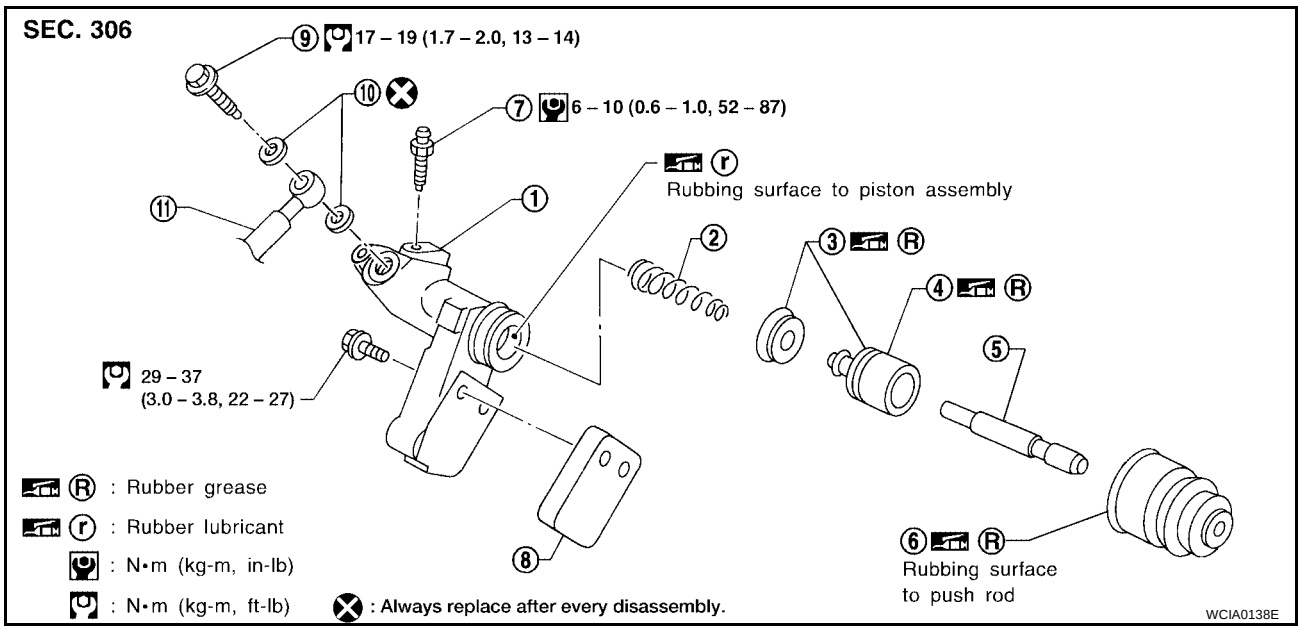
   Clutch tube flare nut : 15 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
6. After installing the clevis pin, install the snap pin to connect the clutch pedal to the push rod.
7. After finishing the component installation, bleed the air from the clutch hydraulic system. Refer to CL-7, "BLEEDING PROCEDURE" .

OPERATING CYLINDER

PFP:30620

Components

ECS005RV



1. Cylinder body
2. Piston spring
3. Piston cup
4. Piston
5. Push rod
6. Dust cover
7. Air bleeder
8. Spacer
9. Union bolt
10. Copper washer
11. Clutch hose

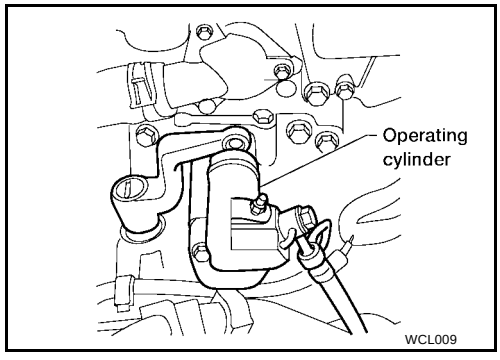
Removal

ECS005RW

1. Drain the brake fluid from the clutch hydraulic system.

   CAUTION:
   Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.

2. Remove the union bolt, the two copper washers, and the clutch hose from the operating cylinder. Discard the copper washers.
3. Remove the operating cylinder bolts, and remove the operating cylinder.



Disassembly

ECS005RX

1. Remove the dust cover from the operating cylinder body.
2. Remove the push rod.
3. Remove the piston.
4. Remove the piston cup.
5. Remove the piston spring.
6. Remove the air bleeder.

Inspection

ECS005RY

Inspect for the following, and replace any parts as necessary.

- Damage, foreign material, wear, rust, and pinholes on the cylinder inner surface, piston, and sliding part of piston cup

- Weak piston spring
- Crack or deformation of dust cover

Assembly

ECS005RZ

CAUTION:
To assemble the operating cylinder use the specified rubber grease and rubber lubricant. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .

1. Apply rubber lubricant to the overall inside surface of the operating cylinder body.
2. Install the air bleeder, tighten to specification.

Air bleeder : 6 - 10 N·m (0.6 - 1.0 kg-m, 52 - 87 in-lb)

3. Install the piston spring with the tapered spring end pointing toward the piston cup.
4. Apply rubber grease and install the piston cup.
5. Apply rubber grease and install the piston.
6. Install the push rod.
7. Apply rubber grease and install the dust cover.

Installation

ECS005S0

Installation is in the reverse order of removal.

CAUTION:
- **Install the clutch hose without twisting it.**
- **The two copper washers for the union bolt cannot be reused. Use two new copper washers for installation.**
- **After finishing the installation, bleed the air from the clutch hydraulic system. Refer to CL-7, "BLEEDING PROCEDURE" .**

PIPING

PFP:00000

Removal

ECS005S1

1. Remove the engine air cleaner and air duct. Refer to EM-15, "Removal and Installation" .
2. Drain the brake fluid from the clutch hydraulic system.

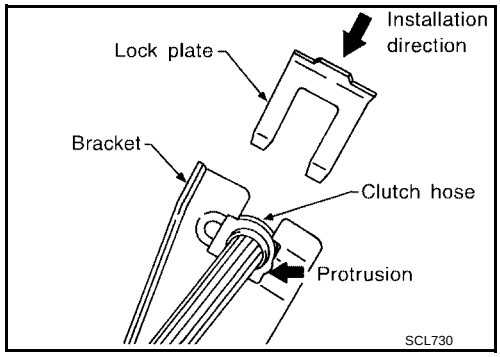
   CAUTION:
   Be careful not to splash brake fluid on painted areas, it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.
3. Remove the flare nut from the operating cylinder body using a flare nut wrench.
4. Remove the union bolt and two copper washers attaching the clutch hose from the operating cylinder. Discard the two copper washers.
5. Remove the clutch hose from the bracket by removing the lock plate.

Installation

ECS005S2

1. When installing the clutch hose into the bracket, position the lock plate in the specified direction as shown to secure the clutch hose.

   CAUTION:
   Install the clutch hose without twisting or bending it.



2. Tighten the flare nut to specification, using a flare nut wrench.

   Flare nut : 15 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)

   CAUTION:
   Be careful not to damage the flare nut and clutch tube.
3. Position the clutch hose and install the union bolt and two new copper washers on to the operating cylinder, and tighten the union bolt to specification.

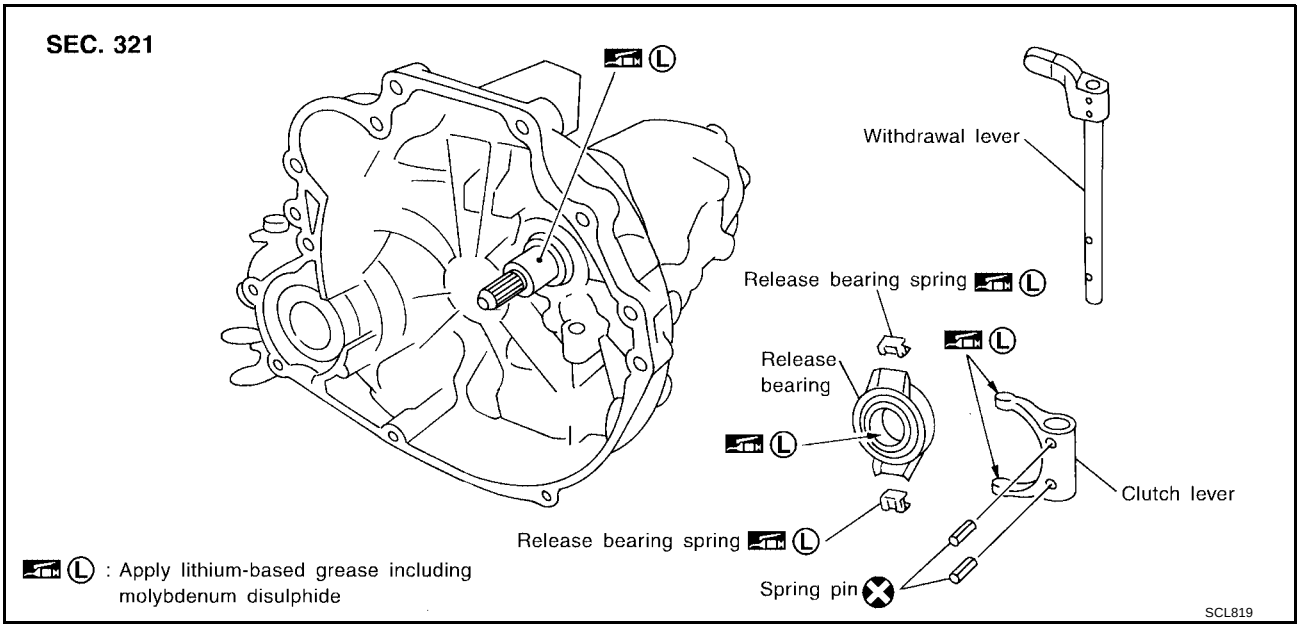
   Union bolt : 17 - 19 N·m (1.7 - 2.0 kg-m, 13 - 14 ft-lb)
4. Bleed the air from the clutch hydraulic system. Refer to CL-7, "BLEEDING PROCEDURE" .
5. Install the engine air cleaner and air duct. Refer to EM-15, "Removal and Installation" .

CLUTCH RELEASE MECHANISM

PFP:30502

Components

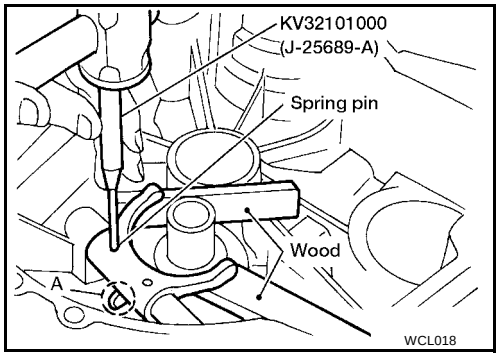
ECS005S3



Removal

ECS005S4

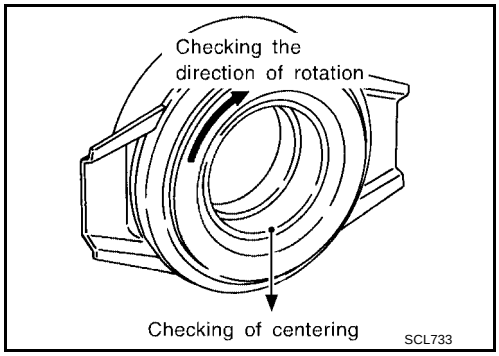
1. Remove the manual transaxle. Refer to MT-15, "Removal and Installation" (RS5F70A).
2. Move the withdrawal lever enough to remove the release bearing and release bearing spring, and remove the release bearing from the clutch lever.
3. Support the clutch lever claws with an appropriate wood block, align the retaining pin with "A" as shown, and drive out the spring pins using a pin punch.
4. Pull out the withdrawal lever and remove the clutch lever from the clutch housing.



Inspection

ECS005S5

- Replace the release bearing if it is seized, damaged, faulty in rotation direction, or has poor alignment.
- Replace the withdrawal lever if the contact surface is worn excessively.
- Replace the clutch lever if its contact surface is worn excessively.



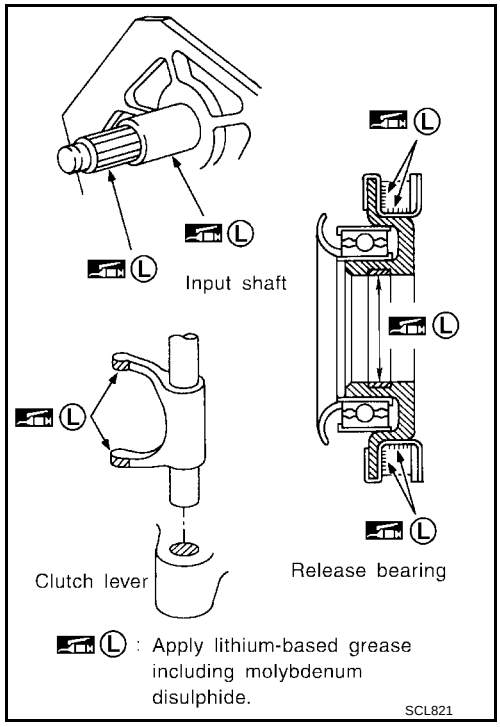
Installation

ECS005S6

CAUTION:

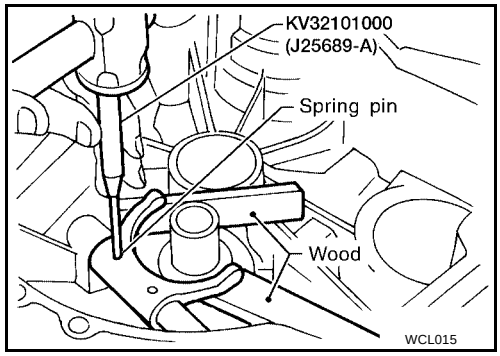
- **Apply grease to the clutch components. Otherwise, abnormal noise, poor clutch disengagement, or clutch damage may occur. Wipe the excess grease off completely, as it may cause the clutch components to slip and shudder.**
- **Keep the clutch disc facing, pressure plate, and flywheel free of oil and grease.**

- **Clean any old grease and abrasive materials off of the grease application areas as shown.**
- **Apply approximately a 1 mm (0.04 in) thick coating of clutch sleeve grease evenly on the sliding part of the clutch lever and the release bearing spring.**
- **Apply just enough clutch sleeve grease to fill up the release bearing inner groove.**
- **Apply the clutch grease to the clutch disc and the input shaft spline. Install the clutch disc to the input shaft, remove the excess grease around the shaft, and remove the clutch disc.**
- **Lightly and evenly apply the clutch sleeve grease on the sliding part of the release bearing. Install the release bearing and remove any excess grease around the bearing, then remove the release bearing.**

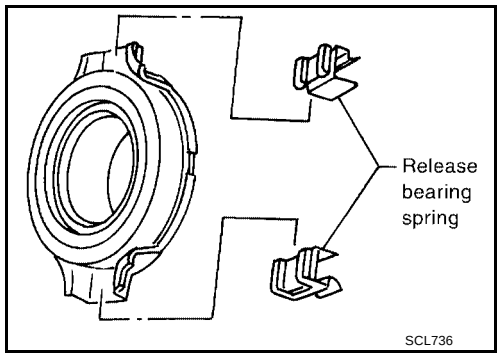


1. Assemble the clutch lever to clutch housing, and insert the withdrawal lever.
2. Support the clutch lever claws with an appropriate wood block, and install new spring pins using a pin punch as shown.

   CAUTION:
   Spring pins cannot be reused.

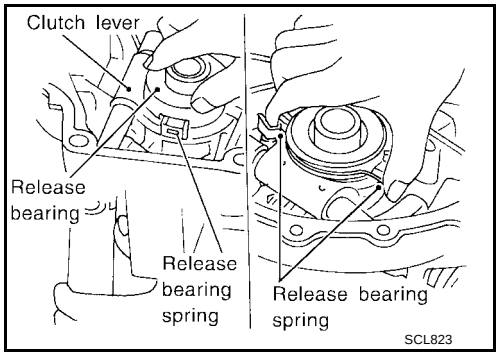


3. Install the release bearing springs on to the release bearing as shown.



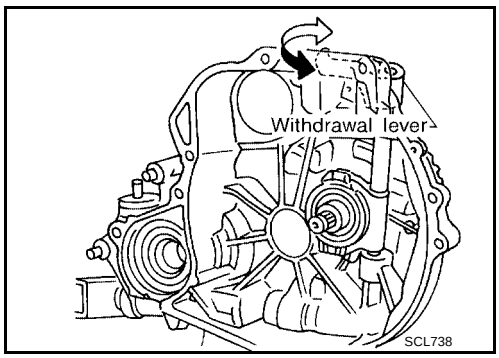
4. Operate the withdrawal lever manually, press the release bearing spring from both sides, and install the release bearing onto the clutch lever securely.

CAUTION:
Make sure a click is heard when the release bearing spring is pressed from both sides.



5. Check that all parts operate smoothly when operating the withdrawal lever.

CAUTION:
Remove any excess grease.



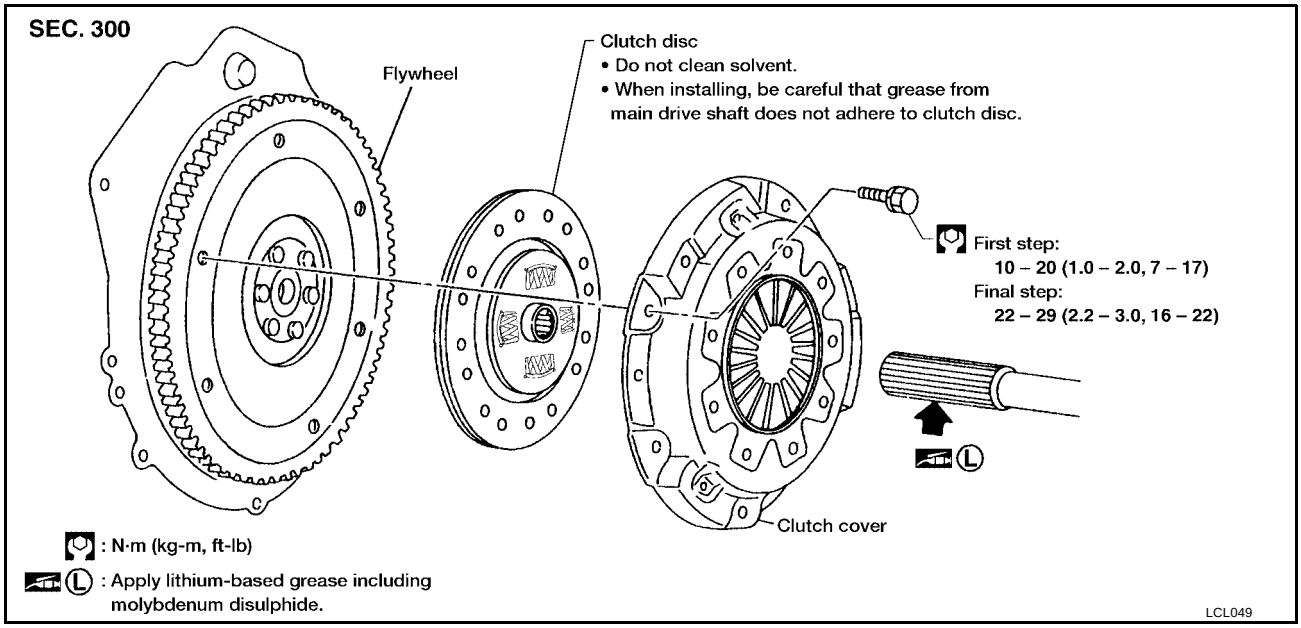
6. Install the manual transaxle. Refer to MT-15, "Removal and Installation" (RS5F70A).

CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

PFP:30100

Components

ECS005S7



Removal

ECS0077Y

1. Remove the manual transaxle. Refer to MT-15, "Removal and Installation" (RS5F70A).
2. Evenly loosen the clutch cover bolts, then remove the clutch cover and clutch disc.

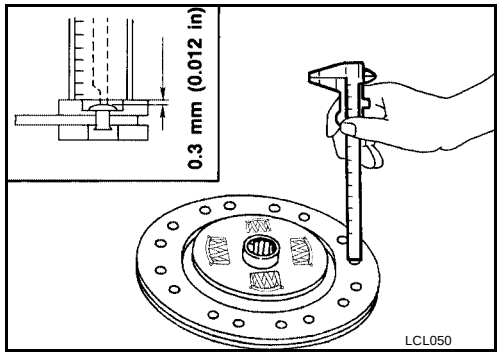
Inspection and Adjustment

ECS005S8

CLUTCH DISC

- Check the clutch disc for wear on the facing surface at the rivets as shown.

Wear limit of facing surface to rivet head : 0.3 mm (0.012 in)

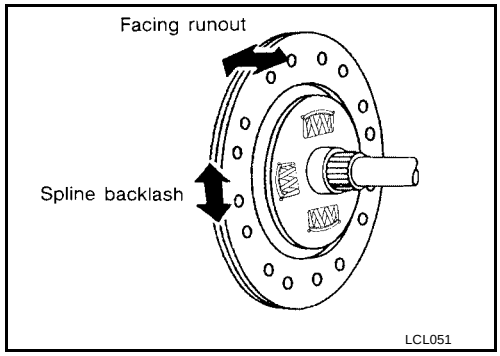


- Check the clutch disc for backlash on the spline and runout on the facing.

Maximum backlash of spline (at outer edge of disc) : 0.9 mm (0.035 in)

Runout limit : 1.0 mm (0.039 in)

Distance of runout check point (from hub center) : 102.5 mm (4.04 in)



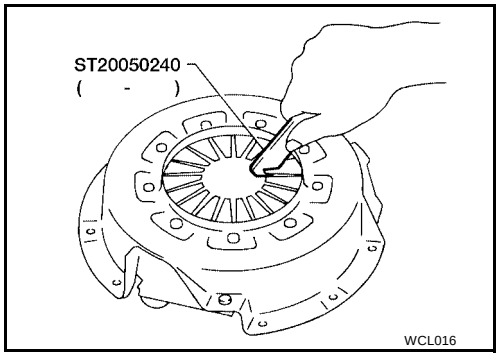
- Check the clutch disc for burns, discoloration, and oil or grease leakage. Replace if necessary.

CLUTCH COVER AND FLYWHEEL

- Check the clutch cover installed for unevenness of the diaphragm spring toe heights.

  Uneven limit : 0.88 mm (0.0346 in)

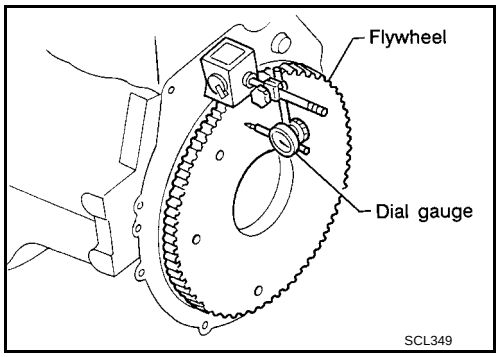
  If the toe heights are greater than the uneven limit, adjust the height with Tool as shown.



FLYWHEEL INSPECTION

- Check the contact surface of flywheel for slight burns or discoloration. Clean the flywheel contact surface with emery paper.
- Check the flywheel runout using a dial gauge as shown.

  Maximum allowable runout : Refer to EM-79, "Flywheel Runout" .



Installation

ECS005S9

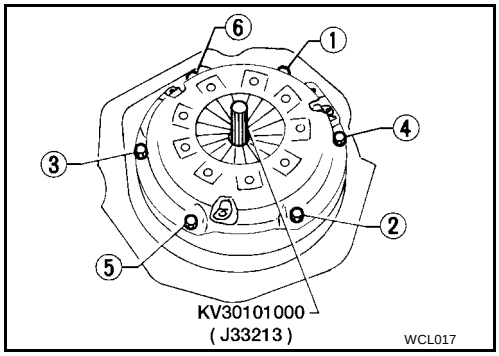
Installation is in the reverse order of removal.

CAUTION:

- **Do not clean the clutch disc with solvent.**
- **When installing the clutch disc, do not to allow grease from the main driveshaft to contact the clutch disc friction surface.**
- Insert Tool into clutch disc hub for proper alignment when installing the clutch cover and disc as shown.
- Tighten the clutch cover bolts in numerical order in two steps as shown.

  First step : 10 - 20 N·m (1.0 - 2.0 kg-m, 7 - 14 ft-lb)

  Final step : 22 - 29 N·m (2.2 - 3.0 kg-m, 16 - 22 ft-lb)



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Clutch Control System

ECS005SA

Type of clutch control	Hydraulic

Clutch Master Cylinder

ECS005SB

Unit: mm (in)

Inner diameter	15.87 (5/8)

Clutch Operating Cylinder

ECS005SC

Unit: mm (in)

Inner diameter	19.05 (3/4)

Clutch Disc

ECS005SD

Unit: mm (in)

Engine model	QG18DE
Model	215
Facing size (Outer dia. × inner dia. × thickness)	215 × 145 × 3.5 (8.46 × 5.71 × 0.138)
Thickness of disc assembly with load	7.7 - 8.3 (0.303 - 0.327) with 4,900 N (499.8 kg, 1,101.5 lb)
Wear limit of facing surface to rivet head	0.3 (0.012)
Runout limit of facing	1.0 (0.039)
Distance of runout check point (from the hub center)	102.5 (4.04)
Maximum backlash of spline (at outer edge of disc)	0.9 (0.035)

Clutch Cover

ECS005SE

Unit: mm (in)

Engine model	QG18DE
Model	215
Full-load	4,900 N (499.8 kg, 1,101.5 lb)
Uneven limit of diaphragm spring toe height	0.88 (0.0346)

Clutch Pedal

ECS005SF

Unit: mm (in)

Clearance “C” between pedal stopper rubber and clutch interlock switch threaded end while clutch pedal is fully depressed.	0.1 - 1.0 (0.004 - 0.039)

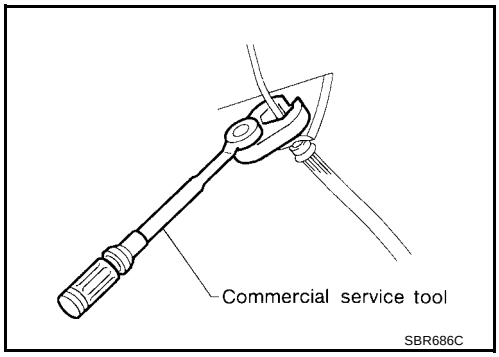
PRECAUTIONS

PFP:00001

Precautions

ECS005SG

- **Recommended fluid is brake fluid “DOT 3”.**
- **Do not reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**
- **Use a flare nut wrench when removing or installing the clutch hydraulic tubes.**
- **Use new brake fluid to clean or wash all parts of the master cylinder and operating cylinder.**
- **Never use mineral oils such as gasoline or kerosene. It will ruin the rubber parts of the hydraulic system.**



WARNING:

After cleaning the clutch disc, wipe it with a dust collector. Do not use compressed air.

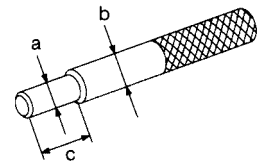
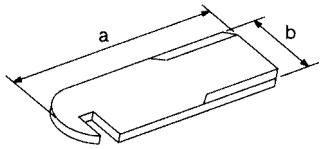
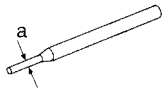
PREPARATION

PFP:00002

Special Service Tools

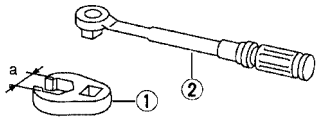
ECS005SH

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
ST20630000 (J26366) Clutch aligning bar  NT405	Installing clutch cover and clutch disc **a: 15.8 mm (0.622 in) dia.** **b: 22.9 mm (0.902 in) dia.** **c: 45.0 mm (1.772 in)**
ST20050240 (—) Diaphragm spring adjusting wrench  S-NT404	Adjusting unevenness of diaphragm spring of clutch cover **a: 150 mm (5.91 in)** **b: 25 mm (0.98 in)**
KV32101000 (J25689-A) Pin punch  S-NT410	Removing and installing spring pin **a: 4 mm (0.16 in) dia.**

Commercial Service Tools

ECS005SI

Tool name	Description
1. Flare nut crowfoot 2. Torque wrench  S-NT360	Removing and installing clutch piping **a: 10 mm (0.39 in)**

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

ECS005SJ

Use the chart below to help you find the cause of the symptom. The numbers indicate the order of inspection. Check each part in order. If necessary, repair or replace the parts.

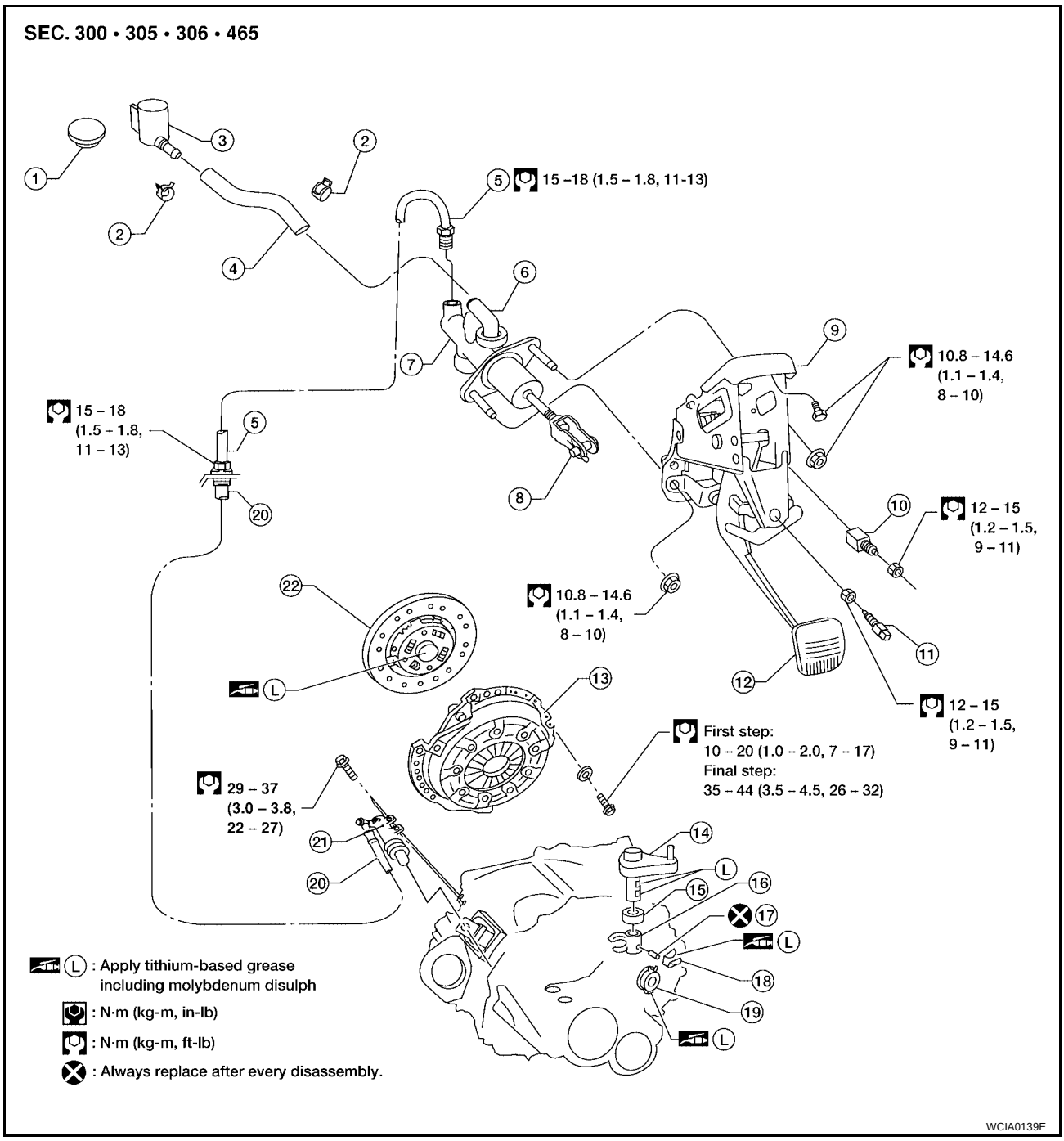
		Reference page	CL-24	CL-24	CL-26	CL-28	EM-65, "Removal and Installation"	CL-31	CL-33							CL-33	CL-34		CL-34
		Suspected parts (Possible cause)	Clutch pedal (Inspection and adjustment)	Clutch line (Air in line)	Master cylinder piston cup (Damaged)	Operating cylinder piston cup (Damaged)	Engine mounting (Loose)	Release bearing (Worn, dirty or damaged)	Clutch disc (Out of true)	Clutch disc (Runout is excessive)	Clutch disc (Lining broken)	Clutch disc (Dirty or burned)	Clutch disc (Oily)	Clutch disc (Worn out)	Clutch disc (Hardened)	Clutch disc (Lack of spline grease)	Diaphragm spring (Damaged)	Diaphragm spring (Out of tip alignment)	Clutch cover (Distortion)	Flywheel (Distortion)
Symptom	Clutch grabs/chatters						1			2			2	2	2			2		
	Clutch pedal spongy		1	2	2															
	Clutch noisy							1												
	Clutch slips	1											2	2			3		4	5
	Clutch does not disengage	1	2	3	4			5	5	5	5	5			5	6	6	7	

CLUTCH SYSTEM

PFP:30502

Components

ECS005SK



1. Reservoir cap
2. Hose clamp
3. Reservoir tank
4. Reservoir hose
5. Clutch tube
6. Nipple
7. Clutch master cylinder
8. Clevis
9. Clutch pedal bracket
10. Clutch interlock switch
11. ASCD clutch switch (if equipped)
12. Clutch pedal
13. Clutch cover
14. Withdrawal lever
15. Spacer
16. Clutch lever
17. Spring pin
18. Release bearing spring
19. Release bearing
20. Clutch hose
21. Operating cylinder
22. Clutch disc

Inspection and Adjustment

ECS006H9

CLUTCH PEDAL INSPECTION AND ADJUSTMENT

1. Check to see if the clutch pedal clevis pin floats freely in the bore of the clutch pedal. It should not be bound by the clevis or clutch pedal.

a. If the pin is not free, check that the ASCD switch or pedal stopper bolt is not applying pressure to the clutch pedal causing the pin to bind. To adjust, loosen the ASCD switch or pedal stopper bolt lock nut and turn the ASCD switch or pedal stopper bolt.

b. Tighten the lock nut.

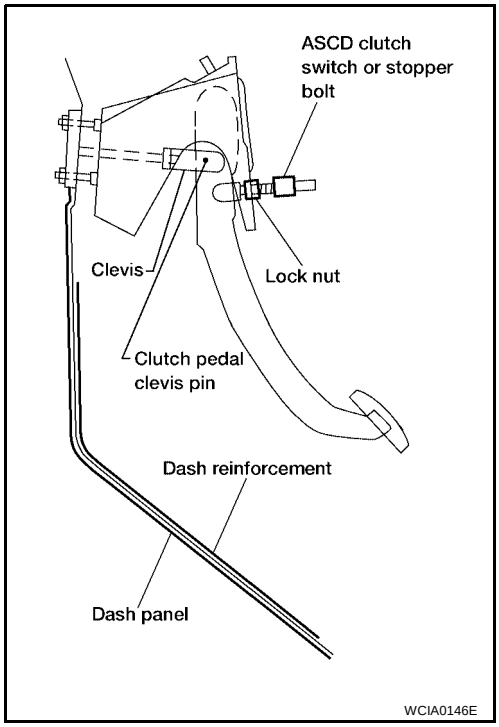
c. Verify that the clutch pedal clevis pin floats freely in the bore of the clutch pedal. It should not be bound by the clevis or clutch pedal.

d. If the pin is still not free, remove the pin and check for deformation or damage. Replace the pin if necessary. Leave the pin removed for step 2.

2. Check the clutch pedal stroke for free range of movement.

a. With the clutch pedal clevis pin removed, manually move the pedal up and down to determine if it moves freely.

b. If any sticking is noted, replace the related parts (clutch pedal, pedal bracket, assist spring, bushing, etc.). Reassemble the pedal and re-verify that the clevis pin floats freely in the bore of the pedal.



3. Adjust the clearance “C” while fully depressing the clutch pedal (with the clutch interlock switch) as shown.

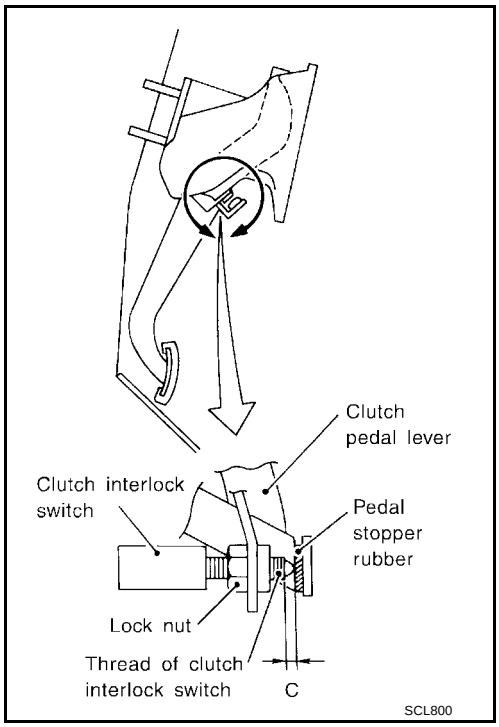
Clearance "C" : 0.1 - 1.0 mm (0.004 - 0.039 in)

4. Check the clutch hydraulic system components (clutch master cylinder, clutch operating cylinder, Clutch withdrawal lever, clutch release bearing, etc.) for sticking or binding.

a. If any sticking or binding is noted, repair or replace the related parts as necessary.

b. If any hydraulic system repair was necessary, bleed the clutch hydraulic system. Refer to CL-24, "BLEEDING PROCEDURE" .

NOTE:
Do not use a vacuum assist or any other type of power bleeder on this system. Use of a vacuum assist or power bleeder will not purge all of the air from the system.



BLEEDING PROCEDURE

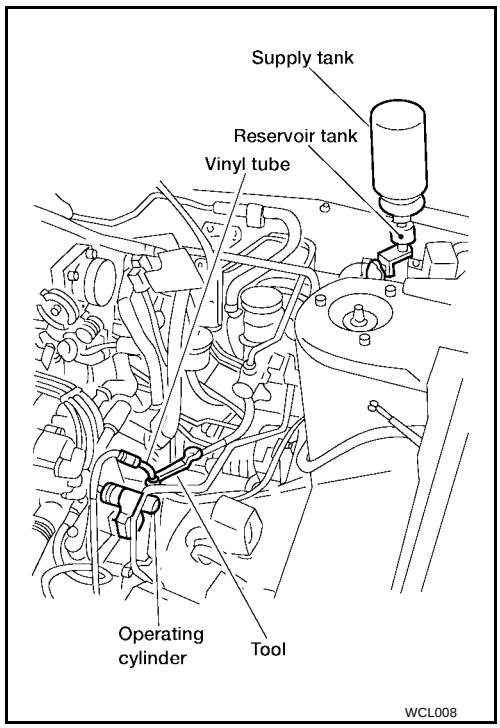
CAUTION:
Carefully monitor the fluid level at the clutch master cylinder during the bleeding operation.

NOTE:
Do not use a vacuum assist or any other type of power bleeder on this system. Use of a vacuum assist or power bleeder will not purge all of the air from the system.

1. Top off the clutch master cylinder reservoir with the recommended brake fluid. Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" . Then attach the additional supply tank as shown.

   CAUTION:

   Do not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.
2. Connect a transparent vinyl tube to the air bleeder valve as shown.
3. Slowly depress the clutch pedal to its full stroke and release it completely. Repeat this operation several times at 2 to 3 seconds intervals.
4. Open the air bleeder valve with the clutch pedal fully depressed.



5. Close the air bleeder valve and tighten to specification.

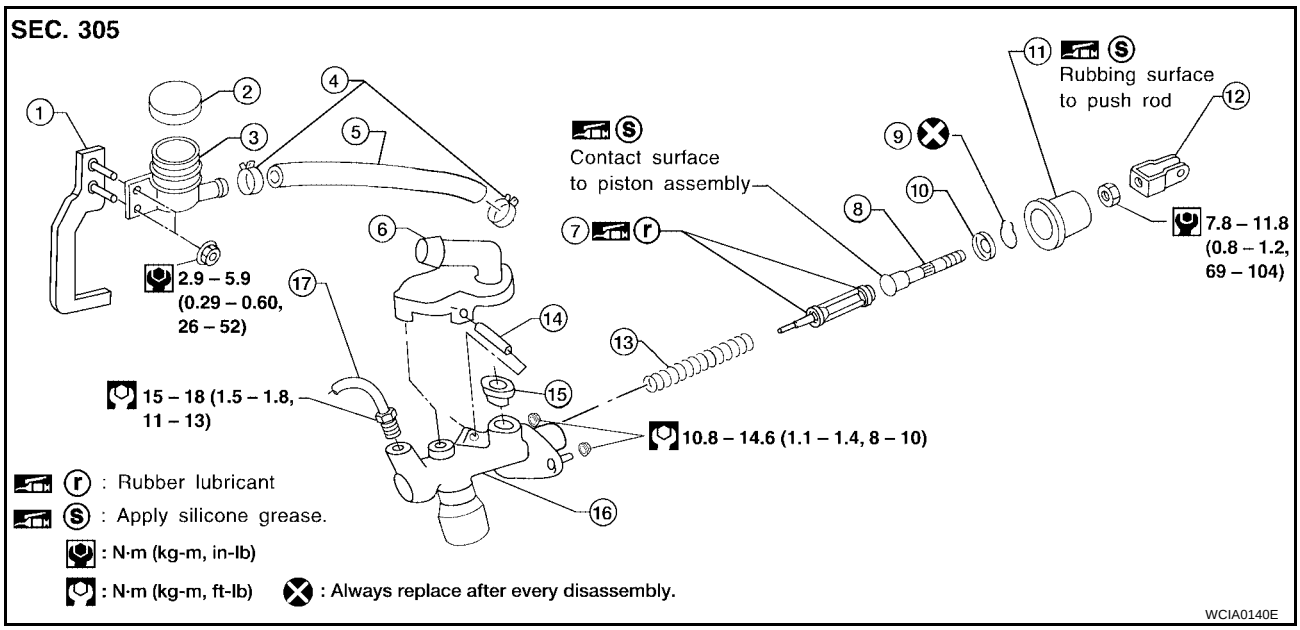
   Air bleeder valve : 5.9 - 9.8 N·m (0.6 - 1.0 kg-m, 52 - 87 in-lb)
6. Release the clutch pedal and wait at least 5 seconds.
7. Repeat steps 3 through 6 above until no more air bubbles are in the brake fluid coming out of the vinyl tube attached to the air bleeder valve.

CLUTCH MASTER CYLINDER

PFP:30610

Components

ECS005SM



1. Bracket	2. Reservoir cap	3. Reservoir tank
4. Hose clamps	5. Reservoir hose	6. Nipple
7. Piston assembly seals	8. Push rod	9. Stopper ring
10. Stopper	11. Dust cover	12. Clevis
13. Return spring	14. Pin	15. Seal
16. Cylinder body	17. Clutch tube	

Removal

ECS005SN

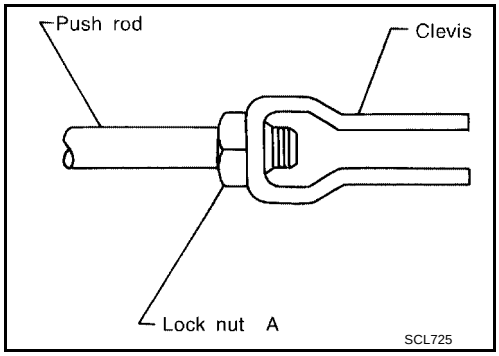
1. Drain the brake fluid from the clutch hydraulic system.

   CAUTION:
   Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.
2. Remove the clutch tube flare nut using a flare nut wrench.
3. Remove the reservoir hose.
4. Remove the snap pin from the clevis pin and remove the clutch pedal from the clevis.
5. Unscrew the master cylinder assembly nuts and reservoir tank bracket nuts to remove the master cylinder assembly.

Disassembly

ECS005SP

1. Loosen the push rod lock nut "A" to remove the clevis and lock nut "A".
2. Remove the dust cover.
3. Remove the stopper ring and stopper, and remove the push rod from the cylinder body. During removal, keep the push rod depressed, to prevent the piston inside the master cylinder from popping out. Discard the stopper ring.
4. Remove the piston assembly from the cylinder body.
5. Remove the return spring.
6. Remove the pin using a pin punch, then remove the nipple and seal.



Inspection

ECS005SQ

Inspect for the following, and replace parts if necessary.

- Damage, wear, rust, and pinholes on the cylinder inner wall
- Damage and deformation of the reservoir tank
- Weak spring
- Crack or deformation of the dust cover

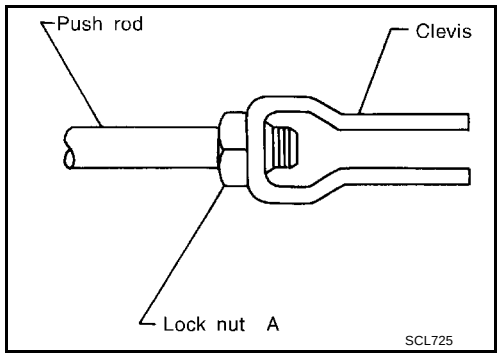
Assembly

ECS005SR

1. Install the return spring.
2. Apply rubber lubricant to the sliding parts of the piston assembly, and insert the piston assembly into cylinder body.
3. After installing the stopper on to the push rod, install the new stopper ring while keeping the piston assembly depressed by hand, so that the piston assembly will not pop out.

   CAUTION:
   The stopper ring cannot be reused. Always use a new stopper ring for assembly.
4. Apply silicone grease to the dust cover and install the dust cover.
5. Install the clevis on to push rod, and tighten the lock nut "A" to specification.

   Lock nut "A" : 7.8 - 11.8 N·m (0.8 - 1.2 kg-m, 69 - 104 in-lb)
6. Install the seal and nipple on to the cylinder body, and install the pin using a pin punch.



Installation

ECS005SO

1. Install the reservoir hose.
2. Connect the clutch tube to the master cylinder assembly, and hand-tighten the flare nut.
3. Install the master cylinder assembly to the cowl, and tighten the nuts to specification.

   Master cylinder nuts : 10.8 - 14.6 N·m (1.1 - 1.4 kg-m, 8 - 10 ft-lb)
4. Tighten reservoir tank bracket nuts to specification.

   Reservoir tank bracket nuts : 2.9 - 5.9 N·m (0.29 - 0.60 kg-m, 26 - 52 in-lb)
5. Tighten clutch tube flare nut using a flare nut torque wrench to specification.

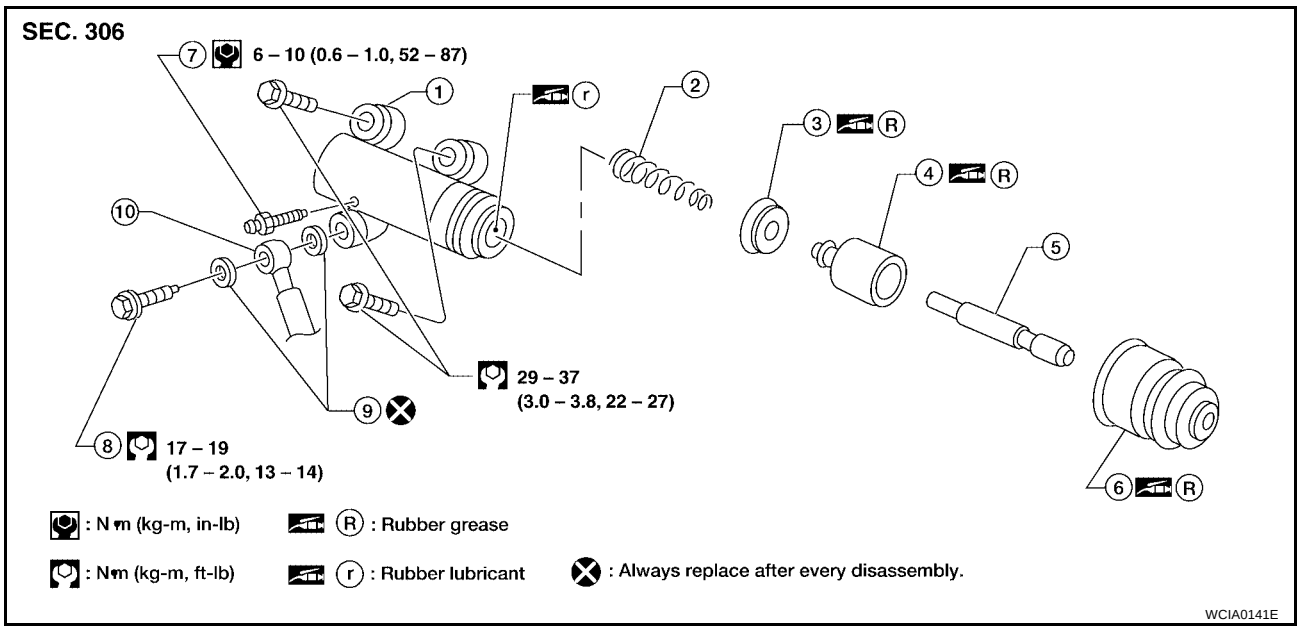
   Clutch tube flare nut : 15 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
6. After installing the clevis pin, install the snap pin to connect the clutch pedal to the push rod.
7. After finishing the installation, bleed the air out of the clutch hydraulic system. Refer to CL-24, "BLEEDING PROCEDURE" .

OPERATING CYLINDER

PFP:30620

Components

ECS005SS



1. Cylinder body
2. Piston spring
3. Piston cup
4. Piston
5. Push rod
6. Dust cover
7. Air bleeder
8. Union bolt
9. Copper washer
10. Clutch hose

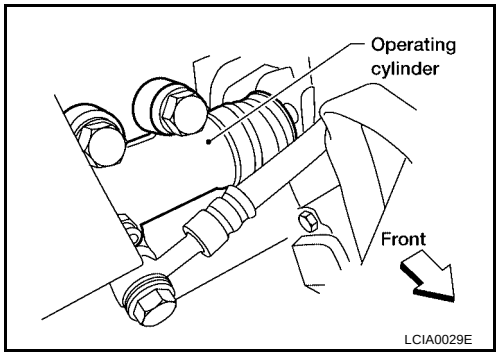
Removal

ECS005ST

1. Drain the brake fluid from clutch hydraulic system.

   CAUTION:
   Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.

2. Remove the union bolt, the two copper washers, and the clutch hose from the operating cylinder. Discard the copper washers.
3. Remove the operating cylinder bolts, and remove the operating cylinder.



Disassembly

ECS005SU

1. Remove the dust cover from the operating cylinder body.
2. Remove the push rod.
3. Remove the piston.
4. Remove the piston cup.
5. Remove the piston spring.
6. Remove the air bleeder.

Inspection

ECS005SV

Inspect for the following, and replace parts as necessary.

- Damage, foreign material, wear, rust, and pinholes on the cylinder inner surface, piston, and sliding part of piston cup

- Weak piston spring
- Crack or deformation of dust cover

Assembly

ECS005SW

1. Apply rubber lubricant to the overall inside surface of the operating cylinder body.

   CAUTION:
   To assemble the operating cylinder use the specified rubber grease and rubber lubricant. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .
2. Install the air bleeder and tighten to specification.

   Air bleeder : 6 - 10 N·m (0.6 - 1.0 kg-m, 52 - 87 in-lb)
3. Install the piston spring.
4. Apply rubber grease and install the piston cup.
5. Apply rubber grease and install the piston.
6. Install the push rod.
7. Apply rubber grease and install the dust cover.

Installation

ECS005SX

Installation is in the reverse order of removal.

CAUTION:

- **Install the clutch hose without twisting it.**
- **The two copper washers for the union bolt cannot be reused. Use two new copper washers for installation.**
- **After finishing the installation, bleed the air from the clutch hydraulic system. Refer to CL-24, "BLEEDING PROCEDURE" .**

PIPING

PFP:00000

Removal

ECS005SY

1. Remove the engine air cleaner and air duct. Refer to EM-106, "Removal and Installation" .
2. Drain the brake fluid from the clutch hydraulic system.

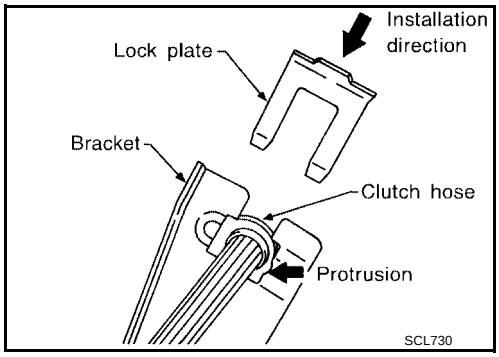
   CAUTION:
   Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.
3. Remove the flare nut from the operating cylinder body using a flare nut wrench.
4. Remove the union bolt and two copper washers attaching the clutch hose from the operating cylinder. Discard the two copper washers.
5. Remove the clutch hose from the bracket by removing the lock plate.

Installation

ECS005SZ

1. When installing the clutch hose into the bracket, position the lock plate in the specified direction as shown to secure the clutch hose.

   CAUTION:
   Install the clutch hose without twisting or bending it.



2. Tighten the flare nut to specification, using a flare nut wrench.

   Flare nut : 15 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)

   CAUTION:
   Be careful not to damage the flare nut and clutch tube.
3. Position the clutch hose and install the union bolt and two new copper washers on to the operating cylinder, and tighten the union bolt to specification.

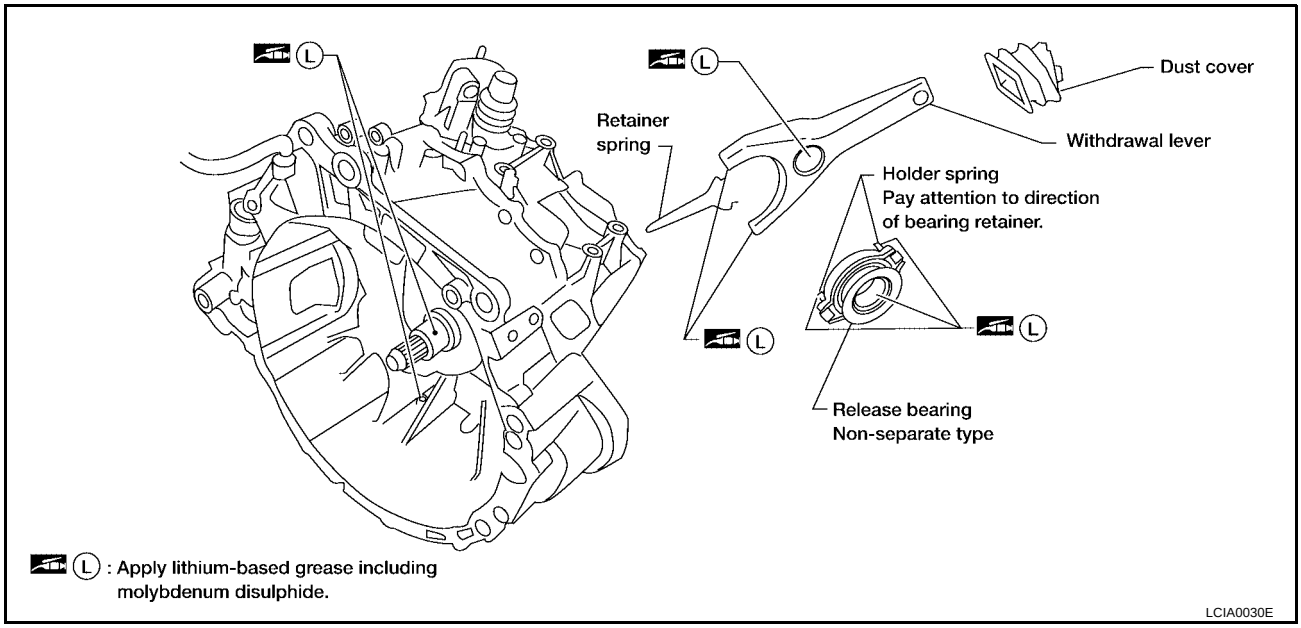
   Union bolt : 17 - 19 N·m (1.7 - 2.0 kg-m, 13 - 14 ft-lb)
4. Bleed the air from the clutch hydraulic system. Refer to CL-24, "BLEEDING PROCEDURE" .
5. Install the engine air cleaner and air duct.

CLUTCH RELEASE MECHANISM

PFP:30502

Components

ECS005T0



Removal

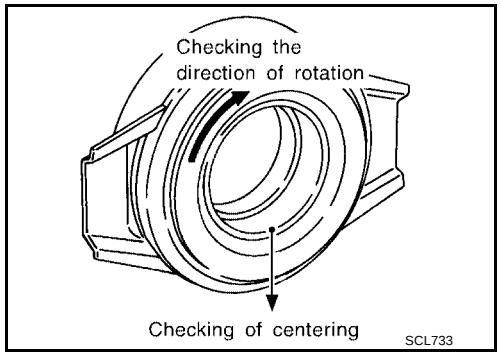
ECS005T1

1. Remove the manual transaxle. Refer to MT-79, "Removal and Installation" (RS6F51H).
2. Move the withdrawal lever enough to remove the release bearing, and remove the release bearing from the clutch lever.
3. Remove the withdrawal lever retainer spring.
4. Pull out the withdrawal lever and remove the dust cover.

Inspection After Removal

ECS005T2

- Replace the release bearing if it is seized, damaged, faulty in rotation direction, or has poor alignment.
- Replace the withdrawal lever if the contact surface is worn excessively.
- Replace the dust seal if its deformed or cracked.

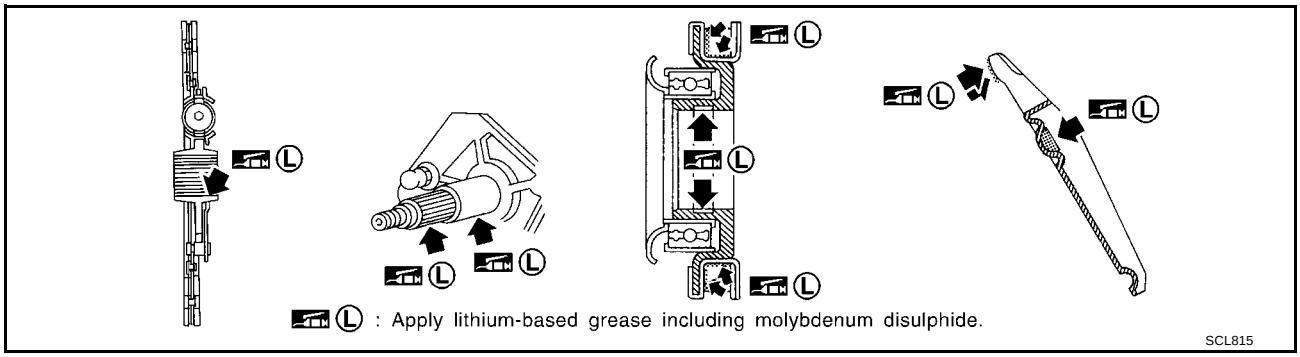


Installation

ECS005T3

Installation is in the reverse order of removal.

- Clean any old grease and abrasive materials off of the grease application areas as shown.



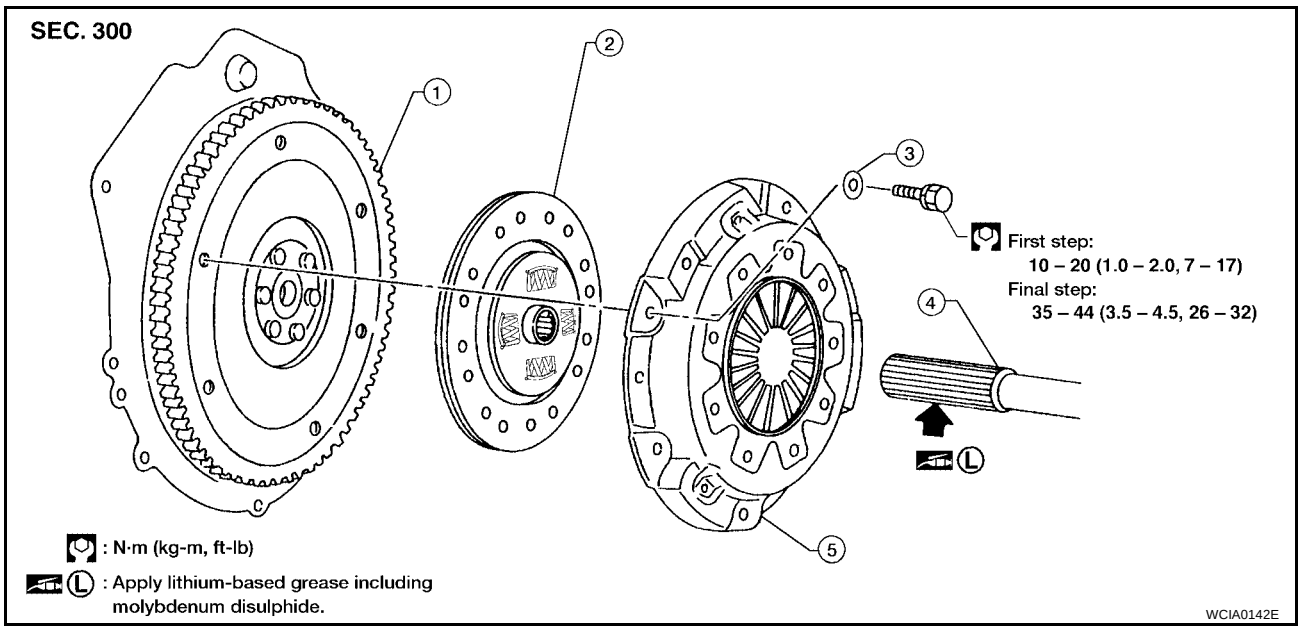
- Apply approximately a 1 mm (0.04 in) thick coating of clutch sleeve grease to the withdrawal lever and holder spring friction surfaces.
- Apply a coat of clutch sleeve grease to the grooves on contact surfaces of the withdrawal lever ball pin and inner surface of the release bearing; make sure the grease is flush with the grooves.
- Apply a thin coat of clutch sleeve grease to the release bearing friction surface. After the grease application, install the release bearing. Wipe off any excess grease forced out from the bearing installation.

CLUTCH DISC, CLUTCH COVER AND FLYWHEEL

PFP:30100

Components

ECS005T4



1. Flywheel
2. Clutch disc
3. Washer
4. Main drive shaft
5. Clutch cover

Removal

ECS0077Z

1. Remove the transaxle. Refer to MT-79, "Removal and Installation" (RS5F51H).
2. Evenly loosen the clutch cover bolts, then remove the clutch cover and clutch disc.

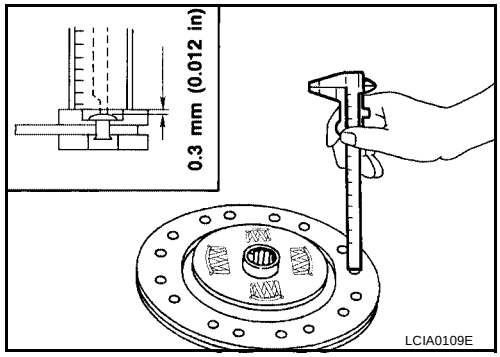
Inspection and Adjustment

ECS005T5

CLUTCH DISC

- Check clutch disc for wear of the facing surface at the rivets as shown.

Wear limit of facing surface to rivet head : 0.3 mm (0.012 in)

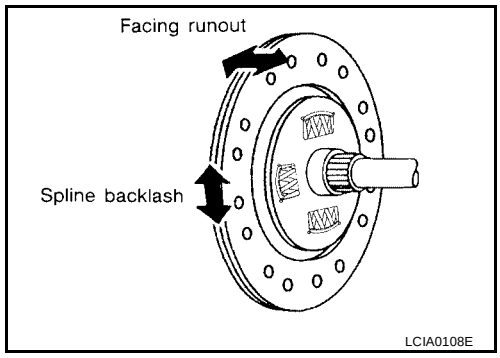


- Check the clutch disc for backlash of the spline and runout of the facing as shown.

Maximum backlash of spline (at outer edge of disc) : 0.9 mm (0.035 in)

Runout limit : 1.0 mm (0.039 in)

Distance of runout check point (from hub center) : 115.0 mm (4.53 in)



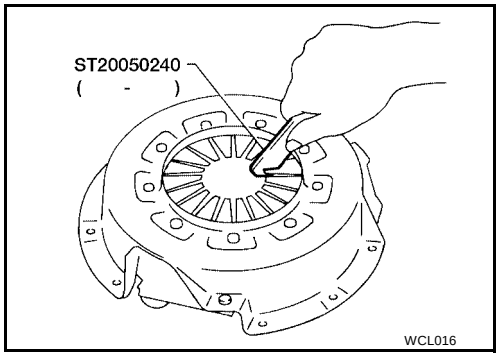
- Check the clutch disc for burns, discoloration, or oil and grease leakage. Replace the components as necessary.

CLUTCH COVER AND FLYWHEEL

Check the spring toe height unevenness of the clutch cover with it installed on the vehicle.

Uneven limit : 0.7 mm (0.028 in)

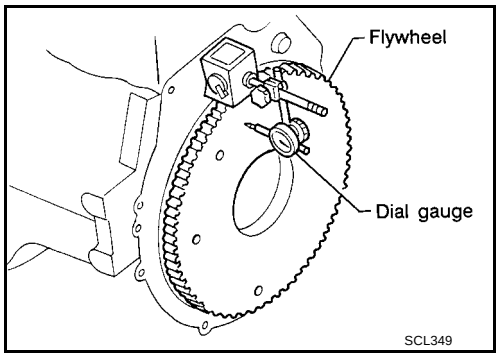
If the measured uneven height is greater than the specified limit, adjust the spring toe height with Tool as shown.



FLYWHEEL INSPECTION

- Check the contact surface of the flywheel for slight burns or discoloration. Clean the flywheel contact surface with emery paper.
- Check the flywheel runout using a dial gauge as shown.

Maximum allowable runout : Refer to EM-188, "MOVEMENT AMOUNT OF FLYWHEEL (M/T MODEL)" .



Installation

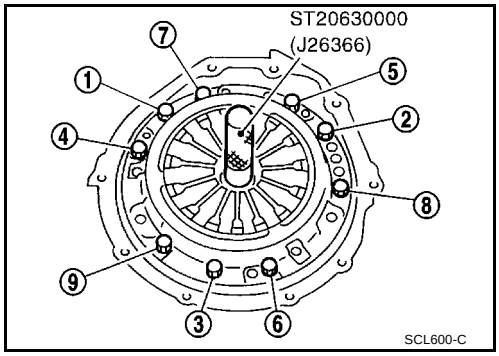
ECS005T6

Installation is in the reverse order of removal.

CAUTION:

- **Do not clean the clutch disc with solvent.**
- **When installing the clutch disc, do not allow grease from the main driveshaft to contact the clutch disc friction surface.**
- Insert Tool into the clutch disc hub for correct alignment when installing the clutch cover and disc as shown.
- Tighten the bolts in numerical order in two steps as shown.

First step : 10 - 20 N·m (1.0 - 2.0 kg-m, 7 - 14 ft-lb)
Final step : 35 - 44 N·m (3.5 - 4.5 kg-m, 26 - 32 ft-lb)



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Clutch Control System

ECS005T7

Type of clutch control	Hydraulic

Clutch Master Cylinder

ECS005T8

Unit: mm (in)

Inner diameter	15.87 (5/8)

Clutch Operating Cylinder

ECS005T9

Unit: mm (in)

Inner diameter	19.05 (3/4)

Clutch Disc

ECS005TA

Unit: mm (in)

Engine model	QR25DE
Model	240
Facing size (Outer dia. × inner dia. × thickness)	240 × 160 × 3.5 (9.45 × 6.30 × 0.138)
Thickness of disc assembly with load	7.8 - 8.4 (0.307 - 0.331) with 5,884 N (600 kg, 1,322 lb)
Wear limit of facing surface to rivet head	0.3 (0.012)
Runout limit of facing	1.0 (0.039)
Distance of runout check point (from the hub center)	115.0 (4.53)
Maximum backlash of spline (at outer edge disc)	0.9 (0.035)

Clutch Cover

ECS005TB

Unit: mm (in)

Engine model	QR25DE
Model	240
Full-load	5,884 N (600 kg, 1,322 lb)
Uneven limit of diaphragm spring toe height	0.7 (0.028)

Clutch Pedal

ECS005TC

Unit: mm (in)

Clearance “C” between pedal stopper rubber and clutch interlock switch threaded end while clutch pedal is fully depressed.	0.1 - 1.0 (0.004 - 0.039)

SECTION AT
AUTOMATIC TRANSAXLE

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RE4F03B

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TROUBLE DIAGNOSIS - INDEX

PFP:00000

Alphabetical & P No. Index for DTC

ECS005VU

ALPHABETICAL INDEX FOR DTC

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	CONSULT-II GST*1	
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A/T 2ND GR FNCTN	P0732	AT-140
A/T 3RD GR FNCTN	P0733	AT-145
A/T 4TH GR FNCTN	P0734	AT-150
A/T TCC S/V FNCTN	P0744	AT-163
ATF TEMP SEN/CIRC	P0710	AT-120
ENGINE SPEED SIG	P0725	AT-131
L/PRESS SOL/CIRC	P0745	AT-173
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TCC SOLENOID/CIRC	P0740	AT-159
TP SEN/CIRC A/T*2	P1705	AT-187
VEH SPD SEN/CIR AT*3	P0720	AT-126
CAN COMM CIRCUIT	U1000	AT-208

- *1: These numbers are prescribed by SAE J2012.
- *2: When the fail-safe operation occurs, the MIL illuminates.
- *3: The MIL illuminates when both the “Revolution sensor signal” and the “Vehicle speed sensor signal” meet the fail-safe condition at the same time.

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P0710	ATF TEMP SEN/CIRC	AT-120
P0720	VEH SPD SEN/CIR AT*3	AT-126
P0725	ENGINE SPEED SIG	AT-131
P0731	A/T 1ST GR FNCTN	AT-135
P0732	A/T 2ND GR FNCTN	AT-140
P0733	A/T 3RD GR FNCTN	AT-145
P0734	A/T 4TH GR FNCTN	AT-150
P0740	TCC SOLENOID/CIRC	AT-159
P0744	A/T TCC S/V FNCTN	AT-163
P0745	L/PRESS SOL/CIRC	AT-173
P0750	SFT SOL A/CIRC*2	AT-179
P0755	SFT SOL B/CIRC*2	AT-183
P1705	TP SEN/CIRC A/T*2	AT-187
P1760	O/R CLTCH SOL/CIRC	AT-193
U1000	CAN COMM CIRCUIT	AT-208

- *1: These numbers are prescribed by SAE J2012.
- *2: When the fail-safe operation occurs, the MIL illuminates.
- *3: The MIL illuminates when both the “Revolution sensor signal” and the “Vehicle speed sensor signal” meet the fail-safe condition at the same time.

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

ECS005VV

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precautions for On Board Diagnostic (OBD) System of A/T and Engine

ECS005VW

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

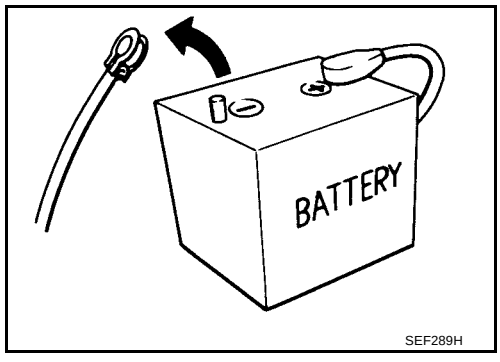
CAUTION:

- **Be sure to turn the ignition switch “OFF” and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to an open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Be sure to route and secure the harnesses properly after work. Interference of the harness with a bracket, etc. may cause the MIL to light up due to a short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to a malfunction of the EGR system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the TCM and ECM before returning the vehicle to the customer.**

Precautions

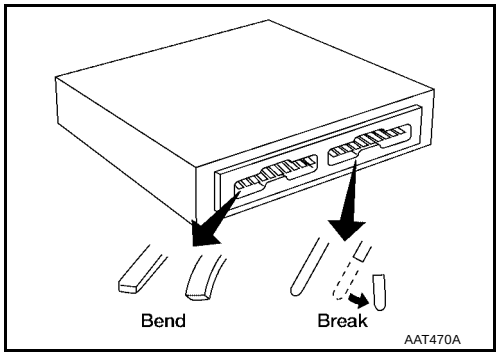
ECS005VX

- **Before connecting or disconnecting the TCM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the TCM. Because battery voltage is applied to TCM even if ignition switch is turned off.**

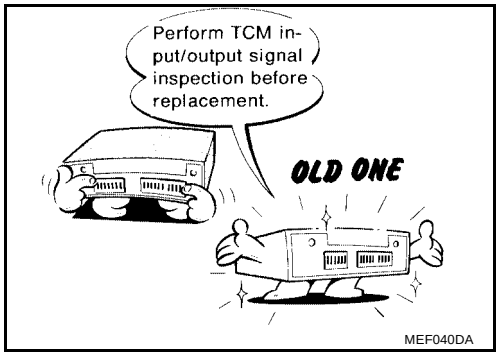


SEF289H

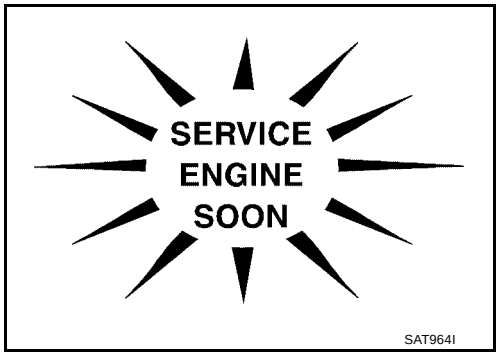
- **When connecting or disconnecting pin connectors into or from TCM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on TCM pin terminal, when connecting pin connectors.



- **Before replacing TCM, perform TCM input/output signal inspection and make sure whether TCM functions properly or not. See page AT-109 .**



- **After performing each TROUBLE DIAGNOSIS, perform "DTC (Diagnostic Trouble Code) CONFIRMATION PROCEDURE".**
  The DTC should not be displayed in the "DTC CONFIRMATION PROCEDURE" if the repair is completed.
- Before proceeding with disassembly, thoroughly clean the outside of the transaxle. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transaxle.



- Place disassembled parts in order for easier and proper assembly.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the transaxle is disassembled.
- It is very important to perform functional tests whenever they are indicated.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place disassembled valve body parts in order for easier and proper assembly. Care will also prevent springs and small parts from becoming scattered or lost.
- Properly installed valves, sleeves, plugs, etc. will slide along bores in valve body under their own weight.
- Before assembly, apply a coat of recommended ATF to all parts. Apply petroleum jelly to protect O-rings and seals, or hold bearings and washers in place during assembly. Do not use grease.
- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. Refer to AT-11, "ATF COOLER SERVICE" .
- After overhaul, refill the transaxle with new ATF.
- When the A/T drain plug is removed, only some of the fluid is drained. Old A/T fluid will remain in torque converter and ATF cooling system.
  Always follow the procedures under "Changing A/T Fluid" in the MA section when changing A/T fluid. Refer to MA-31, "Changing A/T Fluid" .

Service Notice or Precautions

ECS005VY

FAIL-SAFE

The TCM has an electronic Fail-Safe (limp home mode). This allows the vehicle to be driven even if a major electrical input/output device circuit is damaged.
Under Fail-Safe, the vehicle always runs in third gear, even with a shift lever position of “1”, “2” or “D”. The customer may complain of sluggish or poor acceleration.
When the ignition key is turned “ON” following Fail-Safe operation, O/D OFF indicator lamp blinks for about 8 seconds. [For “TCM Self-diagnostic Procedure (No Tools)”, refer to AT-51, "TCM Self-diagnostic Procedure (No Tools)" .]
The blinking of the O/D OFF indicator lamp for about 8 seconds will appear only once and be cleared. The customer may resume normal driving conditions.
Always follow the “Work Flow”. Refer to AT-60, "Work Flow" .
The SELF-DIAGNOSIS results will be as follows:

- The first SELF-DIAGNOSIS will indicate damage to the vehicle speed sensor or the revolution sensor.
- During the next SELF-DIAGNOSIS, performed after checking the sensor, no damages will be indicated.

TORQUE CONVERTER SERVICE

The torque converter should be replaced under any of the following conditions:

- External leaks in the hub weld area.
- Converter hub is scored or damaged.
- Converter pilot is broken, damaged or fits poorly into crankshaft.
- Steel particles are found after flushing the cooler and cooler lines.
- Pump is damaged or steel particles are found in the converter.
- Vehicle has TCC shudder and/or no TCC apply. Replace only after all hydraulic and electrical diagnoses have been made. (Converter clutch material may be glazed.)
- Converter is contaminated with engine coolant containing antifreeze.
- Internal failure of stator roller clutch.
- Heavy clutch debris due to overheating (blue converter).
- Steel particles or clutch lining material found in fluid filter or on magnet when no internal parts in unit are worn or damaged — indicates that lining material came from converter.

The torque converter should not be replaced if:

- The fluid has an odor, is discolored, and there is no evidence of metal or clutch facing particles.
- The threads in one or more of the converter bolt holes are damaged.
- Transaxle failure did not display evidence of damaged or worn internal parts, steel particles or clutch plate lining material in unit and inside the fluid filter.
- Vehicle has been exposed to high mileage (only). The exception may be where the torque converter clutch dampener plate lining has seen excess wear by vehicles operated in heavy and/or constant traffic, such as taxi, delivery or police use.

ATF COOLER SERVICE

Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer.
Replace radiator lower tank (which includes ATF cooler) with a new one and flush cooler line using cleaning solvent and compressed air.
Refer to CO-14, "RADIATOR" .

OBD-II SELF-DIAGNOSIS

- A/T self-diagnosis is performed by the TCM in combination with the ECM. The results can be read through the blinking pattern of the O/D OFF indicator or the malfunction indicator lamp (MIL). Refer to the table on AT-54, "Judgement of Self-diagnosis Code" for the indicator used to display each self-diagnostic result.
- The self-diagnostic results indicated by the MIL are automatically stored in the ECM and TCM memories. **Always perform the procedure “HOW TO ERASE DTC” on page AT-40 to complete the repair and avoid unnecessary blinking of the MIL.**
- The following self-diagnostic items can be detected using ECM self-diagnostic results mode* only when the O/D OFF indicator lamp does not indicate any malfunctions.

– PNP switch

*: For details of OBD-II, refer to EC-51, "ON BOARD DIAGNOSTIC (OBD) SYSTEM" .

- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector.**
  For description and how to disconnect, refer to PG-48, "HARNESS CONNECTOR (SLIDE-LOCKING TYPE)" .

Wiring Diagrams and Trouble Diagnosis

ECS005VZ

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams".
- PG-3, "POWER SUPPLY ROUTING".

When you perform trouble diagnosis, refer to the following:

- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES".
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident".

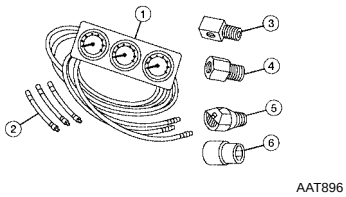
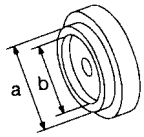
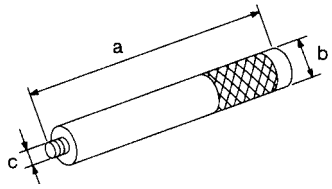
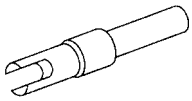
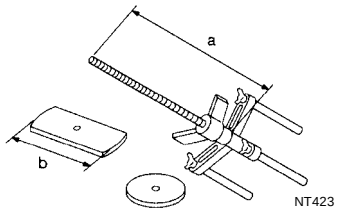
PREPARATION

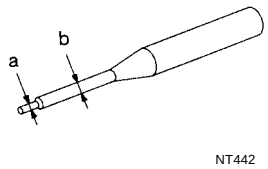
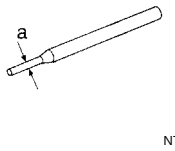
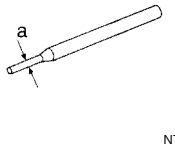
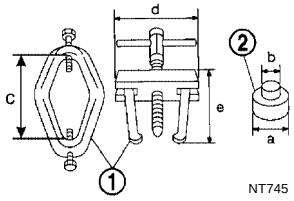
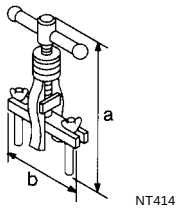
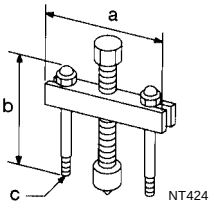
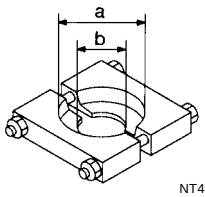
PFP:00002

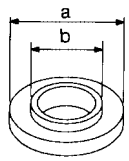
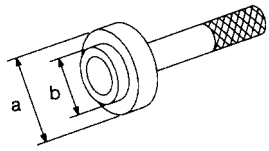
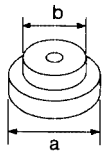
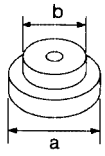
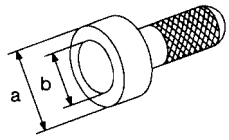
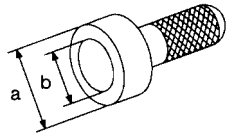
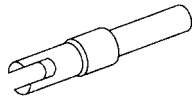
Special Service Tools

ECS005W0

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

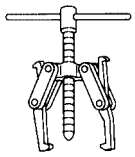
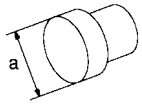
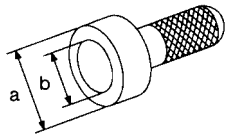
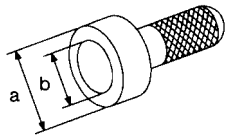
Tool number (Kent-Moore No.) Tool name		Description
(J-34301-C) Oil pressure gauge set 1 (J-34301-1) Oil pressure gauge 2 (J-34301-2) Hoses 3 (J-34298) Adapter 4 (J-34282) Adapter 5 (790-301-1230-A) 60° Adapter 6 (J-34301-15) Square socket	 AAT896	Measuring line pressure
KV31103000 (J-38982) Drift	 NT105	Installing differential oil seal (Use with ST35325000.) **a: 59 mm (2.32 in) dia.** **b: 49 mm (1.93 in) dia.**
ST35325000 (—) Drift	 NT417	Installing differential oil seal (Use with KV31103000.) **a: 215 mm (8.46 in)** **b: 25 mm (0.98 in) dia.** **c: M12 x 1.5P**
KV38107700 (J-39027) Preload adapter	 NT087	● Measuring turning torque of final drive assembly ● Measuring clearance between side gear and differential case with washer ● Selecting differential side bearing adjusting shim
KV31103200 (J-34285-A and J-34285-87) Clutch spring compressor	 NT423	Removing and installing clutch return spring **a: 320 mm (12.60 in)** **b: 174 mm (6.85 in)**

Tool number (Kent-Moore No.) Tool name	Description
ST23540000 (J-25689-A) Pin punch 	Removing and installing parking rod plate, manual plate and differential pinion mate shaft retaining pins **a: 2.3 mm (0.091 in) dia.** **b: 4 mm (0.16 in) dia.**
KV32101000 (J-25689-A) Pin punch 	Installing throttle lever and manual shaft retaining pins **a: 4 mm (0.16 in) dia.**
ST25710000 (—) Pin punch 	Aligning groove of manual shaft and hole of transmission case **a: 2 mm (0.08 in) dia.**
ST3306S001 (J-22888-D) Differential side bearing puller set 1 ST33051001 (J-22888-D) Puller 2 ST33061000 (J-8107-2) Adapter 	Removing differential side bearing inner race **a: 39 mm (1.54 in) dia.** **b: 29.5 mm (1.161 in) dia.** **c: 130 mm (5.12 in)** **d: 135 mm (5.31 in)** **e: 120 mm (4.72 in)**
KV381054S0 (J-34286) Puller 	● Removing idler gear bearing outer race ● Removing differential side oil seals ● Removing differential side bearing outer race ● Removing needle bearing from bearing retainer **a: 250 mm (9.84 in)** **b: 160 mm (6.30 in)**
ST27180001 (J-25726-B) Puller 	● Removing idler gear **a: 100 mm (3.94 in)** **b: 110 mm (4.33 in)** **c: M8 x 1.25P**
ST30031000 (J-22912-O1) Puller 	Removing reduction gear bearing inner race **a: 90 mm (3.54 in) dia.** **b: 50 mm (1.97 in) dia.**

Tool number (Kent-Moore No.) Tool name		Description
ST35272000 (J-26092) Drift	 NT426	● Installing reduction gear bearing inner race ● Installing idler gear bearing inner race **a: 72 mm (2.83 in) dia.** **b: 35.5 mm (1.398 in) dia.**
ST37830000 (—) Drift	 NT427	Installing idler gear bearing outer race **a: 62 mm (2.44 in) dia.** **b: 39 mm (1.54 in) dia.**
ST35321000 (—) Drift	 NT073	Installing output shaft bearing **a: 49 mm (1.93 in) dia.** **b: 41 mm (1.61 in) dia.**
ST30633000 (—) Drift	 NT073	Installing differential side bearing outer race **a: 67 mm (2.64 in) dia.** **b: 49 mm (1.93 in) dia.**
ST35271000 (J-26091) Drift	 NT115	● Installing idler gear **a: 72 mm (2.83 in) dia.** **b: 63 mm (2.48 in) dia.**
ST33400001 (J-26082) Drift	 NT115	● Installing oil pump housing oil seal **a: 60 mm (2.36 in) dia.** **b: 47 mm (1.85 in) dia.**
KV38105710 (—)	 NT087	● Measuring clearance between side gear and differential case

Commercial Service Tools

ECS005W1

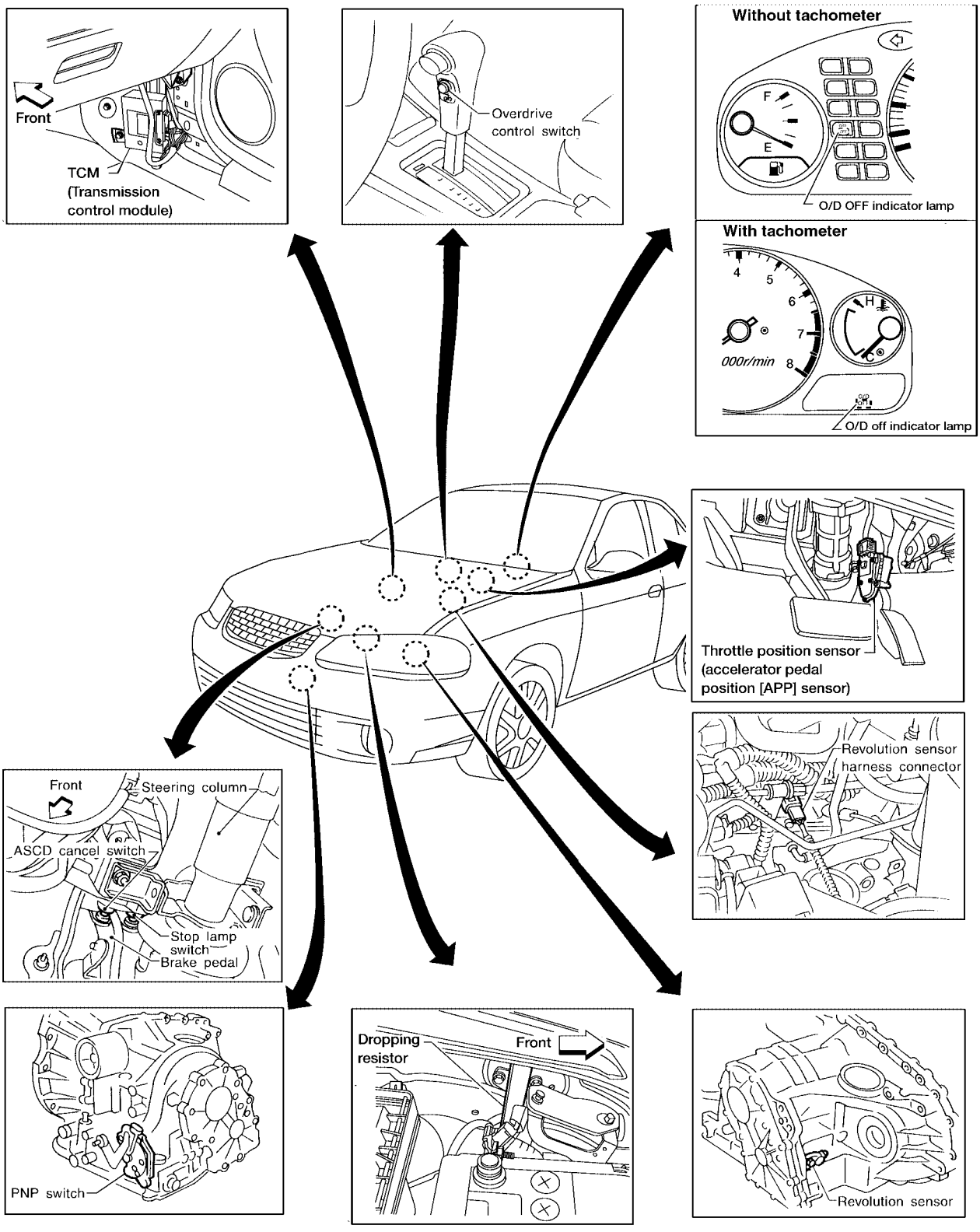
Tool name	Description
Puller  NT077	● Removing idler gear bearing inner race ● Removing and installing band servo piston snap ring
Drift  NT109	Removing idler gear bearing inner race **a: 34 mm (1.34 in) dia.**
Drift  NT115	Installing differential left side bearing **a: 86 mm (3.39 in) dia.** **b: 80 mm (3.15 in) dia.**
Drift  NT115	Installing differential right side bearing **a: 46 mm (1.81 in) dia.** **b: 40 mm (1.57 in) dia.**

OVERALL SYSTEM

PFP:00000

A/T Electrical Parts Location

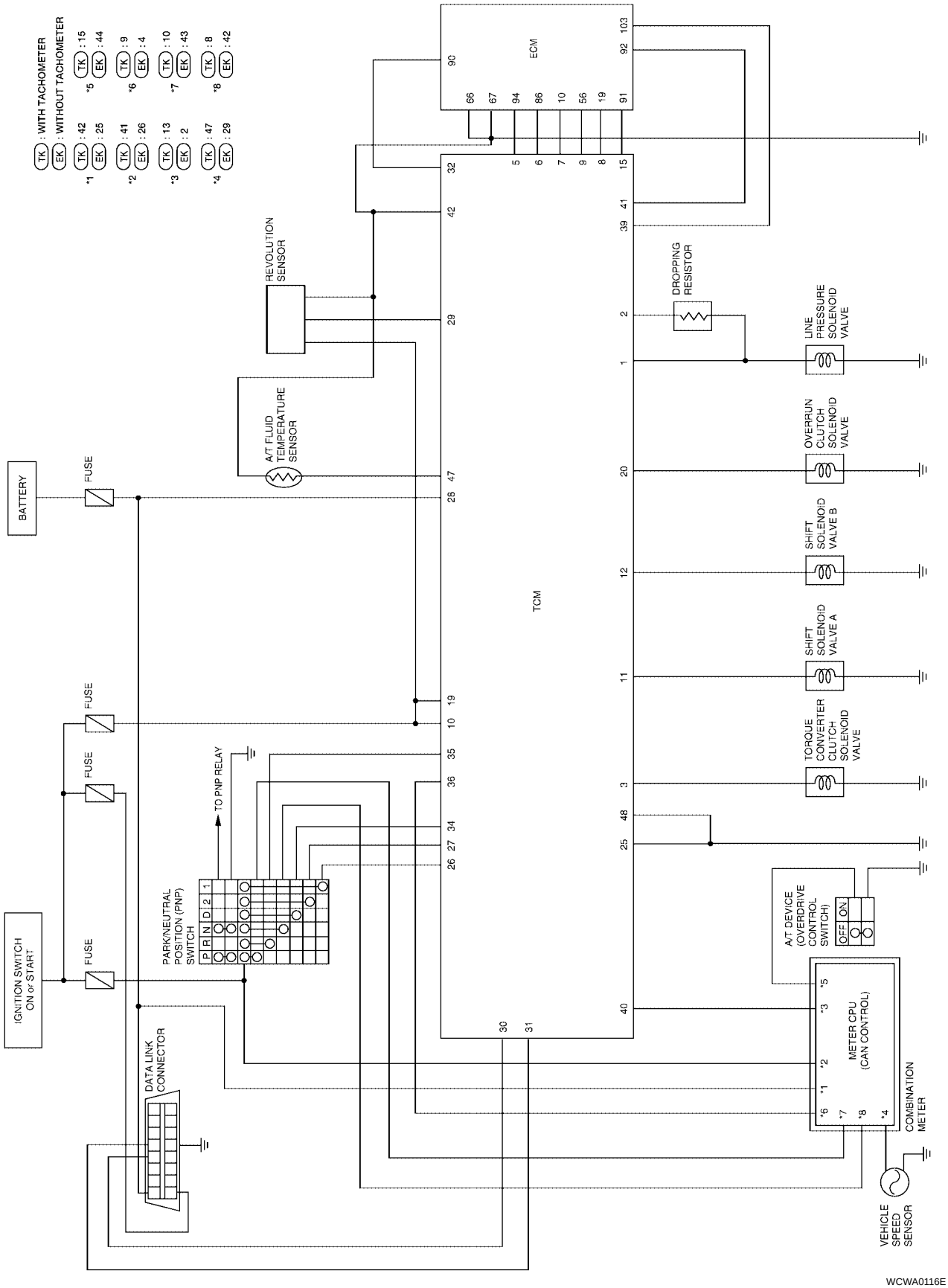
ECS005W2



WCIA0162E

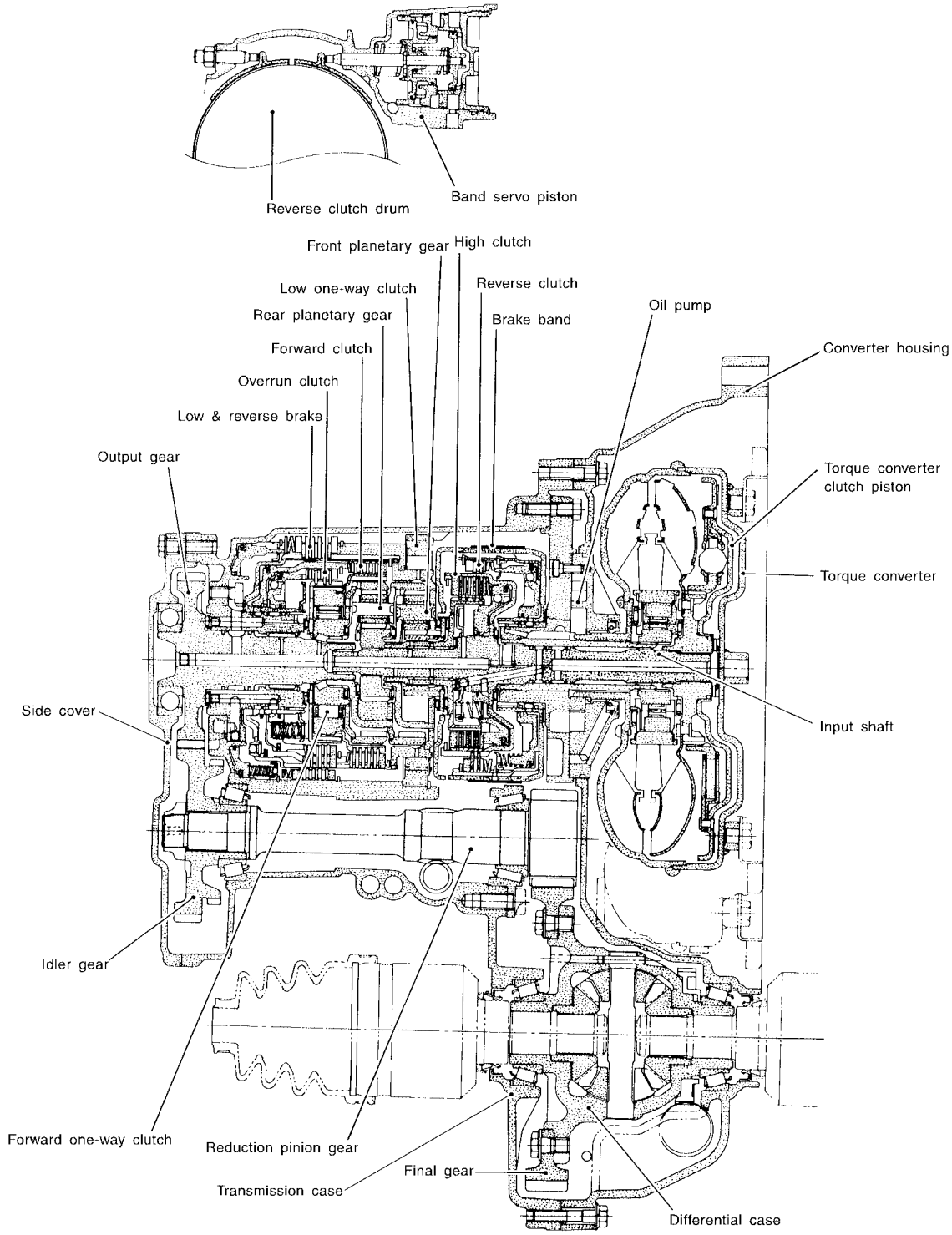
Circuit Diagram

ECS005W3



Cross-sectional View

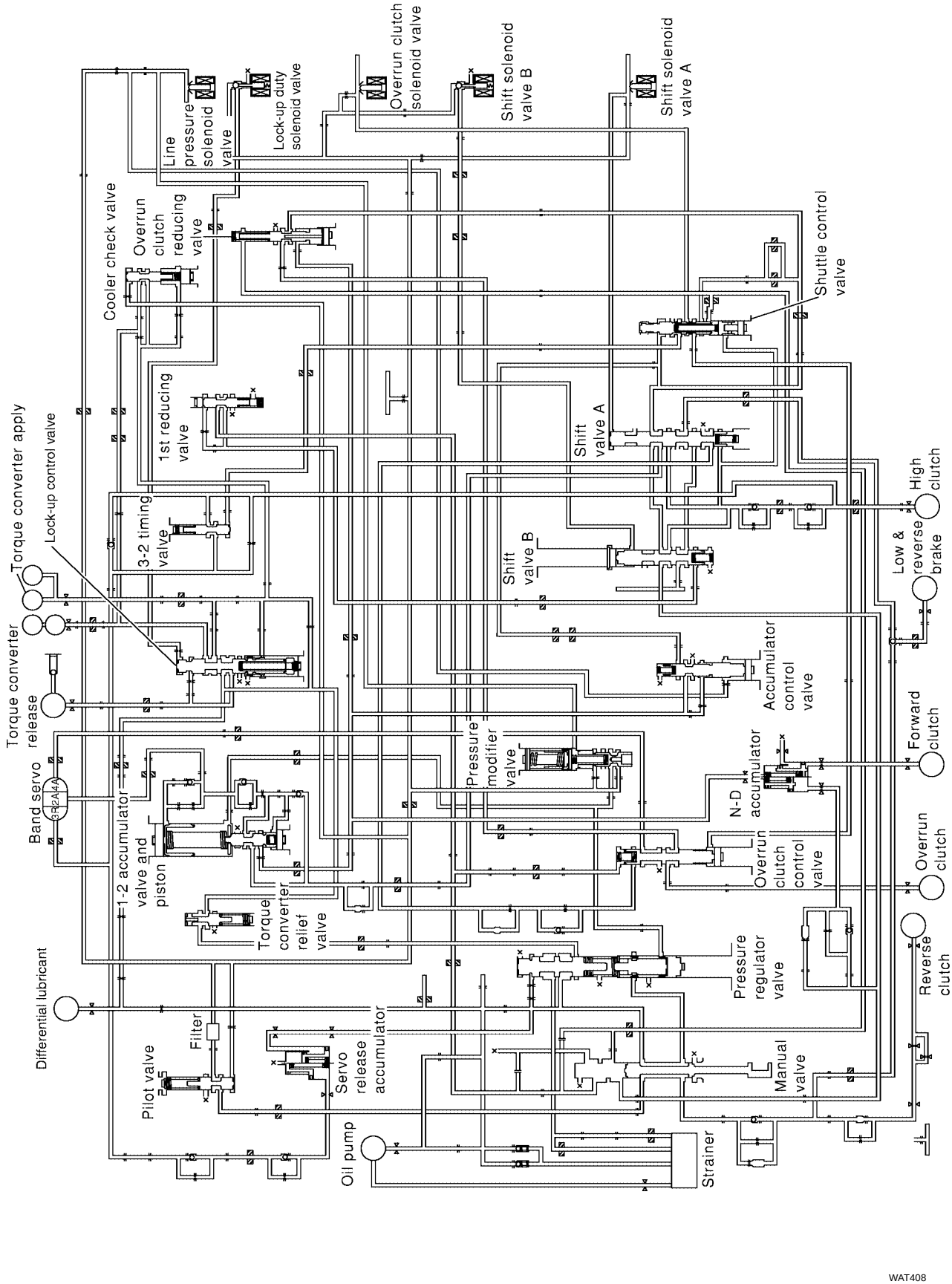
ECS005W4



SAT842J

Hydraulic Control Circuit

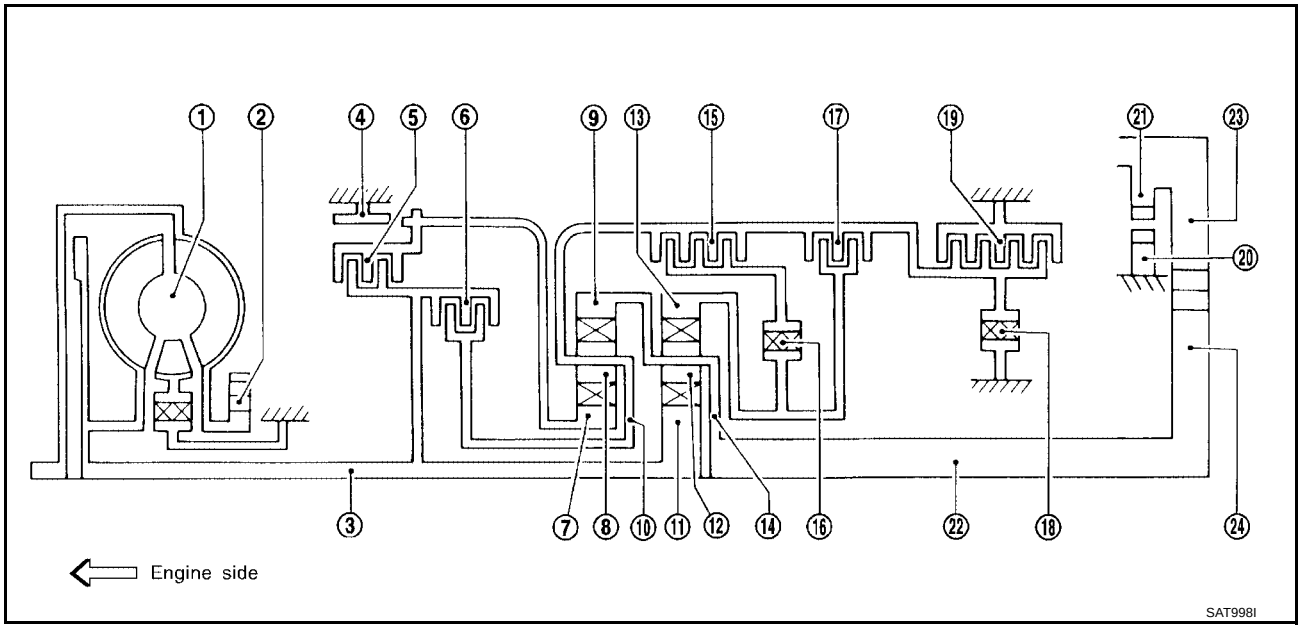
ECS005W5



Shift Mechanism

ECS005W6

CONSTRUCTION



1. Torque converter	2. Oil pump	3. Input shaft
4. Brake band	5. Reverse clutch	6. High clutch
7. Front sun gear	8. Front pinion gear	9. Front internal gear
10. Front planetary carrier	11. Rear sun gear	12. Rear pinion gear
13. Rear internal gear	14. Rear planetary carrier	15. Forward clutch
16. Forward one-way clutch	17. Overrun clutch	18. Low one-way clutch
19. Low & reverse brake	20. Parking pawl	21. Parking gear
22. Output shaft	23. Idle gear	24. Output gear

FUNCTION OF CLUTCH AND BRAKE

Clutch and brake components	Abbr.	Function
5 Reverse clutch	R/C	To transmit input power to front sun gear **7** .
6 High clutch	H/C	To transmit input power to front planetary carrier **10** .
15 Forward clutch	F/C	To connect front planetary carrier **10** with forward one-way clutch **16** .
17 Overrun clutch	O/C	To connect front planetary carrier **10** with rear internal gear **13** .
4 Brake band	B/B	To lock front sun gear **7** .
16 Forward one-way clutch	F/O.C	When forward clutch **15** is engaged, to stop rear internal gear **13** from rotating in opposite direction against engine revolution.
18 Low one-way clutch	L/O.C	To stop front planetary carrier **10** from rotating in opposite direction against engine revolution.
19 Low & reverse brake	L & R/B	To lock front planetary carrier **10** .

CLUTCH AND BAND CHART

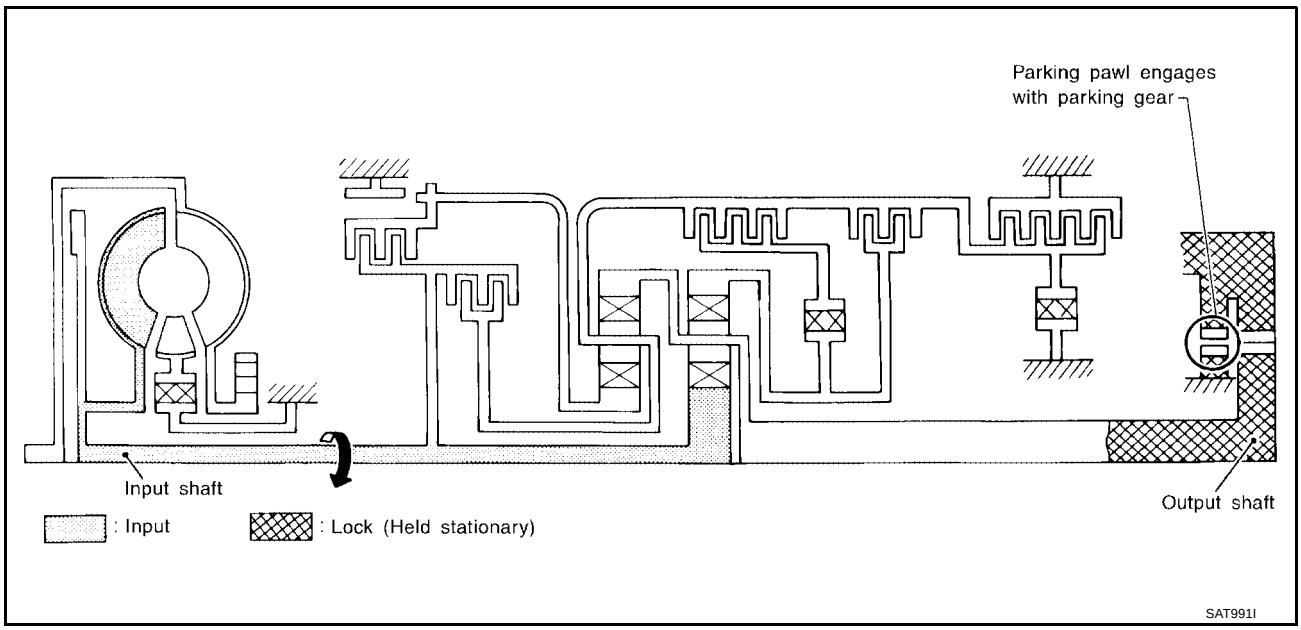
Shift position		Reverse clutch **5**	High clutch **6**	For-ward clutch **15**	Over-run clutch **17**	Band servo			Forward one-way clutch **16**	Low one-way clutch **18**	Low & reverse brake **19**	Lock-up	Remarks
						2nd apply	3rd release	4th apply					
P													PARK POSITION
R		O									O		REVERSE POSITION
N													NEUTRAL POSITION
D *4	1st			O	*1 D				B	B			Automatic shift 1 ⇔ 2 ⇔ 3 ⇔ 4
	2nd			O	*1 A	O			B				
	3rd		O	O	*1 A	*2 C	C		B			*1 O	
	4th		O	C		*3 C	C	O				O	
2	1st			O	O	*2 C			B	B			Automatic shift 1 ⇔ 2 ⇐ 3
	2nd			O	O	O			B				
	3rd			O	O	*2 C			B				
1	1st			O	O				B		O		Locks (held stationary) in 1st speed 1 ⇐ 2 ⇐ 3
	2nd			O	O	O			B				
	3rd			O	O	*2 C			B				

- *1: Operates when overdrive control switch is set in “OFF” position.
- *2: Oil pressure is applied to both 2nd “apply” side and 3rd “release” side of band servo piston. However, brake band does not contract because oil pressure area on the “release” side is greater than that on the “apply” side.
- *3: Oil pressure is applied to 4th “apply” side in condition *2 above, and brake band contracts.
- *4: A/T will not shift to 4th when overdrive control switch is set in “OFF” position.
- O: Operates.
- A: Operates when throttle opening is less than 3/16, activating engine brake.
- B: Operates during “progressive” acceleration.
- C: Operates but does not affect power transmission.
- D: Operates when throttle opening is less than 3/16, but does not affect engine brake.

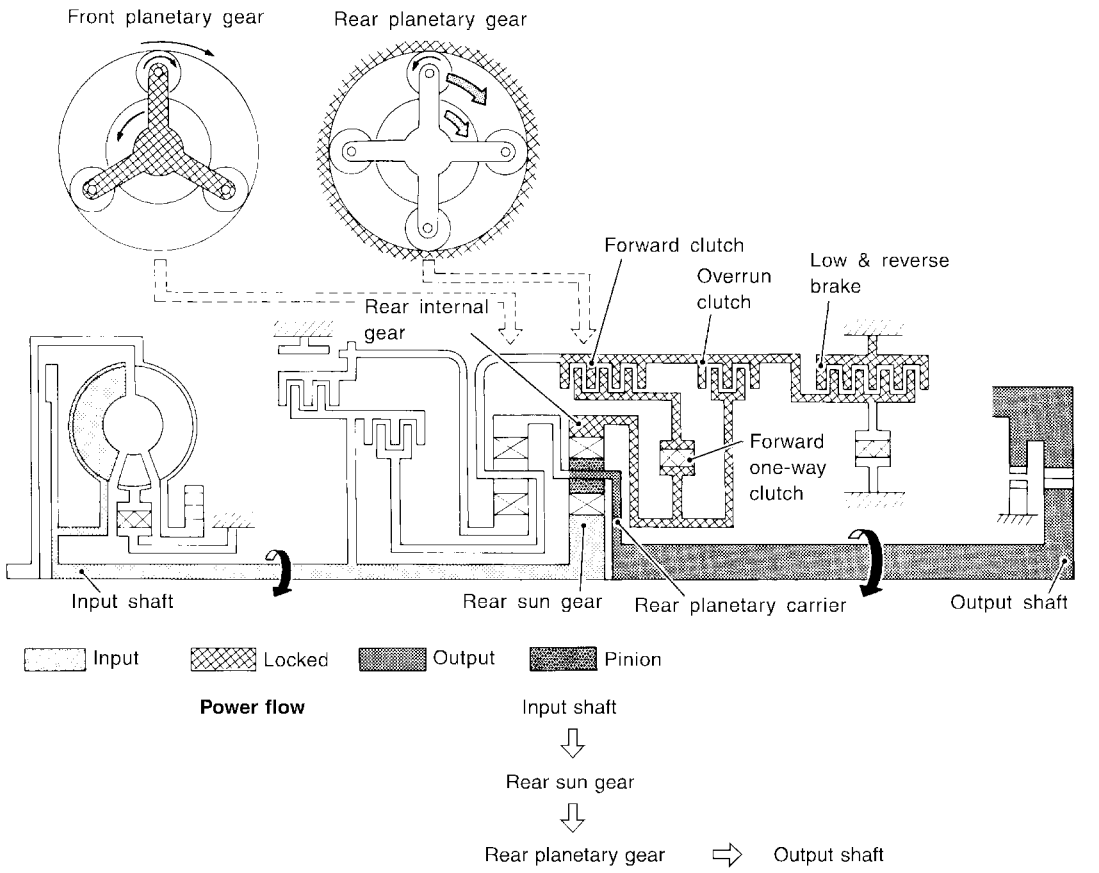
POWER TRANSMISSION

“N” and “P” Positions

- “N” position
  Power from the input shaft is not transmitted to the output shaft because the clutches do not operate.
- “P” position
  Similar to the “N” position, the clutches do not operate. The parking pawl engages with the parking gear to mechanically hold the output shaft so that the powertrain is locked.

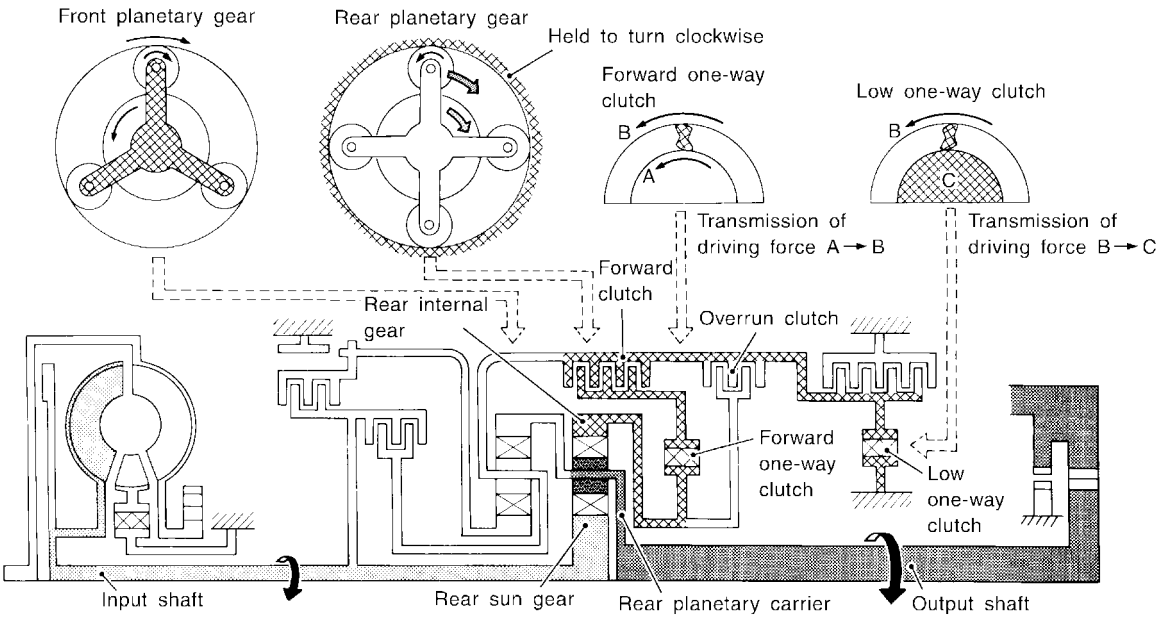


"1₁ " Position



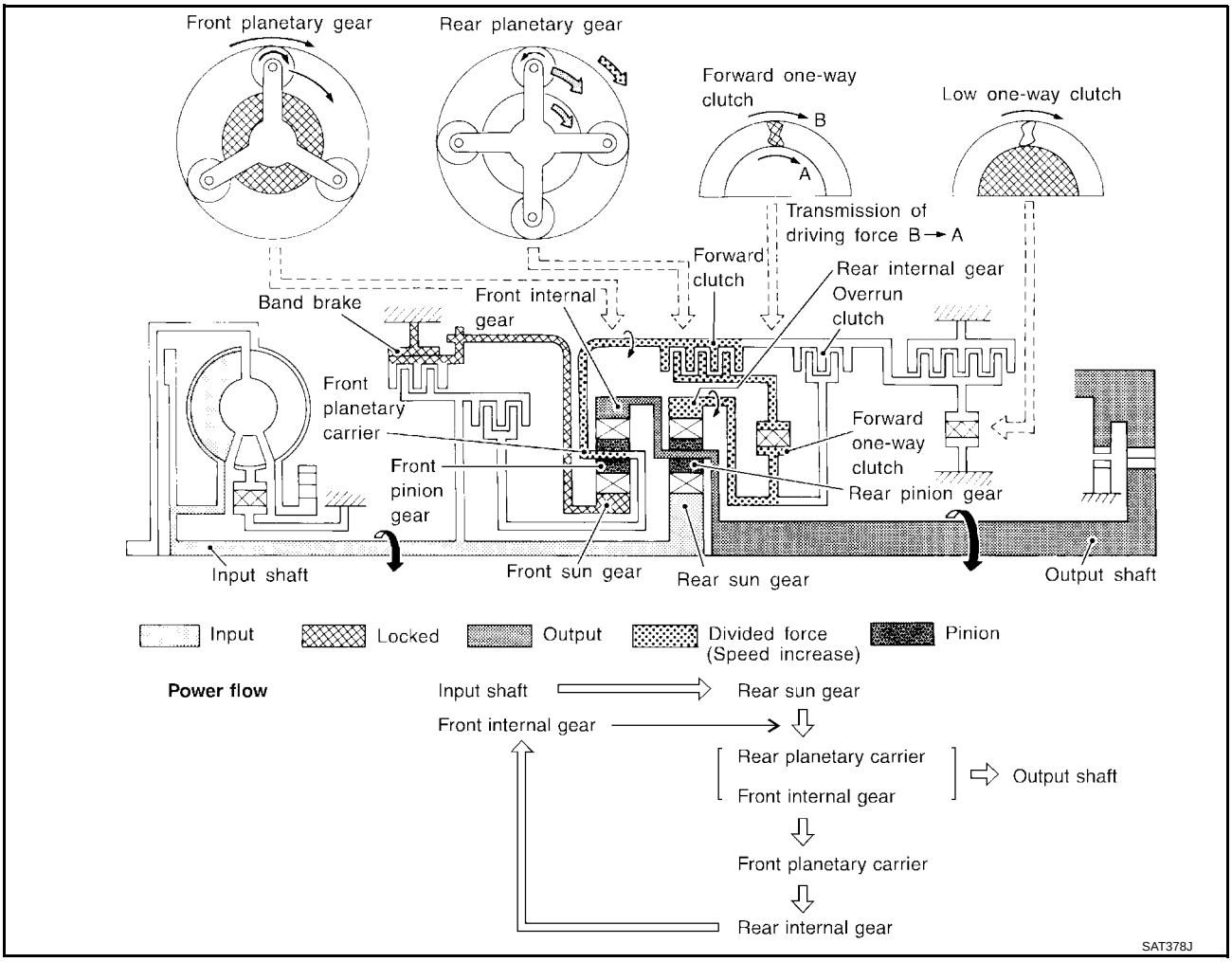
● **Forward clutch** ● **Forward one-way clutch** ● **Overrun clutch** ● **Low and reverse brake**	As overrun clutch engages, rear internal gear is locked by the operation of low and reverse brake. This is different from that of D1 and 2₁ .
Engine brake	Overrun clutch always engages, therefore engine brake can be obtained when decelerating.

"D1 " and "21 " Positions



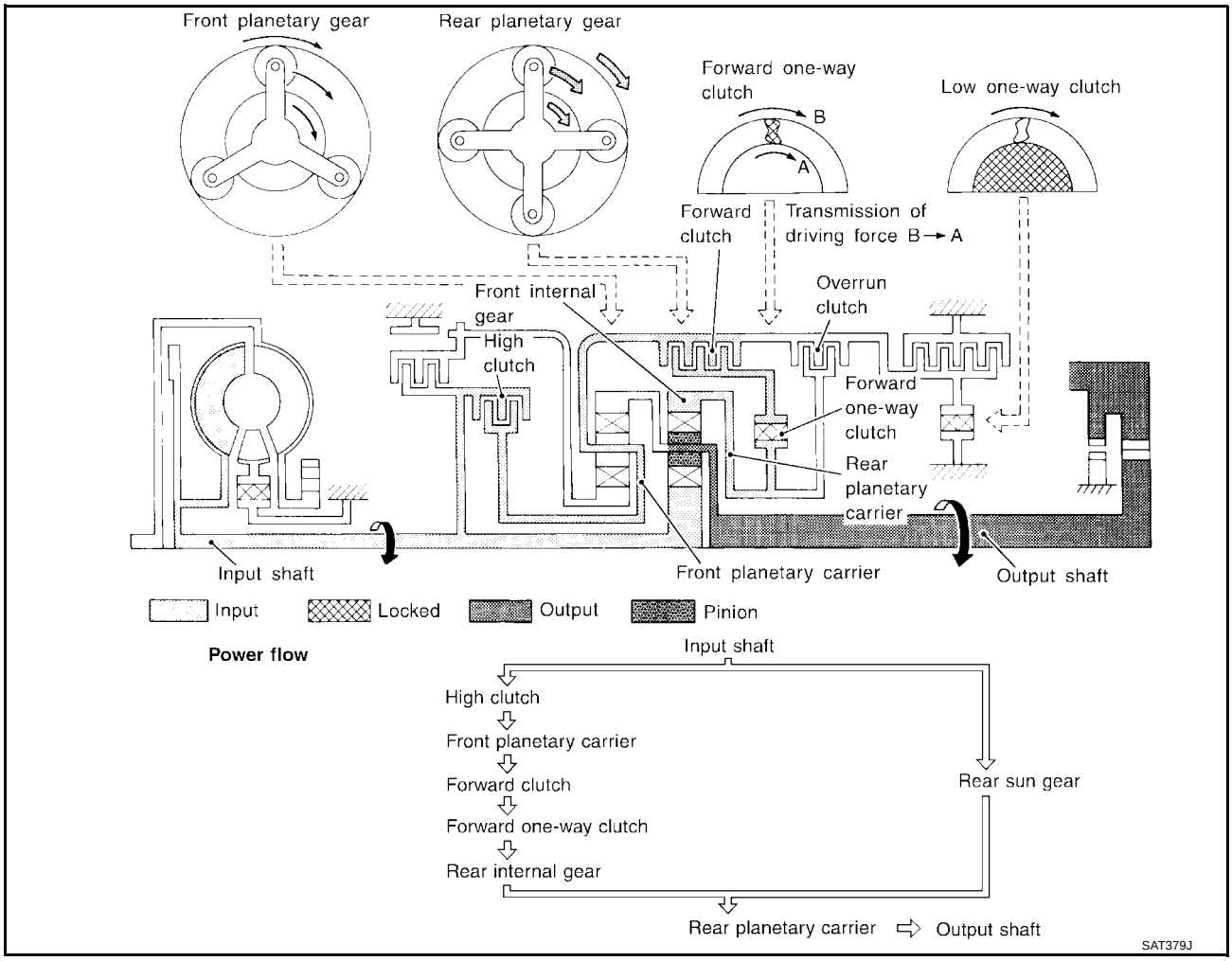
● **Forward one-way clutch** ● **Forward clutch** ● **Low one-way clutch**	Rear internal gear is locked to rotate counterclockwise because of the functioning of these three clutches.
Overrun clutch engagement conditions (Engine brake)	D1 : Overdrive control switch "OFF" and throttle opening is less than 3/16 21 : Always engaged At D1 and 21 positions, engine brake is not activated due to free turning of low one-way clutch.

"D2 ", "22 " and "12 " Positions



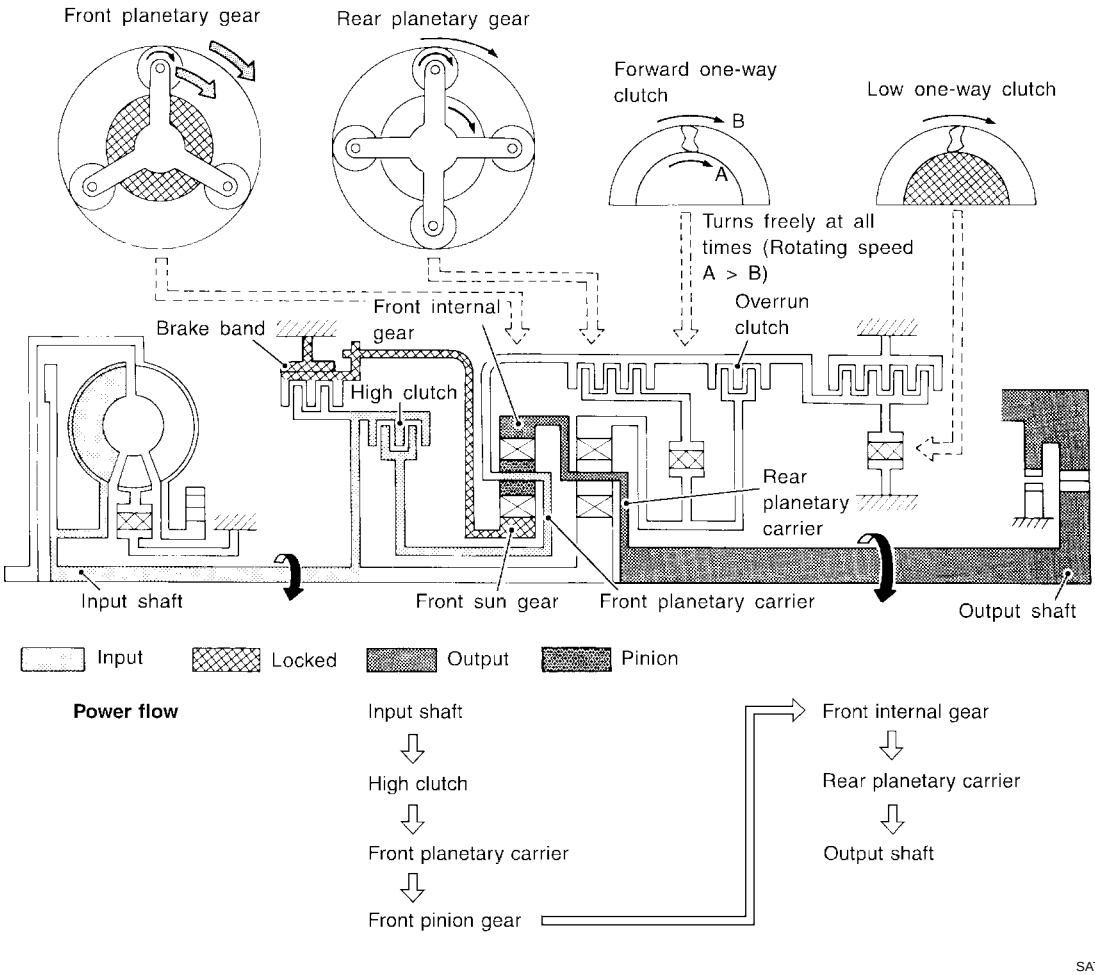
● **Forward clutch** ● **Forward one-way clutch** ● **Brake band**	Rear sun gear drives rear planetary carrier and combined front internal gear. Front internal gear now rotates around front sun gear accompanying front planetary carrier. As front planetary carrier transfers the power to rear internal gear through forward clutch and forward one-way clutch, this rotation of rear internal gear increases the speed of rear planetary carrier compared with that of the 1st speed.
Overrun clutch engagement conditions	D2 : Overdrive control switch "OFF" and throttle opening is less than 3/16 22 and 12 : Always engaged

"D3 " "23 " and "13 " Positions



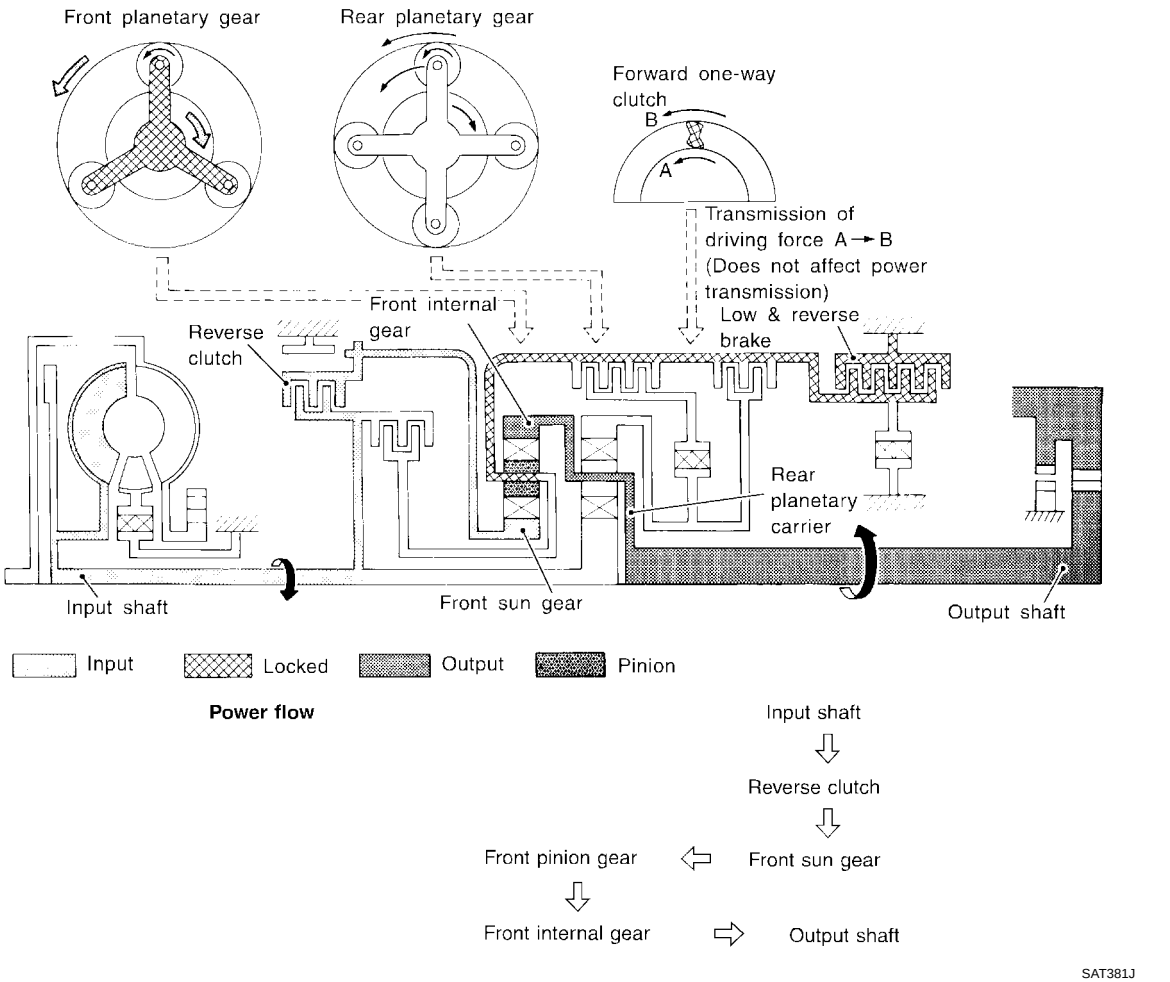
● **High clutch** ● **Forward clutch** ● **Forward one-way clutch**	Input power is transmitted to front planetary carrier through high clutch. And front planetary carrier is connected to rear internal gear by operation of forward clutch and forward one-way clutch. This rear internal gear rotation and another input (the rear sun gear) accompany rear planetary carrier to turn at the same speed.
Overrun clutch engagement conditions	D3 : Overdrive control switch "OFF" and throttle opening is less than 3/16 23 and 13 : Always engaged

"D4 " (OD) Position



● **High clutch** ● **Brake band** ● **Forward clutch** (Does not affect power transmission)	Input power is transmitted to front carrier through high clutch. This front carrier turns around the sun gear which is fixed by brake band and makes front internal gear (output) turn faster.
Engine brake	At D4 position, there is no one-way clutch in the power transmission line and engine brake can be obtained when decelerating.

“R” Position



● **Reverse clutch** ● **Low and reverse brake**	Front planetary carrier is stationary because of the operation of low and reverse brake. Input power is transmitted to front sun gear through reverse clutch, which drives front internal gear in the opposite direction.
Engine brake	As there is no one-way clutch in the power transmission line, engine brake can be obtained when decelerating.

Control System

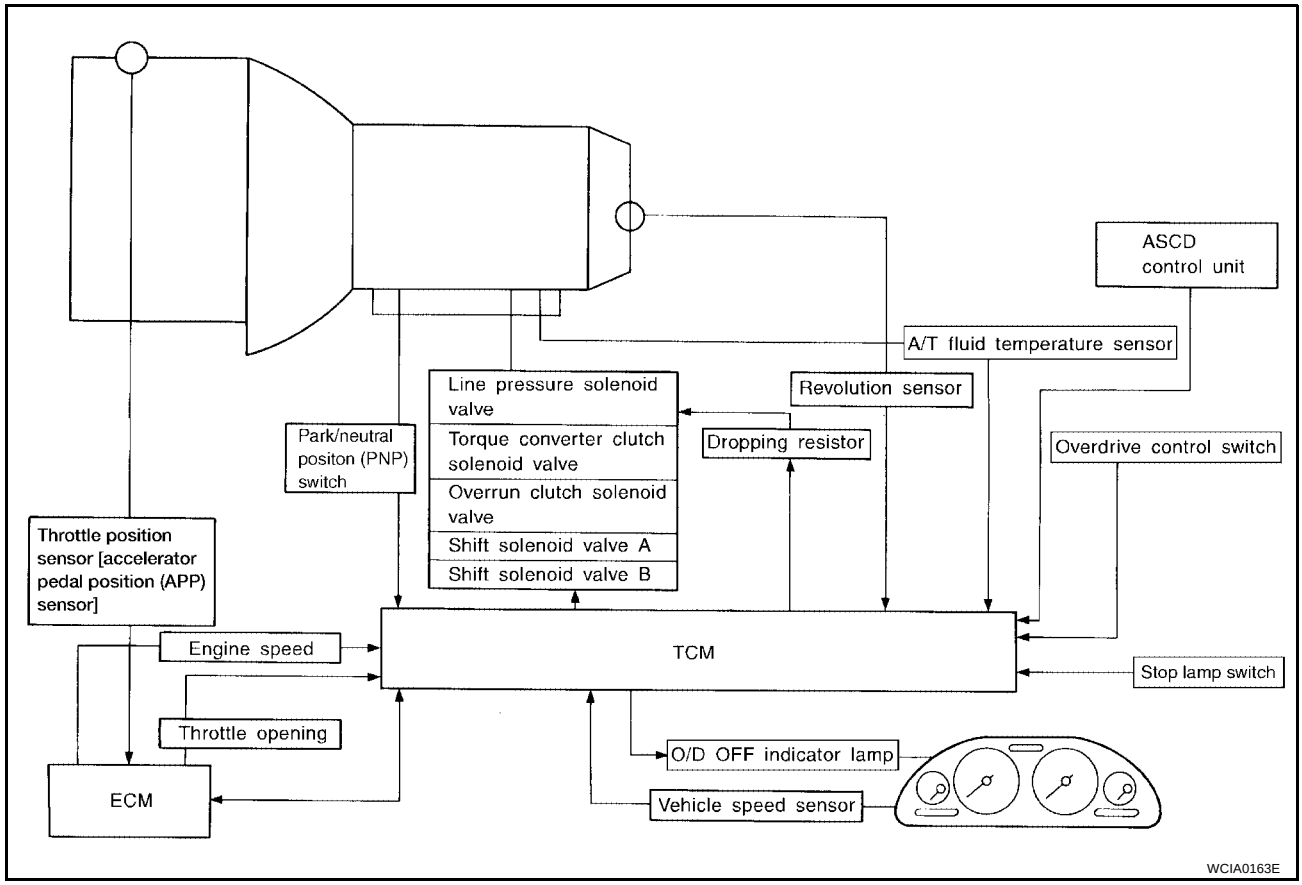
ECS005W7

OUTLINE

The automatic transaxle senses vehicle operating conditions through various switches and sensors. It always controls the optimum shift position and reduces shifting and lock-up shocks.

SWITCHES & SENSORS		TCM		ACTUATORS
Park/neutral position (PNP) switch Throttle position sensor [accelerator pedal position (APP) sensor] Engine speed signal A/T fluid temperature sensor Revolution sensor Vehicle speed sensor Overdrive control switch ASCD control unit Stop lamp switch Turbine revolution sensor		Shift control Line pressure solenoid Lock-up control Overrun clutch control Timing control Fail-safe control Self-diagnosis CONSULT-II communication line control		Shift solenoid valve A Shift solenoid valve B Overrun clutch solenoid valve Torque converter clutch solenoid valve Line pressure solenoid valve O/D OFF indicator lamp

CONTROL SYSTEM



TCM FUNCTION

The function of the TCM is to:

- Receive input signals sent from various switches and sensors.
- Determine required line pressure, shifting point, lock-up operation, and engine brake operation.
- Send required output signals to the respective solenoids.

INPUT/OUTPUT SIGNAL OF TCM

	Sensors, switches and solenoid valves	Function
Input	PNP switch	Detects select lever position and sends a signal to TCM.
	Throttle position sensor [accelerator pedal position (APP) sensor]	Detects accelerator pedal position and requested throttle opening and sends a signal to TCM.
	Engine speed signal	From ECM.
	A/T fluid temperature sensor	Detects transmission fluid temperature and sends a signal to TCM.
	Revolution sensor	Detects output shaft rpm and sends a signal to TCM.
	Vehicle speed sensor	Used as an auxiliary vehicle speed sensor. Sends a signal when revolution sensor (installed on transmission) malfunctions.
	Overdrive control switch	Sends a signal, which prohibits a shift to “D4 ” (overdrive) position, to the TCM.
	ASCD control unit	Sends the cruise signal and “D4 ” (overdrive) cancellation signal from ASCD control unit to TCM.
	Stop lamp switch	Releases lock-up system when depressing pedal in lock-up condition.
Output	Shift solenoid valve A/B	Selects shifting point suited to driving conditions in relation to a signal sent from TCM.
	Line pressure solenoid valve	Regulates (or decreases) line pressure suited to driving conditions in relation to a signal sent from TCM.
	Torque converter clutch solenoid valve	Regulates (or decreases) lock-up pressure suited to driving conditions in relation to a signal sent from TCM.
	Overrun clutch solenoid valve	Controls an “engine brake” effect suited to driving conditions in relation to a signal sent from TCM.
	O/D OFF indicator lamp	Shows TCM faults, when A/T control components malfunction.

CAN Communication

ECS006H7

SYSTEM DESCRIPTION

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only. For details, refer to LAN-4, "CAN Communication Unit" .

Control Mechanism

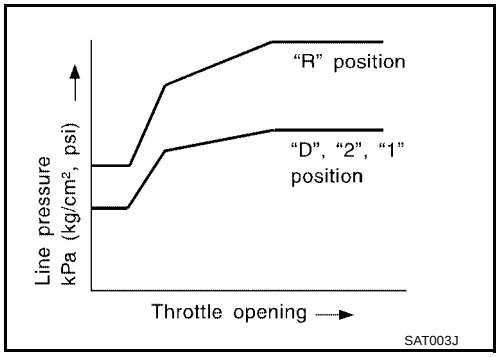
ECS005W8

LINE PRESSURE CONTROL

TCM has various line pressure control characteristics to match the driving conditions.
An ON-OFF duty signal is sent to the line pressure solenoid valve based on TCM characteristics.
Hydraulic pressure on the clutch and brake is electronically controlled through the line pressure solenoid valve to accommodate engine torque. This results in smooth shift operation.

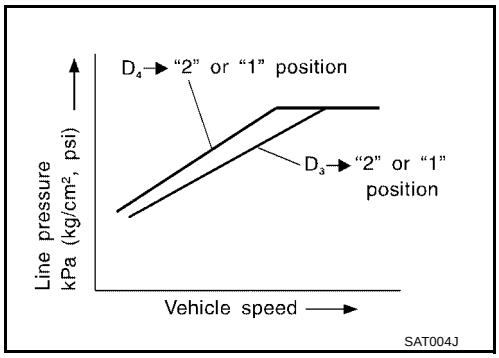
Normal Control

The line pressure to throttle opening characteristics is set for suitable clutch operation.



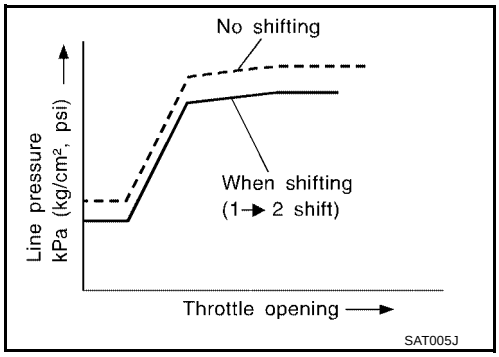
Back-up Control (Engine brake)

If the selector lever is shifted to "2" position while driving in D_4 (OD) or D_3 , great driving force is applied to the clutch inside the transmission. Clutch operating pressure (line pressure) must be increased to deal with this driving force.



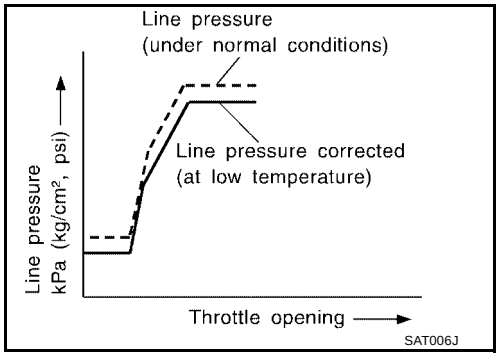
During Shift Change

The line pressure is temporarily reduced corresponding to a change in engine torque when shifting gears (that is, when the shift solenoid valve is switched for clutch operation) to reduce shifting shock.

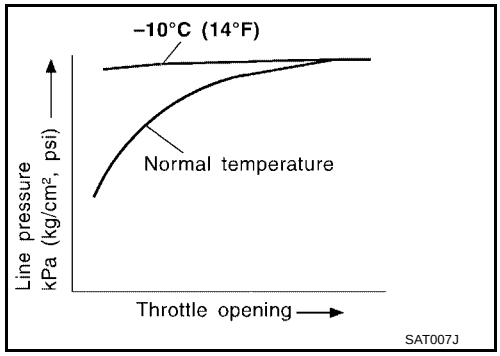


At Low Fluid Temperature

- Fluid viscosity and frictional characteristics of the clutch facing change with fluid temperature. Clutch engaging or band-contacting pressure is compensated for, according to fluid temperature, to stabilize shifting quality.
- The line pressure is reduced below 60°C (140°F) to prevent shifting shock due to low viscosity of automatic transmission fluid when temperature is low.



- Line pressure is increased to a maximum, irrespective of the throttle opening, when fluid temperature drops to −10°C (14°F). This pressure rise is adopted to prevent a delay in clutch and brake operation due to extreme drop of fluid viscosity at low temperature.

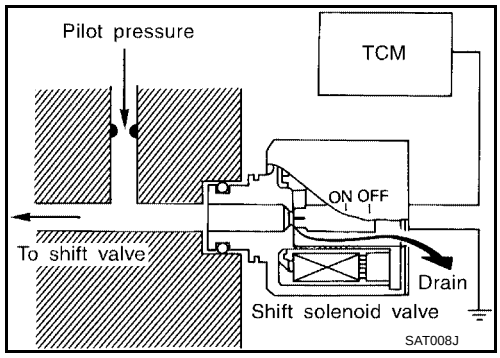


SHIFT CONTROL

The shift is regulated entirely by electronic control to accommodate vehicle speed and varying engine operations. This is accomplished by electrical signals transmitted by the revolution sensor and throttle position sensor [accelerator pedal position (APP) sensor]. This results in improved acceleration performance and fuel economy.

Control of Shift Solenoid Valves A and B

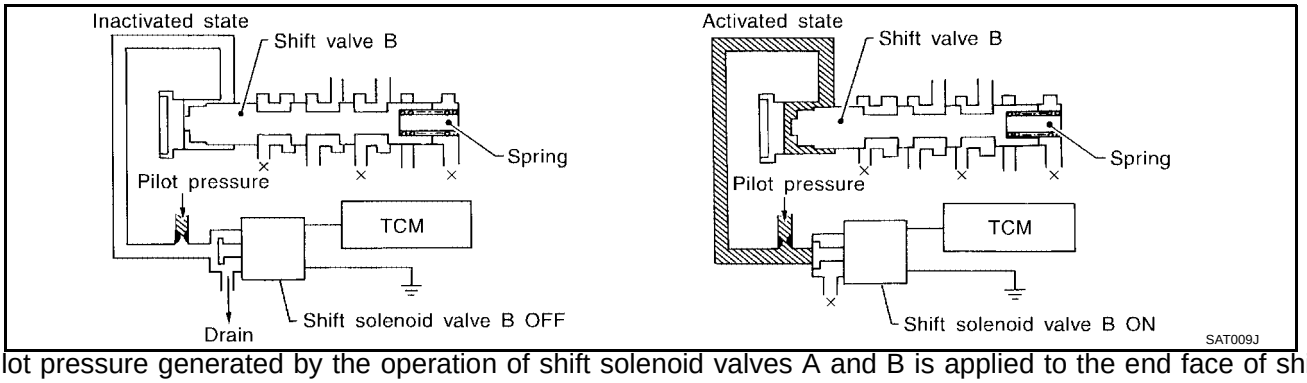
The TCM activates shift solenoid valves A and B according to signals from the throttle position sensor [accelerator pedal position (APP) sensor] and revolution sensor to select the optimum gear position on the basis of the shift schedule memorized in the TCM.
The shift solenoid valve performs simple ON-OFF operation. When set to “ON”, the drain circuit closes and pilot pressure is applied to the shift valve.



Relation Between Shift Solenoid Valves A and B and Gear Positions

Shift solenoid valve	Gear position				
	D_1 , 2_1 , 1_1	D_2 , 2_2 , 1_2	D_3	D_4 (OD)	N-P
A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)	ON (Closed)
B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)

Control of Shift Valves A and B



Pilot pressure generated by the operation of shift solenoid valves A and B is applied to the end face of shift valves A and B.
The drawing above shows the operation of shift valve B. When the shift solenoid valve is “ON”, pilot pressure applied to the end face of the shift valve overcomes spring force, moving the valve upward.

LOCK-UP CONTROL

The torque converter clutch piston in the torque converter is locked to eliminate torque converter slip to increase power transmission efficiency. The solenoid valve is controlled by an ON-OFF duty signal sent from the TCM. The signal is converted to an oil pressure signal which controls the torque converter clutch piston.

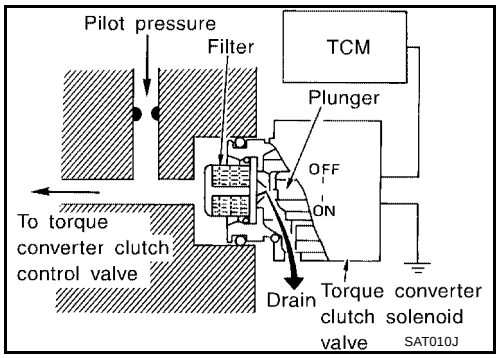
Conditions for Lock-up Operation

When vehicle is driven in 3rd and 4th gear position, vehicle speed and throttle opening are detected. If the detected values fall within the lock-up zone memorized in the TCM, lock-up is performed.

Overdrive control switch	ON	OFF
Selector lever	"D" position	
Gear position	D_4	D_3
Vehicle speed sensor	More than set value	
Throttle position sensor [accelerator pedal position (APP) sensor]	Less than set opening	
A/T fluid temperature sensor	More than 40°C (104°F)	

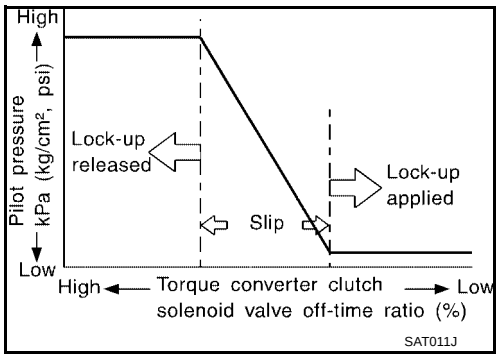
Torque Converter Clutch Solenoid Valve Control

The torque converter clutch solenoid valve is controlled by the TCM. The plunger closes the drain circuit during the "OFF" period, and opens the circuit during the "ON" period. If the percentage of OFF-time increases in one cycle, the pilot pressure drain time is reduced and pilot pressure remains high.

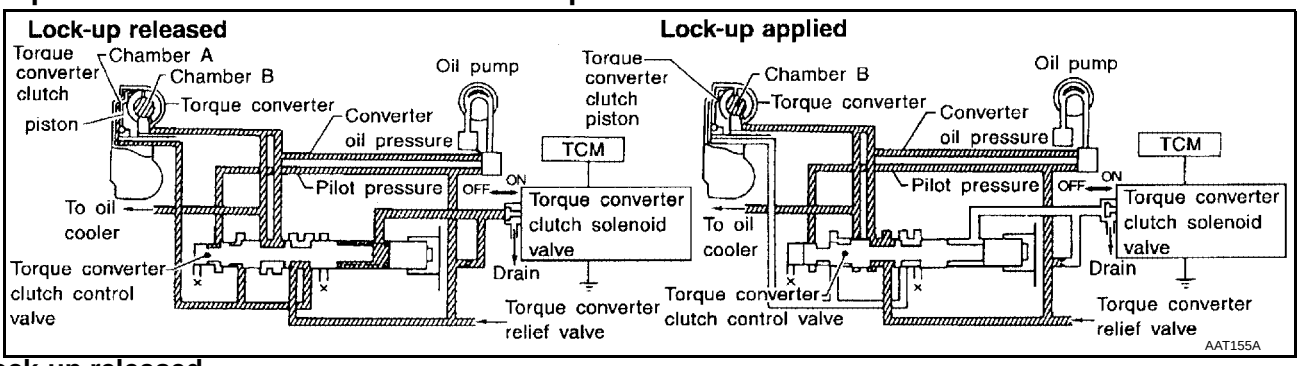


The torque converter clutch piston is designed to slip to adjust the ratio of ON-OFF, thereby reducing lock-up shock.

OFF-time INCREASING
↓
Amount of drain DECREASING
↓
Pilot pressure HIGH
↓
Lock-up RELEASING



Torque Converter Clutch Control Valve Operation



Lock-up released

The OFF-duration of the torque converter clutch solenoid valve is long, and pilot pressure is high. The pilot pressure pushes the end face of the torque converter clutch control valve in combination with spring force to move the valve to the left. As a result, converter pressure is applied to chamber A (torque converter clutch piston release side). Accordingly, the torque converter clutch piston remains unlocked.

Lock-up applied

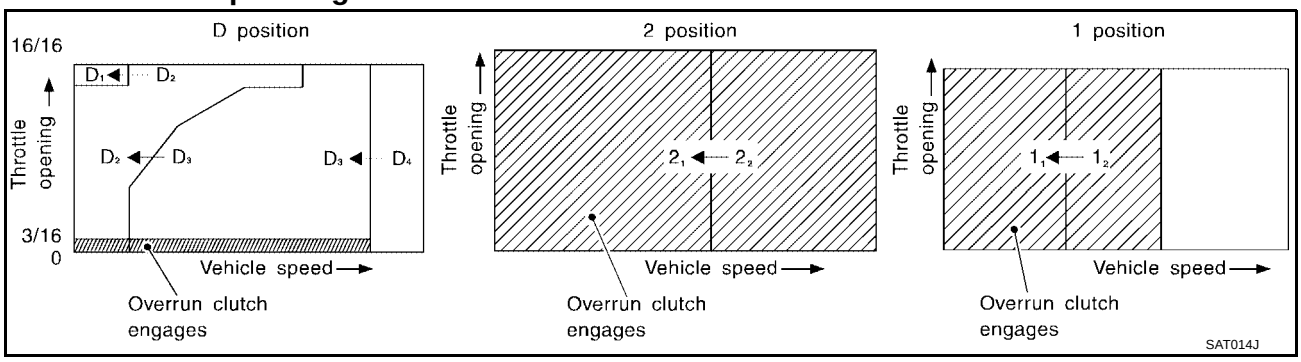
When the OFF-duration of the torque converter clutch solenoid valve is short, pilot pressure drains and becomes low. Accordingly, the control valve moves to the right by the pilot pressure of the other circuit and

converter pressure. As a result, converter pressure is applied to chamber B, keeping the torque converter clutch piston applied.
Also smooth lock-up is provided by transient application and release of the lock-up.

OVERRUN CLUTCH CONTROL (ENGINE BRAKE CONTROL)

Forward one-way clutch is used to reduce shifting shocks in downshifting operations. This clutch transmits engine torque to the wheels. However, drive force from the wheels is not transmitted to the engine because the one-way clutch rotates idle. This means the engine brake is not effective.
The overrun clutch operates when the engine brake is needed.

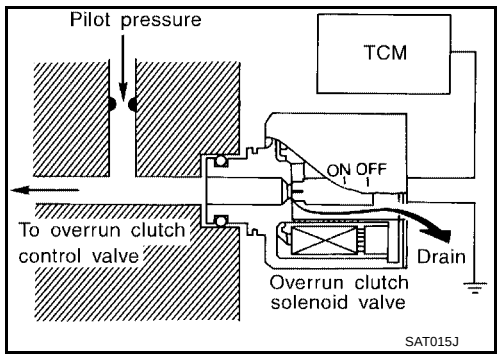
Overrun Clutch Operating Conditions



Selector lever position	Gear position	Throttle opening
"D" position	D1 , D2 , D3 gear position	Less than 3/16
"2" position	21 , 22 gear position	
"1" position	11 , 12 gear position	At any position

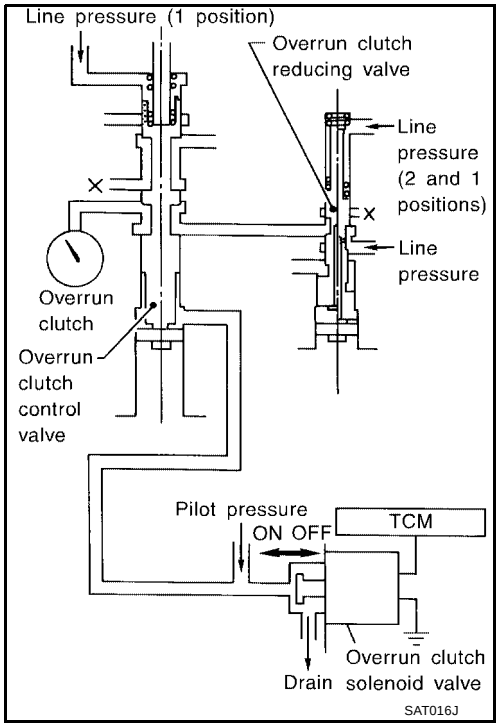
Overrun Clutch Solenoid Valve Control

The overrun clutch solenoid valve is operated by an ON-OFF signal transmitted by the TCM to provide overrun clutch control (engine brake control).
When this solenoid valve is "ON", the pilot pressure drain port closes. When it is "OFF", the drain port opens.
During the solenoid valve "ON", pilot pressure is applied to the end face of the overrun clutch control valve.



Overrun Clutch Control Valve Operation

When the solenoid valve is “ON”, pilot pressure is applied to the overrun clutch control valve. This pushes up the overrun clutch control valve. The line pressure is then shut off so that the clutch does not engage.
When the solenoid valve is “OFF”, pilot pressure is not generated. At this point, the overrun clutch control valve moves downward by spring force. As a result, overrun clutch operation pressure is provided by the overrun clutch reducing valve. This causes the overrun clutch to engage.
In the 1 position, the overrun clutch control valve remains pushed down so that the overrun clutch is engaged at all times.



Control Valve

ECS005W9

FUNCTION OF CONTROL VALVES

Valve name	Function
Pressure regulator valve, plug and sleeve	Regulates oil discharged from the oil pump to provide optimum line pressure for all driving conditions.
Pressure modifier valve and sleeve	Used as a signal supplementary valve to the pressure regulator valve. Regulates pressure-modifier pressure (signal pressure) which controls optimum line pressure for all driving conditions.
Pilot valve	Regulates line pressure to maintain a constant pilot pressure level which controls lock-up mechanism, overrun clutch, shift timing.
Accumulator control valve	Regulates accumulator back-pressure to pressure suited to driving conditions.
Manual valve	Directs line pressure to oil circuits corresponding to select positions. Hydraulic pressure drains when the shift lever is in Neutral.
Shift valve A	Simultaneously switches four oil circuits using output pressure of shift solenoid valve A to meet driving conditions (vehicle speed, throttle opening, etc.). Provides automatic downshifting and up-shifting (1st → 2nd → 3rd → 4th gears/4th → 3rd → 2nd → 1st gears) in combination with shift valve B.
Shift valve B	Simultaneously switches three oil circuits using output pressure of shift solenoid valve B in relation to driving conditions (vehicle speed, throttle opening, etc.). Provides automatic downshifting and up-shifting (1st → 2nd → 3rd → 4th gears/4th → 3rd → 2nd → 1st gears) in combination with shift valve A.
Overrun clutch control valve	Switches hydraulic circuits to prevent engagement of the overrun clutch simultaneously with application of the brake band in D_4 . (Interlocking occurs if the overrun clutch engages during D_4 .)
1st reducing valve	Reduces low & reverse brake pressure to dampen engine-brake shock when down-shifting from the “1” position 1_2 to 1_1 .
Overrun clutch reducing valve	Reduces oil pressure directed to the overrun clutch and prevents engine-brake shock. In “1” and “2” positions, line pressure acts on the overrun clutch reducing valve to increase the pressure-regulating point, with resultant engine brake capability.
Torque converter relief valve	Prevents an excessive rise in torque converter pressure.
Torque converter clutch control valve, plug and sleeve	Activates or inactivates the lock-up function. Also provides smooth lock-up through transient application and release of the lock-up system.
1-2 accumulator valve and piston	Dampens the shock encountered when 2nd gear band servo contracts, and provides smooth shifting.

Valve name	Function
3-2 timing valve	Switches oil pressure with 3-2 timing valve according to throttle opening.
Shuttle control valve	Reduces shock when down-shifting from 3rd to 2nd and regulates overrun clutch.
Cooler check valve	Regulates oil pressure which causes lock-up when driving at low speeds.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

PFP:00000

Introduction

ECS005WA

The A/T system has two self-diagnostic systems.
The first is the emission-related on board diagnostic system (OBD-II) performed by the TCM in combination with the ECM. The malfunction is indicated by the MIL (malfunction indicator lamp) and is stored as a DTC in the ECM memory but not the TCM memory.
The second is the TCM original self-diagnosis indicated by the O/D OFF indicator lamp. The malfunction is stored in the TCM memory. The detected items are overlapped with OBD-II self-diagnostic items. For detail, refer to AT-43, "SELF-DIAGNOSTIC RESULT TEST MODE" .

OBD-II Function for A/T System

ECS005WB

The ECM provides emission-related on board diagnostic (OBD-II) functions for the A/T system. One function is to receive a signal from the TCM used with OBD-related parts of the A/T system. The signal is sent to the ECM when a malfunction occurs in the corresponding OBD-related part. The other function is to indicate a diagnostic result by means of the MIL (malfunction indicator lamp) on the instrument panel. Sensors, switches and solenoid valves are used as sensing elements.
The MIL automatically illuminates in One or Two Trip Detection Logic when a malfunction is sensed in relation to A/T system parts.

One or Two Trip Detection Logic of OBD-II

ECS005WC

ONE TRIP DETECTION LOGIC

If a malfunction is sensed during the first test drive, the MIL will illuminate and the malfunction will be stored in the ECM memory as a DTC. The TCM is not provided with such a memory function.

TWO TRIP DETECTION LOGIC

When a malfunction is sensed during the first test drive, it is stored in the ECM memory as a 1st trip DTC (diagnostic trouble code) or 1st trip freeze frame data. At this point, the MIL will not illuminate. — First Trip
If the same malfunction as that experienced during the first test drive is sensed during the second test drive, the MIL will illuminate. — Second Trip
A/T-related parts for which the MIL illuminates during the first or second test drive are listed below.

Items	MIL	
	One trip detection	Two trip detection
Shift solenoid valve A — DTC: P0750	X	
Shift solenoid valve B — DTC: P0755	X	
Throttle position sensor [accelerator pedal position (APP) sensor] or switch — DTC: P1705	X	
Except above		X

The “trip” in the “One or Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation.

OBD-II Diagnostic Trouble Code (DTC)

ECS005WD

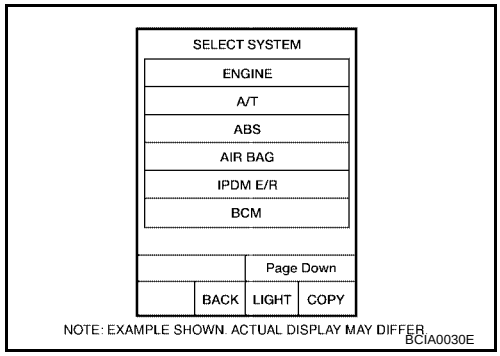
HOW TO READ DTC AND 1ST TRIP DTC

DTC and 1st trip DTC can be read by the following methods.

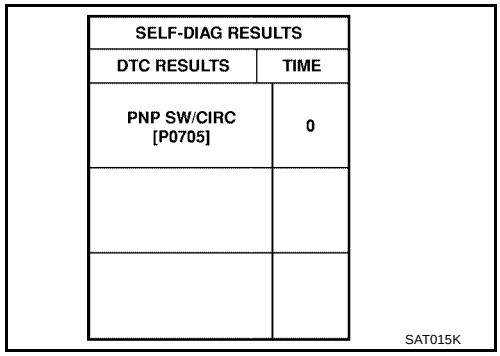
(with CONSULT-II or GST GST) CONSULT-II or GST (Generic Scan Tool) Examples: P0705, P0710, P0720, P0725, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

- **1st trip DTC No. is the same as DTC No.**
- **Output of the diagnostic trouble code indicates that the indicated circuit has a malfunction. However, in case of the Mode II and GST they do not indicate whether the malfunction is still occurring or occurred in the past and returned to normal.**
  CONSULT-II can identify them as shown below. Therefore, using CONSULT-II (if available) is recommended.

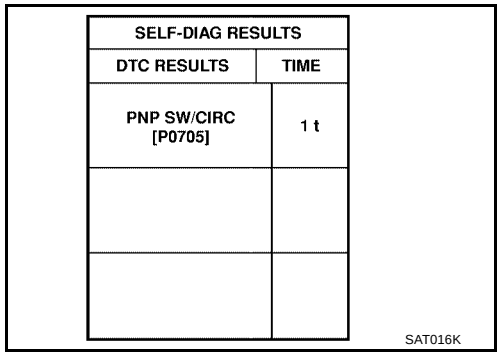
A sample of CONSULT-II display for DTC and 1st trip DTC is shown. DTC or 1st trip DTC of a malfunction is displayed in SELF DIAGNOSIS mode for “ENGINE” with CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.



If the DTC is being detected currently, the time data will be “0”.



If a 1st trip DTC is stored in the ECM, the time data will be “1t”.



Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM has a memory function, which stores the driving condition such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed and vehicle speed at the moment the ECM detects a malfunction.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data, and the data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For detail, refer to EC-56, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .
Only one set of freeze frame data (either 1st trip freeze frame data of freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM.
The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased.

HOW TO ERASE DTC

The diagnostic trouble code can be erased by CONSULT-II, GST or ECM DIAGNOSTIC TEST MODE as follows.

- **If the battery terminal is disconnected, the diagnostic trouble code will be lost within 24 hours.**
- **When you erase the DTC, using CONSULT-II or GST is easier and quicker than switching the mode selector on the ECM.**

The following emission-related diagnostic information is cleared from the ECM memory when erasing DTC related to OBD-II. For details, refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

- **Diagnostic trouble codes (DTC)**
- **1st trip diagnostic trouble codes (1st trip DTC)**
- **Freeze frame data**
- **1st trip freeze frame data**
- **System readiness test (SRT) codes**
- **Test values**

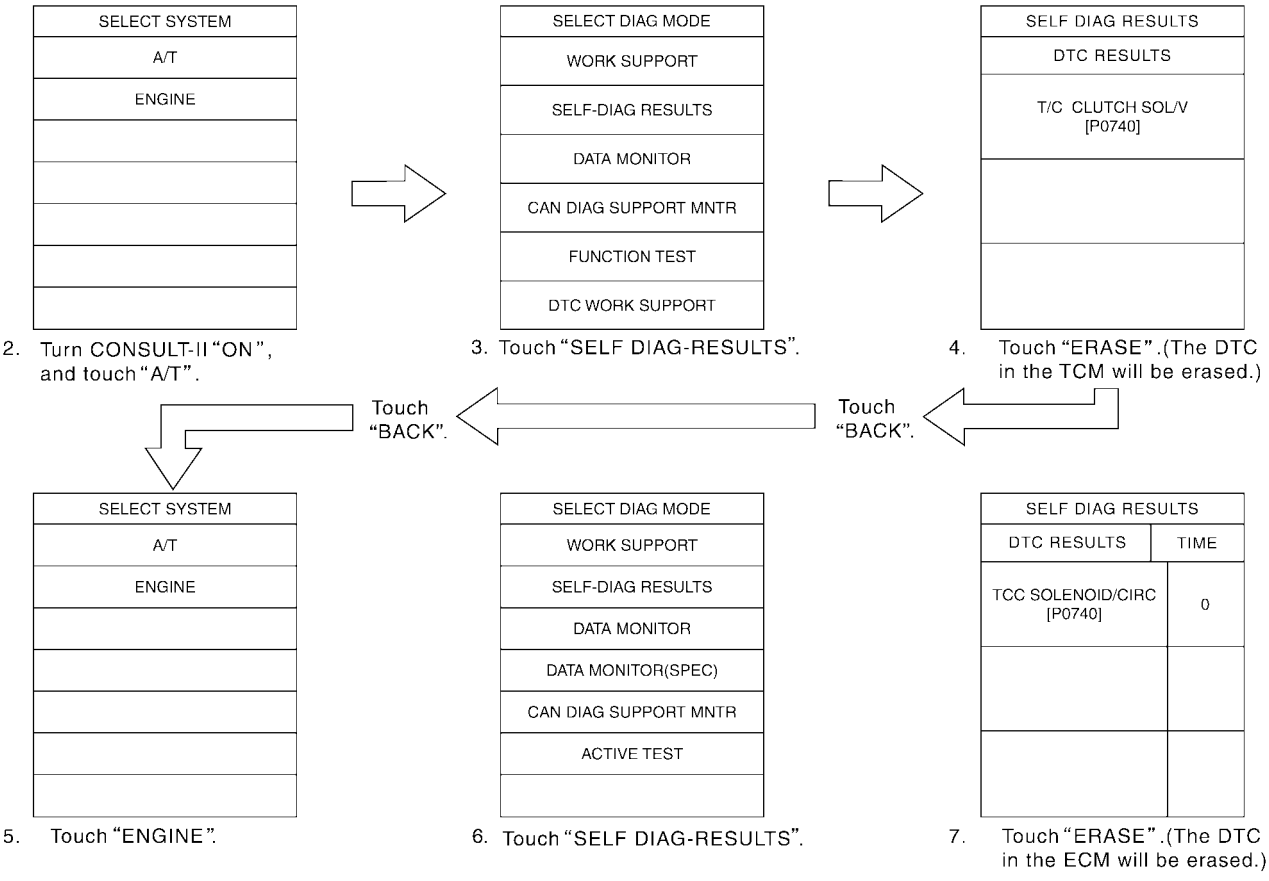
HOW TO ERASE DTC (WITH CONSULT-II)

- **If a DTC is displayed for both ECM and TCM, it needs to be erased for both ECM and TCM.**

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 10 seconds and then turn it “ON” (engine stopped) again.
2. Turn CONSULT-II “ON” and touch “A/T”.
3. Touch “SELF DIAGNOSIS”.
4. Touch “ERASE”. (The DTC in the TCM will be erased.) Then touch “BACK” twice.
5. Touch “ENGINE”.
6. Touch “SELF DIAGNOSIS”.
7. Touch “ERASE”. (The DTC in the ECM will be erased.)

How to erase DTC (With CONSULT-II)

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.



HOW TO ERASE DTC (WITH GST)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Perform TCM Self-diagnostic Procedure. Refer to AT-51, "TCM Self-diagnostic Procedure (No Tools)" . (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with Generic Scan Tool (GST). For details, refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

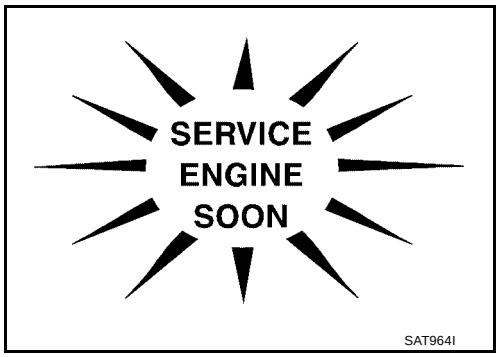
HOW TO ERASE DTC (NO TOOLS)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Perform TCM Self-diagnostic Procedure. Refer to AT-51, "TCM Self-diagnostic Procedure (No Tools)" . (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Perform OBD-II Self-diagnostic Procedure. Refer to AT-51, "TCM Self-diagnostic Procedure (No Tools)" .

Malfunction Indicator Lamp (MIL)

ECS005WE

1. The malfunction indicator lamp will light up when the ignition switch is turned ON without the engine running. This is for checking the lamp.
   - If the malfunction indicator lamp does not light up, refer to DI-27, "WARNING LAMPS" .
     (Or see MIL & CONSULT-II in EC section. Refer to EC-65, "Malfunction Indicator Lamp (MIL)" , and EC-133, "CONSULT-II Function (ENGINE)" .
2. When the engine is started, the malfunction indicator lamp should go off.
   If the lamp remains on, the on board diagnostic system has detected an emission-related (OBD-II) malfunction. For detail, refer to EC-52, "Emission-related Diagnostic Information" .



CONSULT-II

ECS005WF

After performing “SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)” (AT-43, "SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)"), place check marks for results on the “DIAGNOSTIC WORKSHEET”, (AT-57, "DIAGNOSTIC WORKSHEET"). Reference pages are provided following the items.

NOTICE:

1. The CONSULT-II electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid).
   Check for time difference between actual shift timing and the CONSULT-II display. If the difference is noticeable, mechanical parts (except solenoids, sensors, etc.) may be malfunctioning. Check mechanical parts using applicable diagnostic procedures.
2. Shift schedule (which implies gear position) displayed on CONSULT-II and that indicated in Service Manual may differ slightly. This occurs because of the following reasons:

- Actual shift schedule has more or less tolerance or allowance,
- Shift schedule indicated in Service Manual refers to the point where shifts start, and
- Gear position displayed on CONSULT-II indicates the point where shifts are completed.

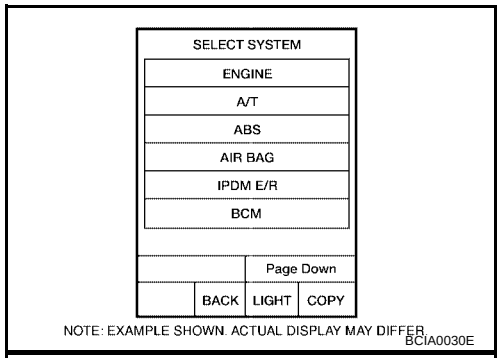
3. Shift solenoid valve “A” or “B” is displayed on CONSULT-II at the start of shifting. Gear position is displayed upon completion of shifting (which is computed by TCM).
4. Additional CONSULT-II information can be found in the Operation Manual supplied with the CONSULT-II unit.

FUNCTION

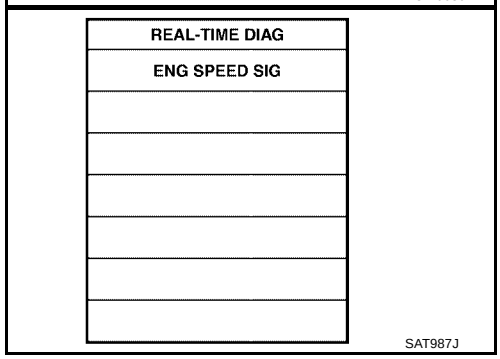
Diagnostic test mode	Function	Reference page
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on CONSULT-II.	—
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.	AT-43
Data monitor	Input/Output data in the ECM can be read.	AT-45
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.	—
Function test	Perform by CONSULT-II instead of a technican to determine whether each system is "OK" or "NG".	—
DTC work support	Select the operating condition to confirm Diagnostic Trouble Codes.	AT-47
TCM part number	TCM part number can be read.	—

SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)

1. Turn on CONSULT-II and touch “ENGINE” for OBD-II detected items or touch “A/T” for TCM self-diagnosis.
   If A/T is not displayed, check TCM power supply and ground circuit. Refer to AT-112, "TROUBLE DIAGNOSIS FOR POWER SUPPLY" . If result is NG, refer to PG-3, "POWER SUPPLY ROUTING" .



2. Touch “SELF DIAG RESULTS”.
   Display shows malfunction experienced since the last erasing operation.
   CONSULT-II performs “REAL TIME DIAG”.
   Also, any malfunction detected while in this mode will be displayed at real time.



SELF-DIAGNOSTIC RESULT TEST MODE

Detected items (Screen terms for CONSULT-II, “SELF DIAGNOSIS” test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
“A/T”	“ENGINE”		Available by O/D OFF indicator lamp or “A/T” on CONSULT-II	SERVICE ENGINE SOON Available by malfunction indicator lamp *2, “ENGINE” on CONSULT-II or GST
PNP switch circuit		● TCM does not receive the correct voltage signal (based on the gear position) from the switch.	—	P0705
—	PNP SW/CIRC			
Revolution sensor		● TCM does not receive the proper voltage signal from the sensor.	X	P0720
VHCL SPEED SEN·A/T	VEH SPD SEN/CIR AT			
Vehicle speed sensor (Meter)		● TCM does not receive the proper voltage signal from the sensor.	X	—
VHCL SPEED SEN·MTR	—			
A/T 1st gear function		● A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	—	P0731*1
A/T 1ST GR FNCTN	A/T 1ST GR FNCTN			
A/T 2nd gear function		● A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	—	P0732*1
A/T 2ND GR FNCTN	A/T 2ND GR FNCTN			
A/T 3rd gear function		● A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	—	P0733*1
A/T 3RD GR FNCTN	A/T 3RD GR FNCTN			
A/T 4th gear function		● A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	—	P0734*1
A/T 4TH GR FNCTN	A/T 4TH GR FNCTN			
A/T TCC S/V function (lock-up)		● A/T cannot perform lock-up even if electrical circuit is good.	—	P0744*1
A/T TCC S/V FNCTN	A/T TCC S/V FNCTN			

Detected items (Screen terms for CONSULT-II, "SELF DIAGNOSIS" test mode)		Malfunction is detected when ...	TCM self-diagnosis	OBD-II (DTC)
"A/T"	"ENGINE"		Available by O/D OFF indicator lamp or "A/T" on CONSULT-II	SERVICE ENGINE SOON Available by malfunction indicator lamp *2, "ENGINE" on CONSULT-II or GST
Shift solenoid valve A		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0750
SHIFT SOLENOID/V A	SFT SOL A/CIRC			
Shift solenoid valve B		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0755
SHIFT SOLENOID/V B	SFT SOL B/CIRC			
Overrun clutch solenoid valve		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P1760
OVERRUN CLUTCH S/V	O/R CLUCH SOL/ CIRC			
T/C clutch solenoid valve		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0740
T/C CLUTCH SOL/V	TCC SOLENOID/ CIRC			
Line pressure solenoid valve		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0745
LINE PRESSURE S/ V	L/PRESS SOL/CIRC			
Throttle position sensor, Throttle position switch		● TCM receives an excessively low or high voltage from the sensor.	X	P1705
THROTTLE POSI SEN	TP SEN/CIRC A/T			
Engine speed signal		● TCM does not receive the proper voltage signal from the ECM.	X	P0725
ENGINE SPEED SIG				
A/T fluid temperature sensor		● TCM receives an excessively low or high voltage from the sensor.	X	P0710
BATT/FLUID TEMP SEN	ATF TEMP SEN/ CIRC			
TCM (RAM)		● TCM memory (RAM) is malfunctioning.	—	—
CONTROL UNIT (RAM)	—			
TCM (ROM)		● TCM memory (ROM) is malfunctioning.	—	—
CONTROL UNIT (ROM)	—			
TCM (EEP ROM)		● TCM memory (EEP ROM) is malfunctioning.	—	—
CONT UNIT (EEP ROM)	—			
Initial start		● This is not a malfunction message (Whenever shutting off a power supply to the TCM, this message appears on the screen.)	X	—
INITIAL START	—			
No failure (NO SELF DIAGNOSTIC FAILURE INDICATED FURTHER TESTING MAY BE REQUIRED**)		● No failure has been detected.	X	X

X: Applicable
—: Not applicable

*1: These malfunctions cannot be displayed by MIL SERVICE ENGINE SOON if another malfunction is assigned to MIL.
*2: Refer to EC-65, "Malfunction Indicator Lamp (MIL)" .

DATA MONITOR MODE (A/T)

Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
Vehicle speed sensor 1 (A/T) (Revolution sensor)	VHCL/S SE·A/T [km/h] or [mph]	X	—	● Vehicle speed computed from signal of revolution sensor is displayed.	When racing engine in “N” or “P” position with vehicle stationary, CONSULT-II data may not indicate 0 km/h (0 mph).
Vehicle speed sensor 2 (Meter)	VHCL/S SE·MTR [km/h] or [mph]	X	—	● Vehicle speed computed from signal of vehicle speed sensor is displayed.	Vehicle speed display may not be accurate under approx. 10 km/h (6 mph). It may not indicate 0 km/h (0 mph) when vehicle is stationary.
Throttle position sensor [accelerator pedal position (APP) sensor]	THRTL POS SEN [V]	X	—	● Throttle position sensor [accelerator pedal position (APP) sensor] signal voltage is displayed.	
A/T fluid temperature sensor	FLUID TEMP SE [V]	X	—	● A/T fluid temperature sensor signal voltage is displayed. ● Signal voltage lowers as fluid temperature rises.	
Battery voltage	BATTERY VOLT [V]	X	—	● Source voltage of TCM is displayed.	
Engine speed	ENGINE SPEED [rpm]	X	X	● Engine speed, computed from engine speed signal, is displayed.	Engine speed display may not be accurate under approx. 800 rpm. It may not indicate 0 rpm even when engine is not running.
Overdrive control switch	OVERDRIVE SW [ON/OFF]	X	—	● ON/OFF state computed from signal of overdrive control SW is displayed.	
PN position switch	PN POSI SW [ON/OFF]	X	—	● ON/OFF state computed from signal of PN position SW is displayed.	
R position switch	R POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of R position SW is displayed.	
D position switch	D POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of D position SW is displayed.	
2 position switch	2 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 2 position SW, is displayed.	
1 position switch	1 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 1 position SW, is displayed.	
ASCD cruise signal	ASCD CRUISE [ON/OFF]	X	—	● Status of ASCD cruise signal is displayed. ON ... Cruising state OFF ... Normal running state	● This is displayed even when no ASCD is mounted.

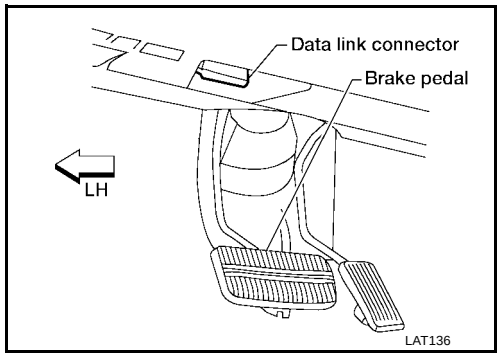
Item	Display	Monitor item		Description	Remarks
		TCM input signals	Main signals		
ASCD OD cut signal	ASCD OD CUT [ON/OFF]	X	—	● Status of ASCD OD release signal is displayed. ON ... OD released OFF ... OD not released	● This is displayed even when no ASCD is mounted.
Kickdown switch	KICKDOWN SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of kickdown SW, is displayed.	● This is displayed even when no kickdown switch is equipped.
Gear position	GEAR	—	X	● Gear position data used for computation by TCM, is displayed.	
Selector lever position	SLCT LVR POSI	—	X	● Selector lever position data, used for computation by TCM, is displayed.	● A specific value used for control is displayed if fail-safe is activated due to error.
Vehicle speed	VEHICLE SPEED [km/h] or [mph]	—	X	● Vehicle speed data, used for computation by TCM, is displayed.	
Stop lamp switch	BRAKE SW [ON/OFF]	X	—	● ON/OFF status are displayed. ON: Brake pedal is depressed. OFF: Brake pedal is released.	
Throttle position	THROTTLE POSI [/8]	—	X	● Throttle position data, used for computation by TCM, is displayed.	● A specific value used for control is displayed if fail-safe is activated due to error.
Line pressure duty	LINE PRES DTY [%]	—	X	● Control value of line pressure solenoid valve, computed by TCM from each input signal, is displayed.	
Torque converter clutch solenoid valve duty	TCC S/V DUTY [%]	—	X	● Control value of torque converter clutch solenoid valve, computed by TCM from each input signal, is displayed.	
Shift solenoid valve A	SHIFT S/V A [ON/OFF]	—	X	● Control value of shift solenoid valve A, computed by TCM from each input signal, is displayed.	Control value of solenoid is displayed even if solenoid circuit is disconnected. The “OFF” signal is displayed if solenoid circuit is shorted.
Shift solenoid valve B	SHIFT S/V B [ON/OFF]	—	X	● Control value of shift solenoid valve B, computed by TCM from each input signal, is displayed.	
Overrun clutch solenoid valve	OVERRUN/C S/V [ON/OFF]	—	X	● Control value of overrun clutch solenoid valve computed by TCM from each input signal is displayed.	
Self-diagnosis display lamp (O/D OFF indicator lamp)	SELF-D DP LMP [ON/OFF]	—	X	● Control status of O/D OFF indicator lamp is displayed.	

X: Applicable
—: Not applicable

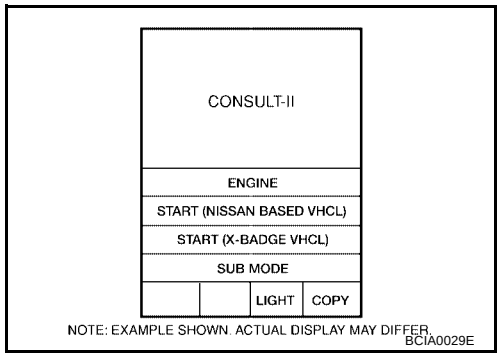
DTC WORK SUPPORT MODE WITH CONSULT-II

CONSULT-II Setting Procedure

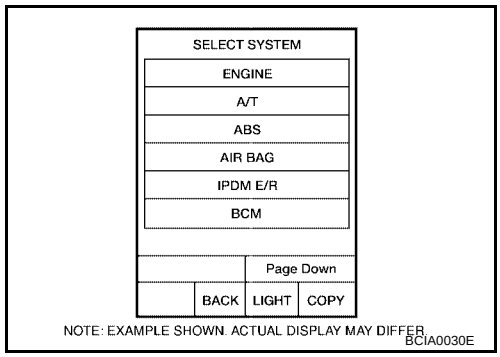
1. Turn ignition switch “OFF”.
2. Connect CONSULT-II to Data link connector which is located in left side lower dash panel.



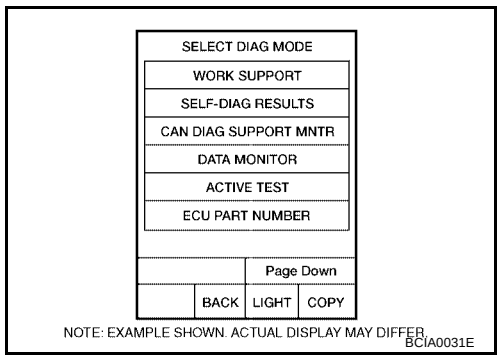
3. Turn ignition switch “ON”.
4. Touch “START (NISSAN BASED VHCL)”.



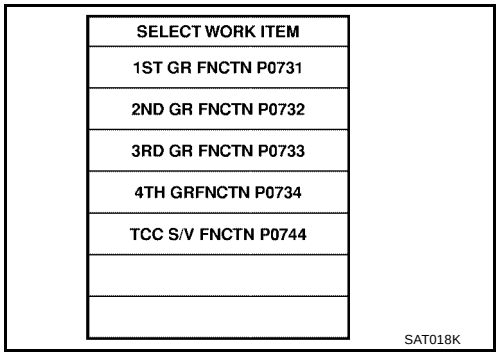
5. Touch “A/T”.



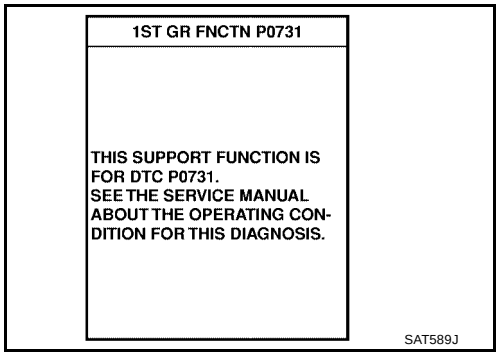
6. Touch “DTC WORK SUPPORT”.



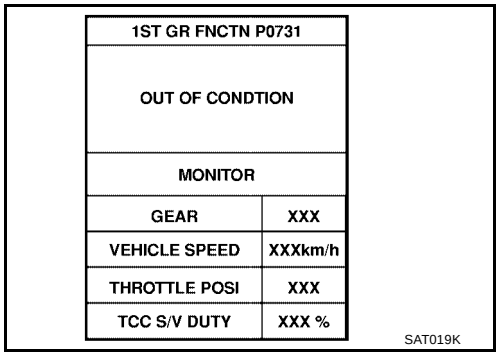
7. Touch select item menu (1ST, 2ND, etc.).



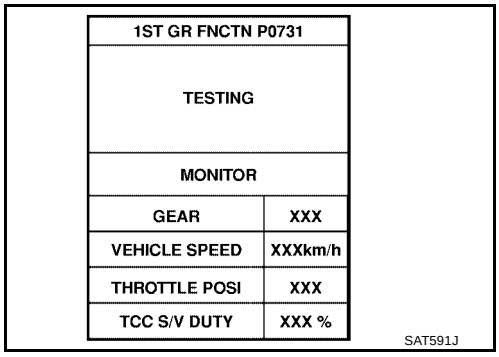
8. Touch “START”.



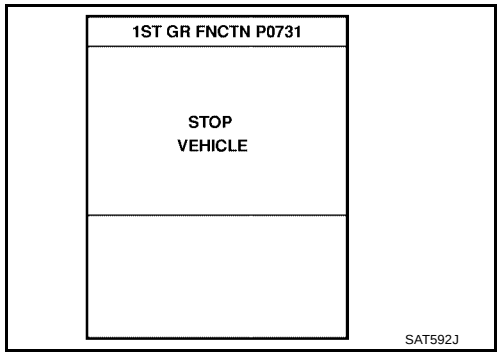
9. Perform driving test according to “DTC CONFIRMATION PROCEDURE” in “TROUBLE DIAGNOSIS FOR DTC”.

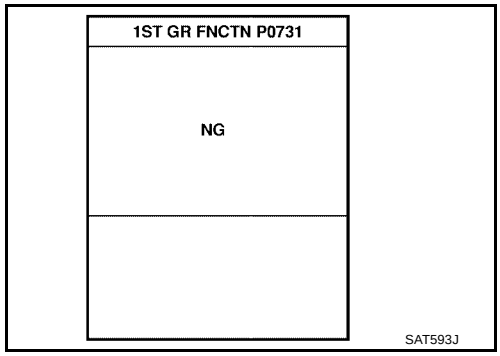


- **When testing conditions are satisfied, CONSULT-II screen changes from “OUT OF CONDITION” to “TESTING”.**

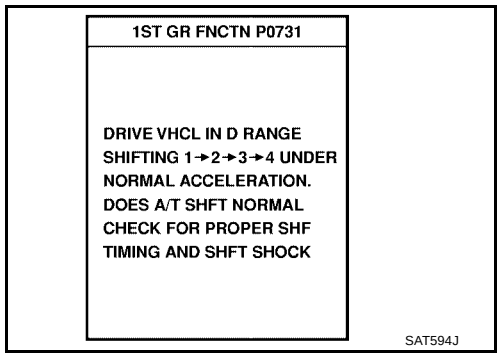


10. Stop vehicle. If “NG” appears on the screen, malfunction may exist. Go to “DIAGNOSTIC PROCEDURE”.

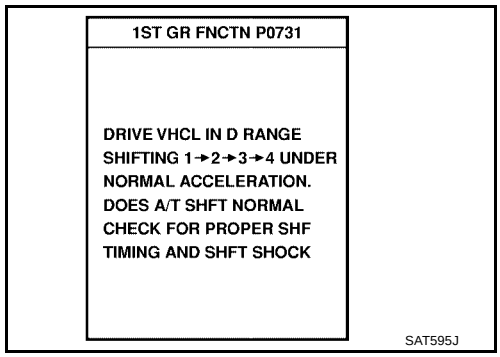




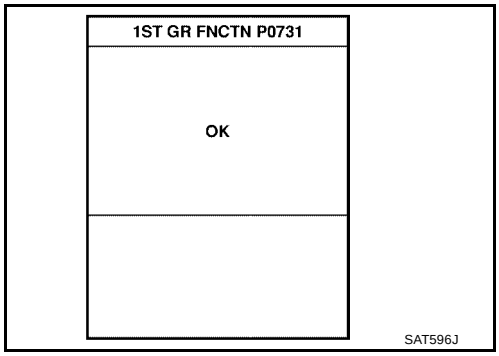
11. Perform test drive to check gear shift feeling in accordance with instructions displayed.

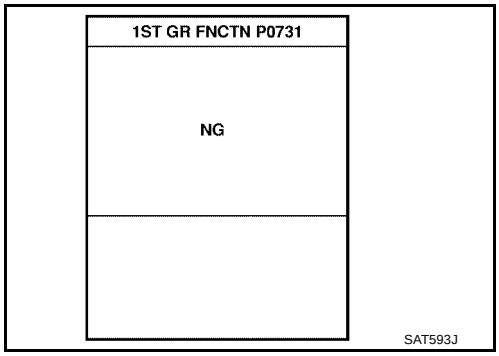


12. Touch “YES” or “NO”.



13. CONSULT-II procedure ended.





If “NG” appears on the screen, a malfunction may exist. Go to “DIAGNOSTIC PROCEDURE”.

DTC WORK SUPPORT MODE

DTC work support item	Description	Check items (Possible cause)
1ST GR FNCTN P0731	Following items for “A/T 1st gear function (P0731)” can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit
2ND GR FNCTN P0732	Following items for “A/T 2nd gear function (P0732)” can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit
3RD GR FNCTN P0733	Following items for “A/T 3rd gear function (P0733)” can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Each clutch ● Hydraulic control circuit
4TH GR FNCTN P0734	Following items for “A/T 4th gear function (P0734)” can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Shift solenoid valve B ● Line pressure solenoid valve ● Each clutch ● Hydraulic control circuit
TCC S/V FNCTN P0744	Following items for “A/T TCC S/V function (lock-up) (P0744)” can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Torque converter clutch solenoid valve ● Each clutch ● Hydraulic control circuit

DIAGNOSTIC PROCEDURE WITHOUT CONSULT-II

OBD-II Self-diagnostic Procedure (With GST)

Refer to EC-145, "Generic Scan Tool (GST) Function" .

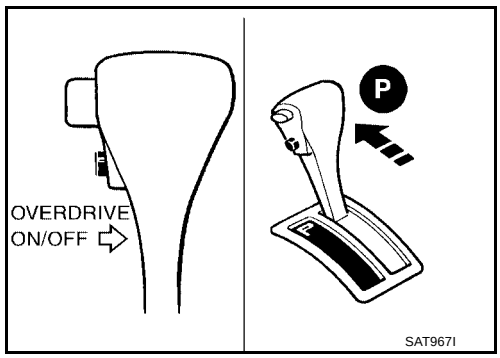
OBD-II Self-diagnostic Procedure (No Tools)

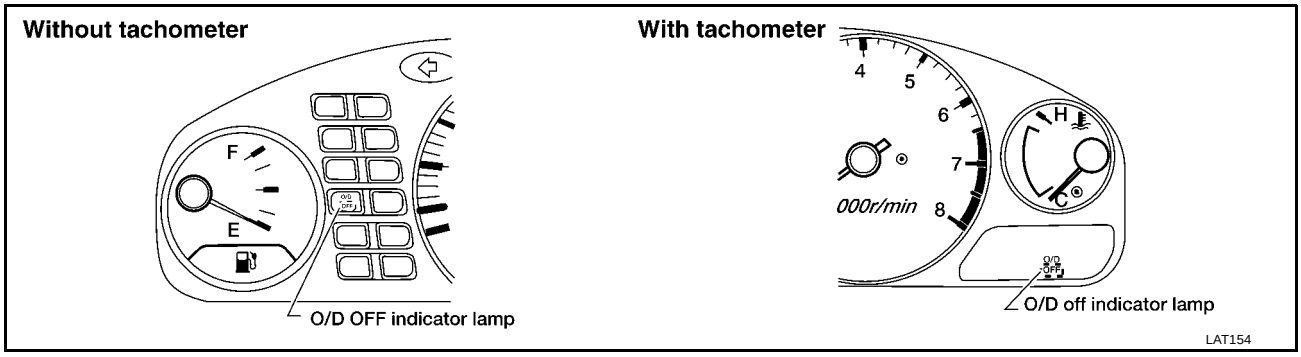
Refer to EC-65, "Malfunction Indicator Lamp (MIL)" .

TCM Self-diagnostic Procedure (No Tools)

1. CHECK O/D OFF INDICATOR LAMP

1. Move A/T selector lever to “P” position.
   Start the engine.
   Warm engine to normal operating temperature.
2. Turn ignition switch to “OFF” position.
3. Wait 5 seconds.
4. Turn ignition switch to “ON” position.
   (Do not start engine.)
5. Does O/D OFF indicator lamp come on for about 2 seconds?



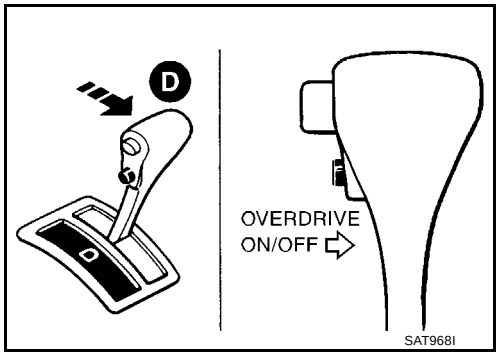


Yes or No

Yes >> GO TO 2.
No >> GO TO AT-220, "1. O/D OFF Indicator Lamp Does Not Come On" .

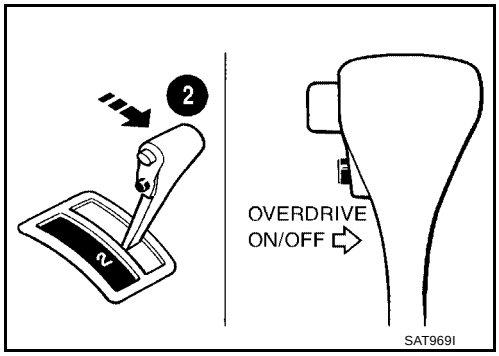
2. JUDGEMENT PROCEDURE STEP 1

1. Turn ignition switch to “OFF” position.
2. Turn ignition switch to “ACC” position.
3. Move A/T selector lever from “P” to “D” position.
4. Turn ignition switch to “ON” position.
   (Do not start engine.)
5. Depress and hold overdrive control switch (the O/D OFF indicator lamp will be “ON”) until directed to release the switch.
   If O/D OFF indicator lamp does not come on, go to AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}" .
6. Turn ignition switch to “OFF” position.
7. Turn ignition switch to “ON” position.
   (Do not start engine.)
8. Release the overdrive control switch (the O/D OFF indicator lamp will be “OFF”).
9. Wait 2 seconds.
10. Move A/T selector lever to “2” position.
11. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be “ON”).



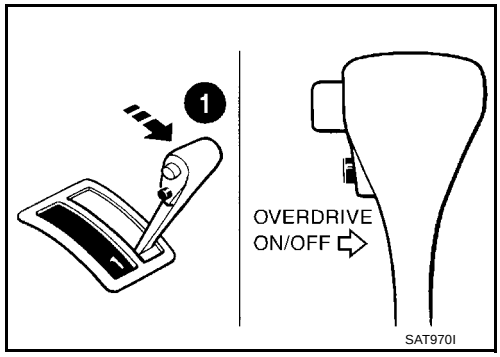
12. Depress and hold the overdrive control switch (the O/D OFF indicator lamp will be “OFF”) until directed to release the switch.

    >> GO TO 3.



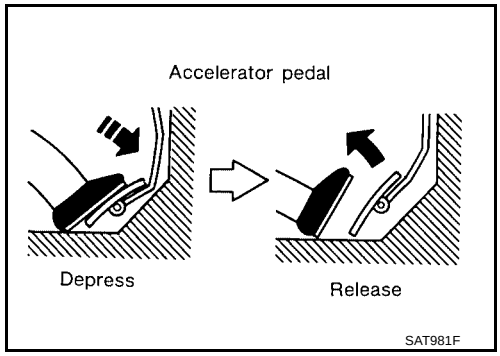
3. JUDGEMENT PROCEDURE STEP 2

1. Move A/T selector lever to “1” position.
2. Release the overdrive control switch.
3. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be “ON”).
4. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be “OFF”).
5. Depress and hold the overdrive control switch (the O/D OFF indicator lamp will be “ON”) until directed to release the switch.



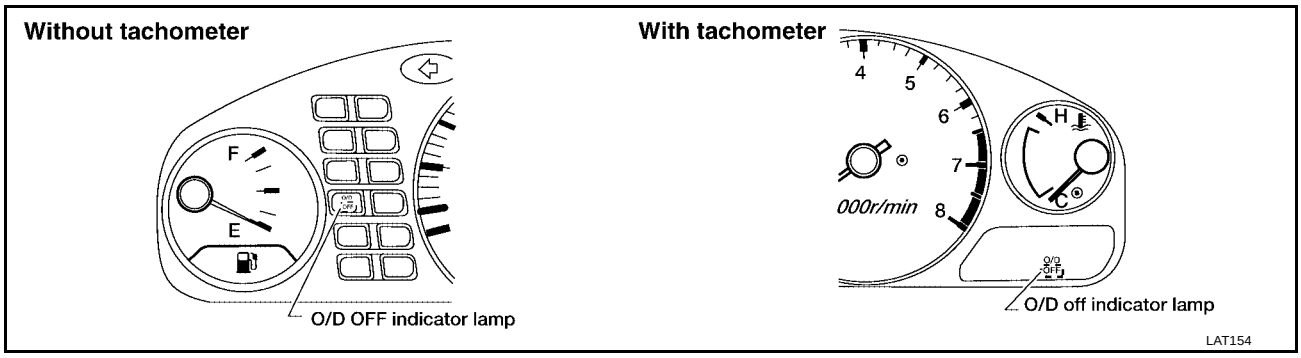
6. Depress accelerator pedal fully and release.
7. Release the overdrive control switch (the O/D OFF indicator lamp will begin to flash “ON” and “OFF”).

>> GO TO 4.



4. CHECK SELF-DIAGNOSIS CODE

Check O/D OFF indicator lamp. Refer to AT-54, "Judgement of Self-diagnosis Code" .

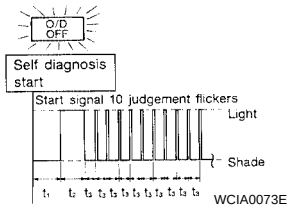


>> **DIAGNOSIS END**

Judgement of Self-diagnosis Code

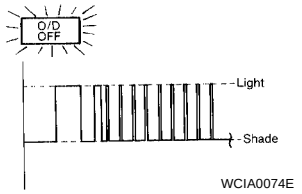
O/D OFF indicator lamp:

All judgement flickers are the same.



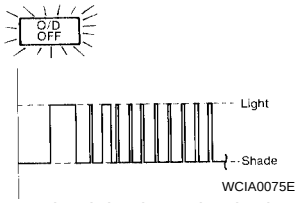
All circuits that can be confirmed by self-diagnosis are OK.

1st judgement flicker is longer than others.



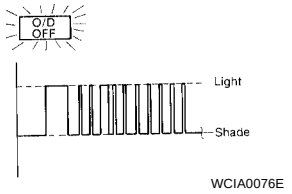
Revolution sensor circuit is short-circuited or disconnected.
⇒ **Go to** AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" .

2nd judgement flicker is longer than others.



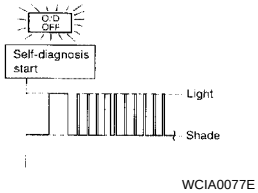
Vehicle speed sensor circuit is short-circuited or disconnected.
⇒ **Go to** AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" .

3rd judgement flicker is longer than others.



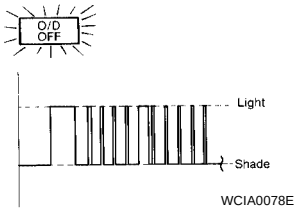
Throttle position sensor [accelerator pedal position (APP) sensor] circuit is short-circuited or disconnected.
⇒ **Go to** AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]" .

4th judgement flicker is longer than others.



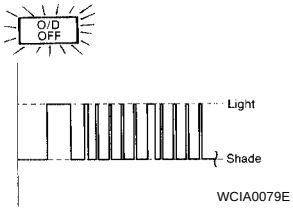
Shift solenoid valve A circuit is short-circuited or disconnected.
⇒ **Go to** AT-179, "DTC P0750 SHIFT SOLENOID VALVE A" .

5th judgement flicker is longer than others.



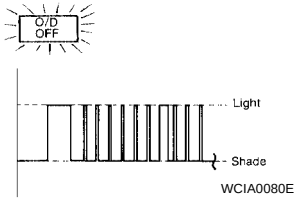
Shift solenoid valve B circuit is short-circuited or disconnected.
⇒ **Go to** AT-183, "DTC P0755 SHIFT SOLENOID VALVE B" .

6th judgement flicker is longer than others.



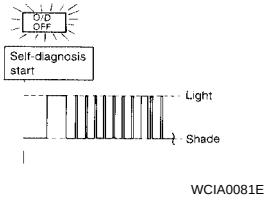
Overrun clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to** AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" .

7th judgement flicker is longer than others.



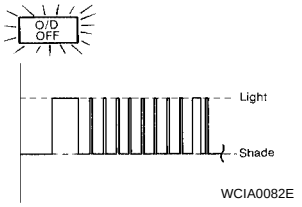
Torque converter clutch solenoid valve circuit is short-circuited or disconnected.
⇒ **Go to** AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE" .

8th judgement flicker is longer than others.

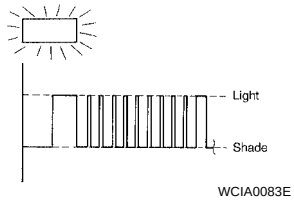
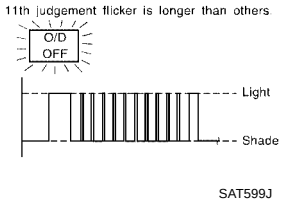
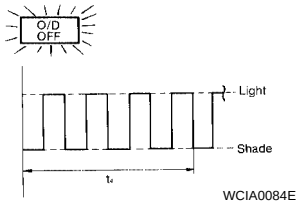
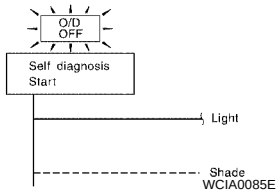


A/T fluid temperature sensor is disconnected or TCM power source circuit is damaged.
⇒ **Go to** AT-197, "DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)" .

9th judgement flicker is longer than others.



Engine speed signal circuit is short-circuited or disconnected.
⇒ **Go to** AT-131, "DTC P0725 ENGINE SPEED SIGNAL" .

O/D OFF indicator lamp:	
10th judgement flicker is longer than others.  WCIA0083E Line pressure solenoid valve circuit is short-circuited or disconnected. ⇒ **Go to** AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE" **.**	11th judgement flicker is longer than others.  SAT599J The ECM-A/T communication line is open or shorted. ⇒ **Go to** AT-208, "DTC U1000 CAN COMMUNICATION LINE" **.**
Flickers as shown below.  WCIA0084E Battery power is low. Battery has been disconnected for a long time. Battery is connected conversely. (When reconnecting TCM connectors. — This is not a problem.)	Lamp comes on.  WCIA0085E PNP switch, overdrive control switch or throttle position switch circuit is disconnected or TCM is damaged. ⇒ **Go to** AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}" **.**

t_1 = 2.5 seconds t_2 = 2.0 seconds t_3 = 1.0 second t_4 = 1.0 second

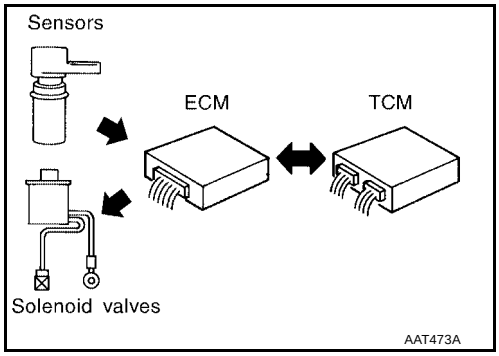
TROUBLE DIAGNOSIS — INTRODUCTION

PFP:00000

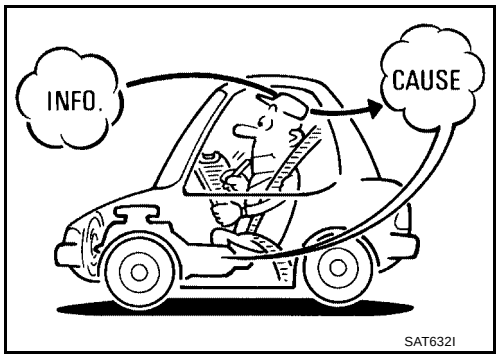
Introduction

ECS005WG

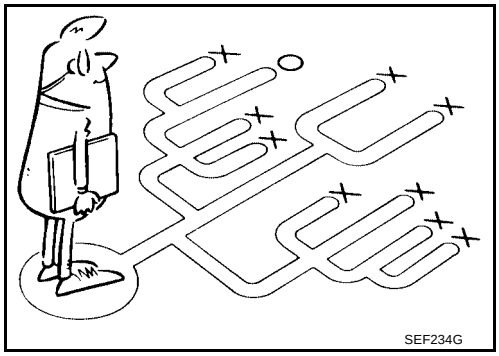
The TCM receives a signal from the vehicle speed sensor, throttle position sensor [accelerator pedal position (APP) sensor] or PNP switch and provides shift control or lock-up control via A/T solenoid valves.
The TCM also communicates with the ECM by means of a signal sent from sensing elements used with the OBD-related parts of the A/T system for malfunction-diagnostic purposes. The TCM is capable of diagnosing malfunctioning parts while the ECM can store malfunctions in its memory.
Input and output signals must always be correct and stable in the operation of the A/T system. The A/T system must be in good operating condition and be free of valve seizure, solenoid valve malfunction, etc.



It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.
A visual check only may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the “Work Flow”. Refer to AT-60, "Work Flow" .



Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “Diagnostic Worksheet” like the example (AT-58, "Diagnostic Worksheet") should be used.
Start your diagnosis by looking for “conventional” problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.
Also check related Service bulletins for information.



DIAGNOSTIC WORKSHEET

Information from Customer

KEY POINTS

- **WHAT** ..... Vehicle & A/T model
- **WHEN**..... Date, Frequencies
- **WHERE**..... Road conditions
- **HOW**..... Operating conditions, Symptoms

Customer name MR/MS	Model & Year	VIN
Trans. model	Engine	Mileage
Incident Date	Manuf. Date	In Service Date
Frequency	❑ Continuous ❑ Intermittent (times a day)	
Symptoms	❑ Vehicle does not move. (❑ Any position ❑ Particular position)	
	❑ No up-shift (❑ 1st → 2nd ❑ 2nd → 3rd ❑ 3rd → O/D)	
	❑ No down-shift (❑ O/D → 3rd ❑ 3rd → 2nd ❑ 2nd → 1st)	
	❑ Lockup malfunction	
	❑ Shift point too high or too low.	
	❑ Shift shock or slip (❑ N → D ❑ Lockup ❑ Any drive position)	
	❑ Noise or vibration	
	❑ No kickdown	
	❑ No pattern select	
	❑ Others ( )	
O/D OFF indicator lamp	Blinks for about 8 seconds.	
	❑ Continuously lit	❑ Not lit
Malfunction indicator lamp (MIL)	❑ Continuously lit	❑ Not lit

Diagnostic Worksheet

1.	❑ Read the “FAIL-SAFE” and listen to customer complaints.			AT-11, "FAIL-SAFE"
2.	❑ CHECK A/T FLUID			AT-63, "A/T Fluid Check"
		❑ Leakage (Follow specified procedure) ❑ Fluid condition ❑ Fluid level		
3.	❑ Perform STALL TEST and LINE PRESSURE TEST.			AT-63, "Stall Test", AT-67, "Line Pressure Test"
		❑ Stall test — Mark possible damaged components/others.		
		❑ Torque converter one-way clutch ❑ Reverse clutch ❑ Forward clutch ❑ Overrun clutch ❑ Forward one-way clutch	❑ Low & reverse brake ❑ Low one-way clutch ❑ Engine ❑ Line pressure is low ❑ Clutches and brakes except high clutch and brake band are OK	
		❑ Line Pressure test — Suspected parts:		
4.	❑ Perform all ROAD TEST and mark required procedures.			AT-68, "Road Test"
	4-1.	Check before engine is started.		AT-70, "1. CHECK BEFORE ENGINE IS STARTED"
		❑ SELF-DIAGNOSTIC PROCEDURE — Mark detected items.		
		❑ PNP switch, AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" . ❑ A/T fluid temperature sensor, AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" . ❑ Vehicle speed sensor·A/T (Revolution sensor), AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" . ❑ Engine speed signal, AT-131, "DTC P0725 ENGINE SPEED SIGNAL" . ❑ Torque converter clutch solenoid valve, . ❑ Line pressure solenoid valve, AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE" . ❑ Shift solenoid valve A, AT-179, "DTC P0750 SHIFT SOLENOID VALVE A" . ❑ Shift solenoid valve B, AT-183, "DTC P0755 SHIFT SOLENOID VALVE B" . ❑ Throttle position sensor [accelerator pedal position (APP) sensor], AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]" . ❑ Overrun clutch solenoid valve, AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" . ❑ PNP, overdrive control and throttle position sensor [accelerator pedal position (APP) sensor], AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}" . ❑ A/T fluid temperature sensor and TCM power source, AT-197, "DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)" . ❑ Vehicle speed sensor·MTR, AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" . ❑ Control unit (RAM), control unit (ROM), AT-211, "DTC CONTROL UNIT (RAM), CONTROL UNIT (ROM)" . ❑ Control unit (EEP ROM), AT-213, "DTC CONTROL UNIT (EEP ROM)" . ❑ Battery ❑ Others		
	4-2.	Check at idle		AT-71, "2. CHECK AT IDLE"
		❑ 1. O/D OFF Indicator Lamp Does Not Come On, AT-220, "1. O/D OFF Indicator Lamp Does Not Come On" . ❑ 2. Engine Cannot Be Started In “P” And “N” Position, AT-222, "2. Engine Cannot Be Started In “P” and “N” Position" . ❑ 3. In “P” Position, Vehicle Moves Forward Or Backward When Pushed, AT-223, "3. In “P” Position, Vehicle Moves Forward Or Backward When Pushed" . ❑ 4. In “N” Position, Vehicle Moves, AT-224, "4. In “N” Position, Vehicle Moves" . ❑ 5. Large Shock. “N” → “R” Position, AT-225, "5. Large Shock. “N” → “R” Position" . ❑ 6. Vehicle Does Not Creep Backward In “R” Position, AT-226, "6. Vehicle Does Not Creep Backward In “R” Position" . ❑ 7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position, AT-228, "7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position" .		

4. (cont'd)	4-3 (cont'd)	Cruise test	AT-73, "3. CRUISE TEST" AT-77, "Cruise Test — Part 1"
		Part-1	
		❑ 8. Vehicle Cannot Be Started From D_1 , AT-230, "8. Vehicle Cannot Be Started From D_1" . ❑ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-233, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$" . ❑ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-235, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" . ❑ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-237, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$" . ❑ 12. A/T Does Not Perform Lock-up, AT-239, "12. A/T Does Not Perform Lock-up" . ❑ 13. A/T Does Not Hold Lock-up Condition, AT-240, "13. A/T Does Not Hold Lock-up Condition" . ❑ 14. Lock-up Is Not Released, AT-242, "14. Lock-up Is Not Released" . ❑ 15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$), AT-243, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" .	
		Part-2	AT-80, "Cruise Test — Part 2"
		❑ 16. Vehicle Does Not Start From D_1 , AT-244, "16. Vehicle Does Not Start From D_1" . ❑ 9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$, AT-233, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$" . ❑ 10. A/T Does Not Shift: $D_2 \rightarrow D_3$, AT-235, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" . ❑ 11. A/T Does Not Shift: $D_3 \rightarrow D_4$, AT-237, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$" .	
4. (cont'd)	4-3 . (cont'd)	Part-3	AT-82, "Cruise Test — Part 3"
		❑ 17. A/T Does Not Shift: $D_4 \rightarrow D_3$ When Overdrive Control Switch “ON” → “OFF”, AT-246, "17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch “ON” → “OFF”" . ❑ 15. Engine Speed Does Not Return To Idle (Engine Brake In D_3), AT-243, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" . ❑ 18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever “D” → “2” Position, AT-247, "18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever “D” → “2” Position" . ❑ 15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_2$), AT-243, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" . ❑ 19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever “2” → “1” Position, AT-248, "19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever “2” → “1” Position" . ❑ 20. Vehicle Does Not Decelerate By Engine Brake, AT-249, "20. Vehicle Does Not Decelerate By Engine Brake" . ❑ SELF-DIAGNOSTIC PROCEDURE — Mark detected items.	
		❑ PNP switch, AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" . ❑ A/T fluid temperature sensor, AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" . ❑ Vehicle speed sensor·A/T (Revolution sensor), AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" . ❑ Engine speed signal, AT-131, "DTC P0725 ENGINE SPEED SIGNAL" . ❑ Torque converter clutch solenoid valve, AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE" . ❑ Line pressure solenoid valve, AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE" . ❑ Shift solenoid valve A, AT-179, "DTC P0750 SHIFT SOLENOID VALVE A" . ❑ Shift solenoid valve B, AT-183, "DTC P0755 SHIFT SOLENOID VALVE B" . ❑ Throttle position sensor [accelerator pedal position (APP) sensor], AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]" . ❑ Overrun clutch solenoid valve, AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" . ❑ PNP, overdrive control and throttle position sensor [accelerator pedal position (APP) sensor], AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}" . ❑ A/T fluid temperature sensor and TCM power source, AT-197, "DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)" . ❑ Vehicle speed sensor·MTR, AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" . ❑ Control unit (RAM), control unit (ROM), AT-211, "DTC CONTROL UNIT (RAM), CONTROL UNIT (ROM)" . ❑ Control unit (EEP ROM), AT-213, "DTC CONTROL UNIT (EEP ROM)" . ❑ Battery ❑ Others	

5.	❏ For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts.	AT-43, "SELF-DIAGNOSTIC RESULT TEST MODE"
6.	❏ Perform all ROAD TEST and re-mark required procedures.	AT-68, "Road Test"
7.	❏ Perform DTC CONFIRMATION PROCEDURE for following MIL indicating items and check out NG items. Refer to EC-143, "DTC & SRT CONFIRMATION MODE" .	EC section
	❏ DTC (P0731), AT-135, "DTC P0731 A/T 1ST GEAR FUNCTION" . ❏ DTC (P0732), AT-140, "DTC P0732 A/T 2ND GEAR FUNCTION" . ❏ DTC (P0733), AT-145, "DTC P0733 A/T 3RD GEAR FUNCTION" . ❏ DTC (P0734), AT-150, "DTC P0734 A/T 4TH GEAR FUNCTION" . ❏ DTC (P0744), AT-163, "DTC P0744 A/T TCC S/V FUNCTION (LOCK-UP)" .	
8.	❏ Perform the Diagnostic Procedures for all remaining items marked NG. Repair or replace the damaged parts. Refer to the Symptom Chart when you perform the procedures. (The chart also shows some other possible symptoms and the component inspection orders.)	AT-43, "SELF-DIAGNOSTIC RESULT TEST MODE" AT-84, "Symptom Chart"
9.	❏ Erase DTC from TCM and ECM memories.	AT-40, "HOW TO ERASE DTC"

Work Flow

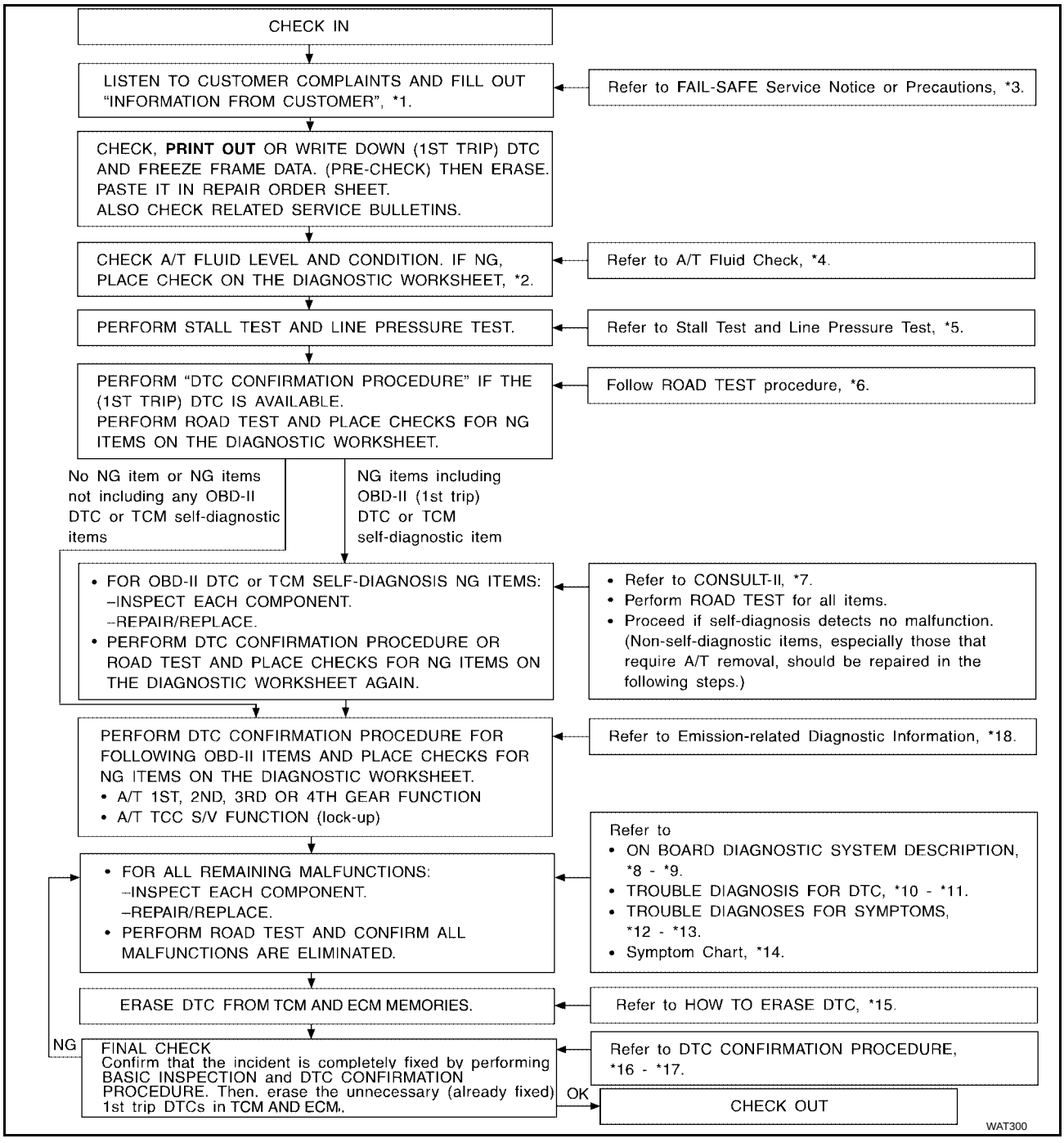
ECS005WH

HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

A good understanding of the malfunction conditions can make troubleshooting faster and more accurate. In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

Make good use of the two sheets provided, “Information from Customer” (AT-57, "Information from Customer") and “Diagnostic Worksheet” (AT-58, "Diagnostic Worksheet"), to perform the best troubleshooting possible.

WORK FLOW CHART



*1 AT-57, "Information from Customer"	*2 AT-58, "Diagnostic Worksheet"	*3 AT-11, "FAIL-SAFE"
*4 AT-63, "A/T Fluid Check"	*5 AT-63, "Stall Test", AT-67, "Line Pressure Test"	*6 AT-68, "Road Test"
*7 AT-42, "CONSULT-II"	*8 AT-38, "Introduction"	*9 AT-54, "Judgement of Self-diagnosis Code"
*10 AT-115, "Description"	*11 AT-213, "Description"	*12 AT-220, "1. O/D OFF Indicator Lamp Does Not Come On"

*13	AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}"	*14	AT-84, "Symptom Chart"	*15	AT-40, "HOW TO ERASE DTC"
*16	AT-115, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE"	*17	AT-213, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE"	*18	EC-52, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS".

TROUBLE DIAGNOSIS — BASIC INSPECTION

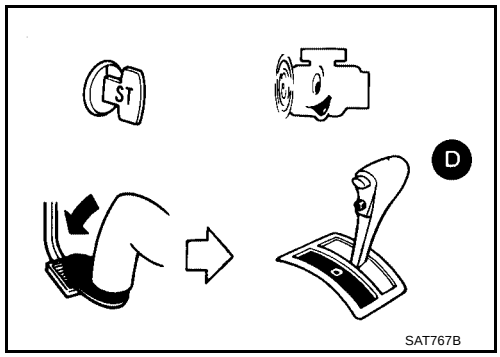
PFP:00000

A/T Fluid Check

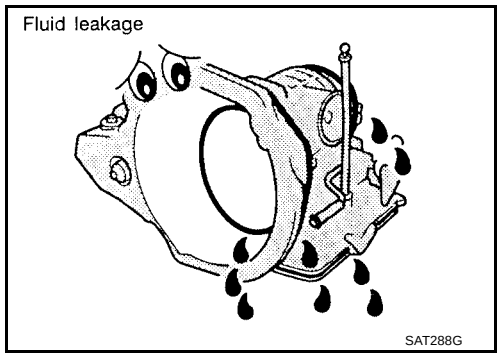
ECS005WI

FLUID LEAKAGE CHECK

1. Clean area suspected of leaking, for example, mating surface of converter housing and transmission case.
2. Start engine, apply foot brake, place selector lever in “D” position and wait a few minutes.
3. Stop engine.

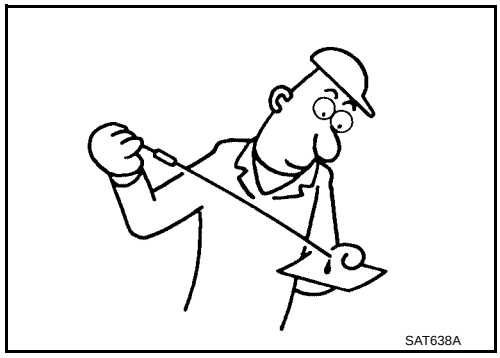


4. Check for fresh leakage.



FLUID CONDITION CHECK

Fluid color	Suspected problem
Dark or black with burned odor	Wear of frictional material
Milky pink	Water contamination — Road water entering through filler tube or breather
Varnished fluid, light to dark brown and tacky	Oxidation — Over or under filling, — Overheating



FLUID LEVEL CHECK

Refer to MA-31, "Checking A/T Fluid" .

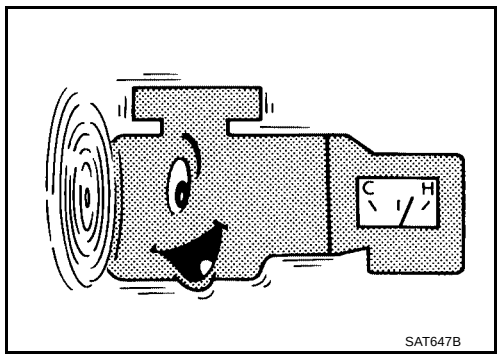
Stall Test

ECS005WJ

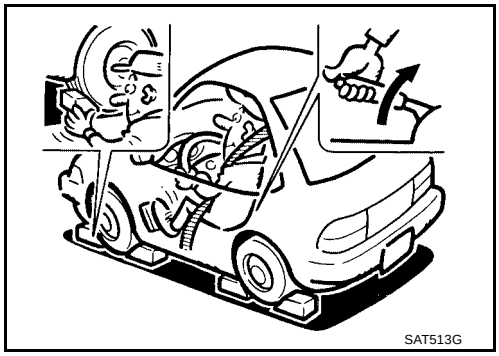
STALL TEST PROCEDURE

1. Check A/T fluid and engine oil levels. If necessary, add.
2. Drive vehicle for approx. 10 minutes or until fluid and oil reach operating temperature.

ATF operating temperature : 50 - 80°C (122 - 176°F)



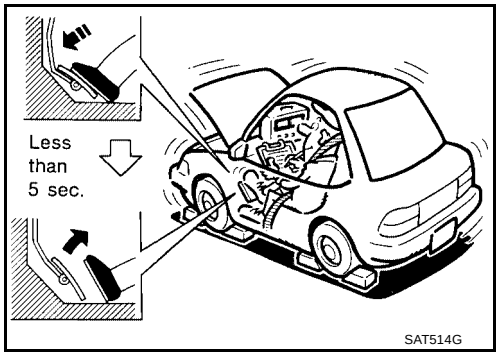
3. Set parking brake and block wheels.
4. Install a tachometer where it can be seen by driver during test.
   - **It is good practice to mark the point of specified engine rpm on indicator.**



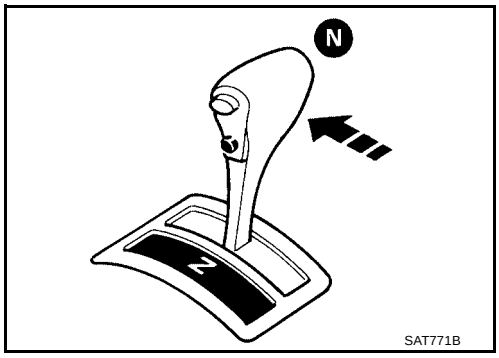
5. Start engine, apply foot brake, and place selector lever in "D" position.
6. Accelerate to wide open throttle gradually while applying foot brake.
7. Quickly note the engine stall revolution and immediately release throttle.
   - **During test, never hold throttle wide open for more than 5 seconds.**

   Stall revolution

   QG18DE : 2,350 - 2,800 rpm



8. Move selector lever to “N” position.
9. Cool off ATF.
   - **Run engine at idle for at least one minute.**
10. Repeat steps 5 through 9 with selector lever in “2”, “1” and “R” positions.



JUDGEMENT OF STALL TEST

The test result and possible damaged components relating to each result are shown in the illustrations that follow.

In order to pinpoint the possible damaged components, follow the “Work Flow” shown in AT-60, "Work Flow" .

NOTE:

Stall revolution is too high in “D”, “2” or “1” position:

- Slippage occurs in 1st gear but not in 2nd and 3rd gears..... Low one-way clutch slippage
- Slippage occurs in the following gears:
  1st through 3rd gears in “D” position and engine brake functions with overdrive control switch set to “OFF”.
  1st and 2nd gears in “2” position and engine brake functions with accelerator pedal released (fully closed throttle)..... Forward clutch or forward one-way clutch slippage

Stall revolution is too high in R position:

- Engine brake does not function in “1” position..... Low & reverse brake slippage
- Engine brake functions in “1” position..... Reverse clutch slippage

Stall revolution within specifications:

- Vehicle does not achieve speed of more than 80 km/h (50 MPH)..... One-way clutch seizure in torque converter housing

CAUTION:

Be careful since automatic fluid temperature increases abnormally.

- Slippage occurs in 3rd and 4th gears in “D” position..... High clutch slippage

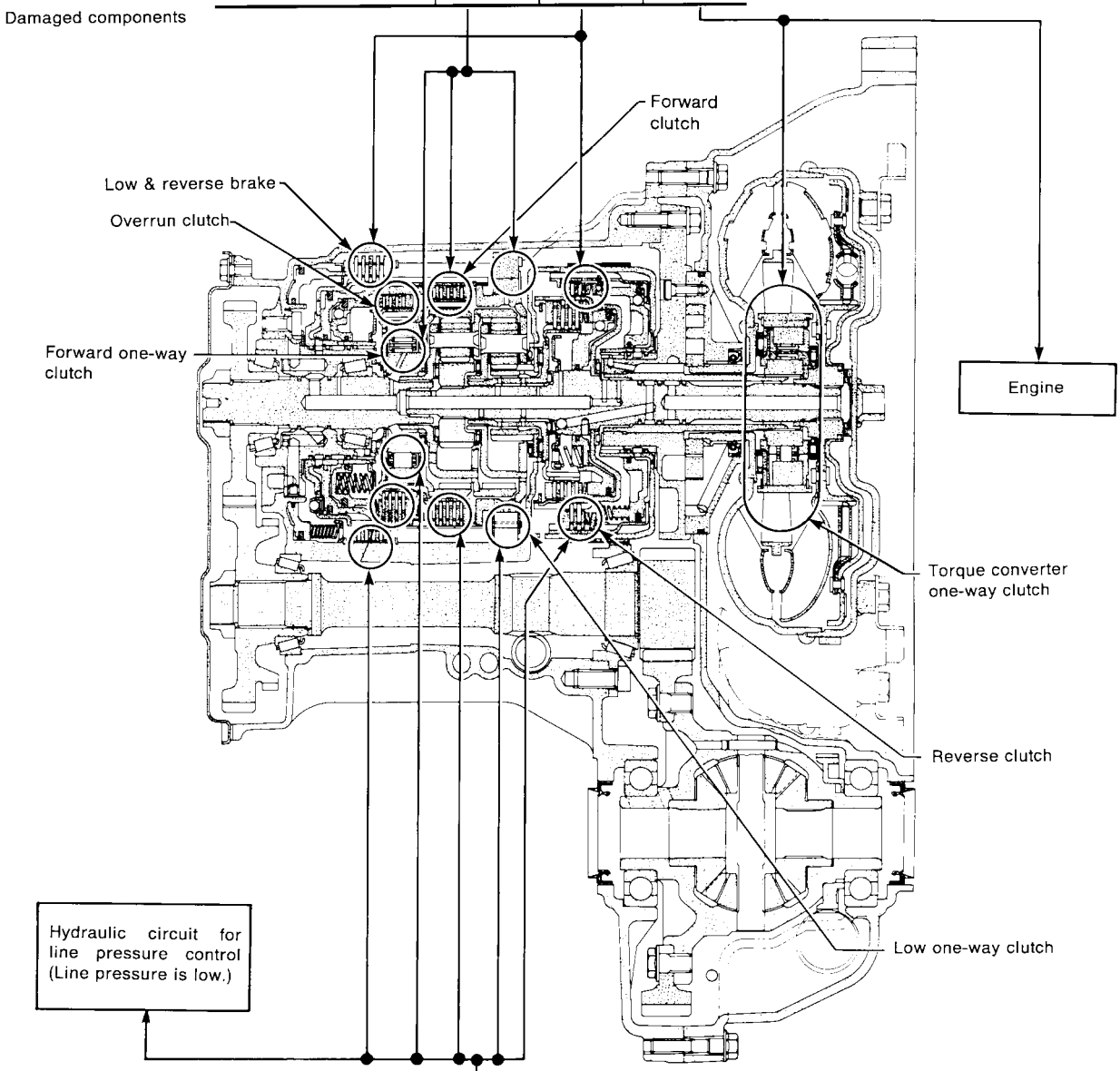
- Slippage occurs in 2nd and 4th gear in “D” position..... Brake band slippage
- Engine brake does not function in 2nd and 3rd gears in “D” position, 2nd gear in “2” position, and 1st gear in “1” position with overdrive control switch set to “OFF”..... Overrun clutch slippage

Stall revolution less than specifications:

- Poor acceleration during starts..... One-way clutch slippage in torque converter

Selector lever position	Judgement		
D	H	O	L
2	H	O	L
1	H	O	L
R	O	H	L

O : Stall revolution is normal.
H : Stall revolution is higher than specified.
L : Stall revolution is lower than specified.



Selector lever position	Judgement	
D	H	O
2	H	O
1	H	O
R	H	O

Clutches and brakes except high clutch and brake band are OK. (Condition of high clutch and brake band cannot be confirmed by stall test.)

SAT871HA

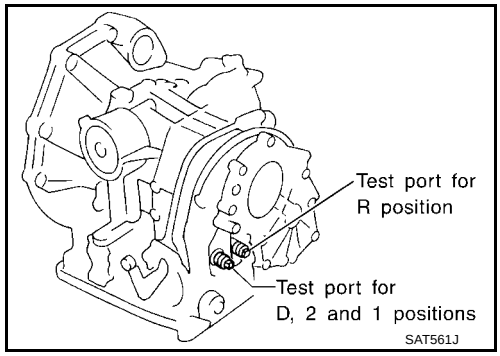
Line Pressure Test

ECS005WK

LINE PRESSURE TEST PORTS

Location of line pressure test ports are shown in the illustration.

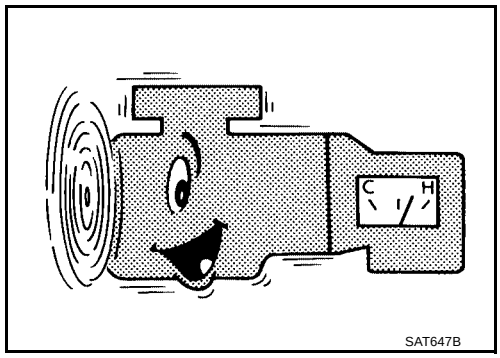
- **Always replace pressure plugs as they are self-sealing bolts.**



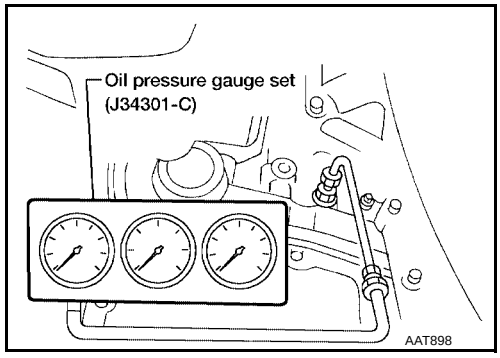
LINE PRESSURE TEST PROCEDURE

1. Check A/T fluid and engine oil levels. If necessary, add fluid or oil.
2. Drive vehicle for approx. 10 minutes or until engine oil and ATF reach operating temperature.

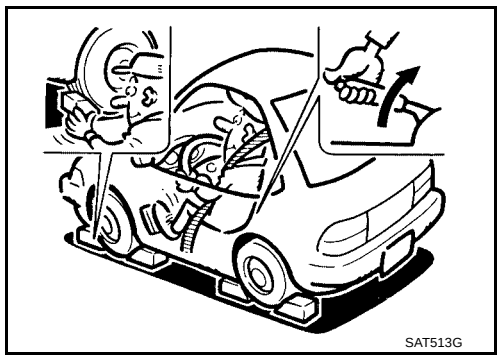
   ATF operating temperature : 50 - 80°C (122 - 176°F)



3. Install pressure gauge to corresponding line pressure port.

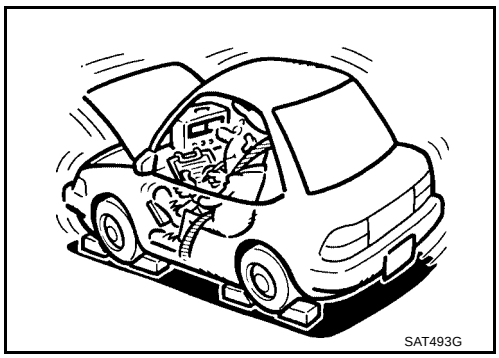


4. Set parking brake and block wheels.
   - **Continue to depress brake pedal fully while line pressure test is being performed at stall speed.**



5. Start engine and measure line pressure at idle and stall speed.
   - **When measuring line pressure at stall speed, follow the stall test procedure.**

Refer to AT-67, "Line Pressure Test" .


SAT493G

JUDGEMENT OF LINE PRESSURE TEST

Judgement		Suspected parts
At idle	Line pressure is low in all positions.	● Oil pump wear ● Control piston damage ● Pressure regulator valve or plug sticking ● Spring for pressure regulator valve damaged ● Fluid pressure leakage between oil strainer and pressure regulator valve ● Clogged strainer
	Line pressure is low in particular position.	● Fluid pressure leakage between manual valve and particular clutch ● For example, line pressure is: – Low in “R” and “1” positions, but – Normal in “D” and “2” positions. Therefore, fluid leakage exists at or around low and reverse brake circuit. Refer to AT-22, "CLUTCH AND BAND CHART" .
	Line pressure is high.	● Maladjustment of throttle position sensor [accelerator pedal position (APP) sensor] ● A/T fluid temperature sensor damaged ● Line pressure solenoid valve sticking ● Short circuit of line pressure solenoid valve circuit ● Pressure modifier valve sticking ● Pressure regulator valve or plug sticking ● Open in dropping resistor circuit
At stall speed	Line pressure is low.	● Maladjustment of throttle position sensor [accelerator pedal position (APP) sensor] ● Line pressure solenoid valve sticking ● Short circuit of line pressure solenoid valve circuit ● Pressure regulator valve or plug sticking ● Pressure modifier valve sticking ● Pilot valve sticking

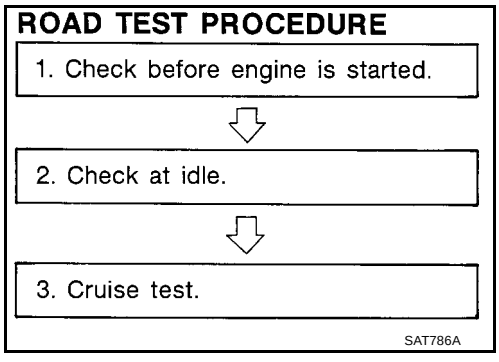
Road Test

ECS005WL

DESCRIPTION

- The purpose of the test is to determine overall performance of the transmission and analyze causes of problems.
- The road test consists of the following three parts:

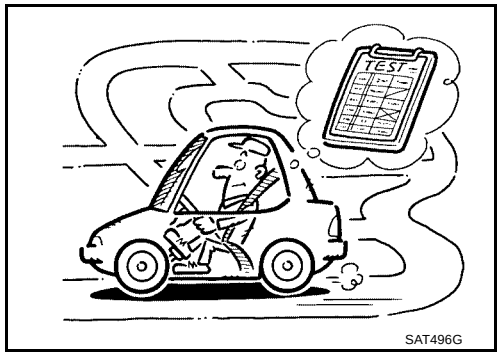
1. Check before engine is started
2. Check at idle



SAT786A

3. Cruise test

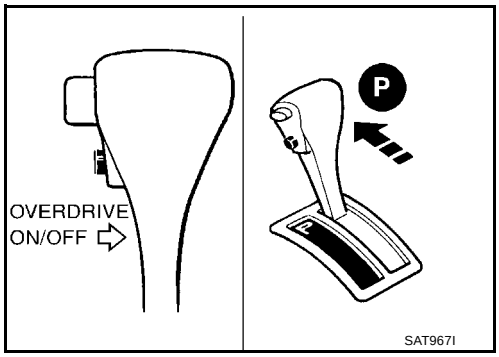
- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items until specified symptom is found. Troubleshoot items which check out No Good after road test. Refer to AT-38, "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" and AT-215, "TROUBLE DIAGNOSES FOR SYMPTOMS" .

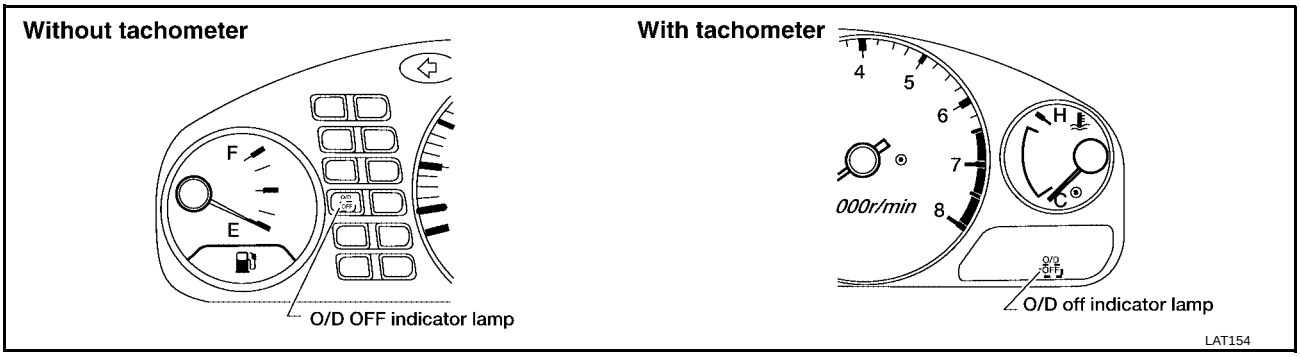


1. CHECK BEFORE ENGINE IS STARTED

1. CHECK O/D OFF INDICATOR LAMP

1. Park vehicle on flat surface.
2. Move A/T selector lever to “P” position.
3. Turn ignition switch to “OFF” position. Wait at least 5 seconds.
4. Turn ignition switch to “ON” position. (Do not start engine.)
5. Does O/D OFF indicator lamp come on for about 2 seconds?



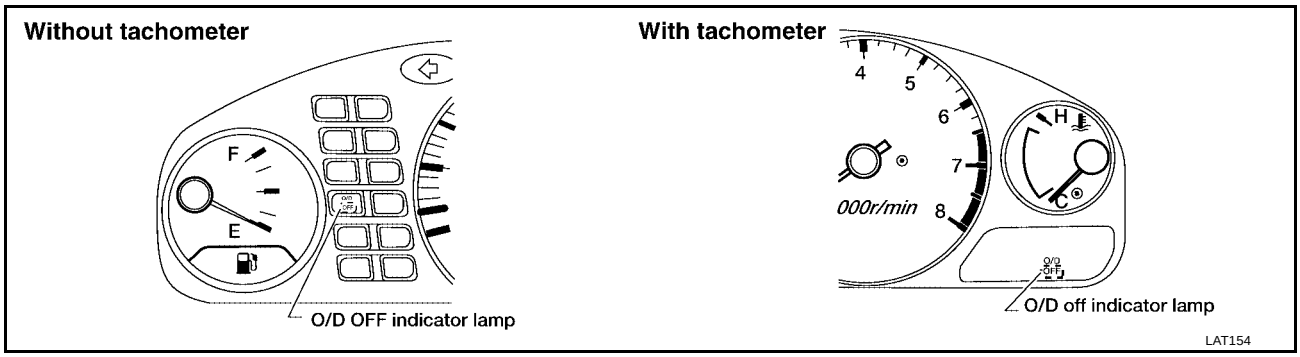


Yes or No

Yes >> GO TO 2.
No >> Stop ROAD TEST. Go to AT-220, "1. O/D OFF Indicator Lamp Does Not Come On" .

2. CHECK O/D OFF INDICATOR LAMP

Does O/D OFF indicator lamp flicker for about 8 seconds?



Yes or No

Yes >> TCM is in fail-safe mode. Perform self-diagnosis and check NG items on the AT-58, "Diagnostic Worksheet" . Refer to AT-51, "TCM Self-diagnostic Procedure (No Tools)" .
No >> 1. Turn ignition switch to “OFF” position.
2. Perform self-diagnosis and note NG items.
Refer to AT-51, "TCM Self-diagnostic Procedure (No Tools)" .
3. Go to AT-71, "2. CHECK AT IDLE" .

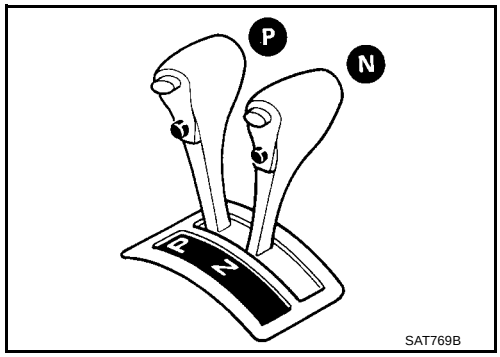
2. CHECK AT IDLE

1. CHECK ENGINE START

1. Park vehicle on flat surface.
2. Move A/T selector lever to “P” position.
3. Turn ignition switch to “OFF” position.
4. Turn ignition switch to “START” position.
5. Is engine started?

Yes or No

Yes >> GO TO 2.
No >> Stop ROAD TEST. Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-222, "2. Engine Cannot Be Started In “P” and “N” Position" .

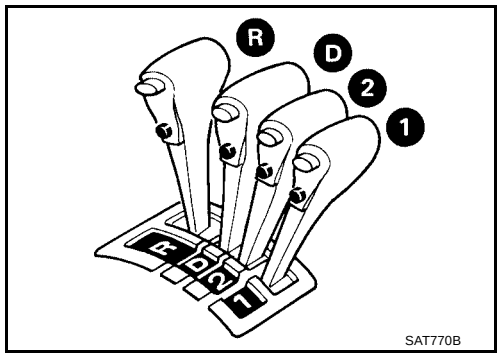


2. CHECK ENGINE START

1. Turn ignition switch to “ACC” position.
2. Move A/T selector lever to “D”, “1”, “2” or “R” position.
3. Turn ignition switch to “START” position.
4. Is engine started?

Yes or No

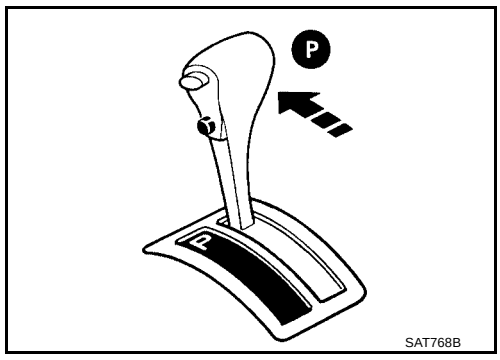
Yes >> Stop ROAD TEST. Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-222, "2. Engine Cannot Be Started In “P” and “N” Position" .
No >> GO TO 3.



3. CHECK VEHICLE MOVE

1. Move A/T selector lever to “P” position.
2. Turn ignition switch to “OFF” position.
3. Release parking brake.

>> GO TO 4.



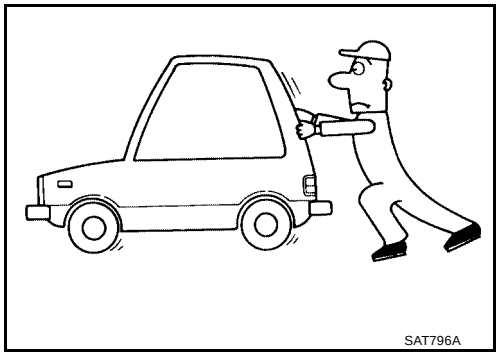
4. CHECK VEHICLE MOVE

1. Push vehicle forward or backward.
2. Does vehicle move when it is pushed forward or backward?
3. Apply parking brake.

Yes or No

Yes >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-223, "3. In “P” Position, Vehicle Moves Forward Or Backward When Pushed" . Continue ROAD TEST.

No >> GO TO 5.



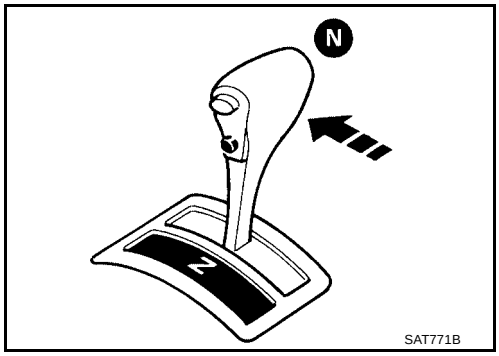
5. CHECK VEHICLE MOVE

1. Start engine.
2. Move A/T selector lever to “N” position.
3. Release parking brake.
4. Does vehicle move forward or backward?

Yes or No

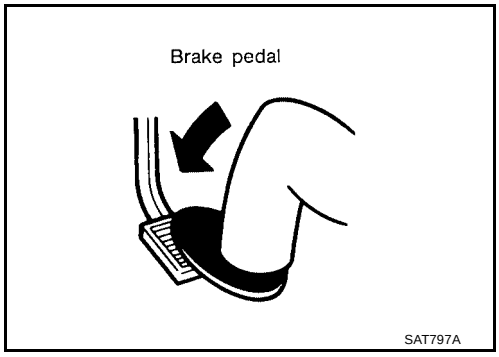
Yes >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-224, "4. In “N” Position, Vehicle Moves" . Continue ROAD TEST.

No >> GO TO 6.



6. CHECK SHIFT SHOCK

1. Apply foot brake.

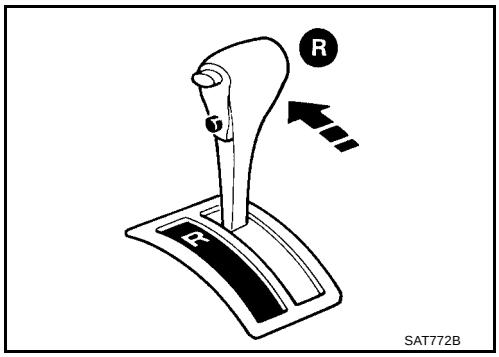


2. Move A/T selector lever to “R” position.
3. Is there large shock when changing from “N” to “R” position?

Yes or No

Yes >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-225, "5. Large Shock. “N” → “R” Position" . Continue ROAD TEST.

No >> GO TO 7.

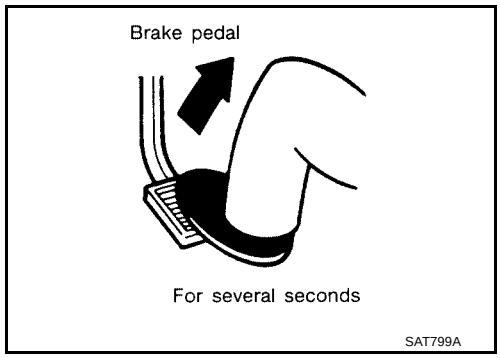


7. CHECK VEHICLE MOVE

1. Release foot brake for several seconds.
2. Does vehicle creep backward when foot brake is released?

Yes or No

Yes >> GO TO 8.
No >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-226, "6. Vehicle Does Not Creep Backward In “R” Position" . Continue ROAD TEST.

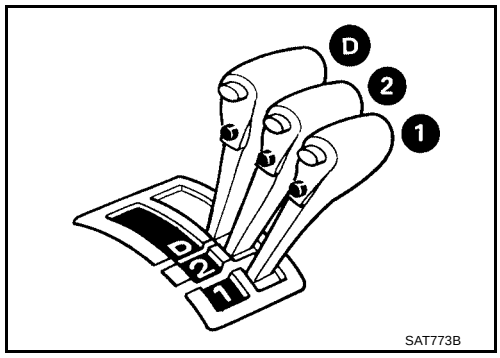


8. CHECK VEHICLE MOVE

1. Move A/T selector lever to “D”, “2” and “1” positions and check if vehicle creeps forward.
2. Does vehicle creep forward in all three positions?

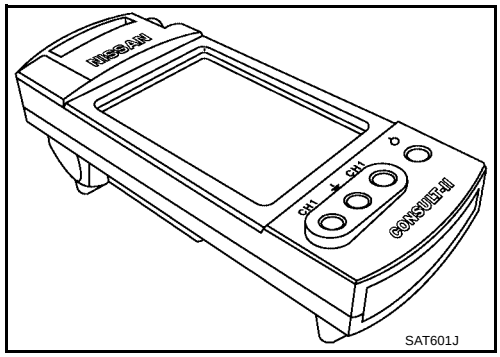
Yes or No

Yes >> Go to AT-73, "3. CRUISE TEST" .
No >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-228, "7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position" . Continue ROAD TEST.



3. CRUISE TEST

- Check all items listed in Parts 1 through 3 of Diagnostic Worksheet.



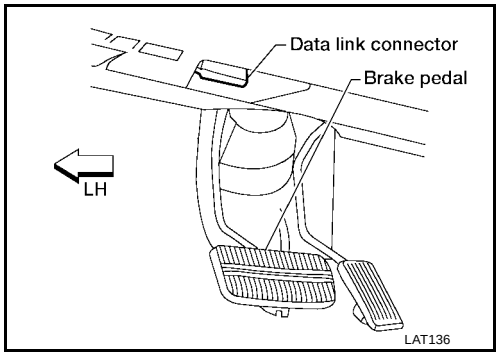
With CONSULT-II

- Using CONSULT-II, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per Shift Schedule.

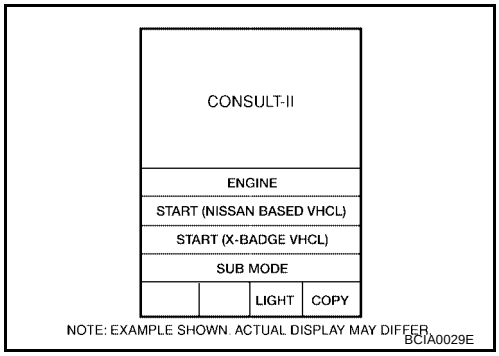
CONSULT-II Setting Procedure

CAUTION:
If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carries out CAN communication.

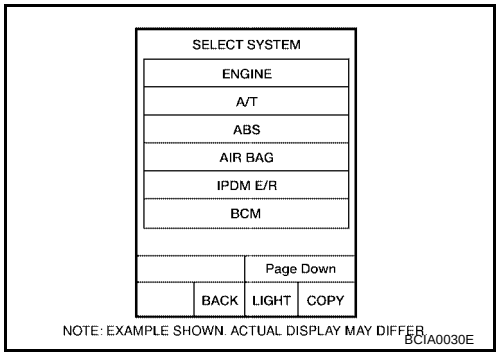
1. With the ignition switch OFF, connect CONSULT-II and CONSULT-II CONVERTER to the data link connector, then turn ignition switch ON.



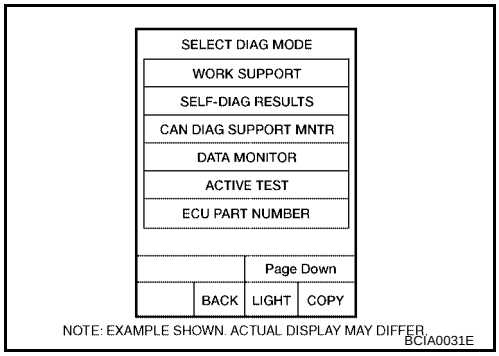
2. Touch “START (NISSAN BASED VHCL)”.



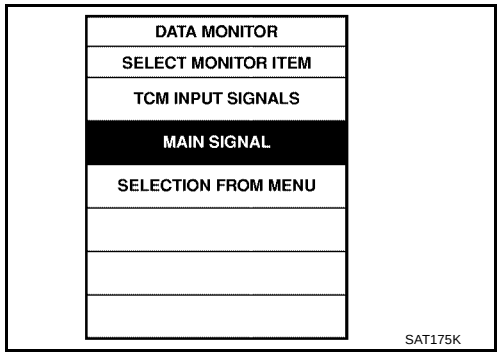
3. Touch “A/T”.



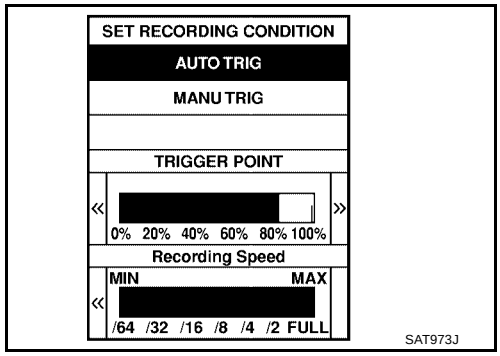
4. Touch “DATA MONITOR”.



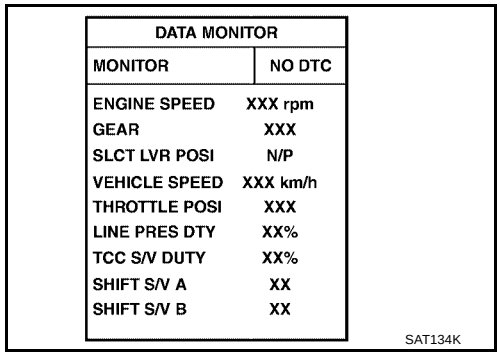
5. Touch “MAIN SIGNALS” or “TCM INPUT SIGNALS”.
6. See “Numerical Display”, “Barchart Display” or “Line Graph Display”.



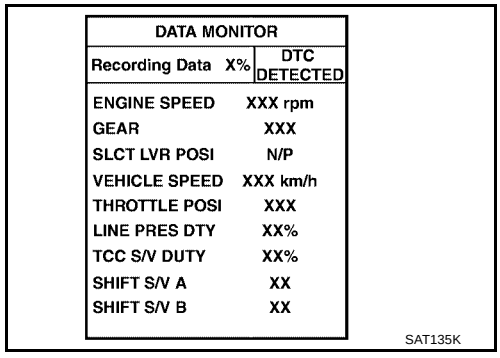
7. Touch “SETTING” to recording condition (“AUTO TRIG” or “MANU TRIG”) and touch “BACK”.
8. Touch “START”.



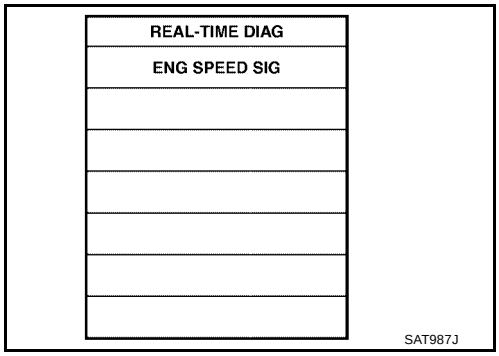
9. When performing cruise test, touch “RECORD”.

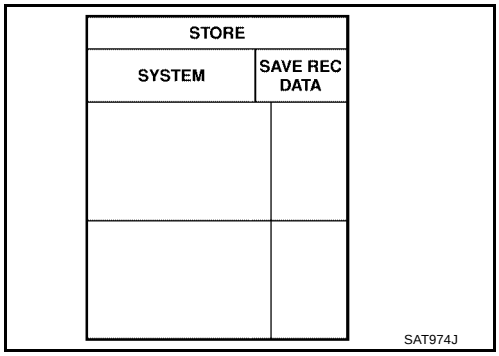


10. After finishing cruise test part 1, touch “STOP”.

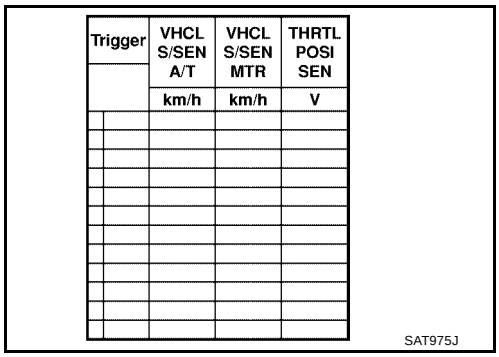


11. Touch “STORE” and touch “BACK”.



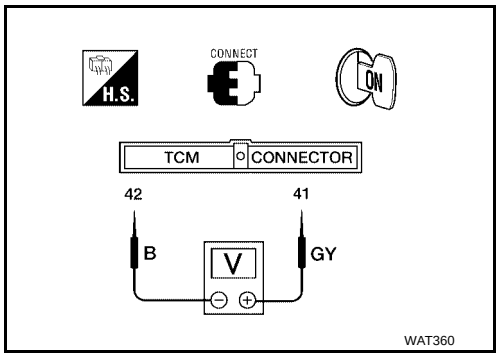


12. Touch “DISPLAY”.
13. Touch “PRINT”.
14. Check the monitor data printed out.
15. Continue cruise test part 2 and 3.



Without CONSULT-II

- Throttle position sensor can be checked by voltage across terminals 41 and 42 of TCM.



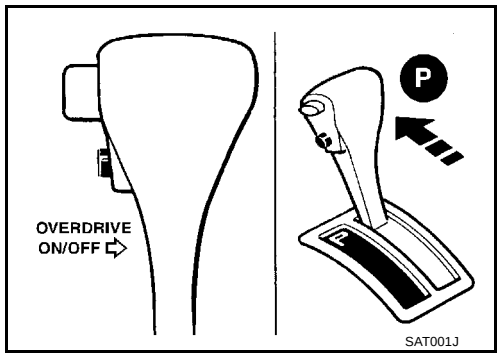
Cruise Test — Part 1

1. CHECK STARTING GEAR (D_1) POSITION

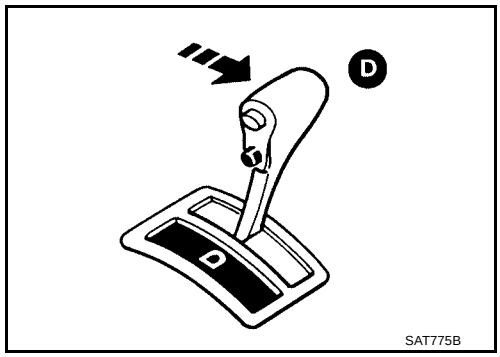
1. Drive vehicle for approx. 10 minutes to warm engine oil and ATF up to operating temperature.

   ATF operating temperature : 50 - 80°C (122 - 176°F)

2. Park vehicle on flat surface.
3. Set overdrive control switch to “ON” position.
4. Move A/T selector lever to “P” position.
5. Start engine.



6. Move A/T selector lever to “D” position.

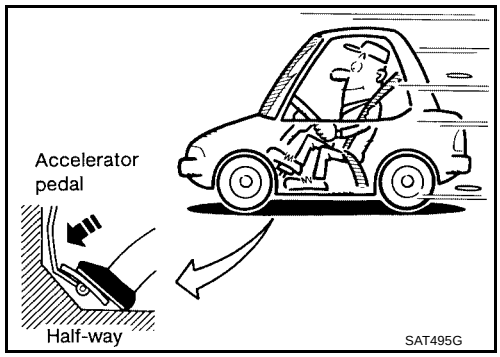


7. Accelerate vehicle by constantly depressing accelerator pedal halfway.
8. Does vehicle start from D_1 ?

   Read gear position.

Yes or No

Yes >> GO TO 2.
No >> Go to AT-230, "8. Vehicle Cannot Be Started From D_1" . Continue ROAD TEST.

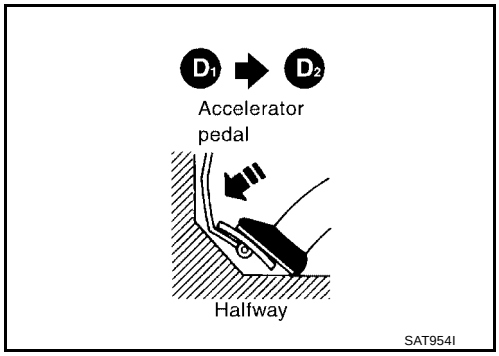


2. CHECK SHIFT UP (D_1 TO D_2)

Does A/T shift from D_1 to D_2 at the specified speed?

Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_1 to D_2 **: Refer to AT-385, "Shift Schedule" .**



Yes or No

Yes >> GO TO 3.

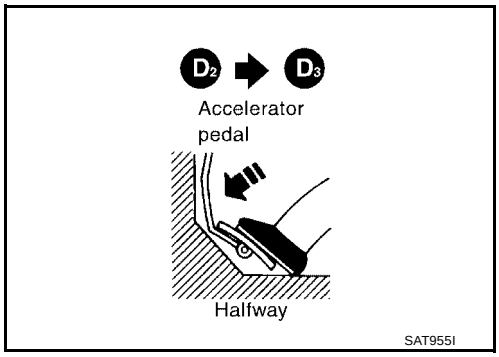
No >> Go to AT-233, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$" . Continue ROAD TEST.

3. CHECK SHIFT UP (D_2 TO D_3)

Does A/T shift from D_2 to D_3 at the specified speed?

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D_2 to D_3 **: Refer to AT-385, "Shift Schedule" .**



Yes or No

Yes >> GO TO 4.

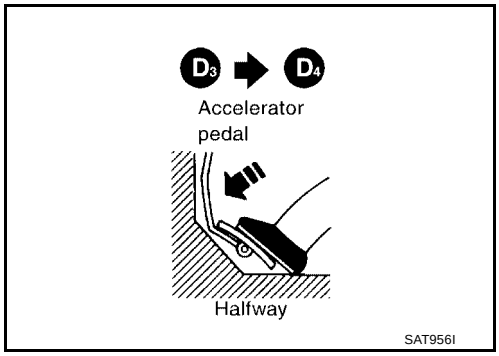
No >> Go to AT-235, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" . Continue ROAD TEST.

4. CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D_3 to D_4 **: Refer to AT-385, "Shift Schedule" .**



Yes or No

Yes >> GO TO 5.

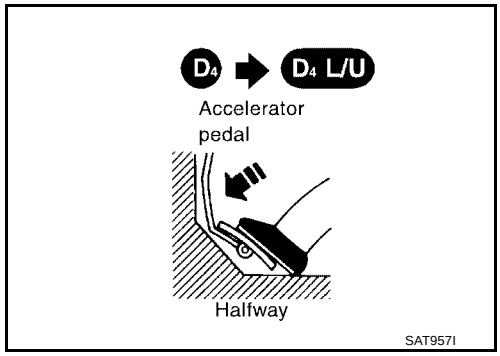
No >> Go to AT-237, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$" . Continue ROAD TEST.

5. CHECK LOCK-UP (D4 TO D4 L/U)

Does A/T perform lock-up at the specified speed?

Read vehicle speed, throttle position when lock-up duty becomes 94%.

Specified speed when lock-up occurs : Refer to AT-385, "Shift Schedule" .



Yes or No

Yes >> GO TO 6.
No >> Go to AT-239, "12. A/T Does Not Perform Lock-up" . Continue ROAD TEST.

6. CHECK HOLD LOCK-UP

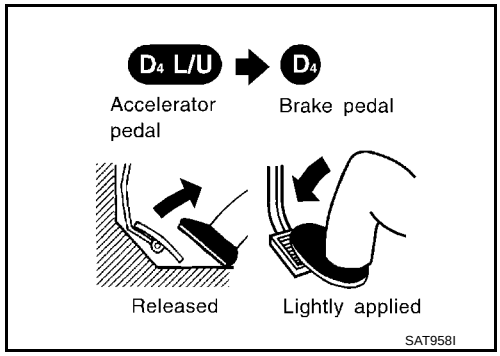
Does A/T hold lock-up condition for more than 30 seconds?

Yes or No

Yes >> GO TO 7.
No >> Go to AT-240, "13. A/T Does Not Hold Lock-up Condition" .

7. CHECK SHIFT DOWN (D4 L/U TO D4)

1. Release accelerator pedal.
2. Is lock-up released when accelerator pedal is released?



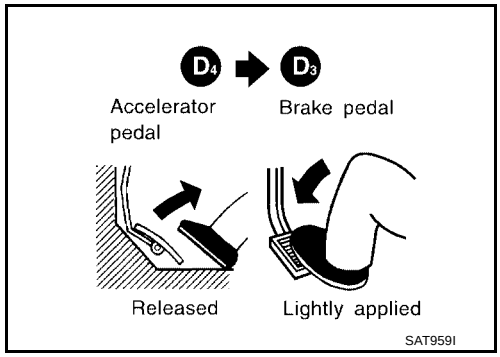
Yes or No

Yes >> GO TO 8.
No >> Go to AT-242, "14. Lock-up Is Not Released" . Continue ROAD TEST.

8. CHECK SHIFT DOWN (D4 TO D3)

1. Decelerate vehicle by applying foot brake lightly.
2. Does engine speed return to idle smoothly when A/T is shifted from D4 to D3 ?

Read gear position and engine speed.



Yes or No

Yes >> 1. Stop vehicle.
2. Go toAT-80, "Cruise Test — Part 2" .
No >> Go to AT-243, "15. Engine Speed Does Not Return To Idle (Light Braking D4 → D3)" . Continue ROAD TEST.

Cruise Test — Part 2

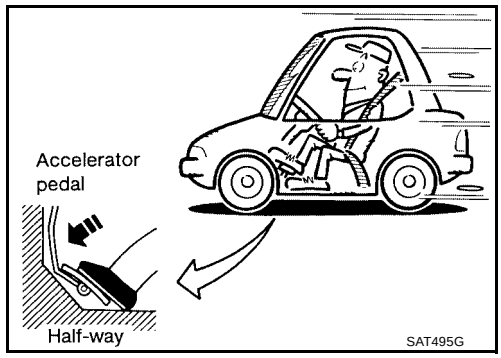
1. CHECK STARTING GEAR (D_1) POSITION

1. Confirm overdrive control switch is in “ON” position.
2. Confirm A/T selector lever is in “D” position.
3. Accelerate vehicle by half throttle again.
4. Does vehicle start from D_1 ?

Read gear position.

Yes or No

Yes >> GO TO 2.
No >> Go to AT-244, "16. Vehicle Does Not Start From D_1" . Continue ROAD TEST.



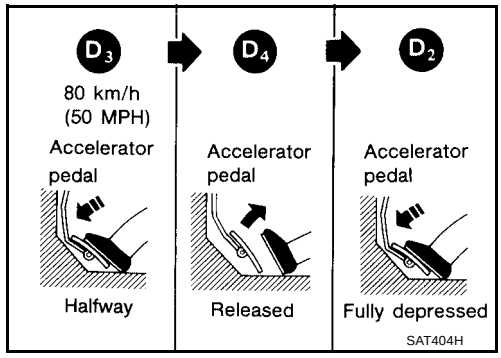
2. CHECK SHIFT UP AND SHIFT DOWN (D_3 TO D_4 TO D_2)

1. Accelerate vehicle to 80 km/h (50 MPH) as shown in illustration.
2. Release accelerator pedal and then quickly depress it fully.
3. Does A/T shift from D_4 to D_2 as soon as accelerator pedal is depressed fully?

Read gear position and throttle position.

Yes or No

Yes >> GO TO 3.
No >> Go to AT-233, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$" . Continue ROAD TEST.



3. CHECK SHIFT UP (D_2 TO D_3)

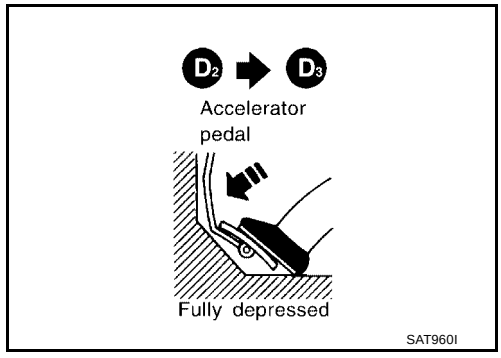
Does A/T shift from D_2 to D_3 at the specified speed?

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D_2 to D_3 : **Refer to AT-385, "Shift Schedule" .**

Yes or No

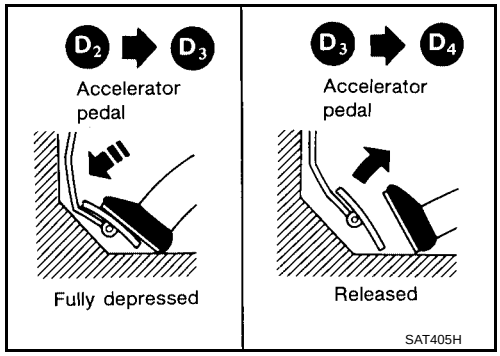
Yes >> GO TO 4.
No >> Go to AT-235, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" . Continue ROAD TEST.



4. CHECK SHIFT UP (D_3 TO D_4) AND ENGINE BRAKE

Release accelerator pedal after shifting from D_2 to D_3.
Does A/T shift from D_3 to D_4 and does vehicle decelerate by engine brake?

Read gear position, throttle position and vehicle speed.



Yes or No

Yes >> 1. Stop vehicle.
2. Go to AT-82, "Cruise Test — Part 3".

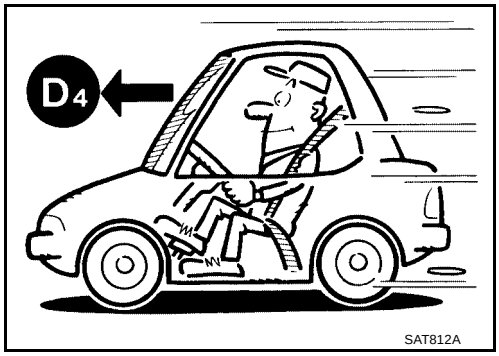
No >> Go to AT-237, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$". Continue ROAD TEST.

Cruise Test — Part 3

1. VEHICLE SPEED D_4 POSITION

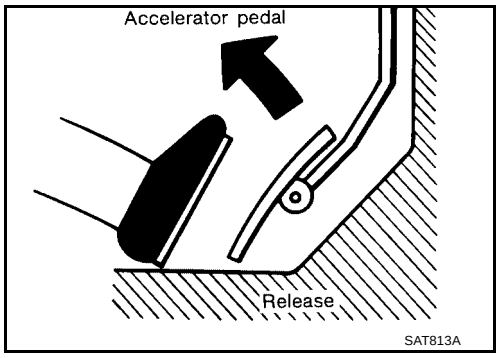
1. Confirm overdrive control switch is in “ON” position.
2. Confirm selector lever is in “D” position.
3. Accelerate vehicle using half-throttle to D_4 .

>> GO TO 2.



2. CHECK SHIFT DOWN (D_4 TO D_3)

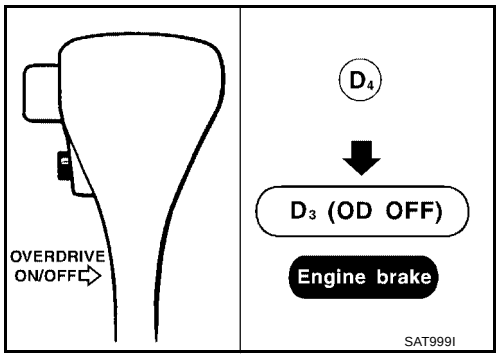
1. Release accelerator pedal.
2. Set overdrive control switch to “OFF” position while driving in D_4 .
3. Does A/T shift from D_4 to D_3 (O/D OFF)?



Read gear position and vehicle speed.

Yes or No

Yes >> GO TO 3.
No >> Go to AT-246, "17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch “ON” → “OFF”" . Continue ROAD TEST.

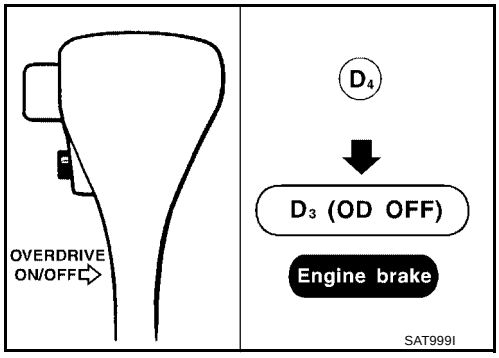


3. CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

Yes or No

Yes >> GO TO 4.
No >> Go to AT-243, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" . Continue ROAD TEST.



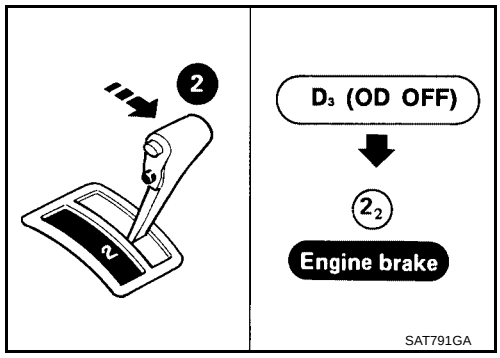
4. CHECK SHIFT DOWN (D_3 TO D_2)

1. Move A/T selector lever from “D” to “2” position while driving in D_3 (O/D OFF).
2. Does A/T shift from D_3 (O/D OFF) to D_2 ?

Read gear position.

Yes or No

Yes >> GO TO 5.
No >> Go to AT-247, "18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever “D” → “2” Position" . Continue ROAD TEST.

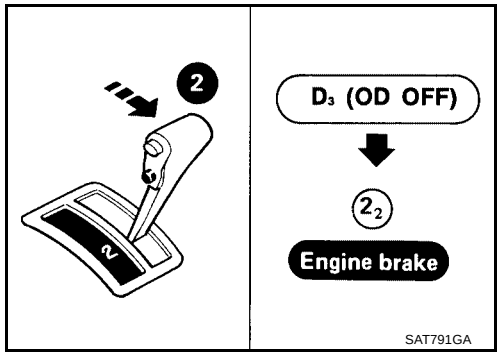


5. CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

Yes or No

Yes >> GO TO 6.
No >> Go to AT-243, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" . Continue ROAD TEST.



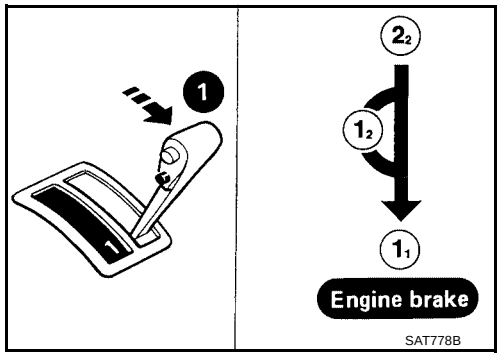
6. CHECK SHIFT DOWN

1. Move A/T selector lever from “2” to “1” position while driving in 2_2 .
2. Does A/T shift from 2_2 to 1_1 position?

Read gear position.

Yes or No

Yes >> GO TO 7.
No >> Go to AT-248, "19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever “2” → “1” Position" . Continue ROAD TEST.



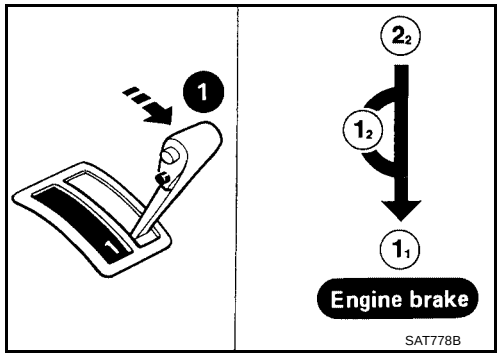
7. CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

Yes or No

Yes >> 1. Stop vehicle.
2. Perform self-diagnosis. Refer to AT-51, "TCM Self-diagnostic Procedure (No Tools)" .

No >> Go to AT-249, "20. Vehicle Does Not Decelerate By Engine Brake" . Continue ROAD TEST.



TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

PFP:00000

Symptom Chart

ECS005WM

Numbers are arranged in order of inspection.
Perform inspections starting with number one and work up.

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not Used	Engine cannot start in “P” and “N” positions. AT-222, "2. Engine Cannot Be Started In “P” and “N” Position"	ON vehicle	1. Ignition switch and starter	PG-3, "POWER SUPPLY ROUTING" and SC-9, "STARTING SYSTEM"	
			2. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			3. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
	Engine starts in position other than “N” and “P” positions. AT-222, "2. Engine Cannot Be Started In “P” and “N” Position"	ON vehicle	1. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			2. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
Not Used	Transaxle noise in “P” and “N” positions.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Line pressure test	AT-67, "Line Pressure Test"	
			3. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
		OFF vehicle	5. Oil pump	AT-292, "Components"	
			6. Torque converter	AT-272, "Disassembly"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not Used	Vehicle moves when changing into “P” position, or parking gear does not disengage when shifted out of “P” position. AT-223, "3. In “P” Position, Vehicle Moves Forward Or Backward When Pushed"	ON vehicle	1. Control cable adjustment	AT-262, "Control Cable Adjustment"	
		OFF vehicle	2. Parking components	AT-267, "Components"	
	Vehicle moves in “N” position. AT-224, "4. In “N” Position, Vehicle Moves"	ON vehicle	1. Control cable adjustment	AT-262, "Control Cable Adjustment"	
		OFF vehicle	2. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			3. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			4. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
Slips/Will Not Engage	Vehicle will not run in “R” position (but runs in “D”, “2” and “1” positions). Clutch slips. Very poor acceleration. AT-226, "6. Vehicle Does Not Creep Backward In “R” Position"	ON vehicle	1. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			2. Stall test	AT-63, "Stall Test"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			5. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	6. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			7. High clutch	AT-318, "HIGH CLUTCH"	
			8. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			9. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			10. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not Used	Vehicle braked when shifting into “R” position.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Line pressure test	AT-67, "Line Pressure Test"	
			3. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	5. High clutch	AT-318, "HIGH CLUTCH"	
			6. Brake band	AT-348, "Components"	
			7. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			8. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
Shift Shock	Sharp shock in shifting from “N” to “D” position.	ON vehicle	1. Engine idling rpm	EC-79, "Idle Speed and Ignition Timing Check" and EC-80, "Idle Mixture Ratio Adjustment"	
			2.Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. A/T fluid temperature sensor	AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT"	
			5. Engine speed signal	AT-131, "DTC P0725 ENGINE SPEED SIGNAL"	
			6. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			7. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			8. Accumulator N-D	AT-297, "Components"	
		OFF vehicle	9. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Slips/Will Not Engage	Vehicle will not run in “D” and “2” positions (but runs in “1” and “R” positions).	ON vehicle	1. Control cable adjustment	AT-262, "Control Cable Adjustment"	
		OFF vehicle	2. Low one-way clutch	AT-267, "Components"	
	Vehicle will not run in “D”, “1”, “2” positions (but runs in “R” position). Clutch slips. Very poor acceleration.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Stall test	AT-63, "Stall Test"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			5. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			6. Accumulator N-D	AT-297, "Components"	
		OFF vehicle	7. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			8. High clutch	AT-318, "HIGH CLUTCH"	
			9. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			10. Forward one-way clutch	AT-337, "Components"	
			11. Low one-way clutch	AT-267, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Slips/Will Not Engage	Clutches or brakes slip somewhat in starting.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			3. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			4. Line pressure test	AT-67, "Line Pressure Test"	
			5. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			6. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			7. Accumulator N-D	AT-297, "Components"	
			8. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			9. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			10. Overrun clutch solenoid	AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE"	
			11. Torque converter clutch solenoid valve	AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE"	
		OFF vehicle	12. Forward clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	
			13. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			14. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
			15. Oil pump	AT-292, "OIL PUMP"	
			16. Torque converter	AT-267, "Components"	
Not Used	Excessive creep.	ON vehicle	1. Engine idling rpm	EC-79, "Idle Speed and Ignition Timing Check" and EC-80, "Idle Mixture Ratio Adjustment"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Slips/Will Not Engage	No creep at all. AT-226, "6. Vehicle Does Not Creep Backward In “R” Position", AT-228, "7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position"	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Line pressure test	AT-67, "Line Pressure Test"	
			3. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	4. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			5. Oil pump	AT-292, "OIL PUMP"	
			6. Torque converter	AT-267, "Components"	
No Up Shift	Failure to change gear from “D_1 ” to “D_2 ”.	ON vehicle	1. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			2. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			3. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			5. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
		OFF vehicle	6. Brake band	AT-348, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
No Up Shift	Failure to change gear from “D_2 ” to “D_3 ”.	ON vehicle	1. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			2. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			3. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			5. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
		OFF vehicle	6. High clutch	AT-318, "HIGH CLUTCH"	
			7. Brake band	AT-348, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
No Up Shift	Failure to change gear from “D_3 ” to “D_4 ".	ON vehicle	1. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
			2. Overdrive control switch	AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Over-drive Control and Throt-tle Position Sensor [Accelerator Pedal Posi-tion (APP) Sensor] Switches Circuit Checks}"	
			3. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehi-cle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SEN-SOR·A/T (REVOLU-TION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SEN-SOR·MTR"	
			5. A/T fluid temperature sen-sor	AT-120, "DTC P0710 A/T FLUID TEMPERA-TURE SENSOR CIR-CUIT"	
			6. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERA-TOR PEDAL POSI-TION (APP) SENSOR]"	
		OFF vehicle	7. Brake band	AT-348, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Improper Shift Timing	Too high a gear change point from “D_1 ” to “D_2 ”, from “D_2 ” to “D_3 ”, from “D_3 ” to “D_4 ”. AT-233, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$", AT-235, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" , AT-237, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$"	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" or AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)"	
			3. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			4. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
	Gear change directly from “D_1 ” to “D_3 ” occurs.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Accumulator servo release	AT-297, "Components"	
		OFF vehicle	3. Brake band	AT-348, "Components"	
Not Used	Engine stops when shifting lever into “R”, “D”, “2” and “1”.	ON vehicle	1. Engine idling rpm	EC-79, "Idle Speed and Ignition Timing Check" and EC-80, "Idle Mixture Ratio Adjustment"	
			2. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			3. Torque converter clutch solenoid valve	AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	5. Torque converter	AT-267, "Components"	
Shift Shock	Too sharp a shock in change from “D_1 ” to “D_2 ”.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Line pressure test	AT-67, "Line Pressure Test"	
			3. Accumulator servo release	AT-297, "Components"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			5. A/T fluid temperature sensor	AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT"	
		OFF vehicle	6. Brake band	AT-348, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Shift Shock	Too sharp a shock in change from “D2 ” to “D3 ”.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Line pressure test	AT-67, "Line Pressure Test"	
			3. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			4. A/T fluid temperature sensor	AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT"	
		OFF vehicle	5. High clutch	AT-318, "HIGH CLUTCH"	
			6. Brake band	AT-348, "Components"	
Shift Shock	Too sharp a shock in change from “D3 ” to “D4 ”.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Line pressure test	AT-67, "Line Pressure Test"	
			3. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			4. A/T fluid temperature sensor	AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT"	
		OFF vehicle	5. Brake band	AT-348, "Components"	
			6. Forward one-way clutch	AT-324, "Components"	
			7. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Slips/Will Not Engage	Almost no shock or clutches slipping in change from “D_1 ” to “D_2 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Accumulator servo release	AT-297, "Components"	
			5. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	6. Brake band	AT-348, "Components"	
	Almost no shock or slipping in change from “D_2 ” to “D_3 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	5. High clutch	AT-318, "HIGH CLUTCH"	
			6. Brake band	AT-348, "Components"	
Slips/Will Not Engage	Almost no shock or slipping in change from “D_3 ” to “D_4 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2.Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	5. Brake band	AT-348, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not Used	Vehicle braked by gear change from “D_1 ” to “D_2 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
		OFF vehicle	2. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			3. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
			4. High clutch	AT-318, "HIGH CLUTCH"	
			5. Low one-way clutch	AT-267, "Components"	
	Vehicle braked by gear change from “D_2 ” to “D_3 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
		OFF vehicle	2. Brake band	AT-348, "Components"	
	Vehicle braked by gear change from “D_3 ” to “D_4 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
		OFF vehicle	2. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			3. Forward one-way clutch	AT-337, "Components"	
			4. Reverse clutch	AT-313, "REVERSE CLUTCH"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not Used	Maximum speed not attained. Acceleration poor.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
			3. Overdrive control switch	AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Over-drive Control and Throt-tle Position Sensor [Accelerator Pedal Posi-tion (APP) Sensor] Switches Circuit Checks}"	
			4. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERA-TOR PEDAL POSI-TION (APP) SENSOR]"	
			5. Vehicle speed sensor · A/T (revolution sensor) and vehicle speed sensor · MTR	AT-126, "DTC P0720 VEHICLE SPEED SEN-SOR·A/T (REVOLU-TION SENSOR)"	
			6. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			7. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			8. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	9. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			10. High clutch	AT-318, "HIGH CLUTCH"	
			11. Brake band	AT-348, "Components"	
			12. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
			13. Oil pump	AT-292, "OIL PUMP"	
			14. Torque converter	AT-267, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
No Down Shift	Failure to change gear from “D_4 ” to “D_3 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2.Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Overrun clutch solenoid valve	AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE"	
			4. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			5. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			6. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	7. Brake band	AT-348, "Components"	
			8. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	
	Failure to change gear from “D_3 ” to “D_2 ” or from “D_4 ” to “D_2 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			4. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			5. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	6. High clutch	AT-318, "HIGH CLUTCH"	
			7. Brake band	AT-348, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
No Down Shift	Failure to change gear from “D_2 ” to “D_1 ” or from “D_3 ” to “D_1 ”.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			4. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			5. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	6. Low one-way clutch	AT-267, "Components"	
			7. High clutch	AT-318, "HIGH CLUTCH"	
			8. Brake band	AT-348, "Components"	
Shift Shock	Gear change shock felt during deceleration by releasing accelerator pedal.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Line pressure test	AT-67, "Line Pressure Test"	
			3. Overrun clutch solenoid valve	AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
Improper Shift Timing	Too high a change point from “D_4 ” to “D_3 ”, from “D_3 " to “D_2 ”, from “D_2 ” to “D_1 ”.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Improper Shift Timing	Kickdown does not operate when depressing pedal in “D4 ” within kickdown vehicle speed.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Revolution sensor and vehicle speed sensor	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			3. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			4. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
	Kickdown operates or engine overruns when depressing pedal in “D4 ” beyond kickdown vehicle speed limit.	ON vehicle	1. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			4. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Slips/Will Not Engage	Races extremely fast or slips in changing from “D4 ” to “D3 ” when depressing pedal.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			5. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			6. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	7. Brake band	AT-348, "Components"	
			8. Forward clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	
	Races extremely fast or slips in changing from “D4 ” to “D2 ” when depressing pedal.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			5. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			6. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			7. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	8. Brake band	AT-348, "Components"	
			9. High clutch	AT-318, "HIGH CLUTCH"	
			10. Forward clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	

Items	Symptom	Condition	Diagnostic Item	Reference Page QG18DE (SULEV)	Reference Page QG18DE (ULEV)
Slips/Will Not Engage	Races extremely fast or slips in changing from “D3 ” to “D2 ” when depressing pedal.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			5. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			6. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
		OFF vehicle	7. Brake band	AT-348, "Components"	
			8. High clutch	AT-318, "HIGH CLUTCH"	
	Races extremely fast or slips in changing from “D4 ” or “D3 ” to “D1 ” when depressing pedal.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			5. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			6. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			7. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	8. Forward clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	
			9. Forward one-way clutch	AT-337, "Components"	
			10. Low one-way clutch	AT-267, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Slips/Will Not Engage	Vehicle will not run in any position.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
		OFF vehicle	5. Oil pump	AT-292, "OIL PUMP"	
			6. High clutch	AT-318, "HIGH CLUTCH"	
			7. Brake band	AT-348, "Components"	
			8. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
			9. Torque converter	AT-267, "Components"	
			10. Parking components	AT-267, "Components"	
Not Used	Transmission noise in “D”, “2”, “1” and “R” positions.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
		OFF vehicle	2. Torque converter	AT-267, "Components"	
No Down Shift	Failure to change from “D_3 ” to “2_2 ” when changing lever into “2” position. AT-247, "18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever “D” → “2” Position"	OFF vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Shift solenoid valve B	AT-183, "DTC P0755 SHIFT SOLENOID VALVE B"	
			3. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			4. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			5. Brake band	AT-348, "Components"	
Improper Shift Timing	Gear change from “2_2 ” to “2_3 ” in “2” position.	ON vehicle	1. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
			2. Control cable adjustment	AT-262, "Control Cable Adjustment"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not Used	Engine brake does not operate in “1” position. AT-248, "19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever “2” → “1” Position"	ON vehicle	1. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
			2. Control cable adjustment	AT-262, "Control Cable Adjustment"	
			3. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
Not Used	Engine brake does not operate in “1” position. AT-248, "19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever “2” → “1” Position"	ON vehicle	5. Overrun clutch solenoid valve	AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE"	
		OFF vehicle	6. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	
			7. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
Improper Shift Timing	Gear change from “1_1” to “1_2” in “1” position.	ON vehicle	1. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
			2. Control cable adjustment	AT-262, "Control Cable Adjustment"	
No Down Shift	Does not change from “1_2” to “1_1” in “1” position.	ON vehicle	1. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			2. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			3. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	4. Low one-way clutch	AT-267, "Components"	
			5. Brake band	AT-348, "Components"	
			6. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
Shift Shock	Large shock changing from “1_2” to “1_1” in “1” position.	ON vehicle	1. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	2. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not used	Transaxle overheats.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Engine idling rpm	EC-79, "Idle Speed and Ignition Timing Check" and EC-80, "Idle Mixture Ratio Adjustment"	
			3. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			4. Line pressure test	AT-67, "Line Pressure Test"	
			5. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			6. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	7. Oil pump	AT-292, "OIL PUMP"	
			8. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			9. High clutch	AT-318, "HIGH CLUTCH"	
			10. Brake band	AT-348, "Components"	
			11. Forward clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	
			12. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	
			13. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
			14. Torque converter	AT-267, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
Not Used	ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
		OFF vehicle	2. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			3. High clutch	AT-318, "HIGH CLUTCH"	
			4. Brake band	AT-348, "Components"	
			5. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			6. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			7. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	
	Offensive smell at fluid charging pipe.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
		OFF vehicle	2. Torque converter	AT-267, "Components"	
			3. Oil pump	AT-292, "OIL PUMP"	
			4. Reverse clutch	AT-313, "REVERSE CLUTCH"	
			5. High clutch	AT-318, "HIGH CLUTCH"	
			6. Brake band	AT-348, "Components"	
			7. Forward clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			8. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVER-RUN CLUTCH"	
			9. Low & reverse brake	AT-332, "LOW & REVERSE BRAKE"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
No Lockup Engagement/ TCC Inoperative	Torque converter is not locked up.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			3. Engine speed signal	AT-131, "DTC P0725 ENGINE SPEED SIGNAL"	
			4. A/T fluid temperature sensor	AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT"	
			5. Line pressure test	AT-67, "Line Pressure Test"	
			6. Torque converter clutch solenoid valve	AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE"	
			7. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	8. Torque converter	AT-267, "Components"	

Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
No Lockup Engagement/ TCC Inoperative	Torque converter clutch piston slip.	ON vehicle	1. Fluid level	AT-63, "FLUID LEVEL CHECK"	
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			3. Line pressure test	AT-67, "Line Pressure Test"	
			4. Torque converter clutch solenoid valve	AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE"	
			5. Line pressure solenoid valve	AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE"	
			6. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
		OFF vehicle	7. Torque converter	AT-267, "Components"	
	Lock-up point is extremely high or low.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			3. Torque converter clutch solenoid valve	AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE"	
			4. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	

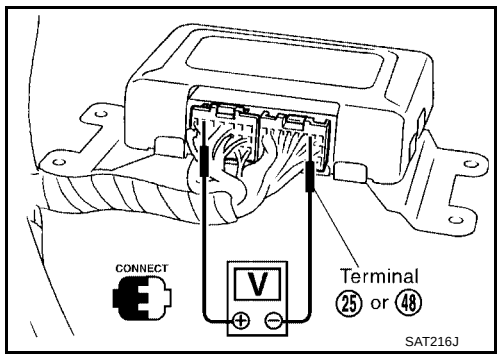
Items	Symptom	Condition	Diagnostic Item	Reference Page	
				QG18DE (SULEV)	QG18DE (ULEV)
No Up Shift	A/T does not shift to “D_4 ” when driving with overdrive control switch “ON”.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"	
			2. PNP switch adjustment	AT-262, "Park/Neutral Position (PNP) Switch Adjustment"	
			3. Overdrive control switch	AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}"	
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)", AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR"	
			5. Shift solenoid valve A	AT-179, "DTC P0750 SHIFT SOLENOID VALVE A"	
			6. Overrun clutch solenoid valve	AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE"	
			7. Control valve assembly	AT-297, "CONTROL VALVE ASSEMBLY"	
			8. A/T fluid temperature sensor	AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT"	
			9. Line pressure test	AT-67, "Line Pressure Test"	
		OFF vehicle	10. Brake band	AT-348, "Components"	
			11. Overrun clutch	AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH"	

TCM Terminals and Reference Value

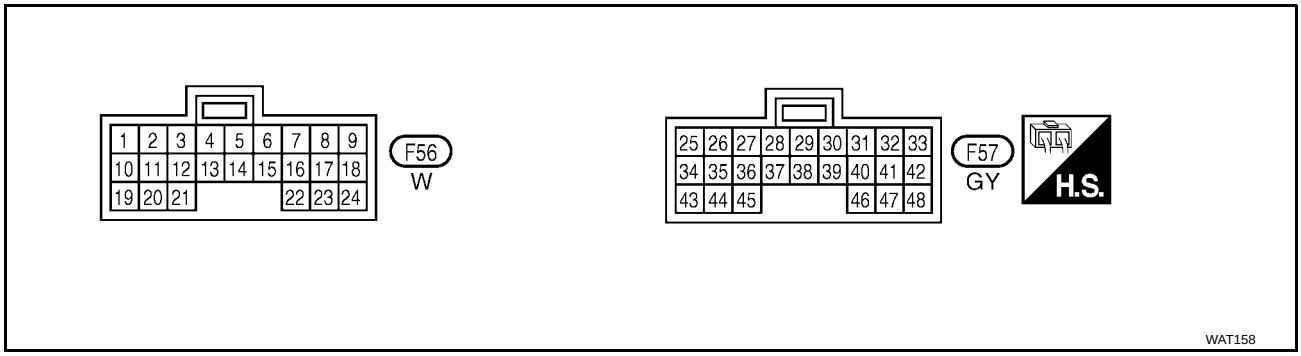
ECS005WN

PREPARATION

- Measure voltage between each terminal and terminal 25 or 48 by following “TCM INSPECTION TABLE”.

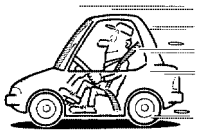


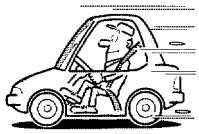
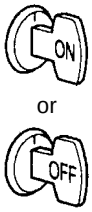
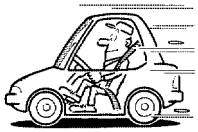
TCM HARNESS CONNECTOR TERMINAL LAYOUT

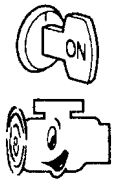
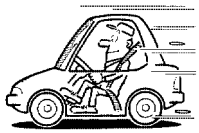


TCM INSPECTION TABLE

(Data are reference values.)

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
1	R/W	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 3.0V
				When depressing accelerator pedal fully after warming up engine.	0V
2	P/B	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	4 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V
3	Y/G	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	0V
5	L	CAN-H		—	—
6	Y	CAN-L		—	—
10	BR/R	Power source		When turning ignition switch to “ON”.	Battery voltage
				When turning ignition switch to “OFF”.	0V

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
11	L/W	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in "D_1 " or "D_4 ".)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in "D_2 " or "D_3 ".)	0V
12	L/Y	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in "D_1 " or "D_2 ".)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in "D_3 " or "D_4 ".)	0V
19	PU	OBD-II		When turning ignition switch to "ON".	Battery voltage
				When turning ignition switch to "OFF".	0V
20	L/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage
				When overrun clutch solenoid valve does not operate.	0V
25	B	Ground		—	0V
26	BR/Y	PNP switch "1" position		When setting selector lever to "1" position.	Battery voltage
				When setting selector lever to other positions.	0V
27	B/R	PNP switch "2" position		When setting selector lever to "2" position.	Battery voltage
				When setting selector lever to other positions.	0V
28	R/B	Power source (Memory back-up)		When turning ignition switch to "OFF".	Battery voltage
				When turning ignition switch to "ON".	Battery voltage
29	W	Revolution sensor		When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function.*1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	150Hz
				When vehicle parks.	Under 1.3V or over 4.5V

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
30 **	G/B	Data link connector		—	—
31 **	GY/L	Data link connector		—	—
32	R	Throttle position sensor (Power source)		When turning ignition switch to "ON".	4.5 - 5.5V
				When turning ignition switch to "OFF".	0V
34	W/G	PNP switch “D” position		When setting selector lever to “D” position.	Battery voltage
				When setting selector lever to other positions.	0V
35	G/Y	PNP switch “R” position		When setting selector lever to “R” position.	Battery voltage
				When setting selector lever to other positions.	0V
36	LG	PNP switch “N” or “P” position		When setting selector lever to “N” or “P” position.	Battery voltage
				When setting selector lever to other positions.	0V
39 *	L/OR	Engine speed signal		Refer to EC-125, "ECM INSPECTION TABLE" .	—
40	PU/R	Vehicle speed sensor		When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Voltage varies between less than 1V and more than 4.5V
41 *	GY	Throttle position sensor		When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: 0.5 - 0.7V Fully-open throttle: 4V
42	B/W	Throttle position sensor (Ground)		—	0V
47	BR	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F).	1.5V
				When ATF temperature is 80°C (176°F).	0.5V
48	B	Ground		—	0V

* : This terminal is connected to the ECM.
** : These terminals are connected to the Data link connector.

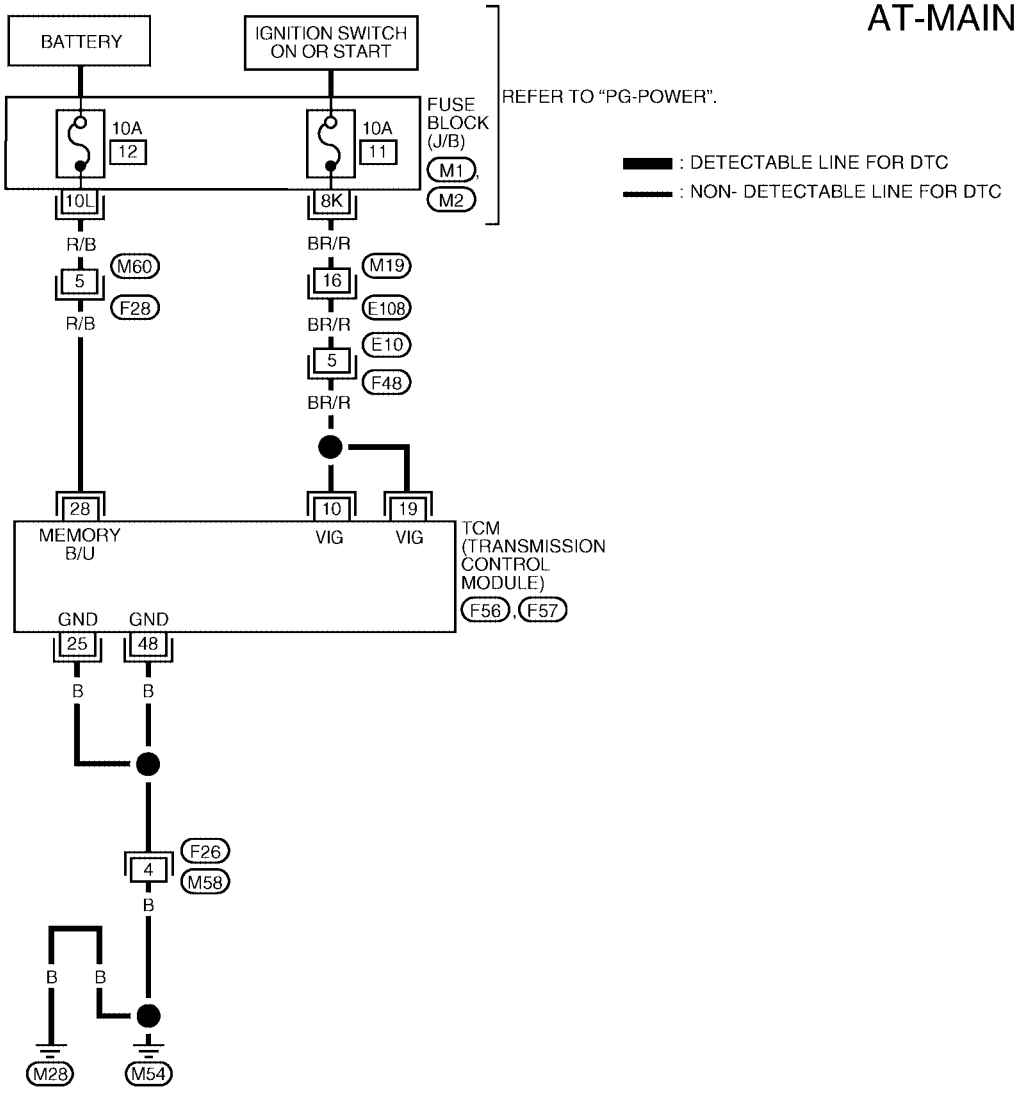
TROUBLE DIAGNOSIS FOR POWER SUPPLY

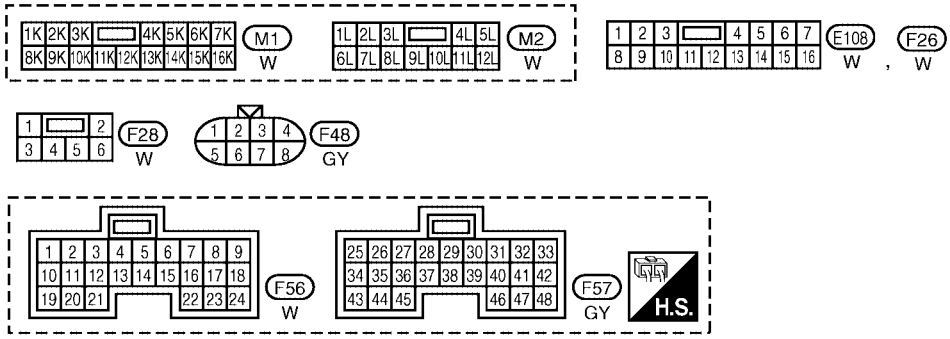
PFP:00000

Wiring Diagram — AT — MAIN

ECS005WO

AT-MAIN-01





BCWA0234E

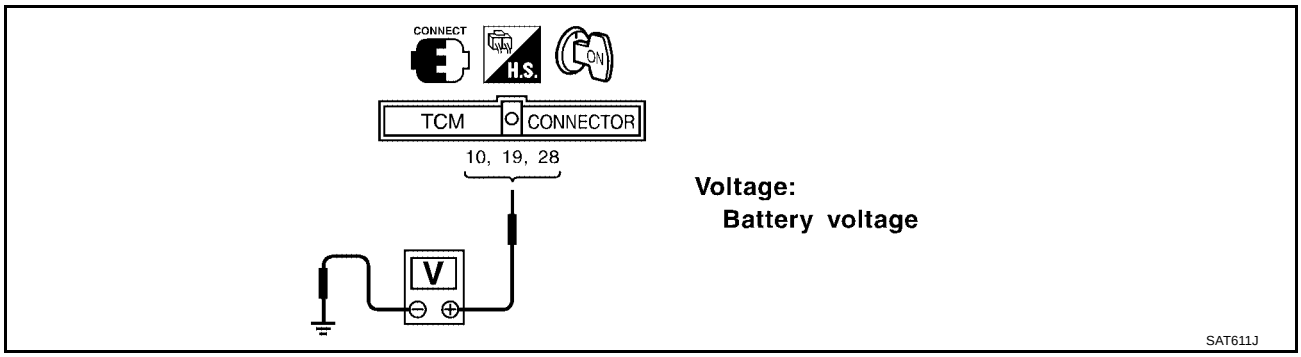
TERMINALS AND REFERENCE VALUE FOR TRANSMISSION CONTROL MODULE				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC) (Approx.)
10	BR/R	POWER SOURCE	WHEN TURNING IGNITION SWITCH TO "ON"	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO "OFF"	0V
19	BR/R	POWER SOURCE	WHEN TURNING IGNITION SWITCH TO "ON"	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO "OFF"	0V
25	B	GROUND	—	0V
28	R/B	POWER SOURCE (MEMORY BACKUP)	WHEN TURNING IGNITION SWITCH TO "OFF"	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO "ON"	BATTERY VOLTAGE
48	B	GROUND	—	0V

Diagnostic Procedure

ECS005WP

1. CHECK TCM POWER SOURCE STEP 1

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM terminals 10, 19, 28 and ground.

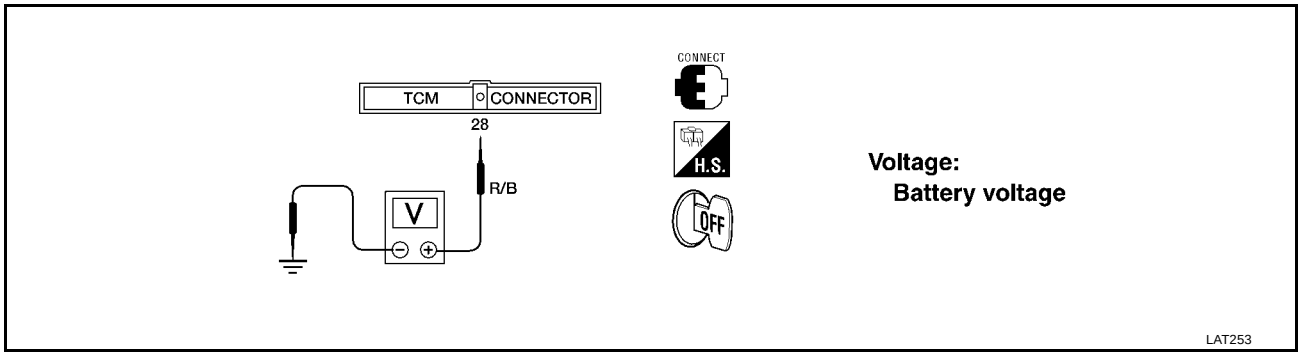


OK or NG

OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK TCM POWER SOURCE STEP 2

1. Turn ignition switch to OFF position.
2. Check voltage between TCM terminal 28 and ground.



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING ITEM

- Check the following items:
- Harness for short or open between ignition switch and TCM terminals 10, 19 and 28 (Main harness)
- Fuse
- Ignition switch
  Refer to PG-3, "POWER SUPPLY ROUTING" .

OK or NG

OK >> GO TO 4.
NG >> Repair or replace damaged parts.

4. CHECK TCM GROUND CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between TCM terminals 25, 48 and ground. Refer to AT-112, "Wiring Diagram — AT — MAIN" .

   Continuity should exist.

   If OK, check harness for short to ground and short to power.

OK or NG

OK >> **INSPECTION END**
NG >> Repair open circuit or short to ground or short to power in harness connectors.

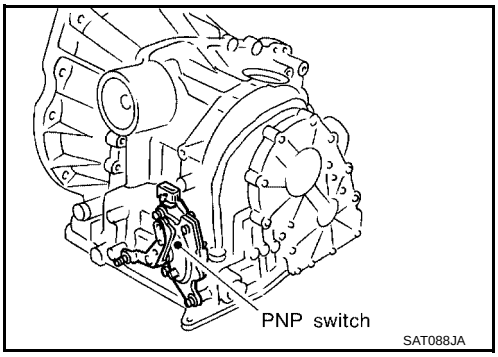
DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH

PFP:32006

Description

ECS005WQ

- The PNP switch assembly includes a transmission range switch.
- The transmission range switch detects the selector lever position and sends a signal to the TCM.



ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: PNP SW/CIRC : P0705	TCM does not receive the correct voltage signal from the switch based on the gear position.	● Harness or connectors (The PNP switch circuit is open or shorted.) ● PNP switch

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

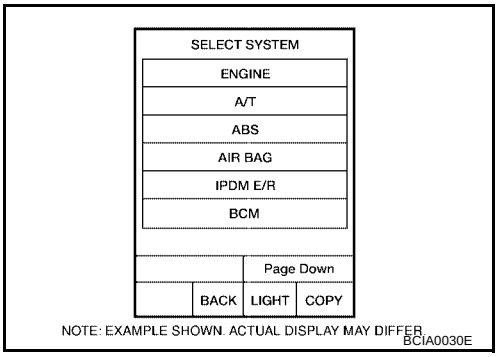
NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

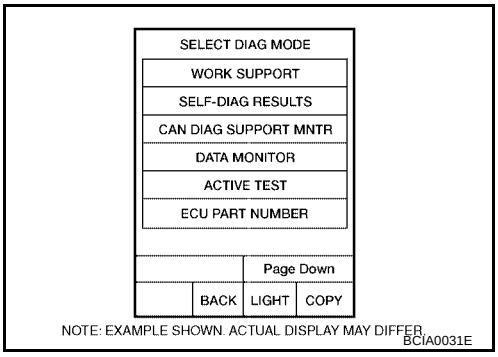
1. Turn ignition switch "ON".



2. Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
3. Start engine and maintain the following conditions for at least 5 consecutive seconds.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.3V
   Selector lever: D position (OD "ON" or "OFF")

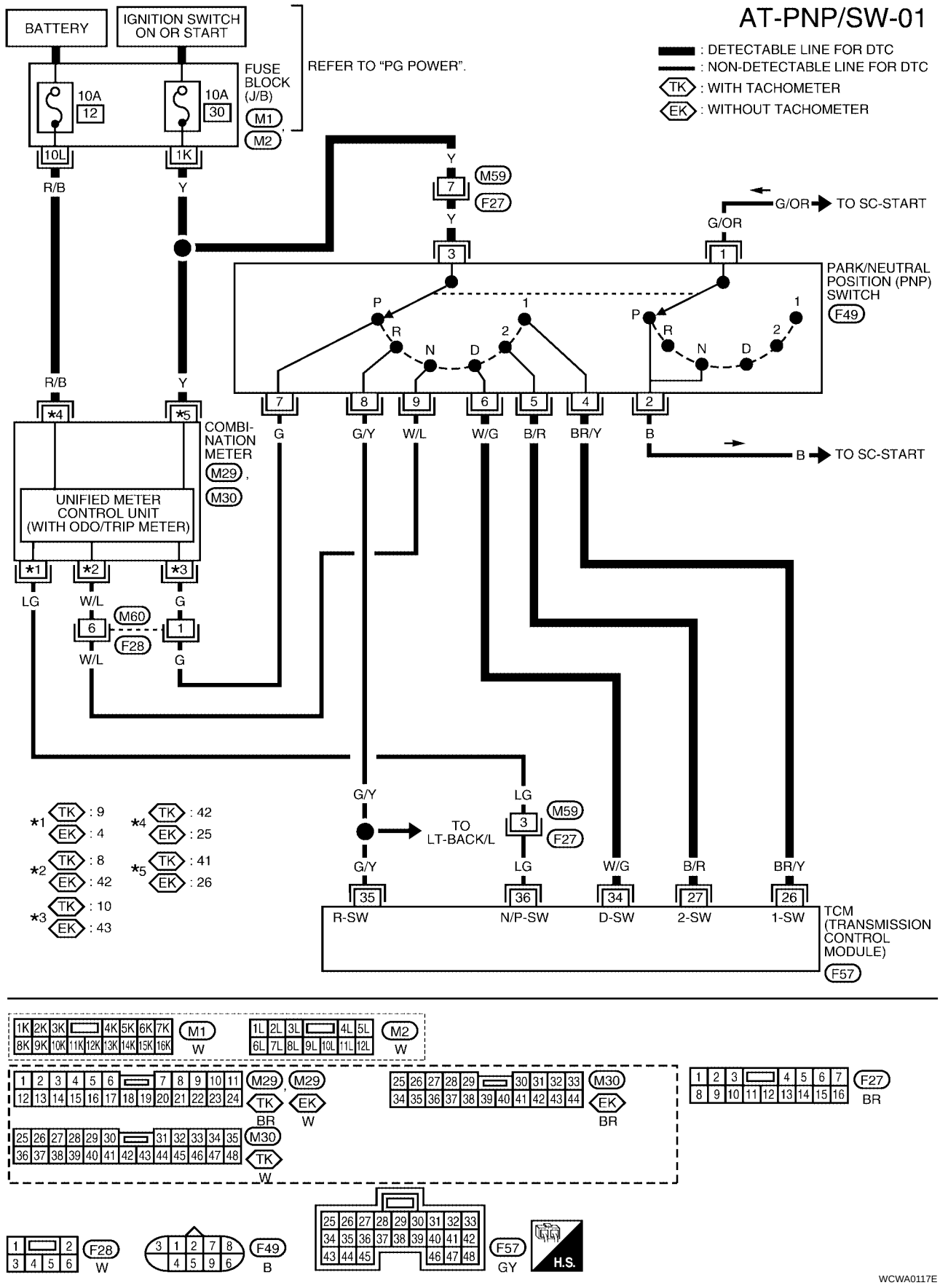
With GST

Follow the procedure "With CONSULT-II".



Wiring Diagram — AT — PNP/SW

ECS005WR



WCWA0117E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
26	BR/Y	PNP SWITCH "1" POSITION	WHEN SETTING SELECTOR LEVER TO "1" POSITION	BATTERY VOLTAGE
			WHEN SETTING SELECTOR LEVER TO OTHER POSITIONS	0V
27	B/R	PNP SWITCH "2" POSITION	WHEN SETTING SELECTOR LEVER TO "2" POSITION	BATTERY VOLTAGE
			WHEN SETTING SELECTOR LEVER TO OTHER POSITIONS	0V
34	W/G	PNP SWITCH "D" POSITION	WHEN SETTING SELECTOR LEVER TO "D" POSITION	BATTERY VOLTAGE
			WHEN SETTING SELECTOR LEVER TO OTHER POSITIONS	0V
35	G/Y	PNP SWITCH "R" POSITION	WHEN SETTING SELECTOR LEVER TO "R" POSITION	BATTERY VOLTAGE
			WHEN SETTING SELECTOR LEVER TO OTHER POSITIONS	0V
36	LG	PNP SWITCH "N" OR "P" POSITION	WHEN SETTING SELECTOR LEVER TO "N" OR "P" POSITION	BATTERY VOLTAGE
			WHEN SETTING SELECTOR LEVER TO OTHER POSITIONS	0V

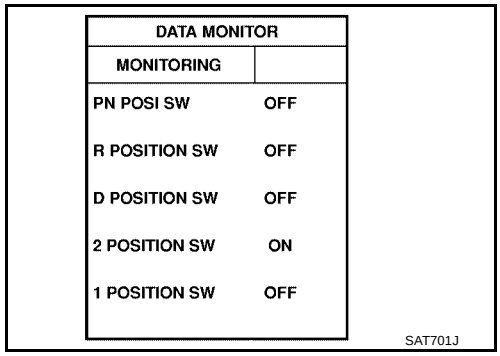
Diagnostic Procedure

ECS005WS

1. CHECK PNP SWITCH CIRCUIT (WITH CONSULT-II)

With CONSULT-II

1. Turn ignition switch to “ON” position. (Do not start engine.)
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out “P/N”, “R”, “D”, “2” and “1” position switches moving selector lever to each position. Check the signal of the selector lever position is indicated properly.



OK or NG

OK >> GO TO 3.

NG >> Check the following items:

- PNP switch
  Refer toAT-119, "Component Inspection" .
- Harness for short or open between ignition switch and PNP switch (Main harness)
- Harness for short or open between PNP switch and TCM (Main harness)
- Ignition switch and fuse
  Refer to PG-3, "POWER SUPPLY ROUTING" .

2. CHECK PNP SWITCH CIRCUIT (WITHOUT CONSULT-II)

Without CONSULT-II

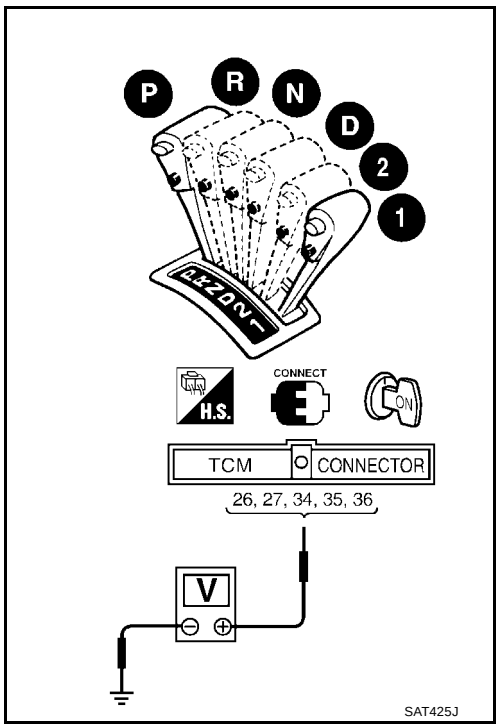
1. Turn ignition switch to “ON” position.
   (Do not start engine.)
2. Check voltage between TCM terminals 26, 27, 34, 35, 36 and ground while moving selector lever through each position.

Lever position	Terminal No.				
	36	35	34	27	26
P, N	B	0	0	0	0
R	0	B	0	0	0
D	0	0	B	0	0
2	0	0	0	B	0
1	0	0	0	0	B

Voltage

B : Battery voltage

0 : 0V



OK or NG

OK >> GO TO 3.

NG >> Check the following items:

- PNP switch
  Refer to AT-119, "Component Inspection" .
- Harness for short or open between ignition switch and PNP switch (Main harness)
- Harness for short or open between PNP switch and TCM (Main harness)
- Ignition switch and fuse
  Refer to PG-3, "POWER SUPPLY ROUTING" .

3. CHECK DTC

Perform AT-115, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**

NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

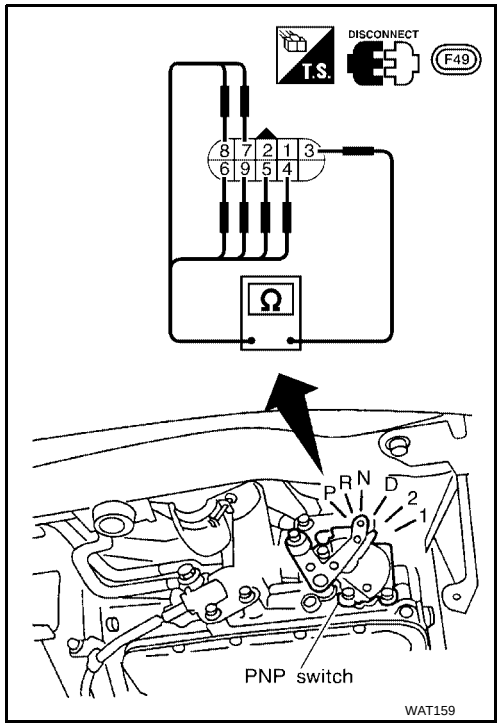
Component Inspection

ECS005WT

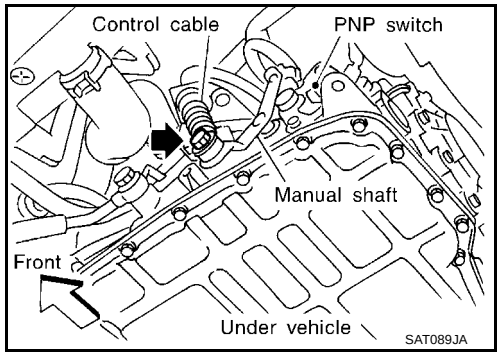
PARK/NEUTRAL POSITION SWITCH

1. Check continuity between terminals 1 and 2 and between terminals 3 and 4, 5, 6, 7, 8, 9 while moving manual shaft through each position.

Lever position	Terminal No.	
P	3 — 7	1 — 2
R	3 — 8	
N	3 — 9	1 — 2
D	3 — 6	
2	3 — 5	
1	3 — 4	



2. If NG, check again with control cable disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust control cable. Refer to AT-262, "Control Cable Adjustment" .
4. If NG on step 2, remove PNP switch from A/T and check continuity of PNP switch terminals. Refer to step 1.
5. If OK on step 4, adjust PNP switch. Refer to AT-262, "Park/Neutral Position (PNP) Switch Adjustment" .
6. If NG on step 4, replace PNP switch.



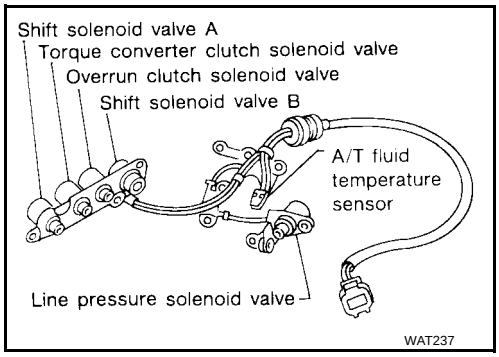
DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

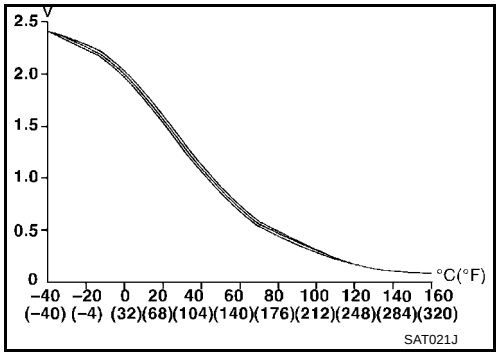
PFP:31940

Description

ECS005WU

The A/T fluid temperature sensor detects the A/T fluid temperature and sends a signal to the TCM.





CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approx.)	
A/T fluid temperature sensor	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]	1.5V ↓ 0.5V	2.5 kΩ ↓ 0.3 kΩ

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when...	Check items (Possible cause)
: ATF TEMP SEN/CIRC : P0710	TCM receives an excessively low or high voltage from the sensor.	● Harness or connectors (The sensor circuit is open or shorted.) ● A/T fluid temperature sensor

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

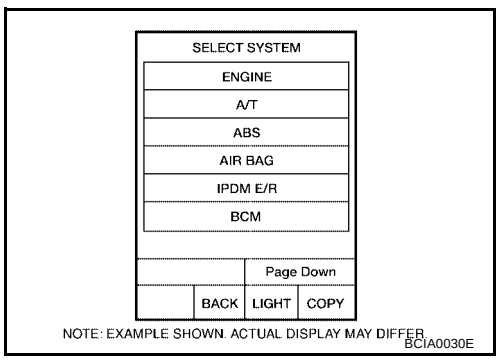
CAUTION:

Always drive vehicle at a safe speed.

NOTE:

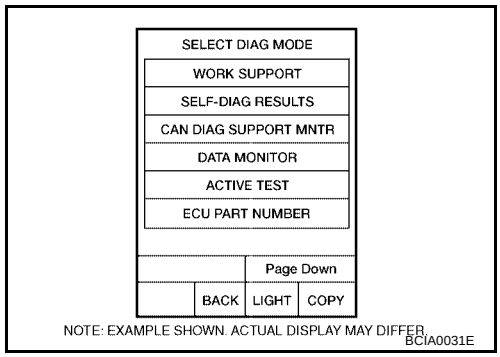
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.



With CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
2. Start engine and maintain the following conditions for at least 10 minutes (Total). (It is not necessary to maintain continuously.)
   CMPS·RPM (REF): 450 rpm or more
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (OD “ON”)



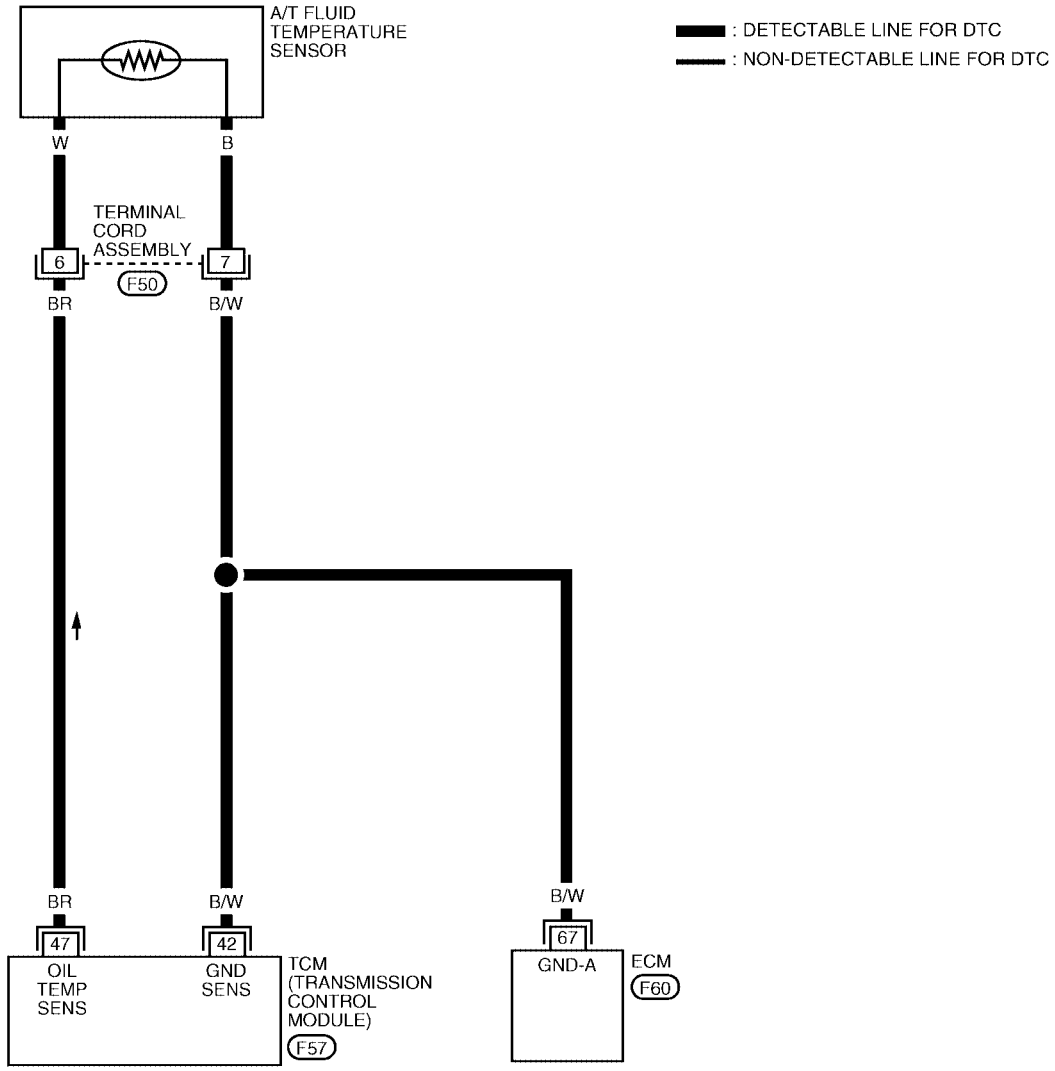
With GST

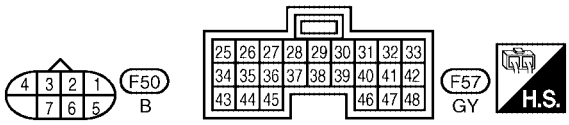
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — FTS

ECS005WV

AT-FTS-01





REFER TO THE FOLLOWING.
F60 - ELECTRICAL UNITS

BCWA0245E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
42	B/W	SENSOR (GROUND)	—	0V
47	BR	A/T FLUID TEMPERATURE SENSOR	WHEN ATF TEMPERATURE IS 20°C (68°F)	1.5V
			WHEN ATF TEMPERATURE IS 80°C (176°F)	0.5V

Diagnostic Procedure

ECS005WW

1. INSPECTION START

Do you have CONSULT-II?

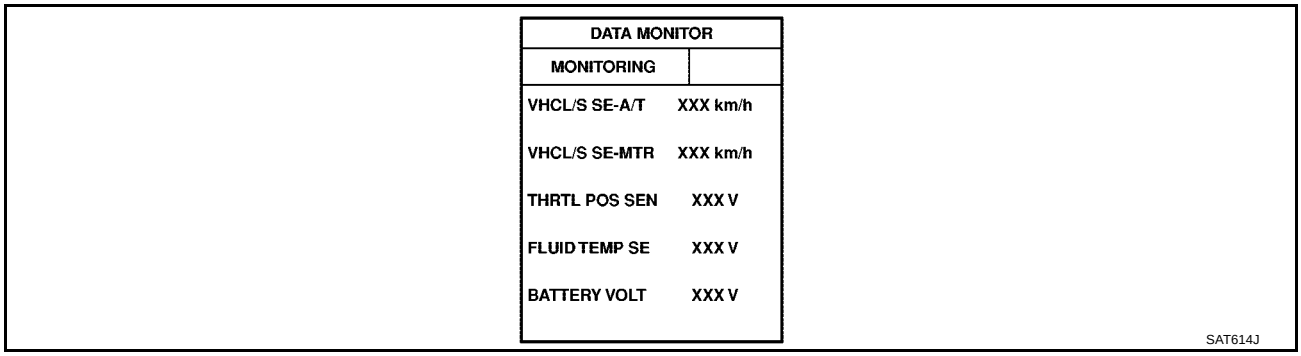
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITH CONSULT-II)

With CONSULT-II

1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “FLUID TEMP SE”.



Voltage

Cold [20°C (68°F)] → : Approximately 1.5V →
Hot [80°C (176°F)] 0.5V

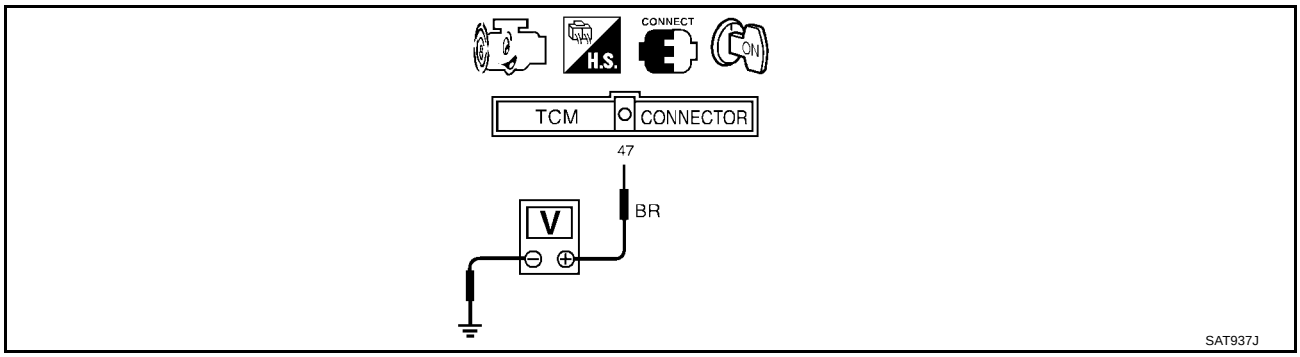
OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

3. CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II)

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM terminal 47 and ground while warming up A/T.



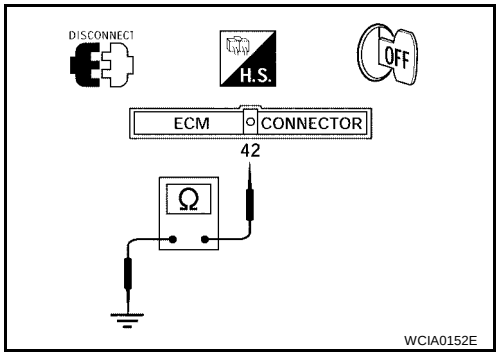
Voltage

Cold [20°C (68°F)] → : Approximately 1.5V →
Hot [80°C (176°F)] 0.5V

3. Turn ignition switch to “OFF” position.
4. Disconnect TCM harness connector.
5. Check continuity between TCM harness connector F57 terminal 42 (B/W) and ground.

   Continuity should exist.

   If OK, check harness for short to ground and short to power.



OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK DTC

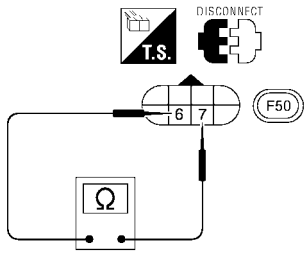
Perform AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" .

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

5. CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminals 6 and 7 when A/T is cold.



Resistance:
Cold [20°C (68°F)
Approximately 2.5 kΩ

LAT160

4. Reinstall any part removed.

OK or NG

OK (With CONSULT-II)>> GO TO 2.
OK (Without CONSULT-II)>> GO TO 3.
NG >> 1. Remove oil pan.
2. Check the following items:
- A/T fluid temperature sensor
Refer to AT-125, "Component Inspection" .
- Harness of terminal cord assembly for short or open

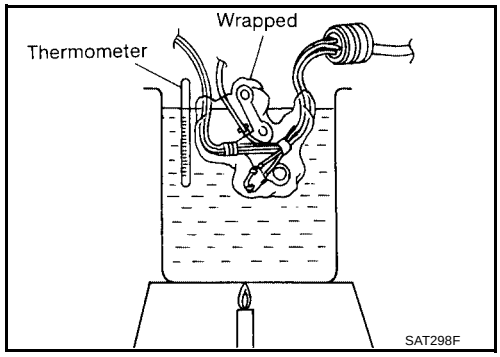
Component Inspection

ECS005WX

A/T FLUID TEMPERATURE SENSOR

- For removal, refer to AT-259, "Control Valve Assembly and Accumulators" .
- Check resistance between two terminals while changing temperature as shown at left.

Temperature °C (°F)	Resistance (Approx.)
20 (68)	2.5 kΩ
80 (176)	0.3 kΩ



SAT298F

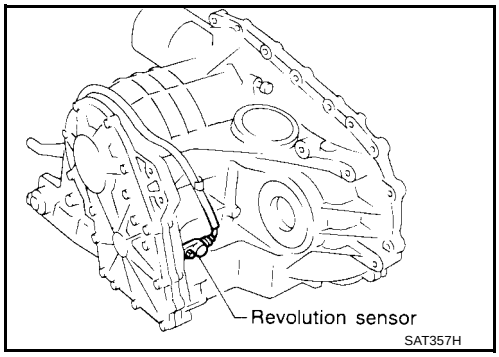
DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)

PFP:32702

Description

ECS005WY

The revolution sensor detects the revolution of the idler gear parking pawl lock gear and emits a pulse signal. The pulse signal is sent to the TCM which converts it into vehicle speed.



ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when...	Check items (Possible cause)
: VEH SPD SEN/CIR AT	TCM does not receive the proper voltage signal from the sensor.	● Harness or connectors (The sensor circuit is open or shorted.) ● Revolution sensor
: P0720		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

CAUTION:

- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

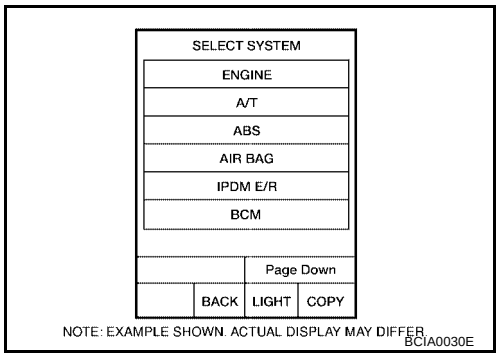
NOTE:

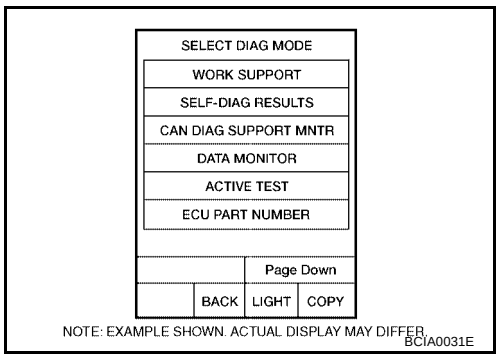
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

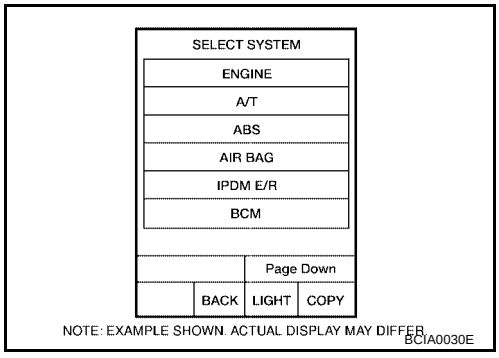
After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2. Drive vehicle and check for an increase of "VHCL/S SE·MTR" value increase.
   If the check result is NG, go to AT-126, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .
   If the check result is OK, go to following step.
3. Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
4. Start engine and maintain the following conditions for at least 5 consecutive seconds.
   VHCL SPEED SE: 30 km/h (19 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (OD "ON")
   Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.
   If the check result is NG, go to AT-129, "Diagnostic Procedure" .

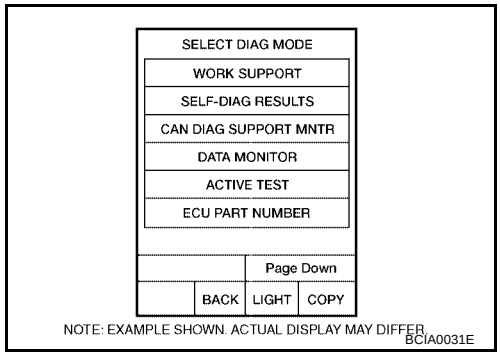






If the check result is OK, go to following step.

5. Maintain the following conditions for at least 5 consecutive seconds.
   CMPS·RPM (REF): 3,500 rpm or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (OD "ON")
   Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.



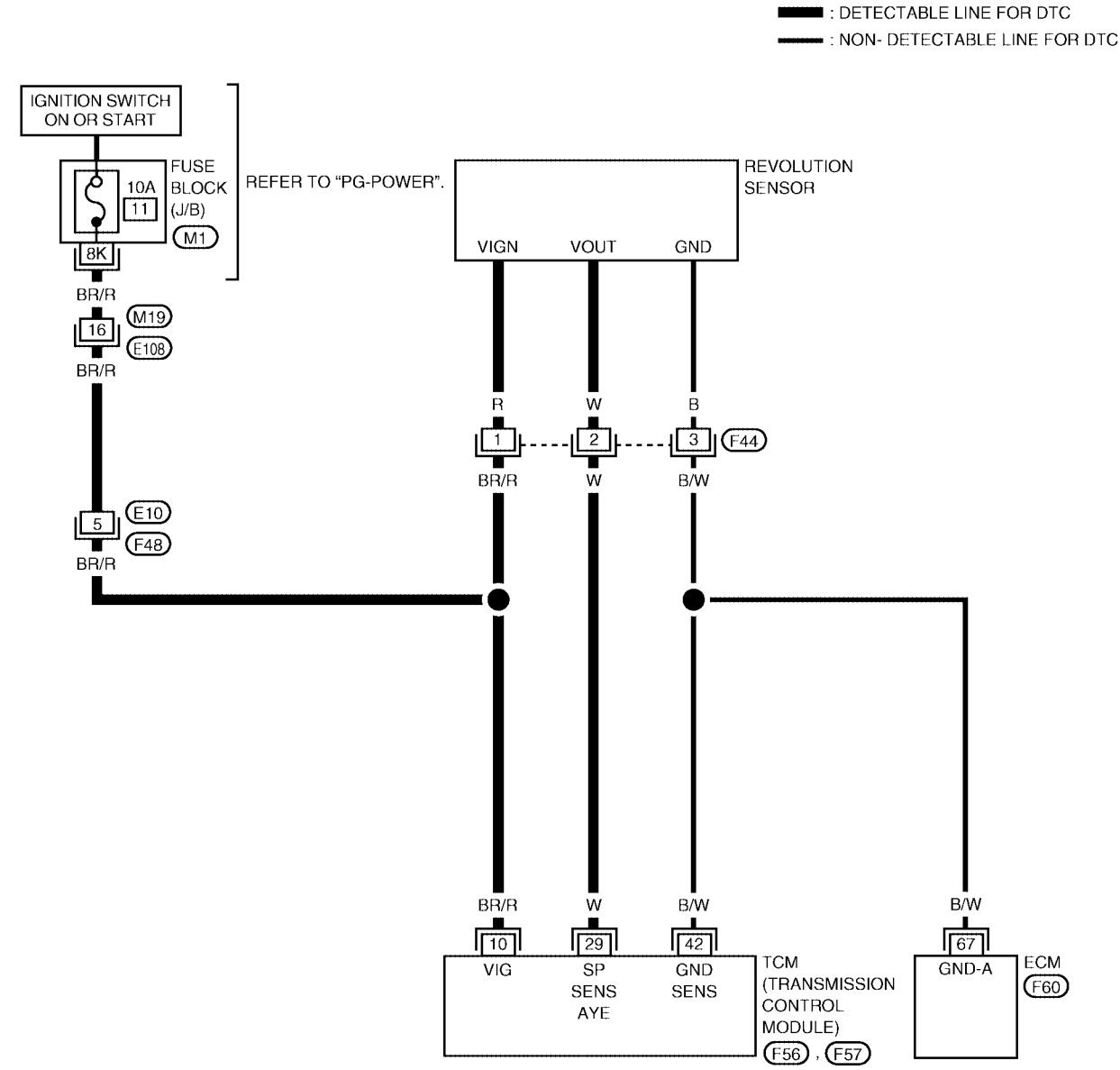
With GST

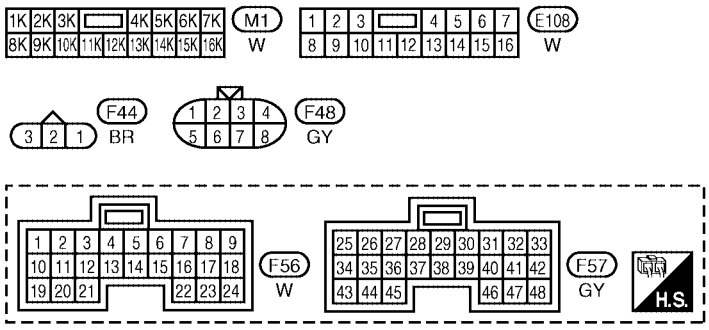
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — VSSA/T

ECS005WZ

AT-VSSA/T-01





REFER TO THE FOLLOWING.
F60 - ELECTRICAL UNITS

BCWA0235E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	BR/R	POWER SOURCE	WHEN TURNING IGNITION SWITCH TO "ON"	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO "OFF"	0V
29	W	REVOLUTION SENSOR	WHEN MOVING AT 20 KM/H (12 MPH). USE CONSULT-II PULSE FREQUENCY MEASURING FUNCTION	150 Hz
42	B/W	THROTTLE POSITION SENSOR (GROUND)	—	0V

Diagnostic Procedure

ECS005X0

1. CHECK INPUT SIGNAL (WITH CONSULT-II)

With CONSULT-II

1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “VHCL/S SE·A/T” while driving.
   Check the value changes according to driving speed.

DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

SAT614J

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK REVOLUTION SENSOR (WITH CONSULT-II)

With CONSULT-II

1. Start engine.

Condition	Judgement standard (Approx.)
When moving at 20 km/h (12 MPH, use the CONSULT-II pulse frequency measuring function. *1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	150 Hz
When vehicle is not moving	Under 1.3V or over 4.5V

WAT402

- Check harness for short or open between TCM, ECM and revolution sensor. Refer to AT-128, "Wiring Diagram — AT — VSSA/T" .
- Check harness for short or open between ignition switch and revolution sensor.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK DTC

Perform AT-126, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

DTC P0725 ENGINE SPEED SIGNAL

PFP:24825

Description

ECS005X1

The engine speed signal is sent from the ECM to the TCM.

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: ENGINE SPEED SIG : P0725	TCM does not receive the proper voltage signal from ECM.	● Harness or connectors (The sensor circuit is open or shorted.)

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

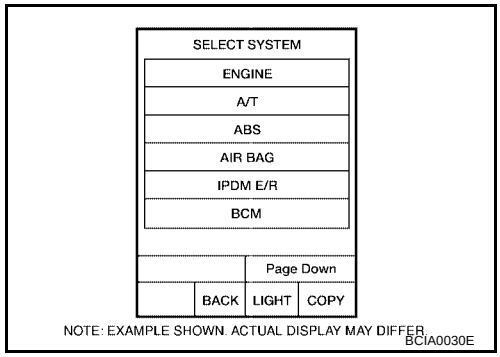
NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

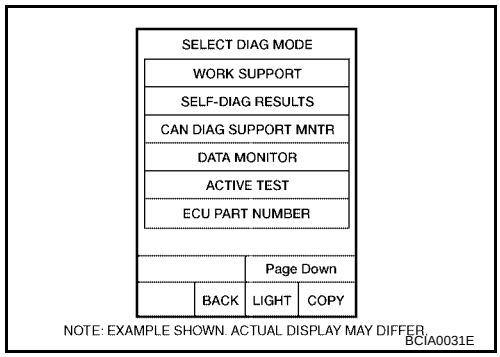
1. Turn ignition switch "ON" and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
2. Start engine and maintain the following conditions for at least 10 consecutive seconds.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (OD "ON")



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0030E

With GST

Follow the procedure "With CONSULT-II".

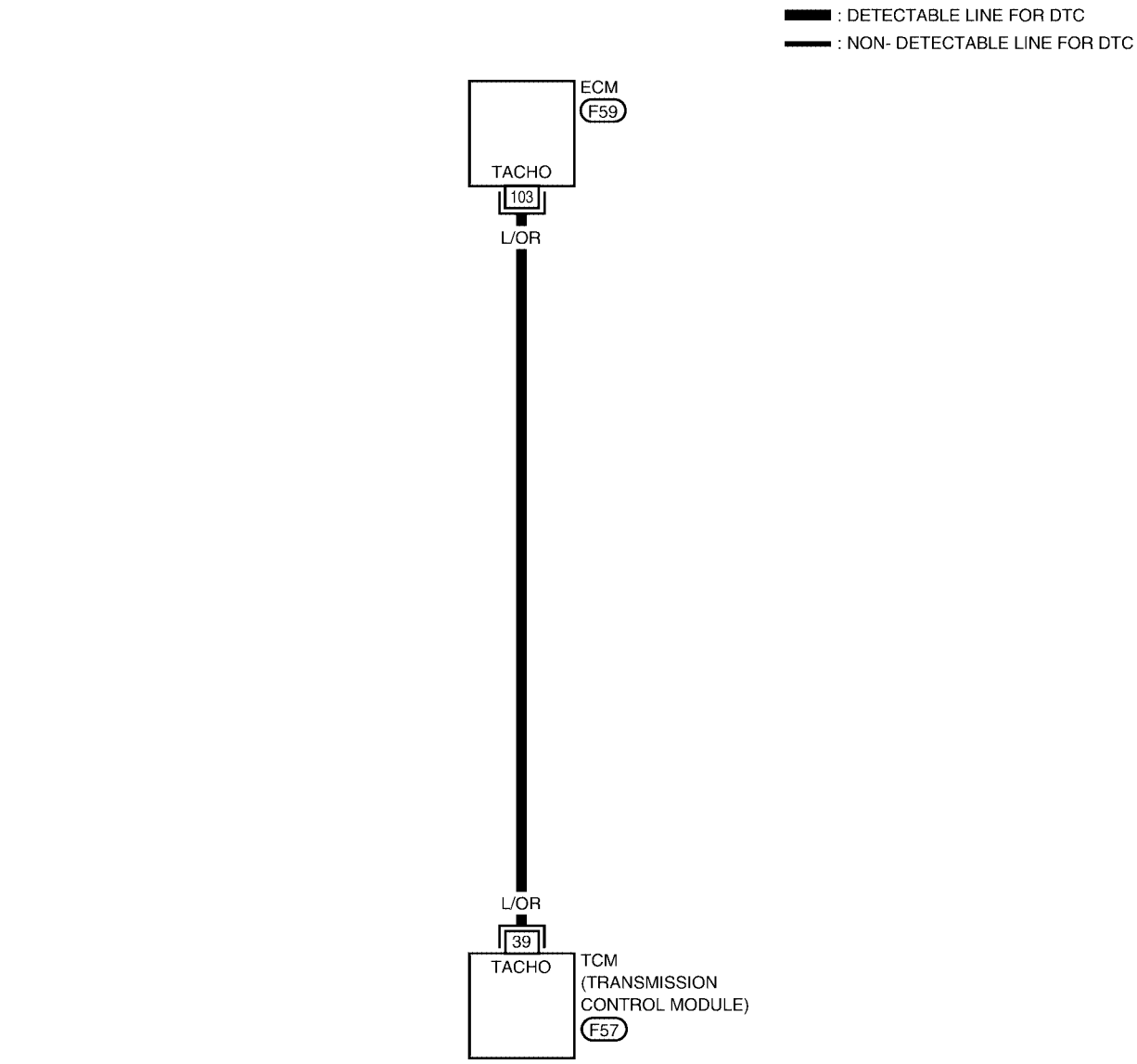


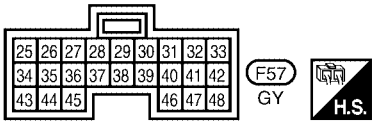
NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0031E

Wiring Diagram — AT — ENGSS

ECS005X2

AT-ENGSS-01





Refer to the following.
F59 - ELECTRICAL UNITS

WCWA0119E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
39	L/OR	ENGINE SPEED SIGNAL	REFER TO ECM TABLE	—

Diagnostic Procedure

ECS005X3

1. CHECK DTC WITH ECM

Perform diagnostic test mode II (self-diagnostic results) for engine control. Check ignition signal circuit condition.

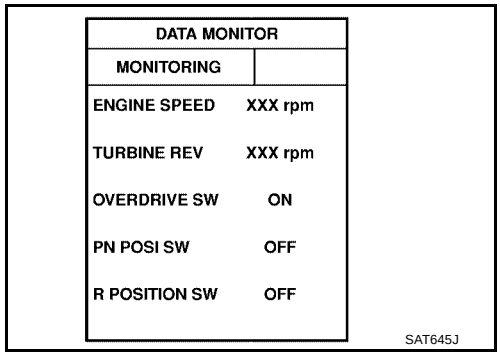
OK or NG

OK (With CONSULT-II)>> GO TO 2.
OK (Without CONSULT-II)>> GO TO 3.
NG >> Check ignition signal circuit for engine control. Refer to EC-30, "INPUT/OUTPUT SIGNAL CHART" .

2. CHECK INPUT SIGNAL (WITH CONSULT-II)

With CONSULT-II

1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “ENGINE SPEED”.
   Check engine speed changes according to throttle position.



OK or NG

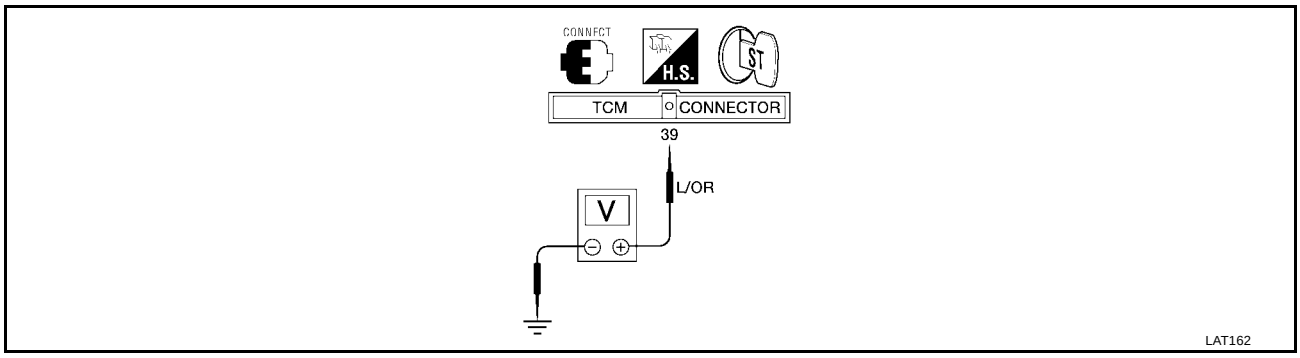
OK >> GO TO 4.
NG >> Check the following items:

- Harness for short or open between TCM and ECM
- Resistor and ignition coil
  Refer to EC-30, "SYSTEM DESCRIPTION" .

3. CHECK INPUT SIGNAL (WITHOUT CONSULT-II)

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM terminal 39 and ground.



Voltage (Idle speed) **: Refer to AT-109, "TCM Terminals and Reference Value" .**

OK or NG

OK >> GO TO 4.
NG >> Check the following items:

- Harness for short or open between TCM and ECM
- Resistor and ignition coil
  Refer to EC-30, "SYSTEM DESCRIPTION" .

4. CHECK DTC

Perform AT-131, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

DTC P0731 A/T 1ST GEAR FUNCTION

PFP:31940

Description

ECS005X4

- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into first gear position as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

ON BOARD DIAGNOSTIC LOGIC

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is higher than the position (1st) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when either shift solenoid valve A is stuck open or shift solenoid valve B is stuck open.

Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve A stuck open	2*	2	3	3
In case of gear position with shift solenoid valve B stuck open	4*	3	3	4

*: P0731 is detected.

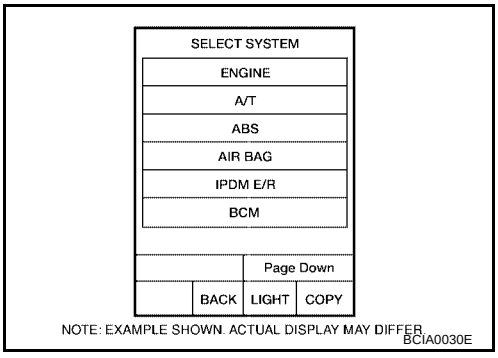
Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T 1ST GR FNCTN : P0731	A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	● Shift solenoid valve A ● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

CAUTION:

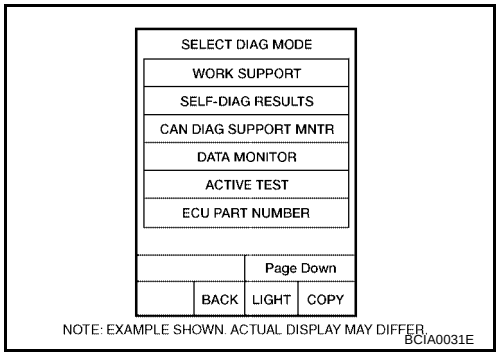
- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
TESTING CONDITION:
Always drive vehicle on a level road to improve the accuracy of test.



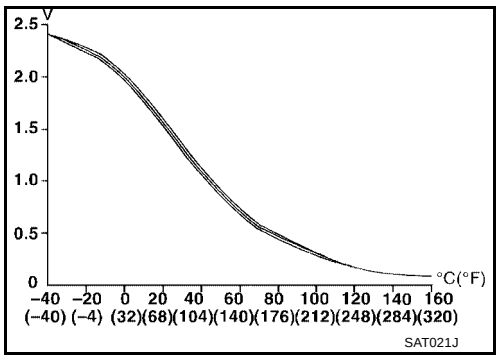
NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER
BCIA0030E

After the repair, perform the following procedure to confirm the malfunction is eliminated.



With CONSULT-II

1. Start engine and select “DATA MONITOR” mode for “A/T” with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3. Select “1ST GR FNCTN P0731” of “DTC WORK SUPPORT” mode for “A/T” with CONSULT-II and touch “START”.
4. Accelerate vehicle to 20 to 25 km/h (12 to 16 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (OD “ON”)
   - **Check that “GEAR” shows “2” after releasing pedal.**



5. Depress accelerator pedal to WOT (more than 7.0/8 of “THROTTLE POSI”) quickly from a speed of 20 to 25 km/h (12 to 16 MPH) until “TESTING” changes to “STOP VEHICLE” or “COMPLETED”. (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to AT-138, "Diagnostic Procedure" .
   If “STOP VEHICLE” appears on CONSULT-II screen, go to the following step.
   - **Check that “GEAR” shows “1” when depressing accelerator pedal to WOT.**
   - **If “TESTING” does not appear on CONSULT-II for a long time, select “SELF-DIAGNOSIS” for “ENGINE”. In case a 1st trip DTC other than P0731 is shown, refer to applicable “TROUBLE DIAGNOSIS FOR DTC”.**
6. Stop vehicle.
7. Follow the instruction displayed. (Check for normal shifting referring to the table below.)

Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists	1 → 2 → 3 → 4
Malfunction for P0731 exists.	2 → 2 → 3 → 3
	4 → 3 → 3 → 4

8. Make sure that “OK” is displayed. (If “NG” is displayed, refer to “Diagnostic Procedure”.)
   Refer to AT-138, "Diagnostic Procedure" .
   Refer to AT-385, "Shift Schedule" .

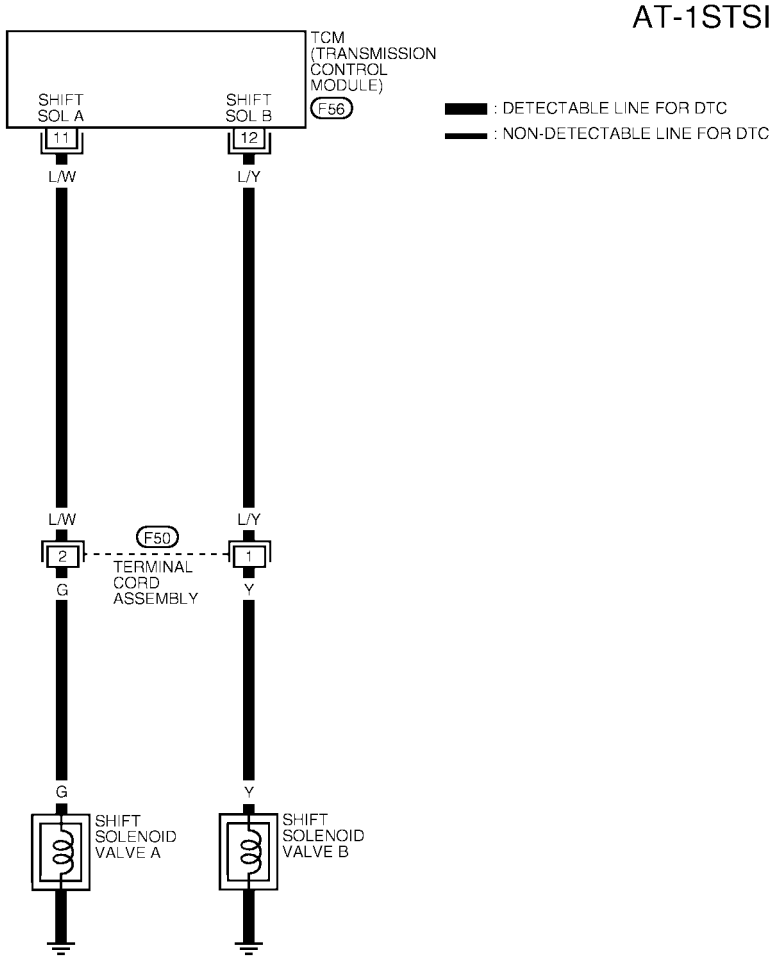
With GST

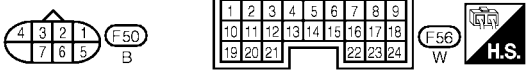
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 1ST

ECS005X5

AT-1STSIG-01





WAT118

TRANSMISSION CONTROL MODULE TERMINALS AND REFERENCE VALUE

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC) (Approx.)
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A DOES NOT OPERATE	0V
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE B DOES NOT OPERATE	0V

WAT343

Diagnostic Procedure

ECS005X6

1. CHECK SHIFT SOLENOID VALVE

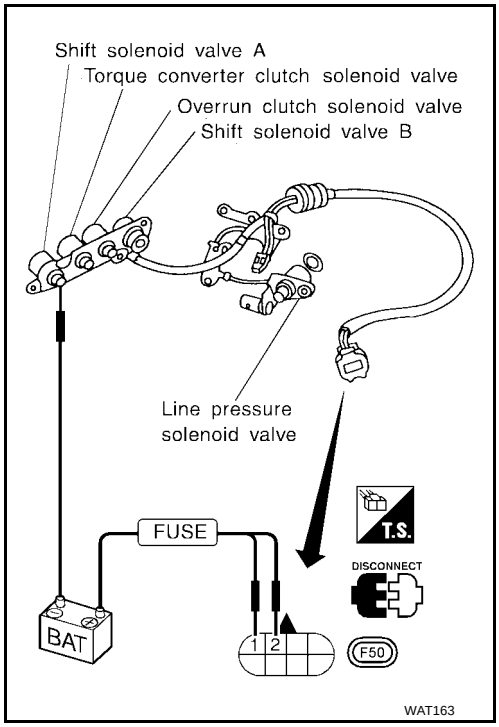
1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check shift solenoid valve operation.

- Shift solenoid valve A
- Shift solenoid valve B

Refer to AT-139, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace shift solenoid valve assembly.



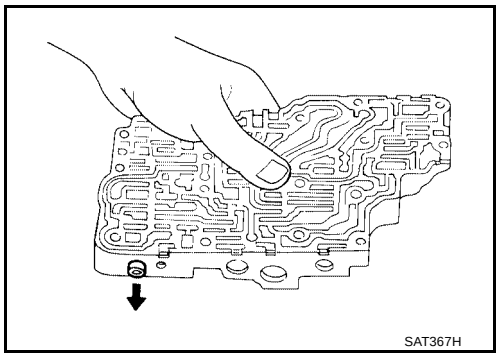
2. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-298, "Disassembly" .
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.

OK or NG

OK >> GO TO 3.
NG >> Repair control valve assembly.



3. CHECK DTC

Perform AT-135, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> Check transaxle internal components (clutch, brake, etc.).

Component Inspection

ECS005X7

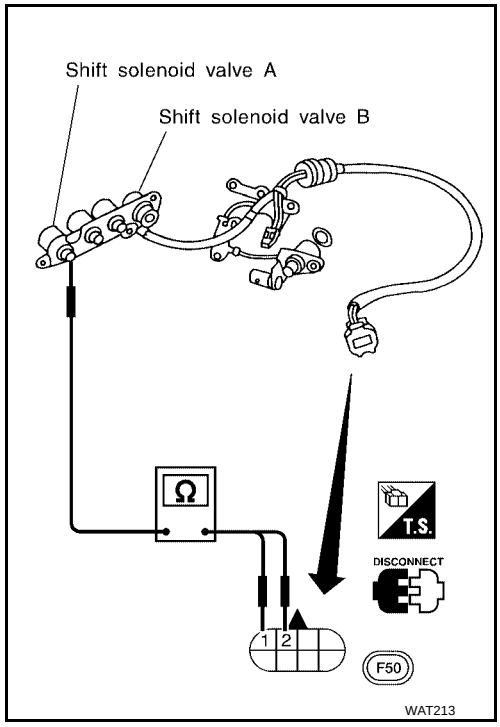
SHIFT SOLENOID VALVE A AND B

- Refer to AT-259, "Control Valve Assembly and Accumulators" .

Resistance Check

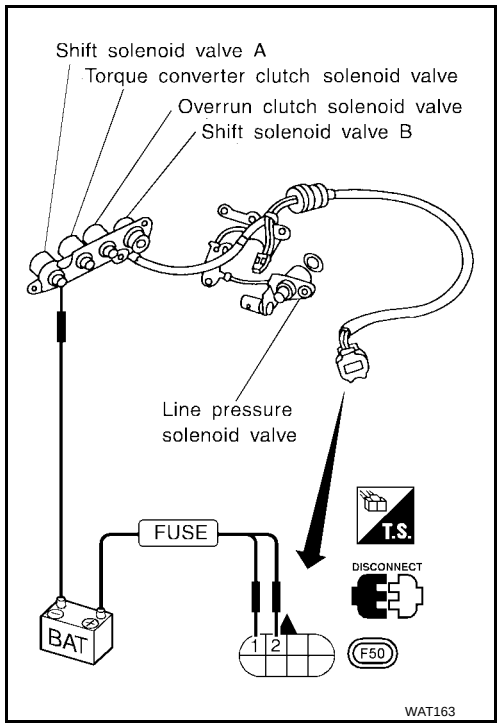
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 30Ω
Shift solenoid valve B	1		5 - 20Ω



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground.



DTC P0732 A/T 2ND GEAR FUNCTION

PFP:31940

Description

ECS005X8

- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into second gear position as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

ON BOARD DIAGNOSTIC LOGIC

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is higher than the position (2nd) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when shift solenoid valve B is stuck open.

Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve B stuck open	4	3*	3	4

*: P0732 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T 2ND GR FNCTN	A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit
: P0732		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

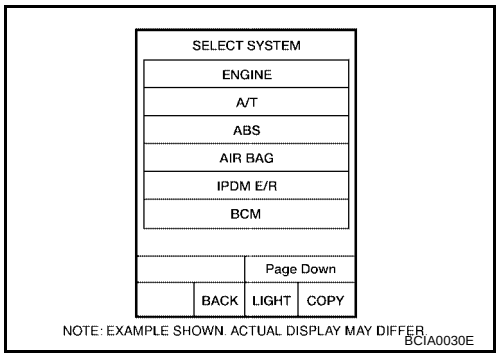
CAUTION:

- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

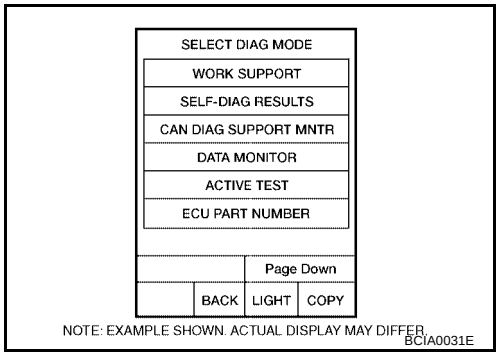
NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
TESTING CONDITION:
Always drive vehicle on a level road to improve the accuracy of test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1. Start engine and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V



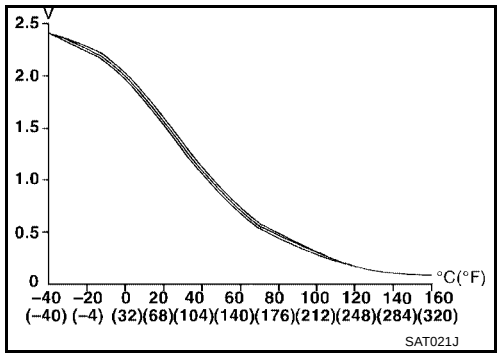
NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0030E



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0031E

If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).

3. Select “2ND GR FNCTN P0732” of “DTC WORK SUPPORT” mode for “A/T” with CONSULT-II and touch “START”.
4. Accelerate vehicle to 50 to 55 km/h (31 to 34 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (OD “ON”)
   - **Check that “GEAR” shows “3” or “4” after releasing pedal.**
5. Depress accelerator pedal to WOT (more than 7.0/8 of “THROTTLE POSI”) quickly from a speed of 50 to 55 km/h (31 to 34 MPH) until “TESTING” changes to “STOP VEHICLE” or “COMPLETED”. (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to AT-143, "Diagnostic Procedure" .
   If “STOP VEHICLE” appears on CONSULT-II screen, go to following step.
   - **Check that “GEAR” shows “2” when depressing accelerator pedal to WOT.**
   - **If “TESTING” does not appear on CONSULT-II for a long time, select “SELF-DIAGNOSIS” for “ENGINE”. In case a 1st trip DTC other than P0732 is shown, refer to applicable “TROUBLE DIAGNOSIS FOR DTC”.**
6. Stop vehicle.
7. Follow the instruction displayed. (Check for normal shifting referring to the table below.)



Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists	1 → 2 → 3 → 4
Malfunction for P0732 exists.	4 → 3 → 3 → 4

8. Make sure that “OK” is displayed. (If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”.)
   Refer to AT-143, "Diagnostic Procedure" .
   Refer to AT-385, "Shift Schedule" .

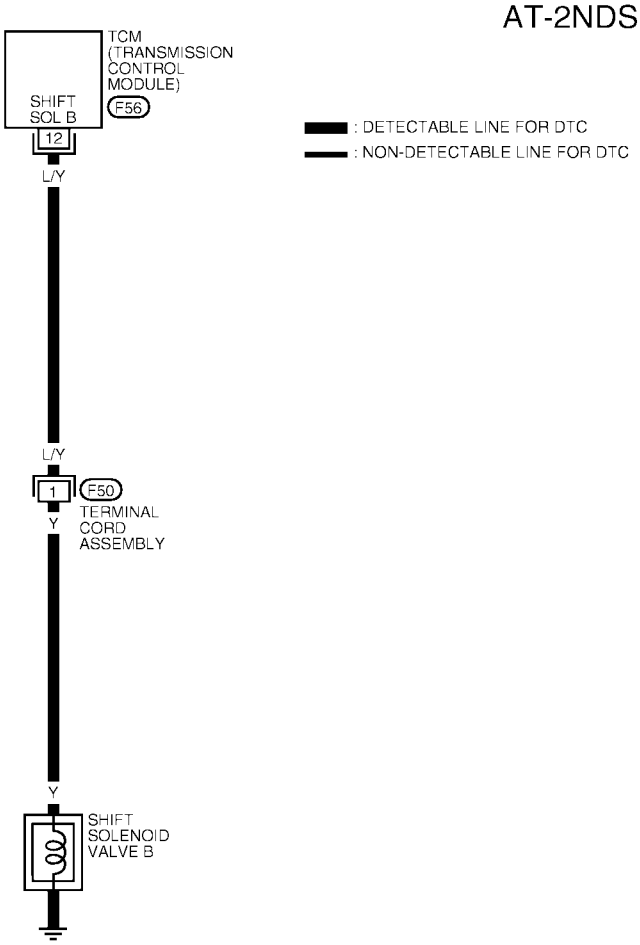
With GST

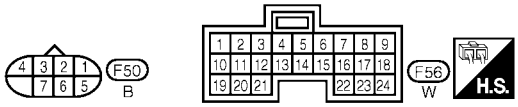
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 2ND

ECS005X9

AT-2NDSIG-01





WAT119

TRANSMISSION CONTROL MODULE TERMINALS AND REFERENCE VALUE BETWEEN TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC) (Approx.)
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE B DOES NOT OPERATE	0V

WAT344

Diagnostic Procedure

ECS005XA

1. CHECK SHIFT SOLENOID VALVE

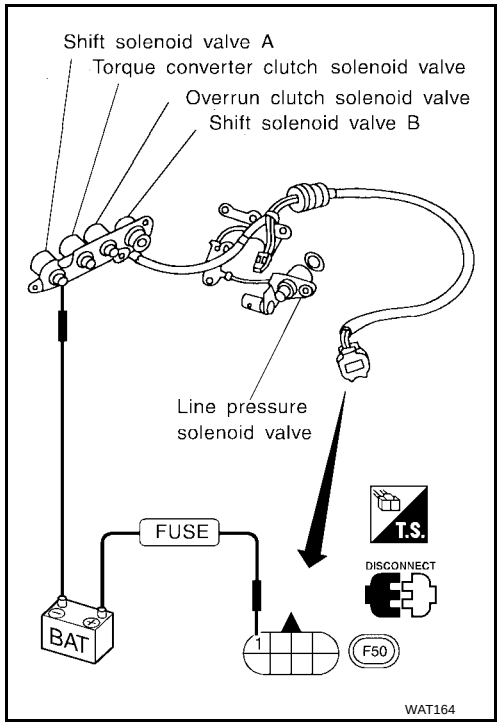
1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check shift solenoid valve operation.

– Shift solenoid valve B

Refer to AT-144, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Repair or replace shift solenoid valve assembly.



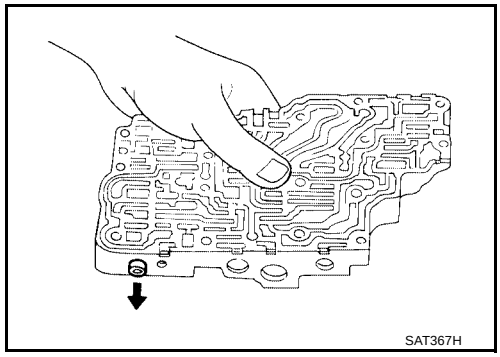
2. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-298, "Disassembly" .
2. Check to ensure that:

– Valve, sleeve and plug slide along valve bore under their own weight.
– Valve, sleeve and plug are free from burrs, dents and scratches.
– Control valve springs are free from damage, deformation and fatigue.
– Hydraulic line is free from obstacles.

OK or NG

OK >> GO TO 3.
NG >> Repair control valve assembly.



3. CHECK DTC

Perform AT-140, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> Check transaxle internal components (clutch, brake, etc.).

Component Inspection

ECS005XB

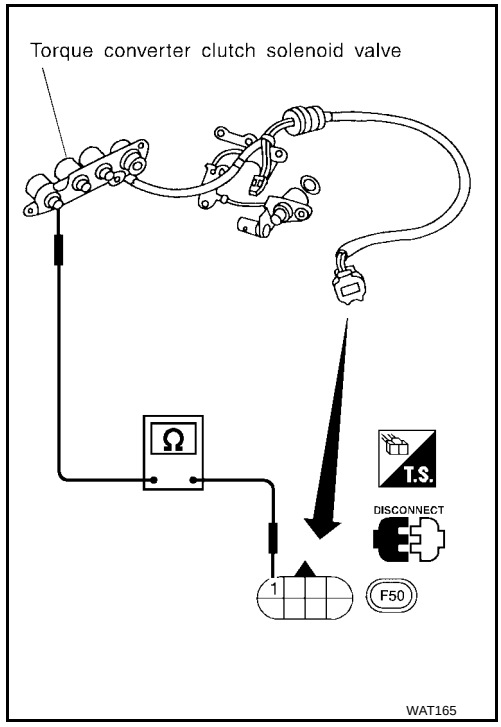
SHIFT SOLENOID VALVE B

- Refer to AT-259, "Control Valve Assembly and Accumulators" .

Resistance Check

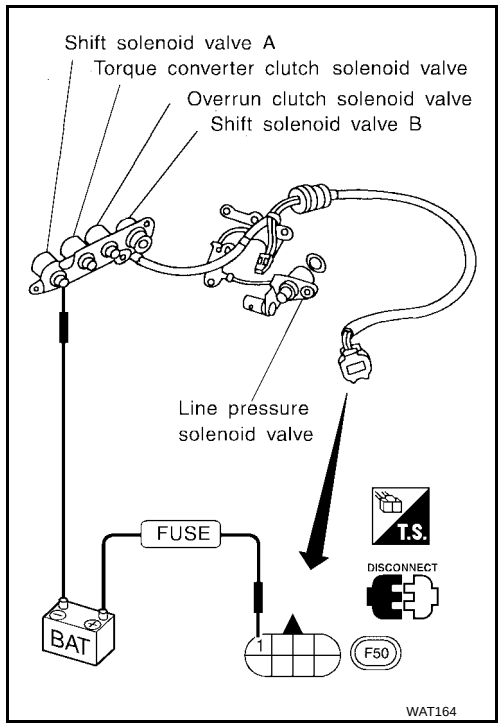
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve B	1	Ground	5 - 20Ω



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground.



DTC P0733 A/T 3RD GEAR FUNCTION

PFP:31940

Description

ECS005XC

- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into third gear position as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning servo piston or brake band, etc.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

ON BOARD DIAGNOSTIC LOGIC

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is higher than the position (3rd) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when shift solenoid valve A is stuck closed.

Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve A stuck closed	1	1	4*	4

*: P0733 is detected.

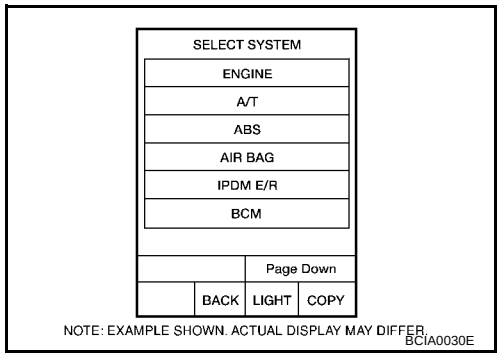
Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T 3RD GR FNCTN	A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	● Shift solenoid valve A ● Each clutch ● Hydraulic control circuit
: P0733		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

CAUTION:

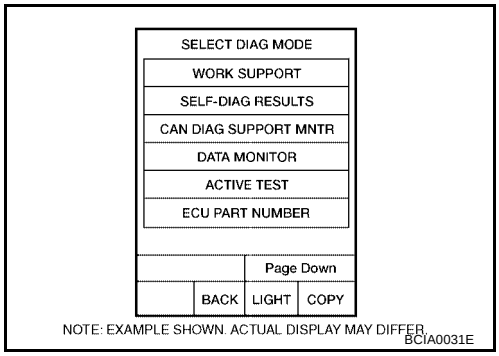
- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
TESTING CONDITION:
Always drive vehicle on a level road to improve the accuracy of test.



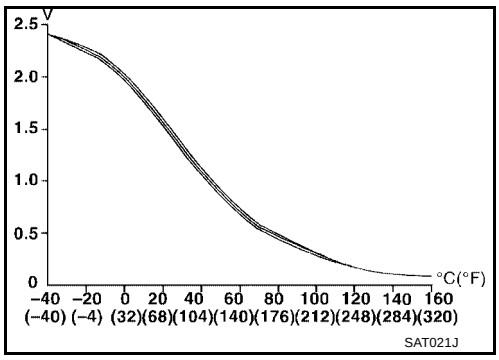
NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0030E

After the repair, perform the following procedure to confirm the malfunction is eliminated.



With CONSULT-II

1. Start engine and select “DATA MONITOR” mode for “A/T” with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3. Select “3RD GR FNCTN P0733” of “DTC WORK SUPPORT” mode for “A/T” with CONSULT-II and touch “START”.
4. Accelerate vehicle to 70 to 85 km/h (43 to 53 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (OD “ON”)



- **Check that “GEAR” shows “4” after releasing pedal.**

5. Depress accelerator pedal steadily with 3.5/8 - 4.5/8 of “THROTTLE POSI” from a speed of 70 to 85 km/h (43 to 53 MPH) until “TESTING” changes to “STOP VEHICLE” or “COMPLETED”. (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to AT-148, "Diagnostic Procedure" .
   If “STOP VEHICLE” appears on CONSULT-II screen, go to following step.

- **Check that “GEAR” shows “3” when depressing accelerator pedal with 3.5/8 - 4.5/8 of “THROTTLE POSI”.**
- **If “TESTING” does not appear on CONSULT-II for a long time, select “SELF-DIAGNOSIS” for “ENGINE”. In case a 1st trip DTC other than P0733 is shown, refer to applicable “TROUBLE DIAGNOSIS FOR DTC”.**

6. Stop vehicle.
7. Follow the instruction displayed. (Check for normal shifting referring to the table below.)

Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists.	1 → 2 → 3 → 4
Malfunction for P0733 exists.	1 → 1 → 4 → 4

8. Make sure that “OK” is displayed. (If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”.)
   Refer to AT-148, "Diagnostic Procedure" .
   Refer to AT-385, "Shift Schedule" .

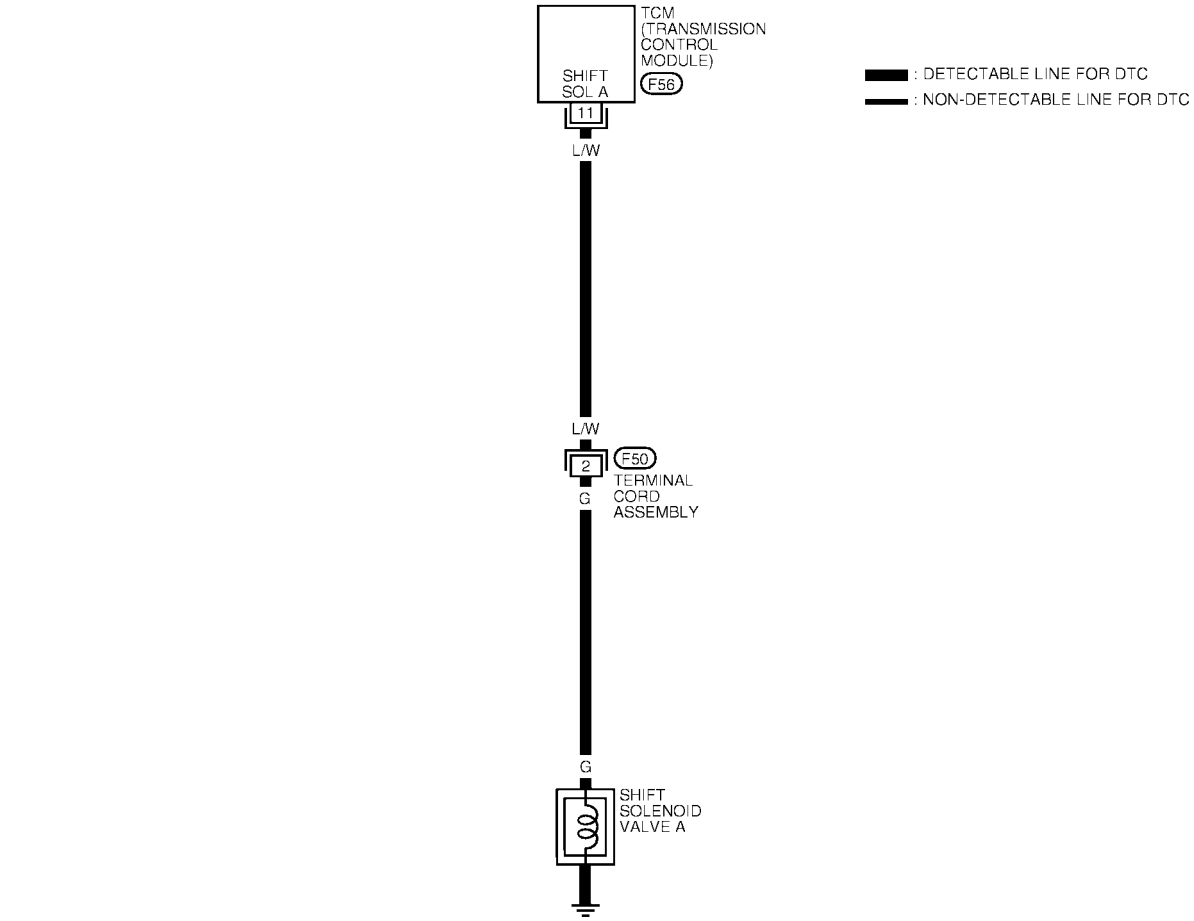
With GST

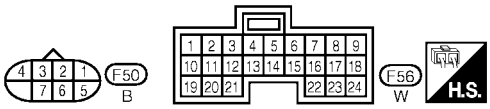
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 3RD

ECS005XD

AT-3RDSIG-01





WAT120

TRANSMISSION CONTROL MODULE TERMINALS AND REFERENCE VALUE BETWEEN TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC) (Approx.)
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A DOES NOT OPERATE	0V

WAT345

Diagnostic Procedure

ECS005XE

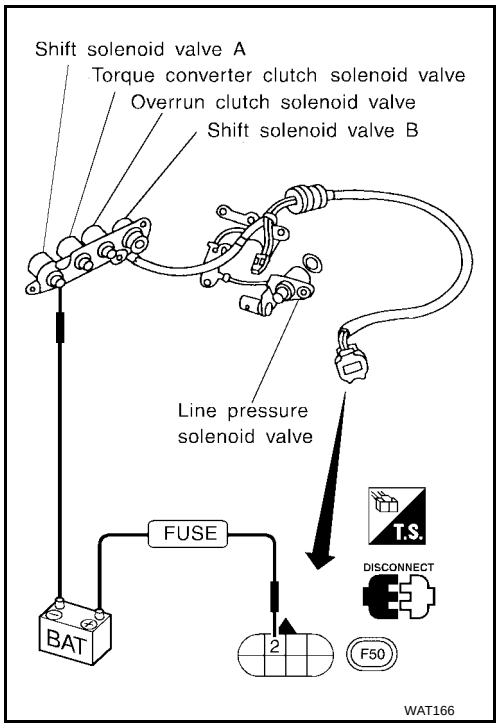
1. CHECK SHIFT SOLENOID VALVE

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check shift solenoid valve operation.

- Shift solenoid valve A
  Refer to “Component Inspection”.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace shift solenoid valve assembly.



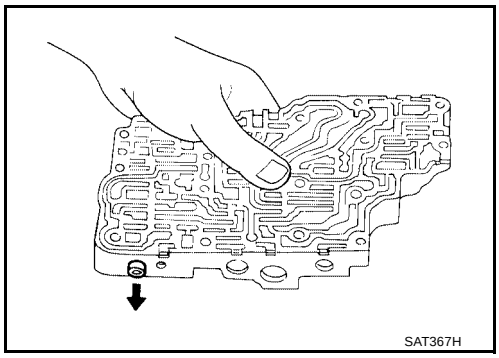
2. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-298, "Disassembly" .
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.

OK or NG

OK >> GO TO 3.
NG >> Repair control valve assembly.



3. CHECK DTC

Perform AT-145, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> Check transaxle internal components (clutch, brake, etc.).

Component Inspection

ECS005XF

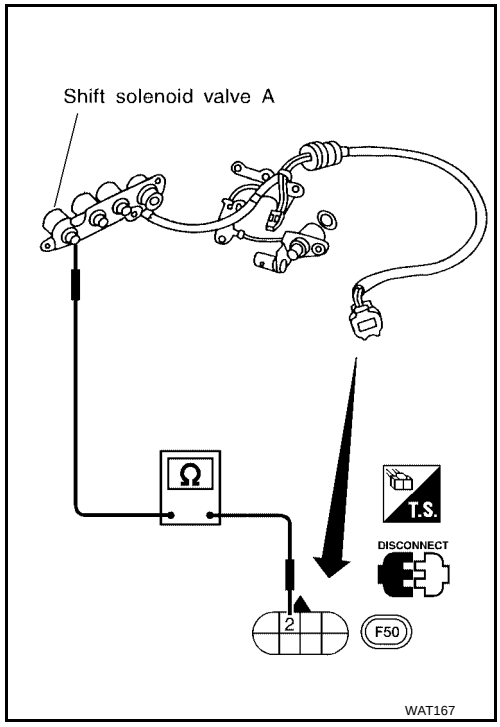
SHIFT SOLENOID VALVE A

- Refer to AT-259, "REMOVAL" .

Resistance Check

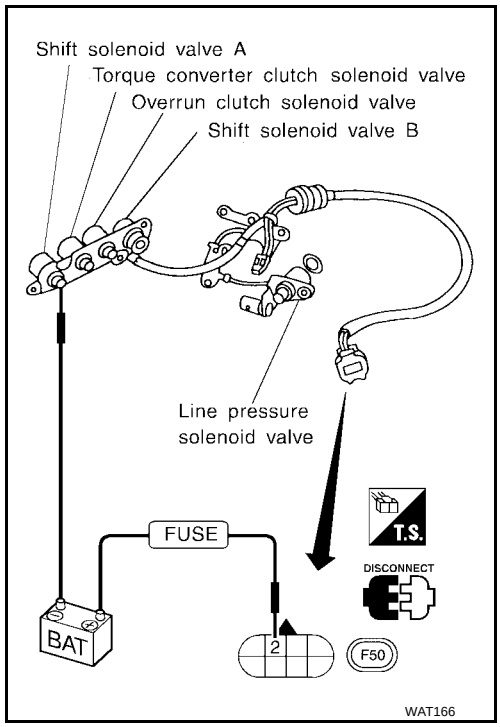
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 30Ω



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground.



DTC P0734 A/T 4TH GEAR FUNCTION

PFP:31940

Description

ECS005XG

- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into fourth gear position or when the line pressure is low. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning oil pump or torque converter clutch, etc.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approx.)
Line pressure solenoid valve duty	Small throttle opening (Low line pressure) ↓ Large throttle opening (High line pressure)	24% ↓ 95%

ON BOARD DIAGNOSTIC LOGIC

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is much lower than the position (4th) supposed by TCM, the slip ratio will be much less than normal. In case the ratio does not reach the specified value, TCM judges this diagnosis malfunction. This malfunction will be caused when shift solenoid valve B is stuck closed.

Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve B stuck closed	1	2	2	1*

*: P0734 is detected.

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: A/T 4TH GR FNCTN	A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	● Shift solenoid valve A ● Shift solenoid valve B ● Line pressure solenoid valve ● Each clutch ● Hydraulic control circuit
: P0734		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

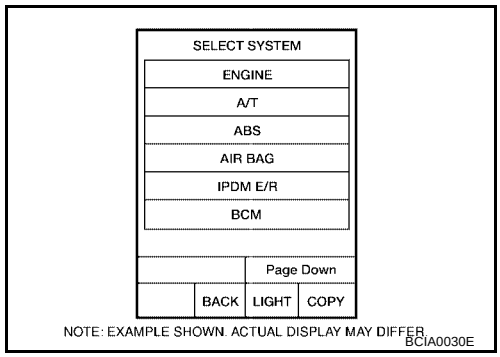
CAUTION:

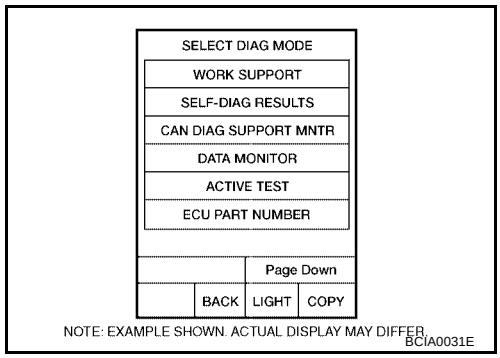
- **Always drive vehicle at a safe speed.**
- **If conducting this "DTC CONFIRMATION PROCEDURE" again, always turn ignition switch "OFF" and wait at least 5 seconds before continuing.**
- **Be careful not to rev engine into the red zone on the tachometer.**

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:
Always drive vehicle on a level road to improve the accuracy of test.

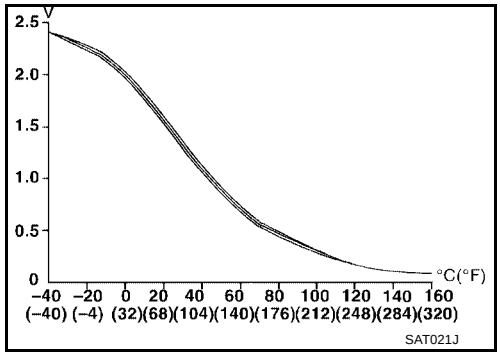
After the repair, perform the following procedure to confirm the malfunction is eliminated.





With CONSULT-II

1. Start engine and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3. Select "4TH GR FNCTN P0734" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".
4. Accelerate vehicle to 45 to 55 km/h (28 to 34 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 5.5/8 (at all times during step 4)
   Selector lever: D position (OD "ON")



- **Check that "GEAR" shows "3" after releasing pedal.**

5. Depress accelerator pedal steadily with 1.0/8 - 2.0/8 of "THROTTLE POSI" from a speed of 45 to 55 km/h (28 to 34 MPH) until "TESTING" has turned to "STOP VEHICLE" or "COMPLETED". (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to AT-154, "Diagnostic Procedure" .
   If "STOP VEHICLE" appears on CONSULT-II screen, go to following step.

- **Check that "GEAR" shows "4" when depressing accelerator pedal with 1.0/8 - 2.0/8 of "THROTTLE POSI".**
- **If "TESTING" does not appear on CONSULT-II for a long time, select "SELF-DIAGNOSIS" for "ENGINE". In case a 1st trip DTC other than P0734 is shown, refer to applicable "TROUBLE DIAGNOSIS FOR DTC".**

6. Stop vehicle.
7. Follow the instruction displayed. (Check for normal shifting referring to the table below.)

Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists	1 → 2 → 3 → 4
Malfunction for P0734 exists.	1 → 2 → 2 → 1

8. Make sure that "OK" is displayed. (If "NG" is displayed, refer to "Diagnostic Procedure".)
   Refer to AT-154, "Diagnostic Procedure" .
   Refer to AT-385, "Shift Schedule" .

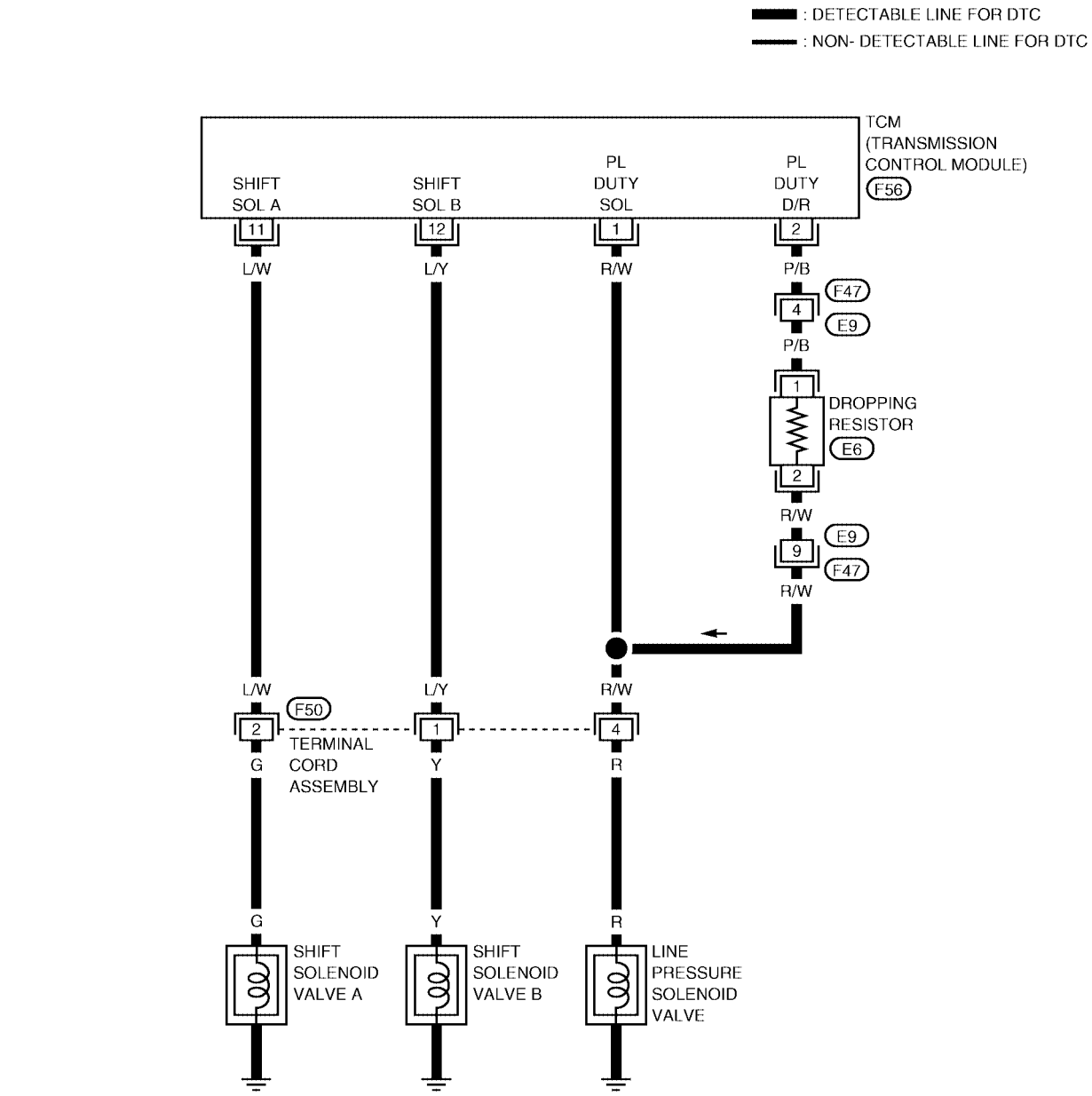
With GST

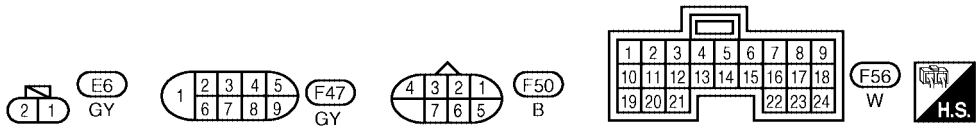
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 4TH

ECS005XH

AT-4THSIG-01





BCWA0236E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	R/W	LINE PRESSURE SOLENOID VALVE	WHEN RELEASING ACCELERATOR PEDAL (ENGINE WARM)	1.5 - 2.5V
			WHEN DEPRESSING ACCELERATOR PEDAL (ENGINE WARM)	0V
2	P/B	LINE PRESSURE SOLENOID VALVE (WITH DROPPING RESISTOR)	WHEN RELEASING ACCELERATOR PEDAL (ENGINE WARM)	5 - 14V
			WHEN DEPRESSING ACCELERATOR PEDAL (ENGINE WARM)	0.5V OR LESS
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A DOES NOT OPERATES	0V
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE B DOES NOT OPERATES	0V

Diagnostic Procedure

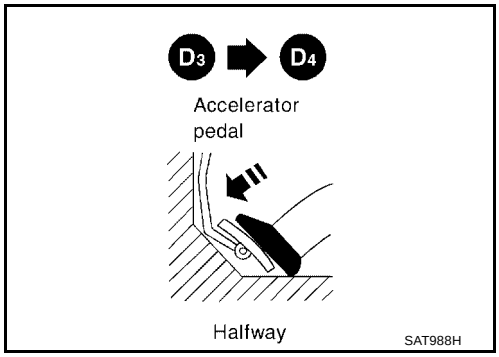
ECS005XI

1. CHECK SHIFT UP (D_3 TO D_4)

During “Cruise Test – Part 1” (AT-77, "Cruise Test — Part 1"), does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes >> GO TO 9.
No >> GO TO 2.



2. CHECK LINE PRESSURE

Perform line pressure test.
Refer to AT-67, "Line Pressure Test" .

Engine speed rpm	Line pressure kPa (kg/cm², psi)	
	D, 2 and 1 positions	R position
Idle	500 (5.1, 73)	778 (7.9, 113)
Stall	1,167 (11.9, 169)	1,816 (18.5, 263)

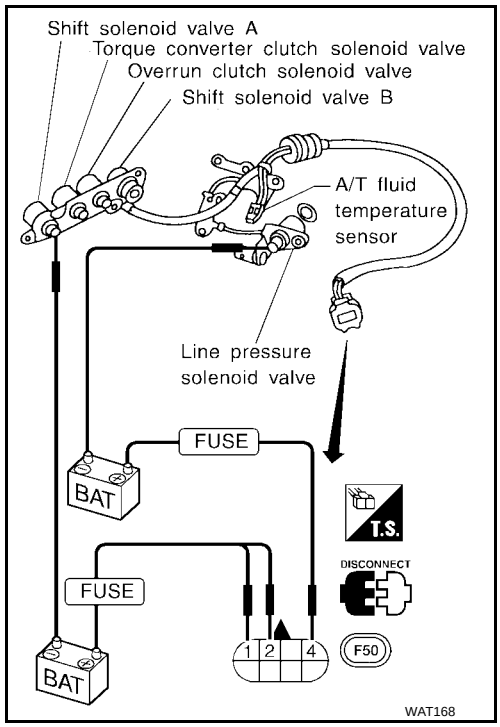
LAT236

OK or NG

OK >> GO TO 3.
NG >> GO TO 6.

3. CHECK SOLENOID VALVES

1. Remove control valve assembly.
   Refer to AT-259, "REMOVAL" .
2. Refer to AT-158, "SOLENOID VALVES" .



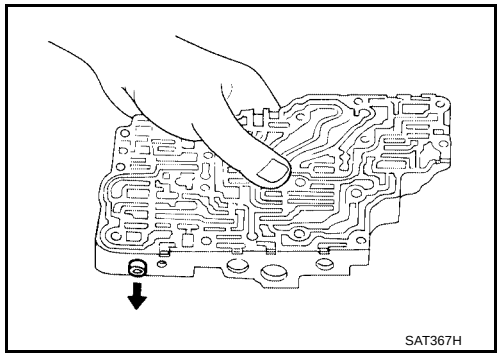
OK or NG

OK >> GO TO 4.
NG >> Replace solenoid valve assembly.

4. CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-298, "Disassembly" .
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



OK or NG

OK >> GO TO 5.
NG >> Repair control valve.

5. CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

OK or NG

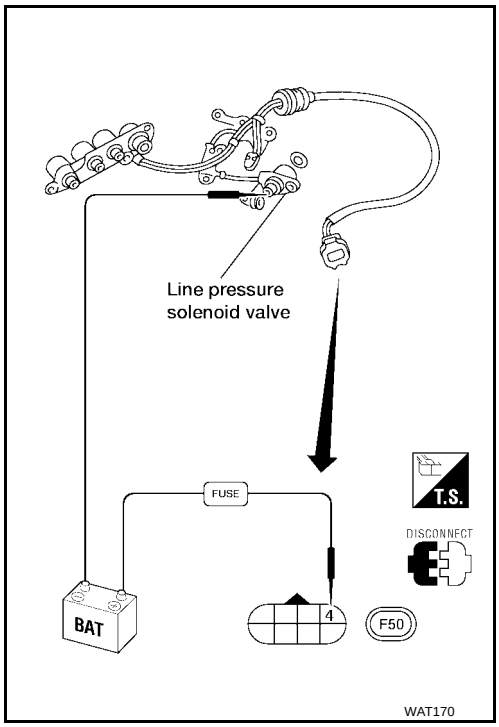
OK >> GO TO 9.
NG >> Check transaxle internal components (clutch, brake, etc.).

6. CHECK LINE PRESSURE SOLENOID VALVE

1. Remove control valve assembly.
   Refer to AT-259, "REMOVAL" .
2. Refer to AT-158, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace solenoid valve assembly.



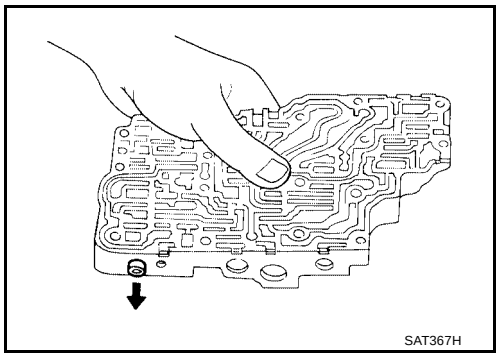
7. CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-298, "Disassembly" .
2. Check line pressure circuit valves for sticking.

- Pressure regulator valve
- Pilot valve
- Pressure modifier valve

OK or NG

OK >> GO TO 8.
NG >> Repair control valve.



8. CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes >> GO TO 9.
No >> Check transaxle internal components (clutch, brake, etc.).

9. CHECK DTC

Perform AT-151, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**

NG >> Perform “Cruise Test — Part 1” (AT-77, "Cruise Test — Part 1") again and return to the start point of this test group.

Component Inspection

ECS005XJ

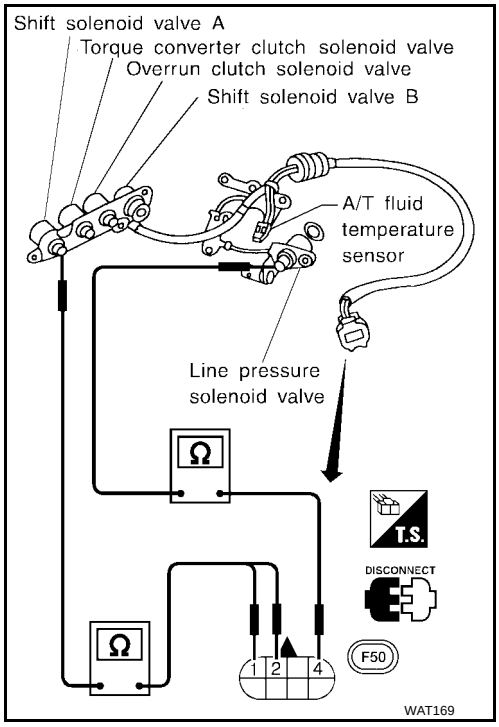
SOLENOID VALVES

- Refer to AT-259, "REMOVAL" .

Resistance Check

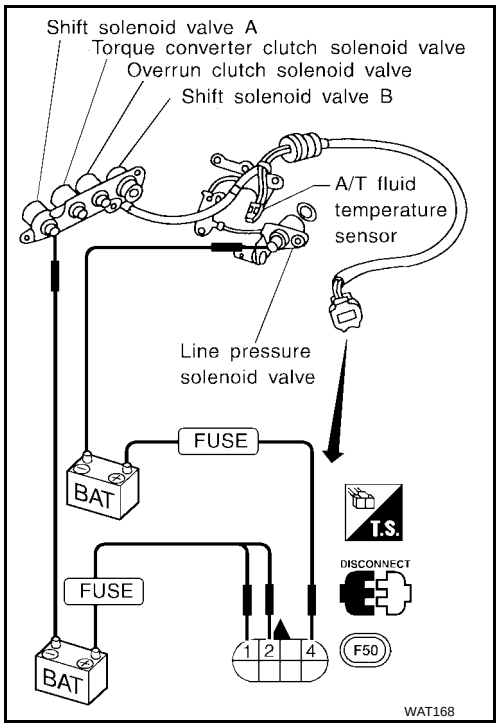
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 30Ω
Shift solenoid valve B	1		5 - 20Ω
Line pressure solenoid valve	4		2.5 - 5Ω



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground.



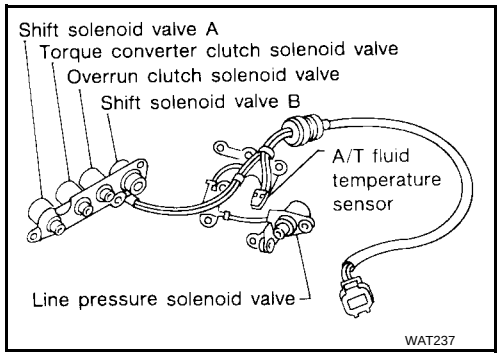
DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

PFP:31940

Description

ECS005XK

The torque converter clutch solenoid valve is activated, with the gear in "D4 ", by the TCM in response to signals sent from the vehicle speed sensor and throttle position sensor [accelerator pedal position (APP) sensor]s. Lock-up piston operation will then be controlled.
Lock-up operation, however, is prohibited when A/T fluid temperature is too low.
When the accelerator pedal is depressed (less than 2/8) in lock-up condition, the engine speed should not change abruptly. If there is a big jump in engine speed, there is no lock-up.



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approx.)
Torque converter clutch solenoid valve duty	Lock-up "OFF" ↓ Lock-up "ON"	4% ↓ 94%

ON BOARD DIAGNOSIS LOGIC

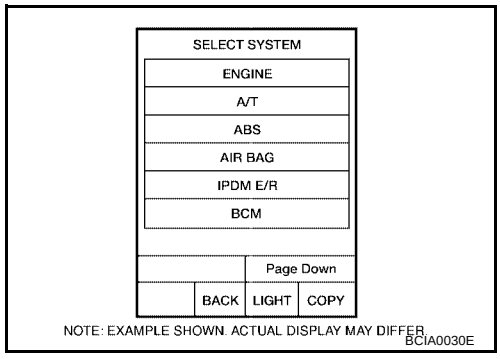
Diagnostic trouble code	Malfunction is detected when...	Check items (Possible cause)
: TCC SOLENOID/CIRC : P0740	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	● Harness or connectors (The solenoid circuit is open or shorted.) ● T/C clutch solenoid valve

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

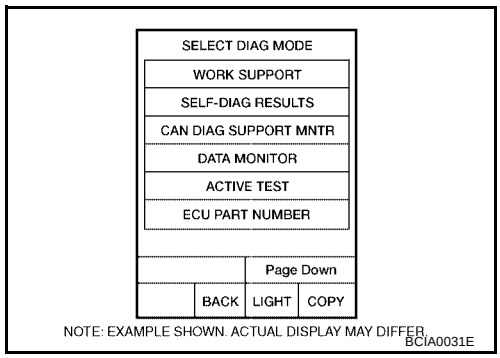
With CONSULT-II

1. Turn ignition switch "ON".



2. Select "DATA MONITOR" mode for "ENGINE" with CONSULT-II and wait at least 1 second.

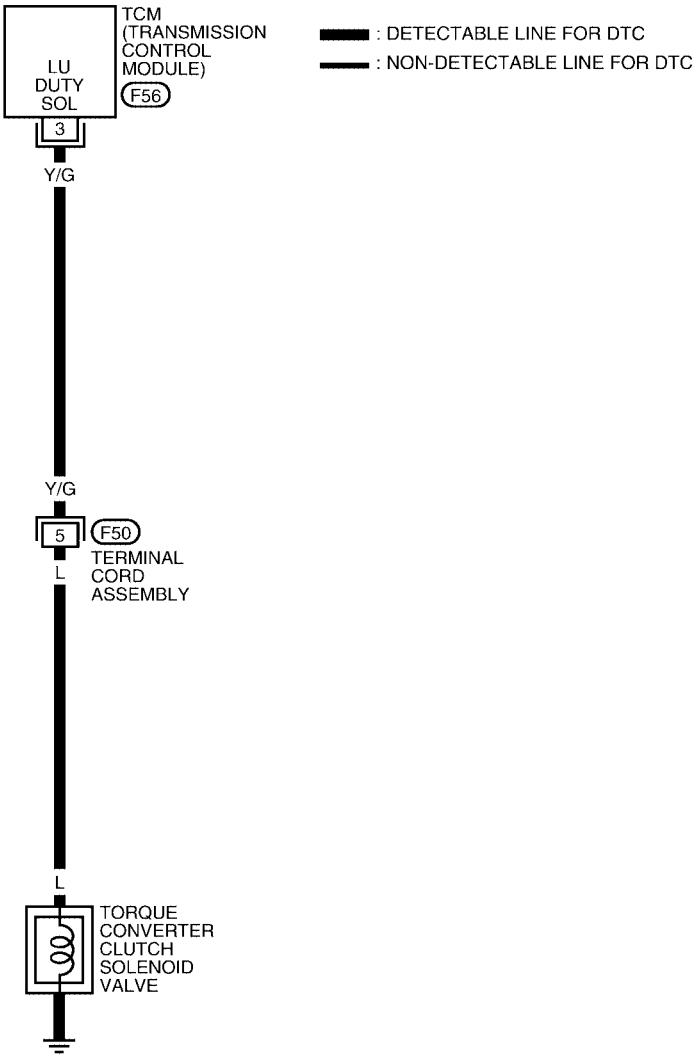
With GST
Follow the procedure "With CONSULT-II".

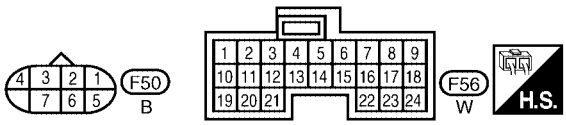


Wiring Diagram — AT — TCV

ECS005XL

AT-TCV-01





WCWA0066E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

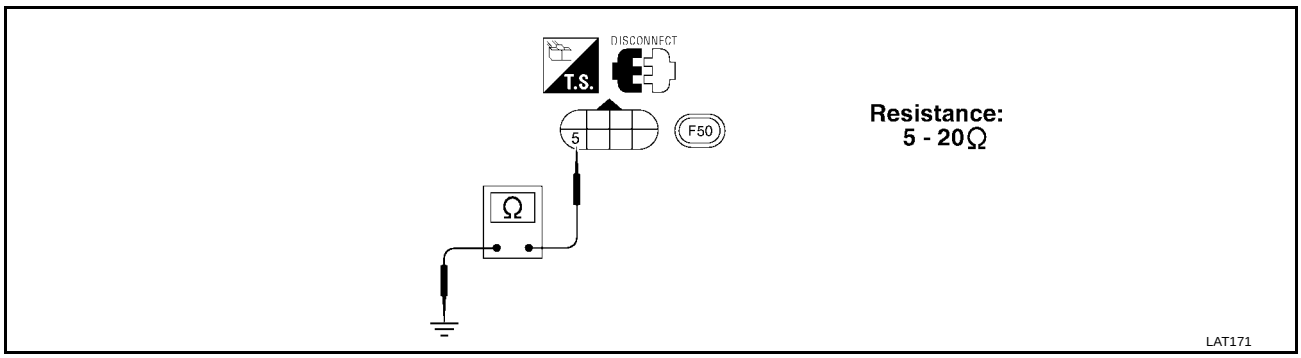
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
3	Y/G	TORQUE CONVERTER CLUTCH SOLENOID VALVE	WHEN A/T PERFORMS LOCK-UP	8 - 15V
			WHEN A/T DOES NOT PERFORM LOCK-UP	0V

Diagnostic Procedure

ECS005XM

1. CHECK VALVE RESISTANCE

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal 5 and ground.



OK or NG

OK >> GO TO 2.
NG >> 1. Remove oil pan. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Torque converter clutch solenoid valve
Refer to AT-162, "TORQUE CONVERTER CLUTCH SOLENOID VALVE" .
- Harness of terminal cord assembly for short or open

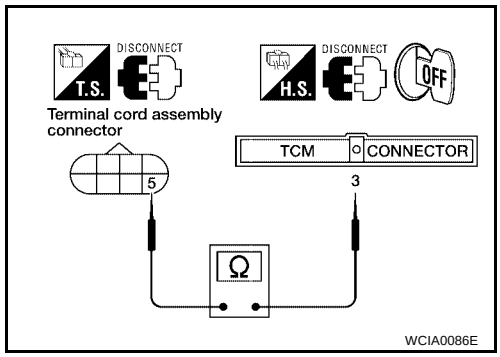
2. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector F56.
3. Check continuity between terminal cord assembly F50 terminal 5 (Y/G) and TCM harness connector terminal 3 (Y/G).

Continuity should exist.

If OK, check harness for short to ground and short to power.

4. Reinstall any part removed.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK DTC

Perform AT-159, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

Component Inspection

ECS005XN

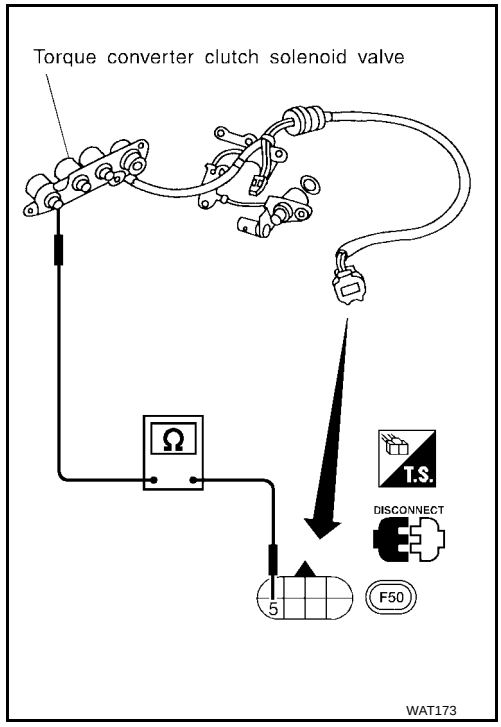
TORQUE CONVERTER CLUTCH SOLENOID VALVE

- Refer to AT-259, "REMOVAL" .

Resistance Check

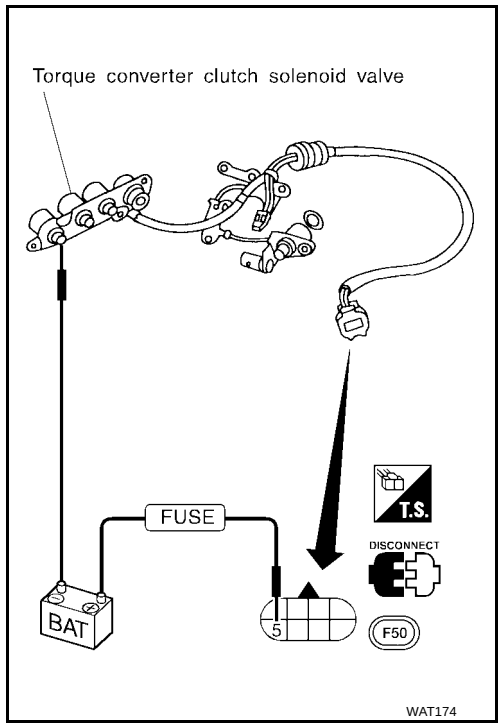
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Torque converter clutch solenoid valve	5	Ground	5 - 20Ω



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground.



DTC P0744 A/T TCC S/V FUNCTION (LOCK-UP)

PFP:31940

Description

ECS005XO

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into fourth gear position or the torque converter clutch does not lock up as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning oil pump or torque converter clutch, etc.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approx.)
Torque converter clutch solenoid valve duty	Lock-up “OFF” ↓ Lock-up “ON”	4% ↓ 94%

ON BOARD DIAGNOSTIC LOGIC

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is much lower than the position (4th) supposed by TCM, the slip ratio will be much less than normal. In case the ratio does not reach the specified value, TCM judges this diagnosis malfunction. This malfunction will be caused when shift solenoid valve B is stuck closed.

Gear position supposed by TCM	1	2	3	4
In case of gear position with no malfunctions	1	2	3	4
In case of gear position with shift solenoid valve B stuck closed	1	2	2	1*

*: P0744 is detected.

Diagnostic trouble code	Malfunction is detected when...	Check items (Possible cause)
: A/T TCC S/V FNCTN : P0744	A/T cannot perform lock-up even if electrical circuit is good.	● Torque converter clutch solenoid valve ● Line pressure solenoid valve ● Each clutch ● Hydraulic control circuit

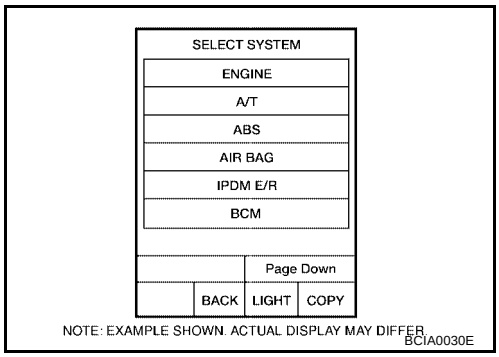
DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

CAUTION:
Always drive vehicle at a safe speed.

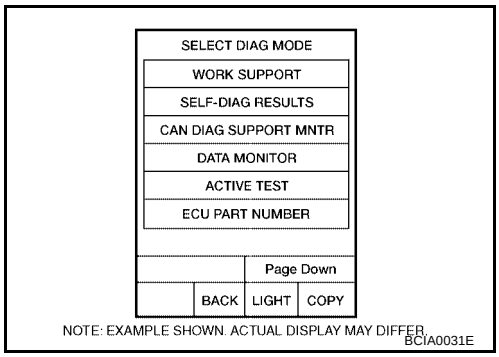
NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1. Start engine and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3. Select "TCC S/V FNCTN P0744" of "DTC WORK SUPPORT" mode for "A/T" with CONSULT-II and touch "START".

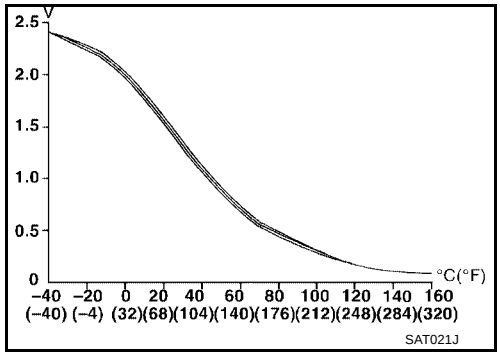


NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0030E



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0031E

4. Accelerate vehicle to more than 80 km/h (50 MPH) and maintain the following condition continuously until “TESTING” has turned to “COMPLETE”. (It will take approximately 30 seconds after “TESTING” shows.)
   THROTTLE POSI: 1.0/8 - 2.0/8 (at all times during step 4)
   Selector lever: D position (OD “ON”)
   TCC S/V DUTY: More than 94%
   VHCL/S SE·A/T: Constant speed of more than 80 km/h (50 MPH)



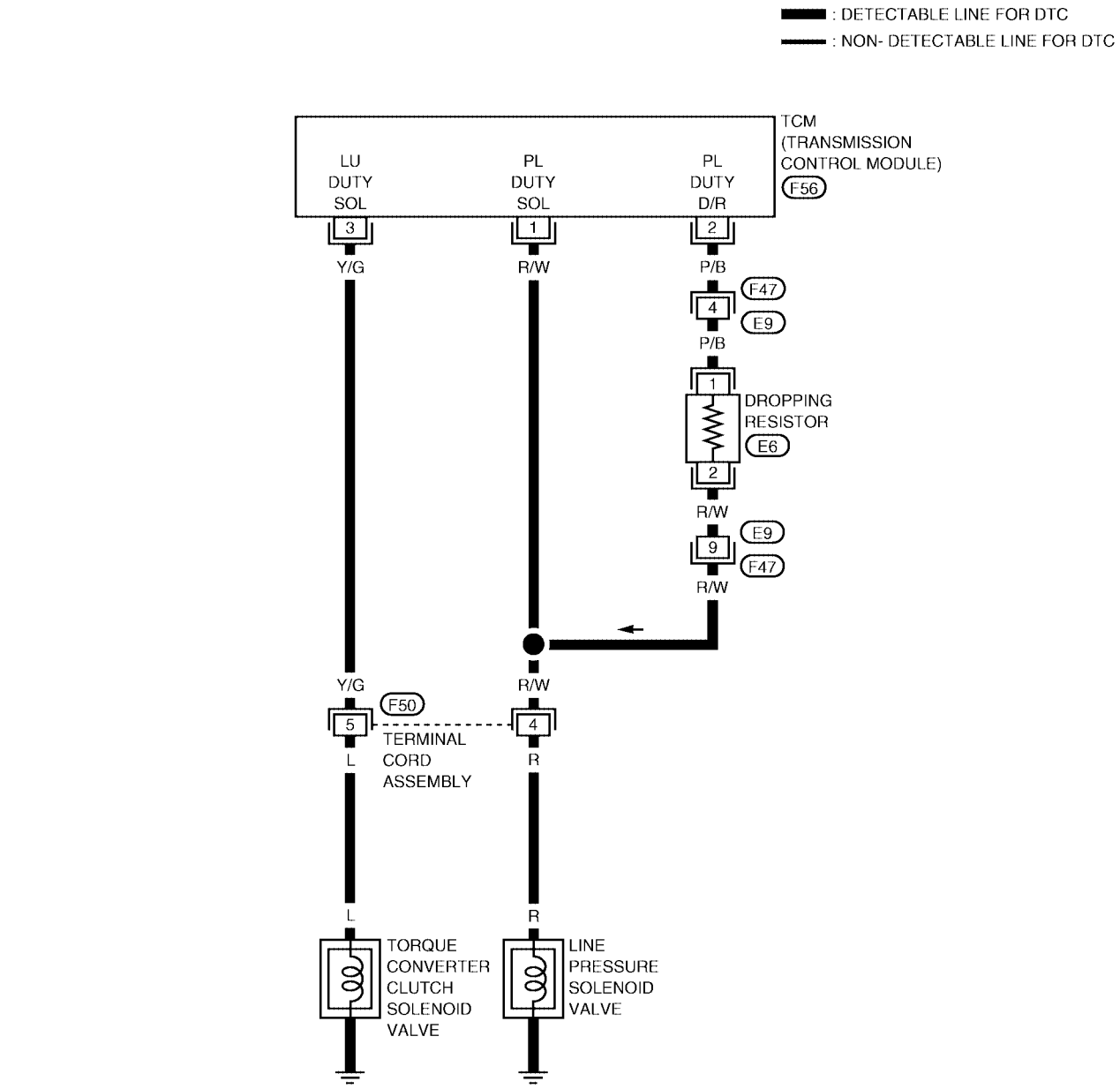
   - **Check that “GEAR” shows “4”.**
   - **If “TESTING” does not appear on CONSULT-II for a long time, select “SELF-DIAGNOSIS”. In case a 1st trip DTC other than P0744 is shown, refer to applicable “TROUBLE DIAGNOSIS FOR DTC”.**
5. Make sure that “OK” is displayed. (If “NG” is displayed, refer to AT-167, "Diagnostic Procedure" .)
   Refer to AT-167, "Diagnostic Procedure" .
   Refer to AT-385, "Shift Schedule" .

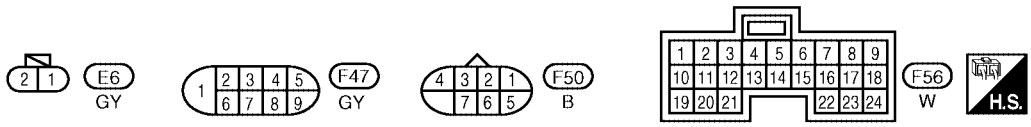
With GST
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — TCCSIG

ECS005XP

AT-TCCSIG-01





BCWA0237E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	R/W	LINE PRESSURE SOLENOID VALVE	WHEN RELEASING ACCELERATOR PEDAL (ENGINE WARM)	1.5 - 2.5V
			WHEN DEPRESSING ACCELERATOR PEDAL (ENGINE WARM)	0.5V OR LESS
2	P/B	LINE PRESSURE SOLENOID VALVE (WITH DROPPING RESISTOR)	WHEN RELEASING ACCELERATOR PEDAL (ENGINE WARM)	5 - 14V
			WHEN DEPRESSING ACCELERATOR PEDAL (ENGINE WARM)	0.5V OR LESS
3	Y/G	TORQUE CONVERTER CLUTCH SOLENOID VALVE	WHEN A/T PERFORMS LOCK-UP	8 - 14V
			WHEN A/T DOES NOT PERFORM LOCK-UP	0V

Diagnostic Procedure

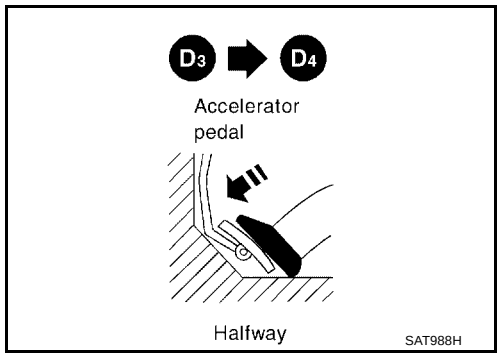
ECS005XQ

1. CHECK SHIFT UP (D_3 TO D_4)

During “Cruise Test – Part 1” (AT-77, "Cruise Test — Part 1"), does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes >> GO TO 10.
No >> GO TO 2.



2. CHECK LINE PRESSURE

Perform line pressure test.
Refer to AT-67, "Line Pressure Test" .

Engine speed rpm	Line pressure kPa (kg/cm², psi)	
	D, 2 and 1 positions	R position
Idle	500 (5.1, 73)	778 (7.9, 113)
Stall	1,167 (11.9, 169)	1,816 (18.5, 263)

LAT236

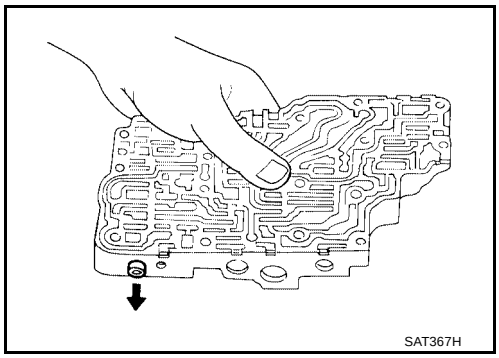
OK or NG

OK >> GO TO 3.
NG >> GO TO 6.

3. CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-298, "Disassembly" .
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



OK or NG

OK >> GO TO 4.
NG >> Repair control valve.

4. CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes >> GO TO 5.
No >> Check transaxle internal components (clutch, brake, etc.).

5. CHECK DTC

Perform AT-164, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

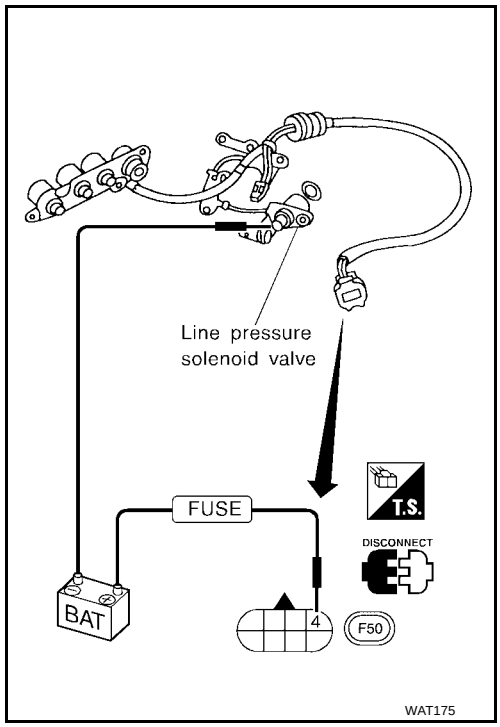
OK >> **INSPECTION END**
NG >> GO TO 10. Check lock-up condition.

6. CHECK LINE PRESSURE SOLENOID VALVE

1. Remove control valve assembly.
   Refer to AT-259, "REMOVAL" .
2. Check line pressure solenoid valve operation.
   Refer to AT-177, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace solenoid valve assembly.



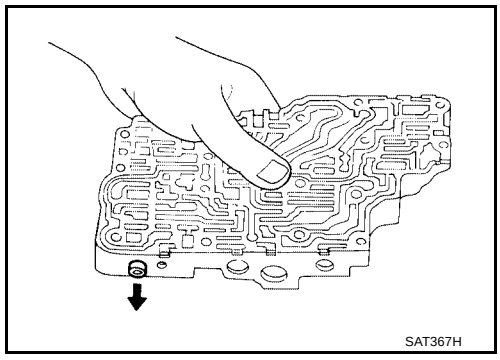
7. CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-298, "Disassembly" .
2. Check line pressure circuit valves for sticking.

- Pressure regulator valve
- Pilot valve
- Pressure modifier valve

OK or NG

OK >> GO TO 8.
NG >> Repair control valve.



8. CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes >> GO TO 9.
No >> Check transaxle internal components (clutch, brake, etc.).

9. CHECK DTC

Perform AT-164, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

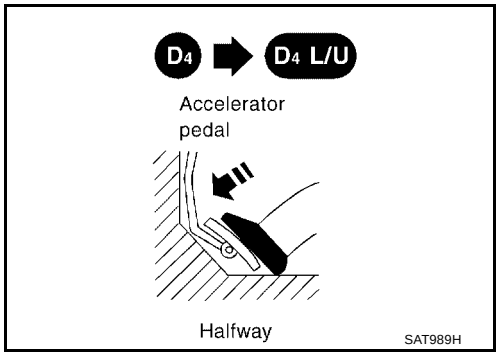
OK >> **INSPECTION END**
NG >> GO TO 10. Check for proper lock-up.

10. CHECK LOCK-UP CONDITION

During “Cruise Test – Part 1” (AT-77, "Cruise Test — Part 1"), does A/T perform lock-up at the specified speed?

Yes or No

Yes >> Perform “Cruise Test – Part 1” (AT-77, "Cruise Test — Part 1") again and return to the start point of this test group.
No >> GO TO 11.

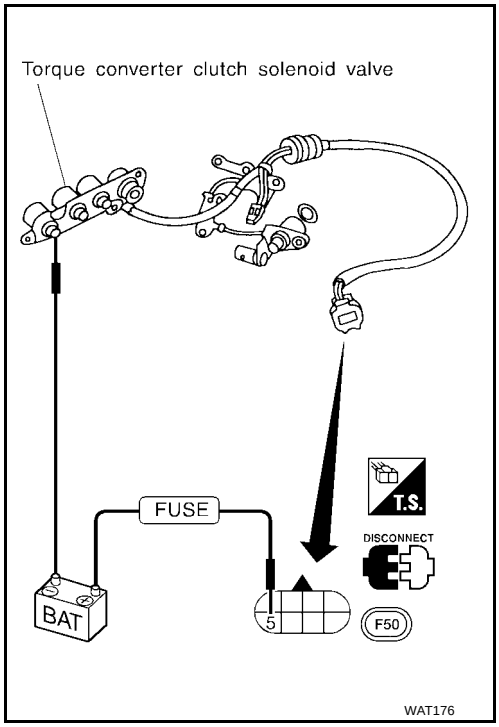


11. CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE

1. Remove control valve assembly.
   Refer to AT-259, "REMOVAL" .
2. Check torque converter clutch solenoid valve operation. Refer to AT-162, "TORQUE CONVERTER CLUTCH SOLENOID VALVE" .

OK or NG

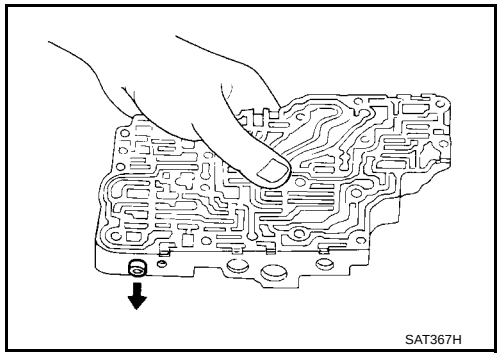
OK >> GO TO 12.
NG >> Replace solenoid valve assembly.



12. CHECK CONTROL VALVE

1. Disassemble control valve assembly.
   Refer to AT-298, "Disassembly" .
2. Check control valves for sticking.

- Torque converter clutch control valve
- Torque converter clutch relief valve



OK or NG

OK >> GO TO 13.
NG >> Repair control valve.

13. CHECK LOCK-UP CONDITION

Does A/T perform lock-up at the specified speed?

Yes or No

Yes >> GO TO 14.
No >> Check transaxle internal components (clutch, brake, etc.).

14. CHECK DTC

Perform AT-164, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> Perform “Cruise Test — Part 1” (AT-77, "Cruise Test — Part 1") again and return to the start point of this test group.

Component Inspection

ECS005XR

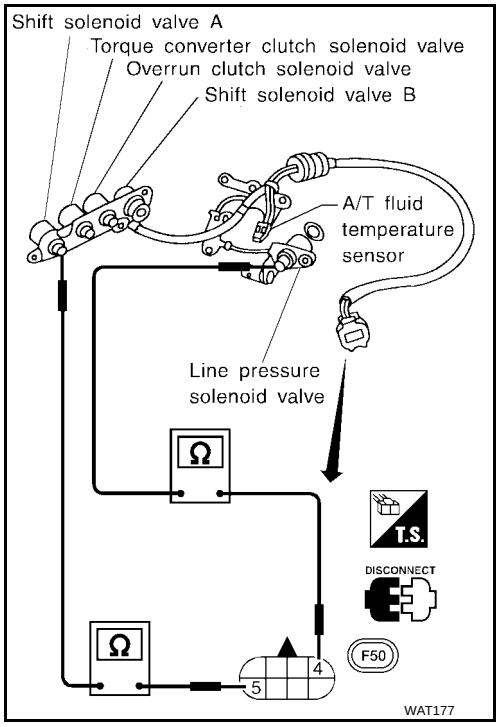
SOLENOID VALVES

- Refer to AT-259, "REMOVAL" .

Resistance Check

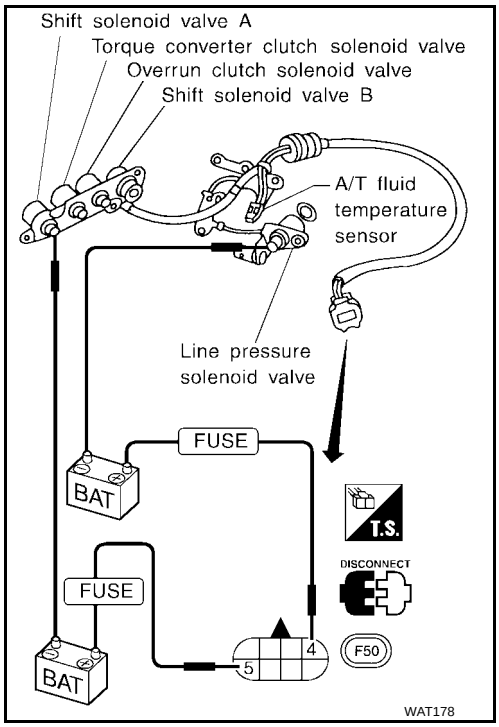
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	4	Ground	2.5 - 5Ω
Torque converter clutch solenoid valve	5		5 - 20Ω



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground.



DTC P0745 LINE PRESSURE SOLENOID VALVE

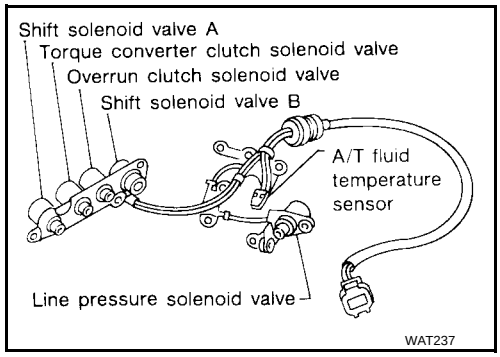
PFP:31940

Description

ECS005XS

The line pressure solenoid valve regulates the oil pump discharge pressure to suit the driving condition in response to a signal sent from the TCM.

The line pressure duty cycle value is not consistent when the closed throttle position switch is “ON”. To confirm the line pressure duty cycle at low pressure, the accelerator (throttle) should be open until the closed throttle position switch is “OFF”.



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approx.)
Line pressure solenoid valve duty	Small throttle opening (Low line pressure) ↓ Large throttle opening (High line pressure)	24% ↓ 95%

NOTE:

The line pressure duty cycle value is not consistent when the closed throttle position switch is “ON”. To confirm the line pressure duty cycle at low pressure, the accelerator (throttle) should be open until the closed throttle position switch is “OFF”.

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: L/PRESS SOL/CIRC : P0745	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	● Harness or connectors (The solenoid circuit is open or shorted.) ● Line pressure solenoid valve

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

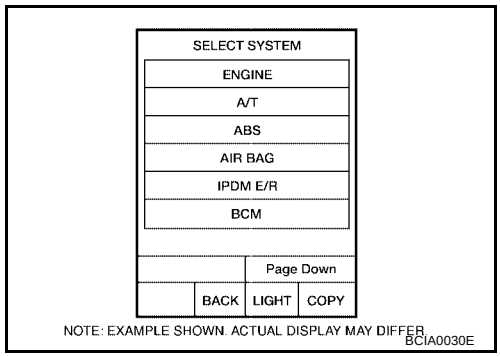
NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

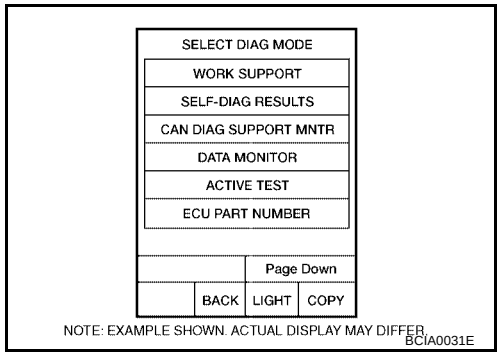
1. Turn ignition switch “ON” and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.



2. Depress accelerator pedal completely and wait at least 5 seconds.

With GST

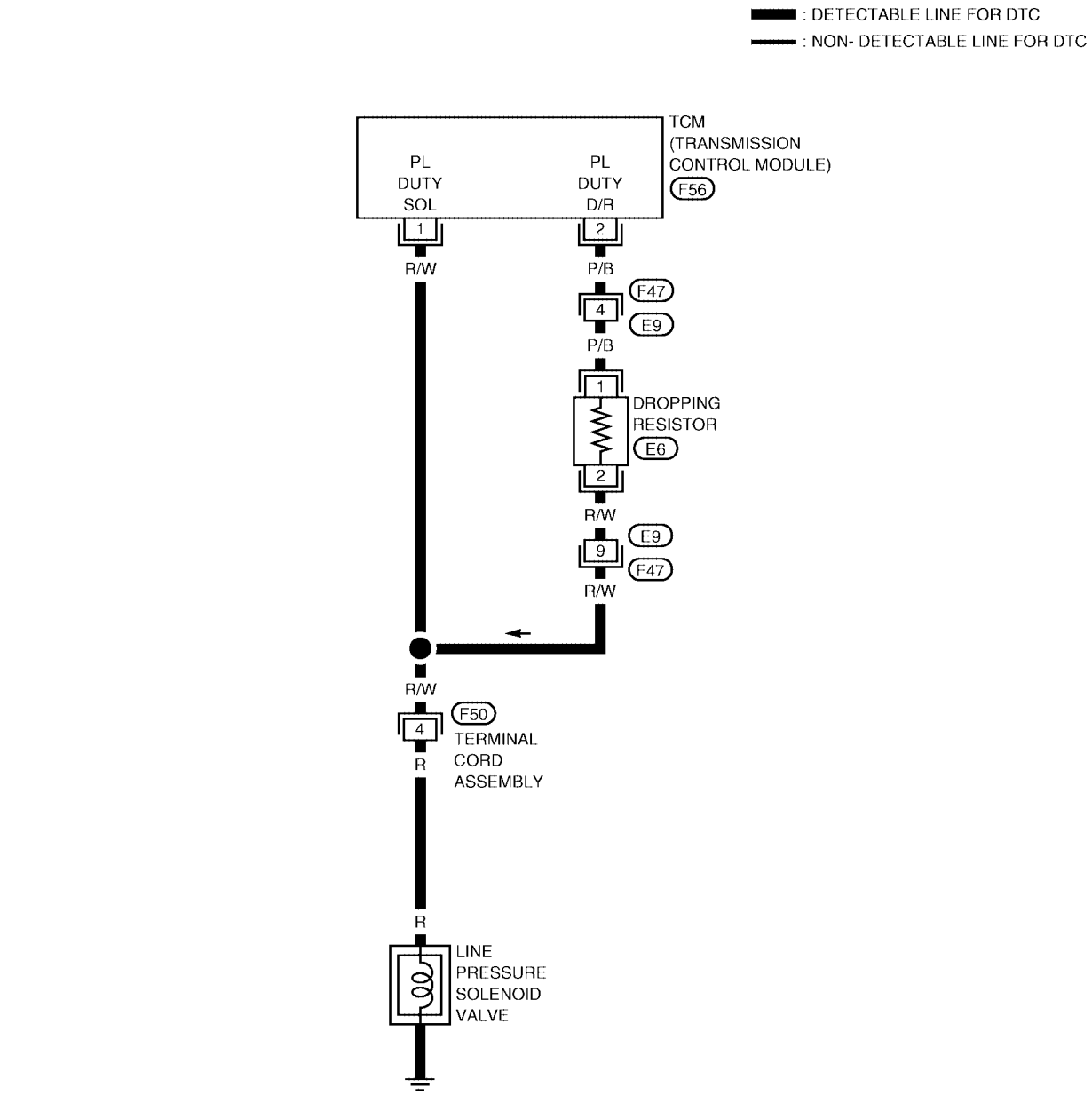
Follow the procedure “With CONSULT-II”.

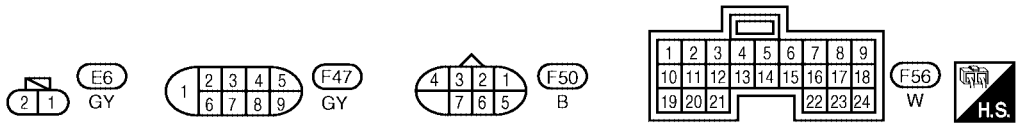


Wiring Diagram — AT — LPSV

ECS005XT

AT-LPSV-01





BCWA0238E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL

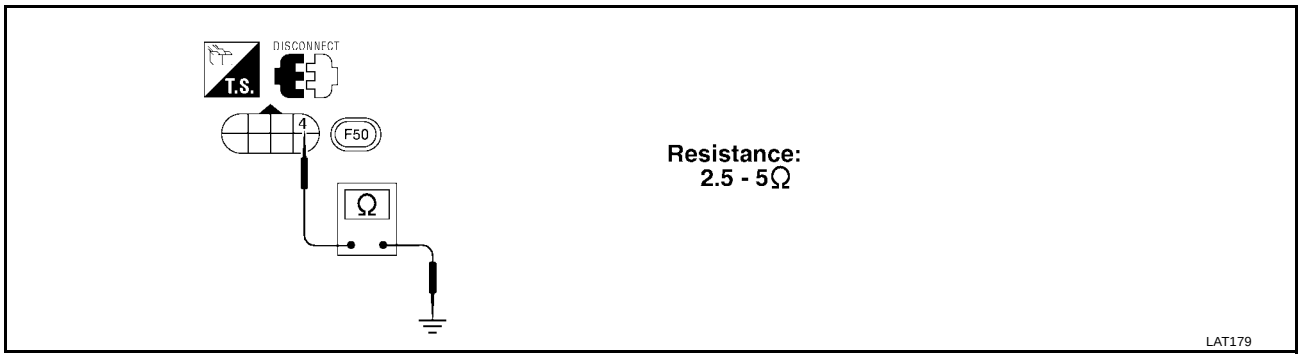
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	R/W	LINE PRESSURE SOLENOID VALVE	WHEN RELEASING ACCELERATOR PEDAL (ENGINE WARM)	1.5 - 3.0V
			WHEN DEPRESSING ACCELERATOR PEDAL (ENGINE WARM)	0.5V OR LESS
2	P/B	LINE PRESSURE SOLENOID VALVE (WITH DROPPING RESISTOR)	WHEN RELEASING ACCELERATOR PEDAL (ENGINE WARM)	5 - 14v
			WHEN DEPRESSING ACCELERATOR PEDAL (ENGINE WARM)	0.5V OR LESS

Diagnostic Procedure

ECS005XU

1. CHECK VALVE RESISTANCE

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal 4 and ground.



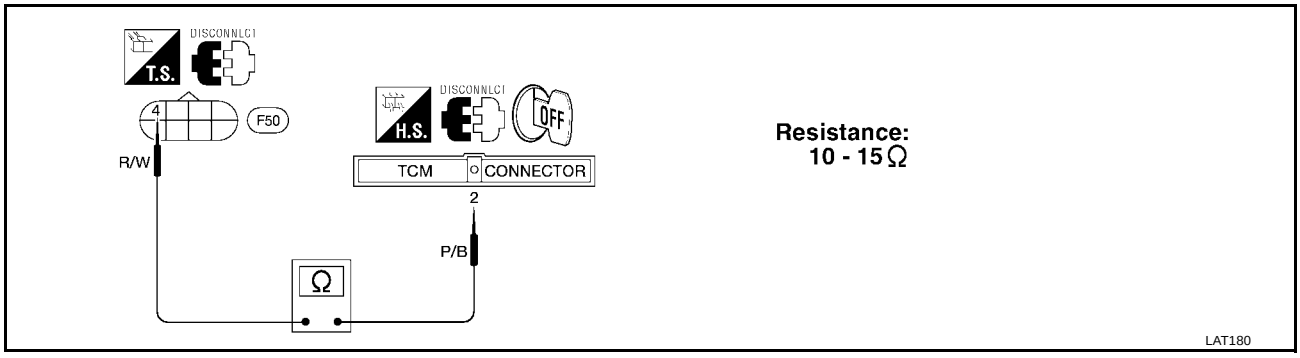
OK or NG

OK >> GO TO 2.

NG >> 1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Line pressure solenoid valve
  Refer to AT-177, "Component Inspection" .
- Harness of terminal cord assembly for short or open

2. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal 4 and TCM harness connector terminal 2.



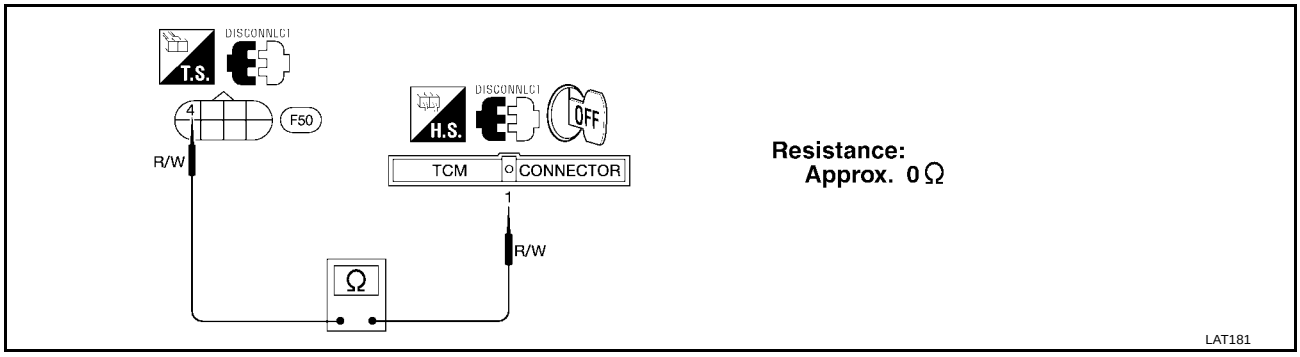
OK or NG

OK >> GO TO 3.
NG >> Check the following items:

- Dropping resistor
  Refer to AT-178, "DROPPING RESISTOR" .
- Harness for short or open between TCM terminal 2 and terminal cord assembly (Main harness)

3. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to “OFF” position.
2. Check resistance between terminal 4 and TCM harness connector terminal 1.



If OK, check harness for short to ground and short to power.

3. Reinstall any part removed.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK DTC

Perform AT-173, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

Component Inspection

ECS005XV

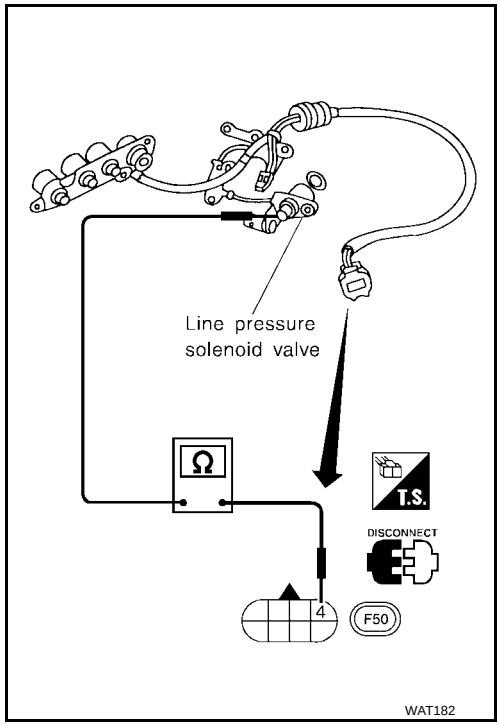
LINE PRESSURE SOLENOID VALVE

- Refer to AT-259, "REMOVAL" .

Resistance Check

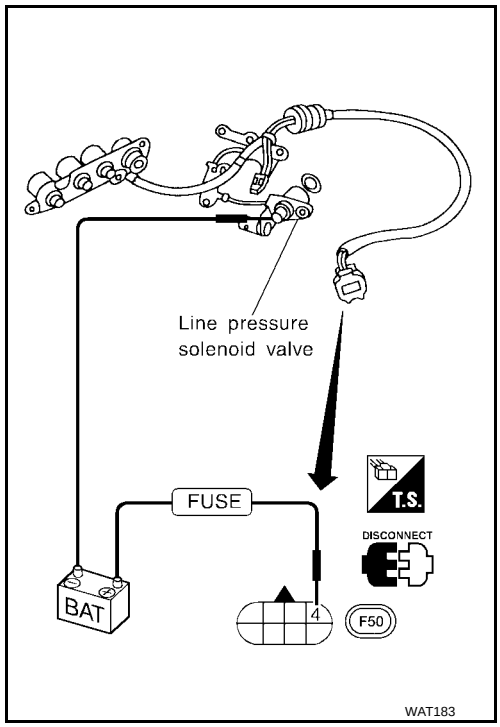
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	4	Ground	2.5 - 5Ω



Operation Check

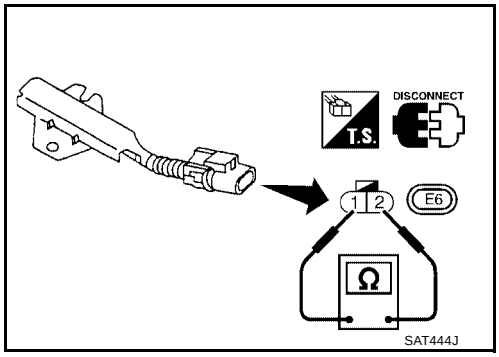
- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground.



DROPPING RESISTOR

- Check resistance between two terminals.

Resistance : 10 - 15Ω



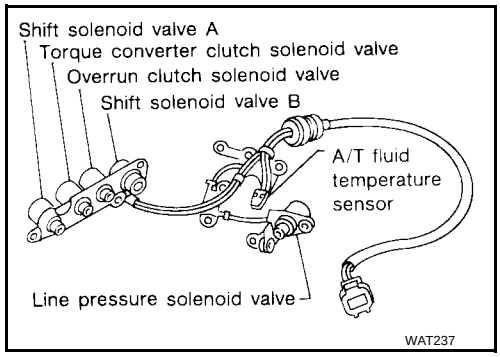
DTC P0750 SHIFT SOLENOID VALVE A

PFP:31940

Description

ECS005XW

Shift solenoid valves A and B are turned “ON” or “OFF” by the TCM in response to signals sent from the PNP switch, vehicle speed sensor and throttle position sensor [accelerator pedal position (APP) sensor]. Gears will then be shifted to the optimum position.



Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: SFT SOL A/CIRC : P0750	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	● Harness or connectors (The solenoid circuit is open or shorted.) ● Shift solenoid valve A

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

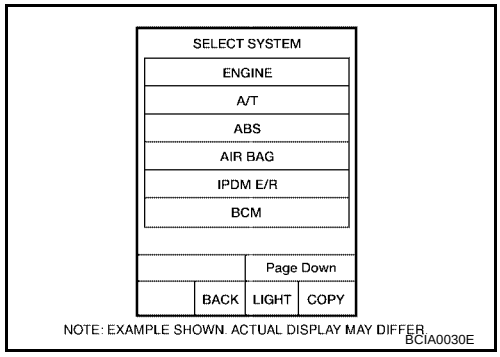
CAUTION:

Always drive vehicle at a safe speed.

NOTE:

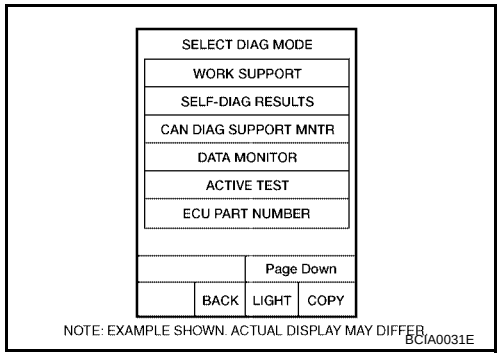
If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.



With CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
2. Start engine.
3. Drive vehicle in D position and allow the transmission to shift “1” → “2” (“GEAR”).



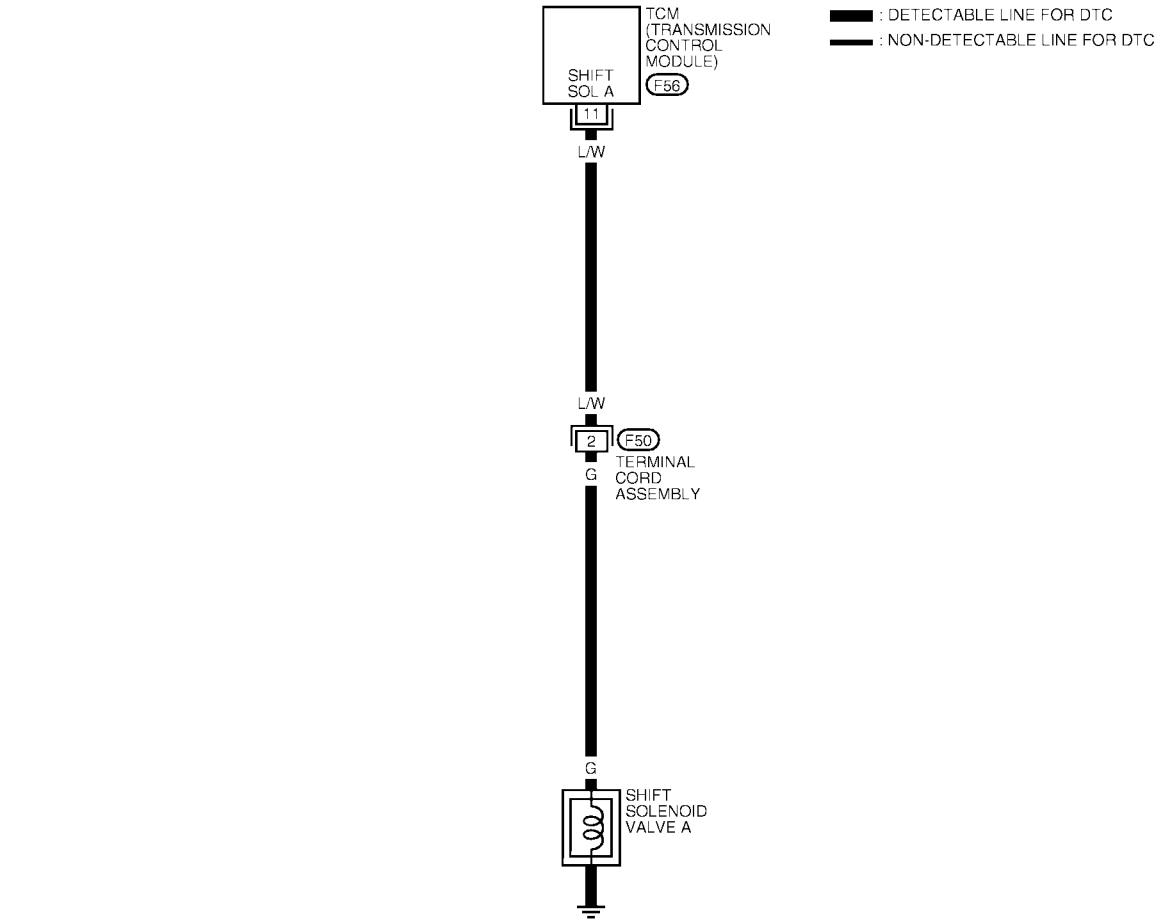
With GST

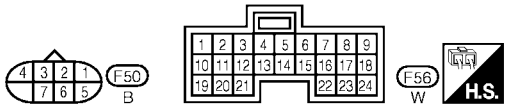
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — SSV/A

ECS005XX

AT-SSV/A-01





WAT125

TRANSMISSION CONTROL MODULE TERMINALS AND REFERENCE VALUE BETWEEN TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC) (Approx.)
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A DOES NOT OPERATE	0V

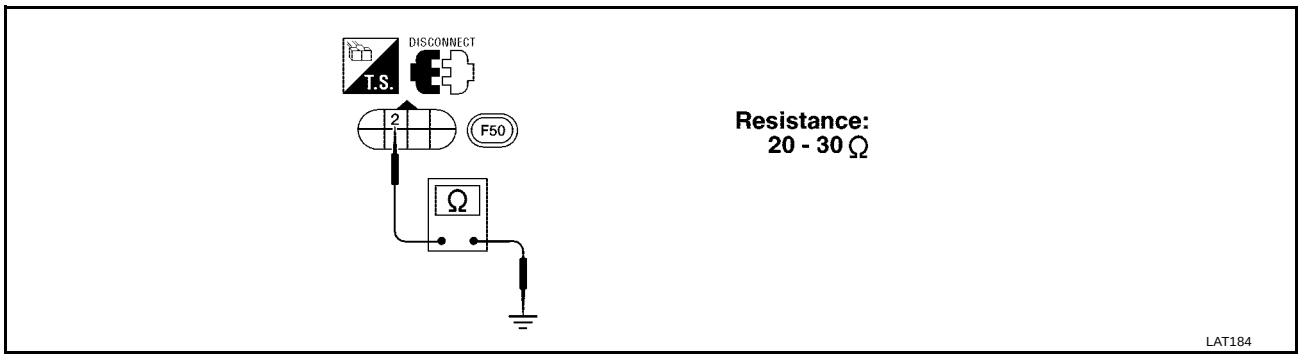
WAT345

Diagnostic Procedure

ECS005XY

1. CHECK VALVE RESISTANCE

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal 2 and ground.

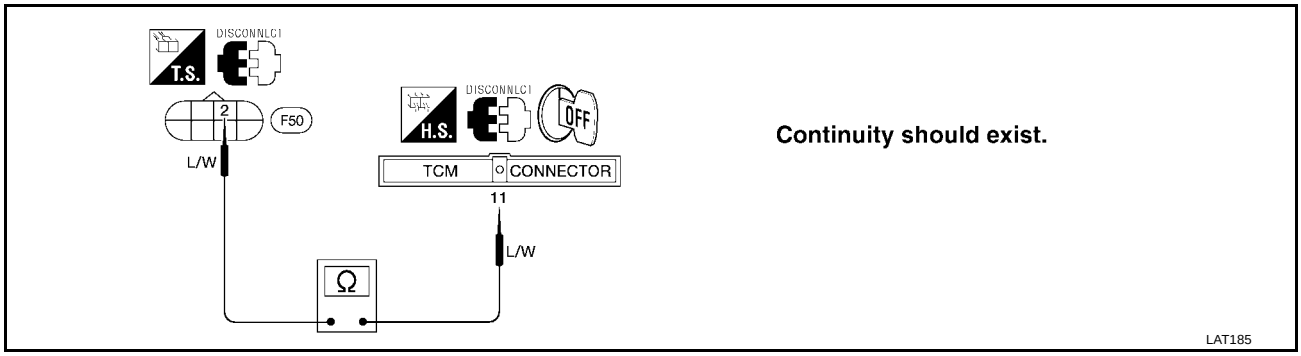


OK or NG

OK >> GO TO 2.
NG >> 1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Shift solenoid valve A
  Refer to AT-182, "Component Inspection" .
- Harness of terminal cord assembly for short or open

2. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal 2 and TCM harness connector terminal 11.



If OK, check harness for short to ground and short to power.

4. Reinstall any part removed.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK DTC

Perform AT-179, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

Component Inspection

ECS005XZ

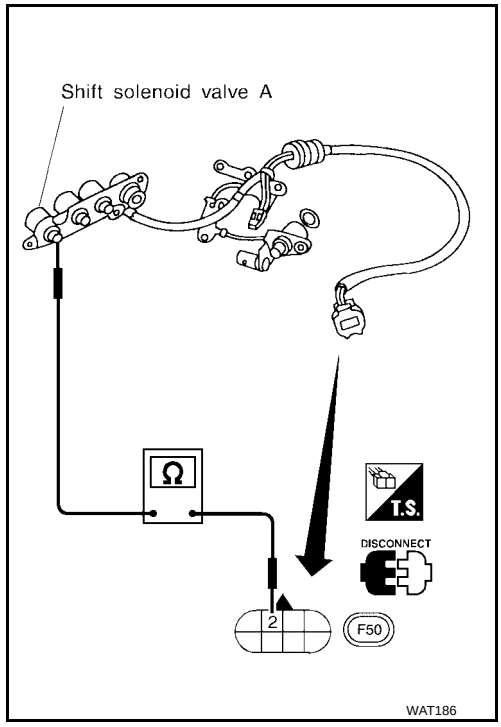
SHIFT SOLENOID VALVE A

- Refer to AT-182, "Component Inspection" .

Resistance Check

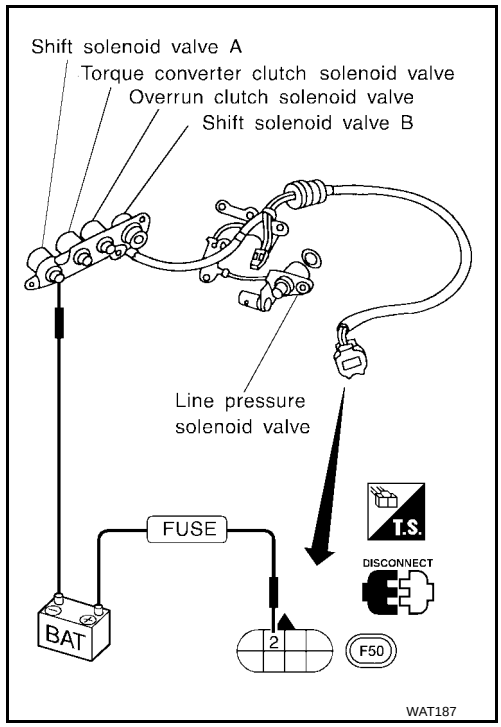
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 30Ω



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground.



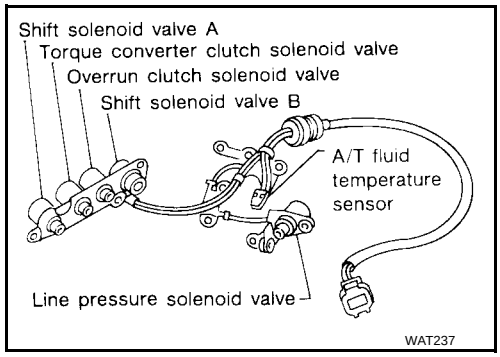
DTC P0755 SHIFT SOLENOID VALVE B

PFP:31940

Description

ECS005Y0

Shift solenoid valves A and B are turned “ON” or “OFF” by the TCM in response to signals sent from the PNP switch, vehicle speed and throttle position sensors. Gears will then be shifted to the optimum position.



Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: SFT SOL B/CIRC : P0755	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	● Harness or connectors (The solenoid circuit is open or shorted.) ● Shift solenoid valve B

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

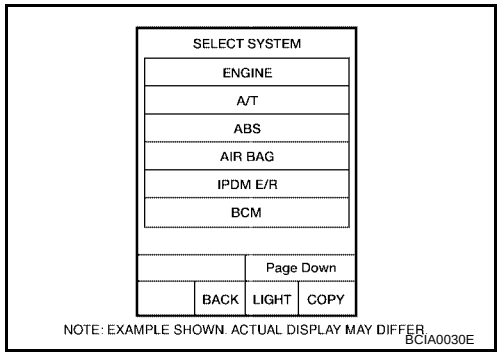
CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

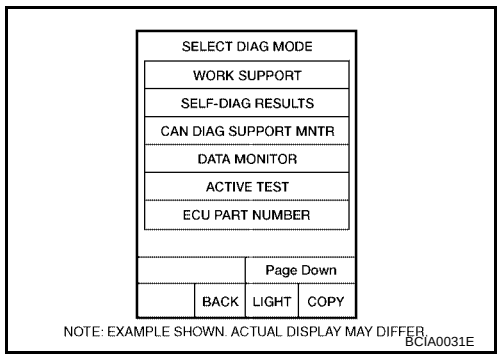


With CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
2. Start engine.
3. Drive vehicle in D position and allow the transmission to shift 1 → 2 → 3 (“GEAR”).

With GST

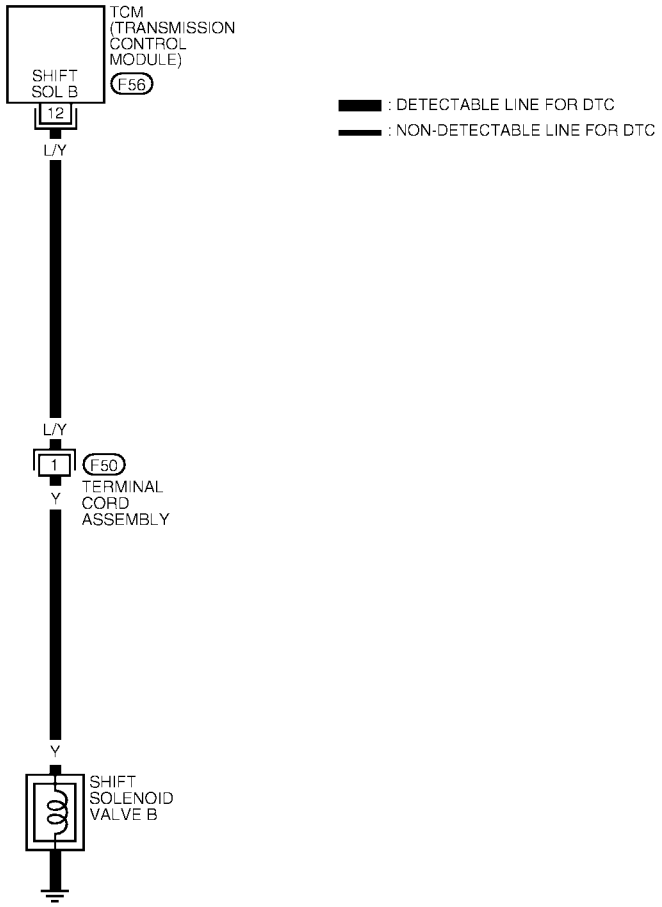
Follow the procedure “With CONSULT-II”.

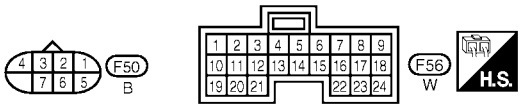


Wiring Diagram — AT — SSV/B

ECS005Y1

AT-SSV/B-01





WAT126

TRANSMISSION CONTROL MODULE TERMINALS AND REFERENCE VALUE BETWEEN TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC) (Approx.)
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B OPERATES	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE B DOES NOT OPERATE	0V

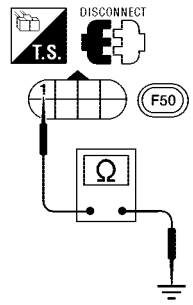
WAT344

Diagnostic Procedure

ECS005Y2

1. CHECK VALVE RESISTANCE

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal 1 and ground.



Resistance:
5 - 20Ω

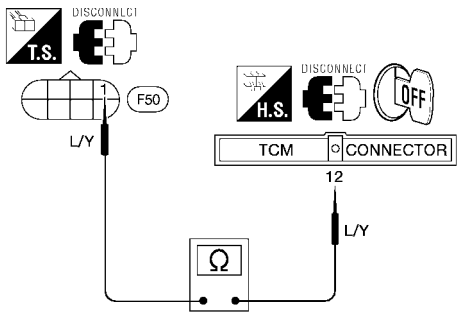
LAT188

OK or NG

OK >> GO TO 2.
NG >> 1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Shift solenoid valve B
  Refer to AT-186, "Component Inspection" .
- Harness of terminal cord assembly for short or open

2. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal 1 and TCM harness connector terminal 12.



Continuity should exist.

LAT189

If OK, check harness for short to ground and short to power.

4. Reinstall any part removed.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK DTC

Perform AT-183, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

Component Inspection

ECS005Y3

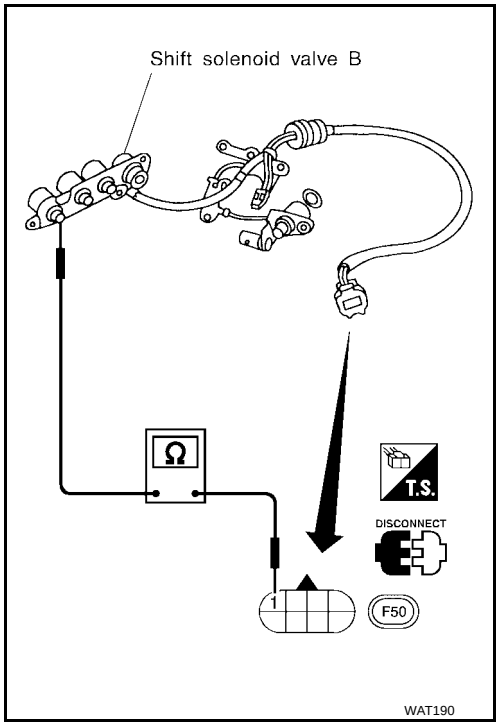
SHIFT SOLENOID VALVE B

- Refer to AT-259, "REMOVAL" .

Resistance Check

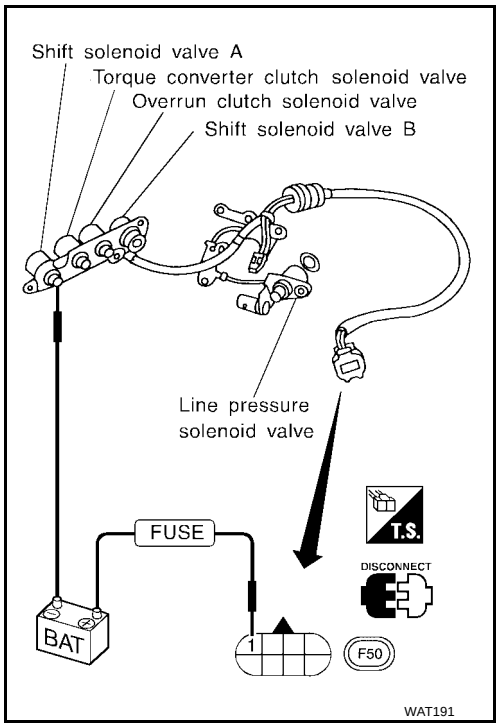
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve B	1	Ground	5 - 20Ω



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground.



DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

PFP:22560

Description

ECS006GS

The throttle position sensor [accelerator pedal position (APP) sensor] is part of the system that controls throttle position. This system also uses an electric throttle control actuator which consists of a throttle control motor and throttle position sensors. Accelerator pedal position signal is sent to the ECM.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Throttle position sensor [accelerator pedal position (APP) sensor]	Fully-closed throttle	Approximately 0.5V
	Fully-open throttle	Approximately 4V

On Board Diagnosis Logic

ECS006GT

Diagnostic trouble code TP SEN/CIRC A/T with CONSULT-II or P1705 without CONSULT-II is detected when TCM receives an excessively low or high voltage from the ECM.

Possible Cause

ECS006GU

Check the following items.

- Harness or connectors
  (The sensor circuit is open or shorted.)

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS006GV

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

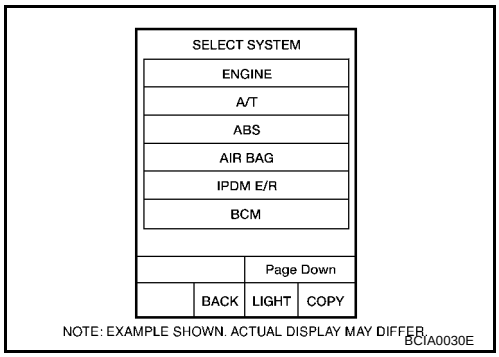
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode for “A/T” with CONSULT-II.

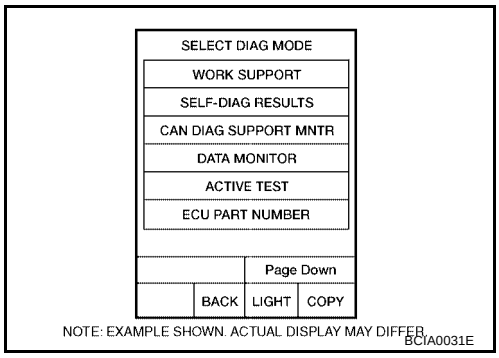
Accelerator pedal condition	THRTL POS SEN	CLOSED THL/SW	W/O THRL/P·SW
Fully released	Less than 4.7V	ON	OFF
Partially depressed	0.1 - 4.6V	OFF	OFF
Fully depressed	1.9 - 4.6V	OFF	ON



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0030E

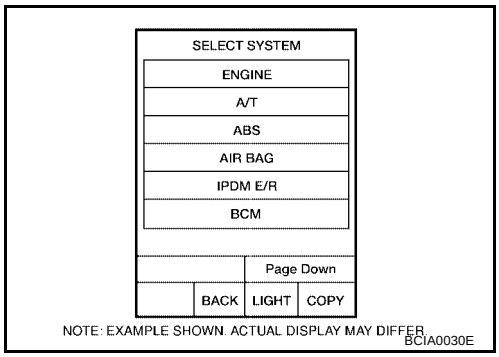
If the check result is NG, go to AT-191, "Diagnostic Procedure" .
If the check result is OK, go to following step.

2. Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
3. Start engine and maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: Approximately 3V or less
   Selector lever: D position (O/D ON)
   If the check result is NG, go to AT-191, "Diagnostic Procedure" .
   If the check result is OK, go to following step.

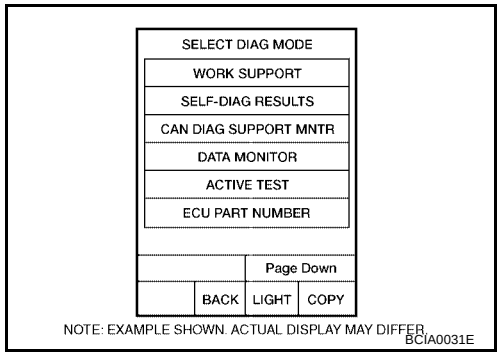


NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0031E

4. Maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   Accelerator pedal: Wide open throttle
   Selector lever: D position (O/D ON)



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0030E



WITH GST

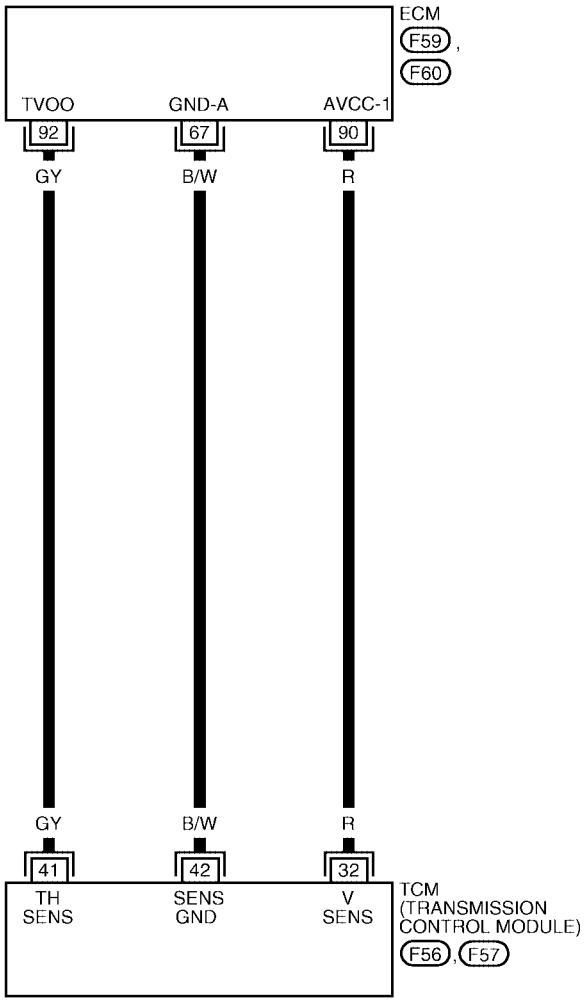
Follow the procedure “With CONSULT-II”.

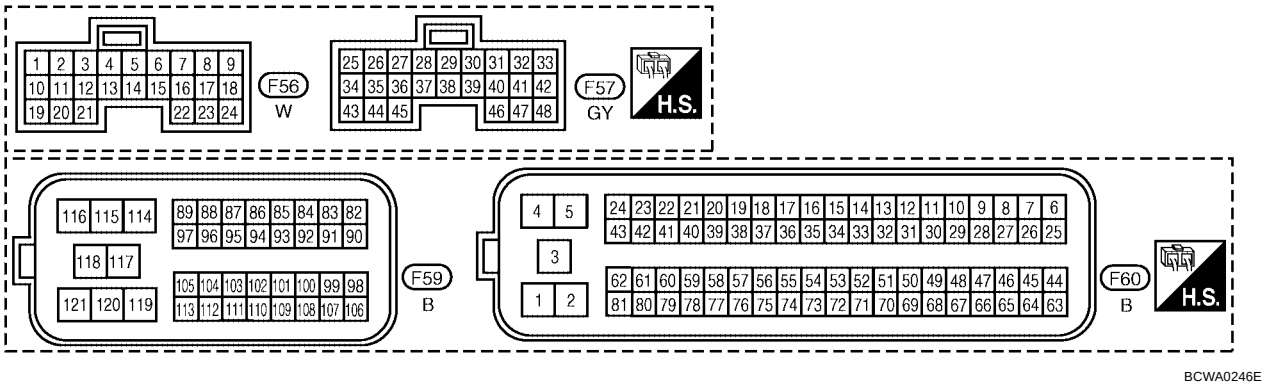
Wiring Diagram — AT — TPS

ECS006GW

AT-TPS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





BCWA0246E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
32	R	SENSOR POWER	IGNITION SWITCH ON	4.5 - 5.5V
			IGNITION SWITCH OFF	0V
41	GY	THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]	IGNITION ON AND ACCELERATOR PEDAL IS DEPRESSED SLOWLY AFTER WARMING UP ENGINE	FULLY CLOSED THROTTLE: 0.5V
				WIDE OPEN THROTTLE: 4.0V
42	B/W	SENSOR GROUND	—	—

Diagnostic Procedure

ECS006GX

1. CHECK DTC WITH ECM

- Check P code with CONSULT-II “ENGINE”.
  Turn ignition switch ON and select “SELF DIAGNOSTIC RESULTS” mode for “ENGINE” with CONSULT-II.

Refer to EC-65, "Malfunction Indicator Lamp (MIL)" .

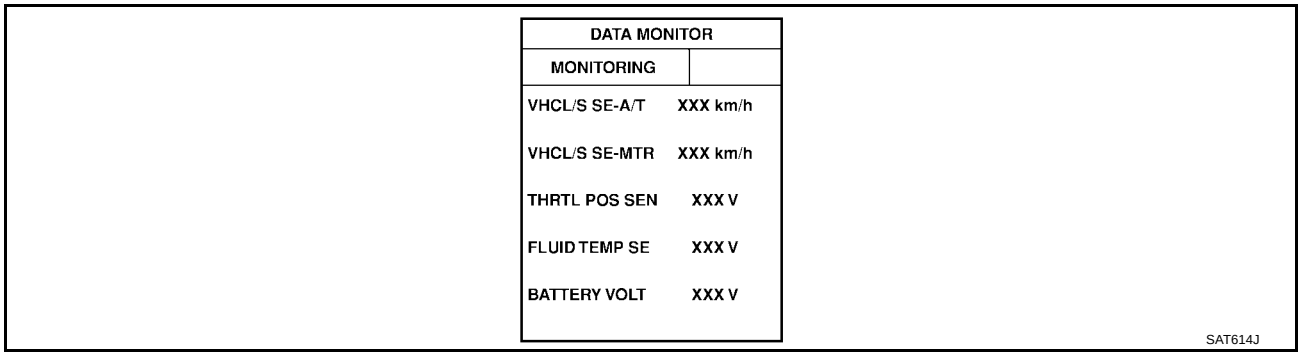
OK or NG

OK (with CONSULT-II)>>GO TO 2.
OK (without CONSULT-II)>>GO TO 3.
NG >> Check throttle position sensor [accelerator pedal position (APP) sensor] circuit for engine control. Refer to EC-264, "DTC P0222, P0223 TP SENSOR" and EC-572, "DTC P2122, P2123 APP SENSOR" .

2. CHECK INPUT SIGNAL (WITH CONSULT-II)

With CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “THRTL POS SEN”.



Voltage:
Fully-closed throttle :Approximately 0.5V
Fully-open throttle :Approximately 4V

OK or NG

OK >> GO TO 4.
NG >> Check harness for short or open between ECM and TCM regarding throttle position sensor [accelerator pedal position (APP) sensor] circuit. (Main harness)

3. CHECK INPUT SIGNAL (WITHOUT CONSULT-II)

Without CONSULT-II

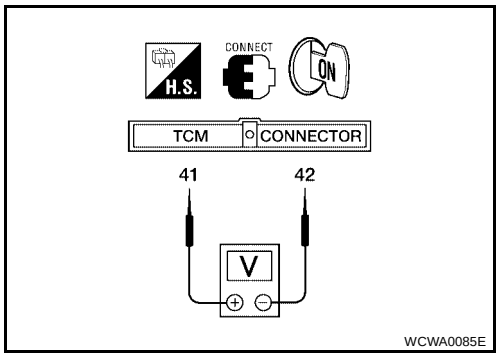
1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between TCM terminals 41 (GY) and 42 (B/W) while accelerator pedal is depressed slowly.

Voltage:

Fully-closed throttle valve **:Approximately 0.5V**

Fully-open throttle valve **:Approximately 4V**

(Voltage rises gradually in response to throttle position.)



OK or NG

OK >> GO TO 4.
NG >> Check harness for short or open between ECM and TCM regarding throttle position sensor [accelerator pedal position (APP) sensor] circuit. (Main harness)

4. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

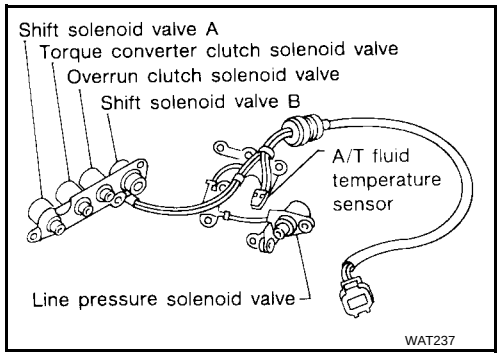
DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

PFP:31940

Description

ECS005Y8

The overrun clutch solenoid valve is activated by the TCM in response to signals sent from the inhibitor switch, overdrive control switch, vehicle speed and throttle position sensors. The overrun clutch operation will then be controlled.



ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: O/R CLTCH SOL/CIRC : P1760	TCM detects an improper voltage drop when it tries to operate the solenoid valve.	● Harness or connectors (The solenoid circuit is open or shorted.) ● Overrun clutch solenoid valve

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

CAUTION:

Always drive vehicle at a safe speed.

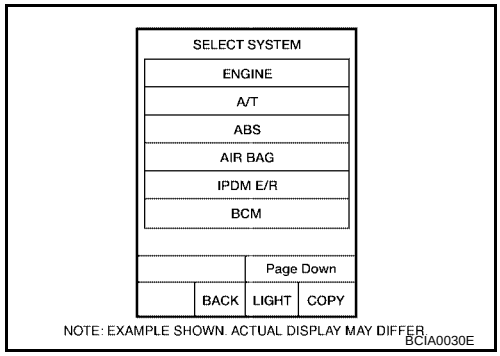
NOTE:

If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

TESTING CONDITION:

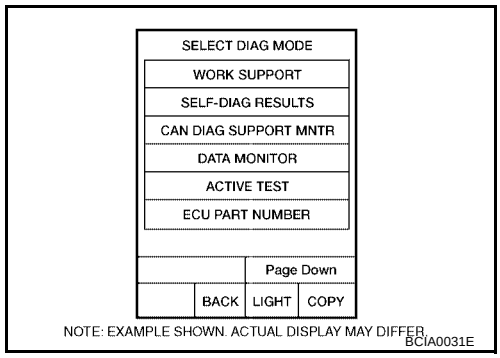
Always drive vehicle on a level road to improve accuracy of test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.



With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode for "ENGINE" with CONSULT-II.
2. Start engine.
3. Accelerate vehicle to a speed of more than 10 km/h (6 MPH) with "D" position (OD "ON").
4. Release accelerator pedal completely with "D" position (OD "OFF").



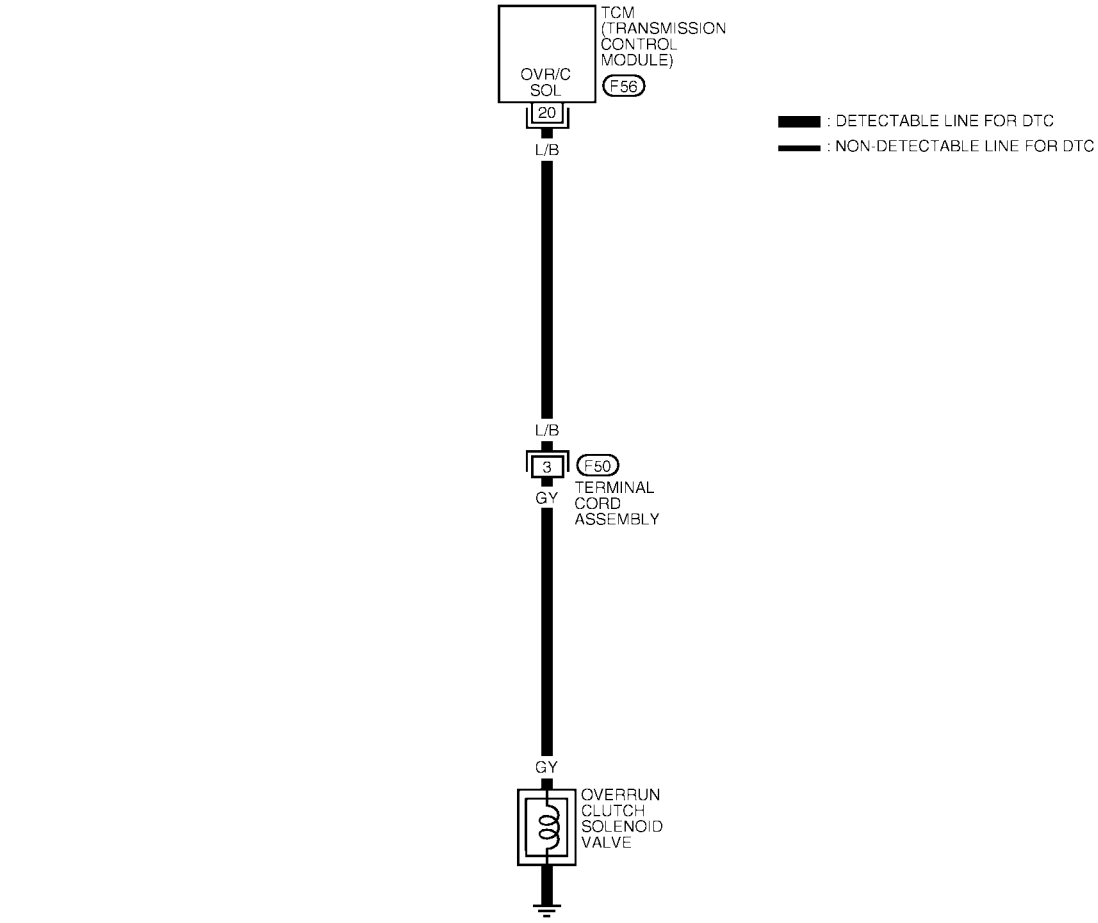
With GST

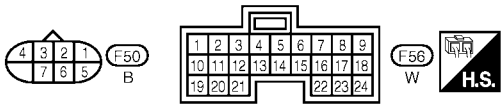
Follow the procedure "With CONSULT-II".

Wiring Diagram — AT — OVRCSV

ECS005Y9

AT-OVRCSV-01





WAT128

TRANSMISSION CONTROL MODULE TERMINALS AND REFERENCE VALUE BETWEEN TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC) (Approx.
20	L/B	OVERRUN CLUTCH SOLENOID VALVE	WHEN OVERRUN CLUTCH SOLENOID VALVE OPERATES	BATTERY VOLTAGE
			WHEN OVERRUN CLUTCH SOLENOID VALVE DOES NOT OPERATE	0V

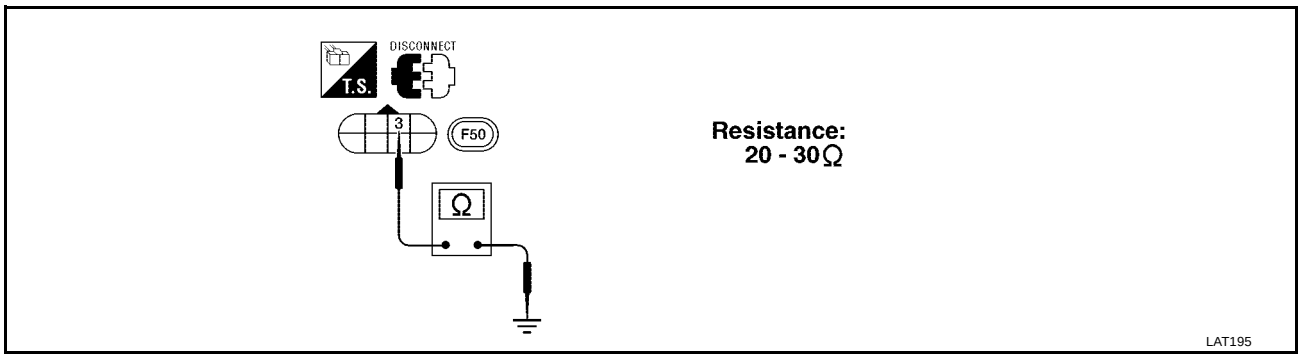
WAT351

Diagnostic Procedure

ECS005YA

1. CHECK VALVE RESISTANCE

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal 3 and ground.

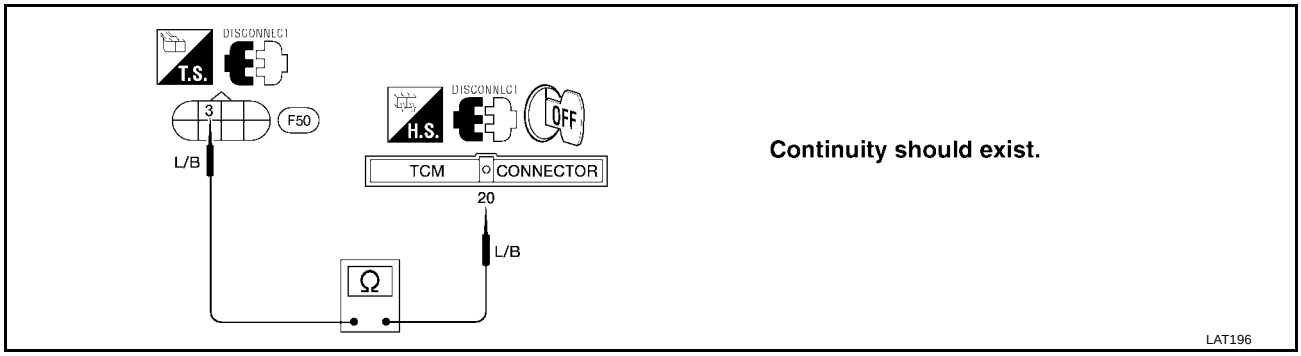


OK or NG

OK >> GO TO 2.
NG >> 1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Overrun clutch solenoid valve
  Refer to AT-196, "Component Inspection" .
- Harness of terminal cord assembly for short or open

2. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal 3 and TCM harness connector terminal 20.



If OK, check harness for short to ground and short to power.

4. Reinstall any part removed.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK DTC

Perform AT-193, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

Component Inspection

ECS005YB

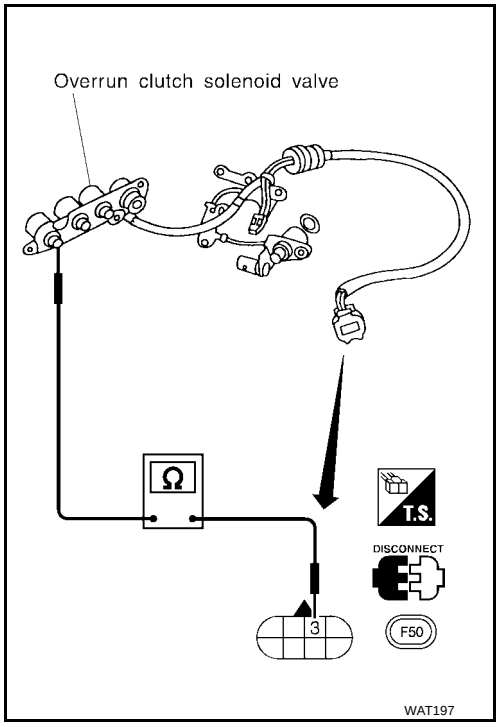
OVERRUN CLUTCH SOLENOID VALVE

- Refer to AT-196, "Component Inspection" .

Resistance Check

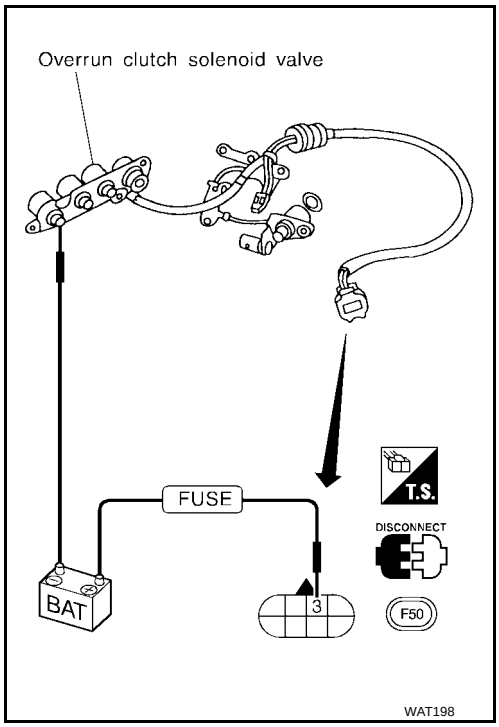
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Overrun clutch solenoid valve	3	Ground	20 - 30Ω



Operation Check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground.



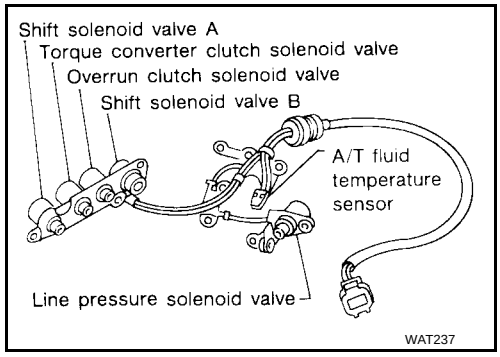
DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)

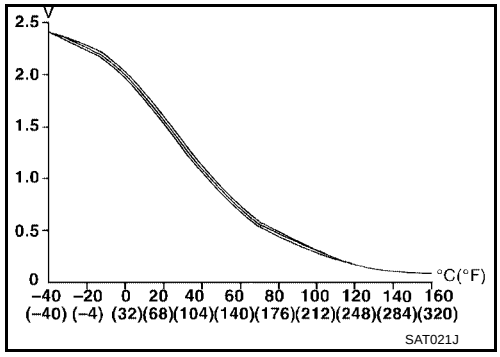
PFP:31940

Description

ECS005YC

The A/T fluid temperature sensor detects the A/T fluid temperature and sends a signal to the TCM.





CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approx.)	
A/T fluid temperature sensor	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]	1.5V ↓ 0.5V	2.5 kΩ ↓ 0.3 kΩ

ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: BATT/FLUID TEMP SEN	TCM receives an excessively low or high voltage from the sensor.	● Harness or connectors (The sensor circuit is open or shorted.) ● A/T fluid temperature sensor
: 8th judgement flicker		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

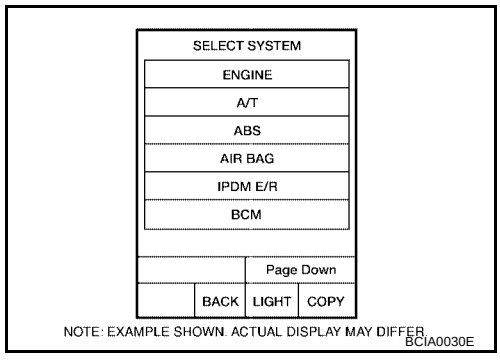
After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

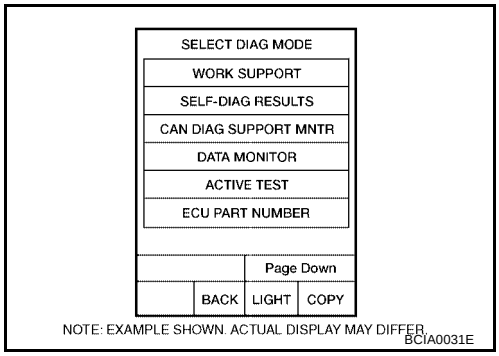
1. Start engine.
2. Select “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Drive vehicle under the following conditions:
   Selector lever in “D”, vehicle speed higher than 20 km/h (12 MPH).

Without CONSULT-II

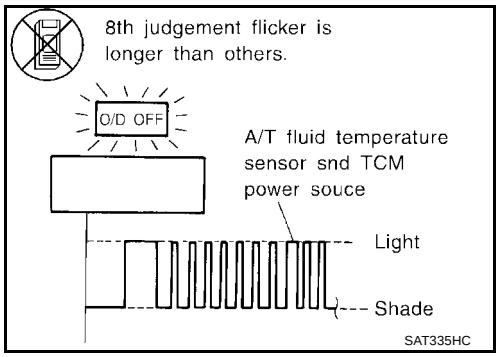
1. Start engine.



2. Drive vehicle under the following conditions:
   Selector lever in “D”, vehicle speed higher than 20 km/h (12 MPH).



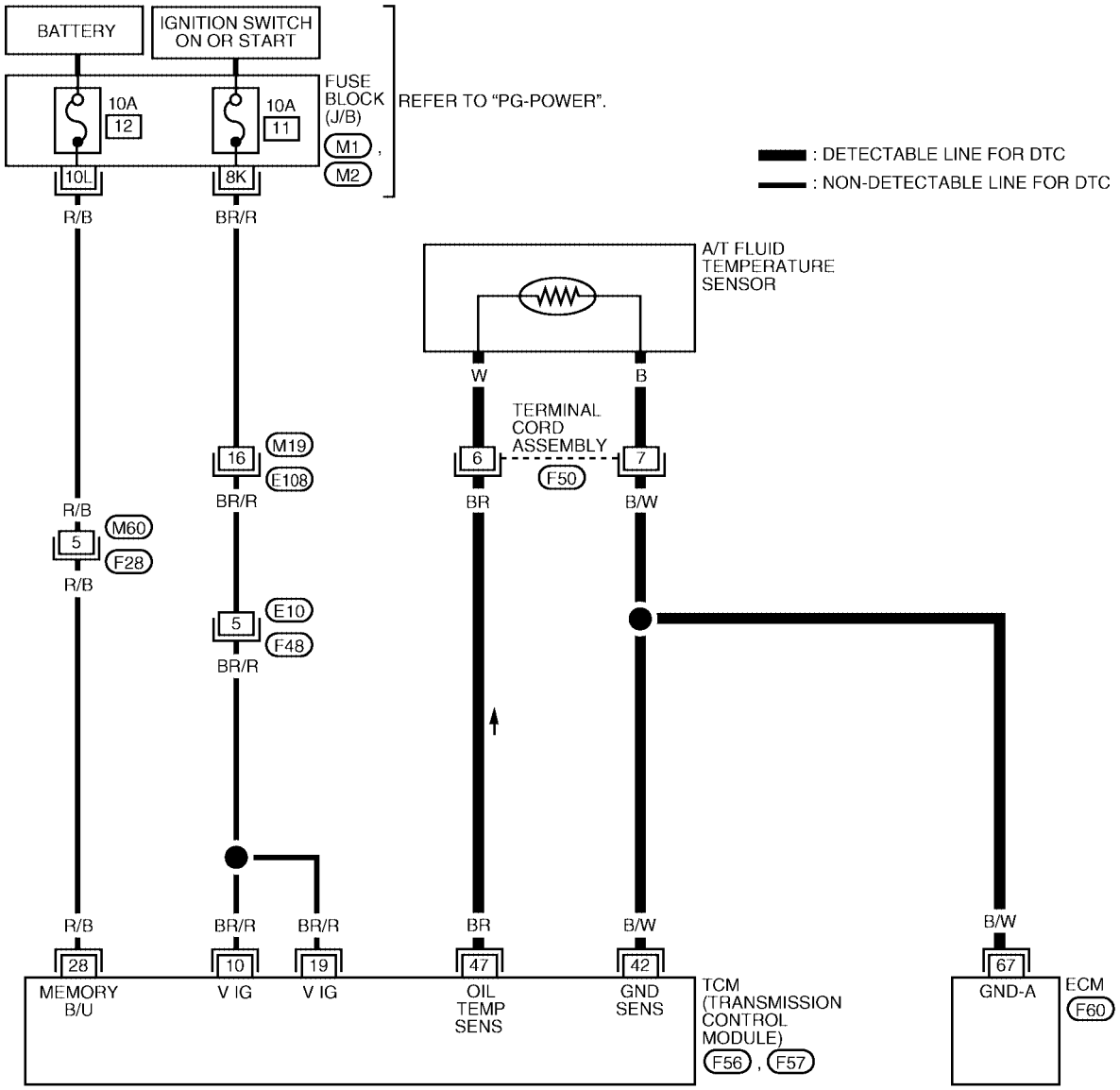
3. Perform self-diagnosis.
   Refer to TCM Self-diagnostic Procedure (No Tools), AT-51, "TCM Self-diagnostic Procedure (No Tools)" .

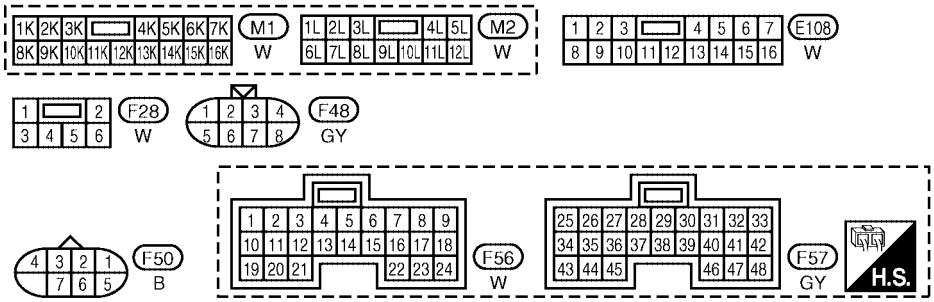


Wiring Diagram — AT — BA/FTS

ECS005YD

AT-BA/FTS-01





REFER TO THE FOLLOWING.
F60 - ELECTRICAL UNITS

BCWA0239E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	BR/R	POWER SOURCE	WHEN TURNING IGNITION SWITCH TO "ON"	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO "OFF"	0V
19	BR/R	POWER SOURCE	WHEN TURNING IGNITION SWITCH TO "ON"	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO "OFF"	0V
28	R/B	POWER SOURCE (MEMORY BACK UP)	WHEN TURNING IGNITION SWITCH TO "OFF"	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO "ON"	BATTERY VOLTAGE
42	B/W	GROUND (A/T FLUID TEMPERATURE SENSOR)	—	0V
47	BR	A/T FLUID TEMPERATURE SENSOR	WHEN ATF TEMPERATURE IS 20°C (68°F)	APPROX. 1.5V
			WHEN ATF TEMPERATURE IS 80°C (176°F)	APPROX. 0.5V

Diagnostic Procedure

ECS005YE

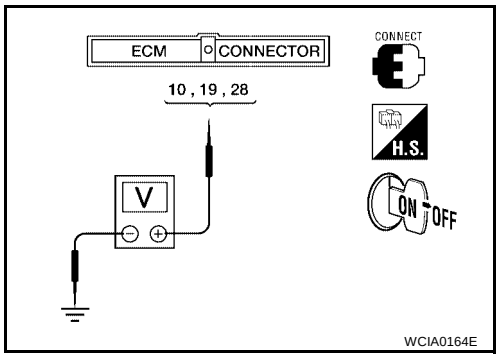
1. CHECK TCM POWER SOURCE

1. Turn ignition switch to “ON” position.
   (Do not start engine.)
2. Check voltage between TCM terminals 10, 19, 28 and ground.

Voltage : Battery voltage

3. Turn ignition switch to “OFF” position.
4. Check voltage between TCM terminal 28 and ground.

Voltage : Battery voltage



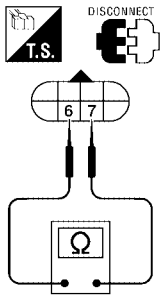
OK or NG

OK >> GO TO 2.
NG >> Check the following items:

- Harness for short or open between ignition switch and TCM (Main harness)
- Harness for short or open between battery and TCM (Main harness)
- Ignition switch and fuse
  Refer to PG-3, "POWER SUPPLY ROUTING" .

2. CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY

1. Turn ignition switch to “OFF” position.
2. Disconnect terminal cord assembly connector F50 in engine compartment.
3. Check resistance between terminal cord assembly F50 terminals 6 and 7 when A/T is cold.



Resistance:
Cold 20°C (68°F)
Approximately 2.5 kΩ

LCIA0027E

4. Reinstall any part removed.

OK or NG

OK (With CONSULT-II)>> GO TO 3.
OK (Without CONSULT-II)>> GO TO 4.
NG >> 1. Remove oil pan.
2. Check the following items:
- A/T fluid temperature sensor
  Refer to AT-202, "Component Inspection" .
- Harness of terminal cord assembly for short or open

3. CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITH CONSULT-II)

With CONSULT-II

1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “FLUID TEMP SE”.

DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

SAT614J

Voltage

Cold [20°C (68°F)] → : Approximately 1.5V →
Hot [80°C (176°F)] 0.5V

OK or NG

OK >> GO TO 5.
NG >> Check the following items:
- Harness for short or open between TCM, ECM and terminal cord assembly (Main harness)
- Ground circuit for ECM
  Refer to EC-164, "Wiring Diagram" .

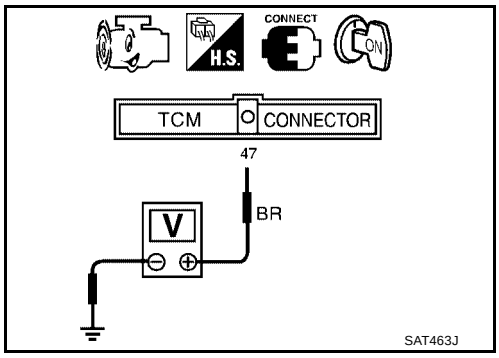
4. CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II)

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM terminal 47 and ground while warming up A/T.

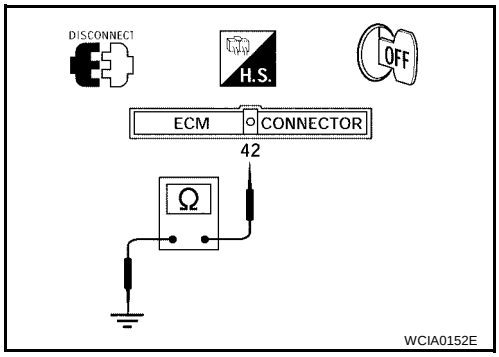
Voltage

Cold [20°C (68°F)] → : Approximately 1.5V →
Hot [80°C (176°F)] 0.5V



3. Turn ignition switch to “OFF” position.
4. Disconnect TCM harness connector.
5. Check resistance between terminal 42 (B/W) and ground.

Continuity should exist.



OK or NG

OK >> GO TO 5.
NG >> Check the following items:

- Harness for short or open between TCM, ECM and terminal cord assembly (Main harness)
- Ground circuit for ECM
  Refer to EC-164, "Wiring Diagram" .

5. CHECK DTC

Perform AT-197, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

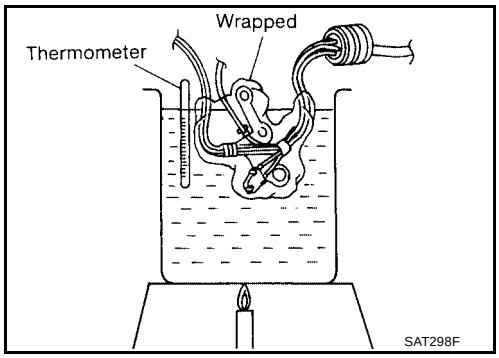
Component Inspection

ECS005YF

A/T FLUID TEMPERATURE SENSOR

- Refer to AT-259, "REMOVAL" .
- Check resistance between two terminals while changing temperature as shown.

Temperature °C (°F)	Resistance (approx.)
20 (68)	2.5 kΩ
80 (176)	0.3 kΩ



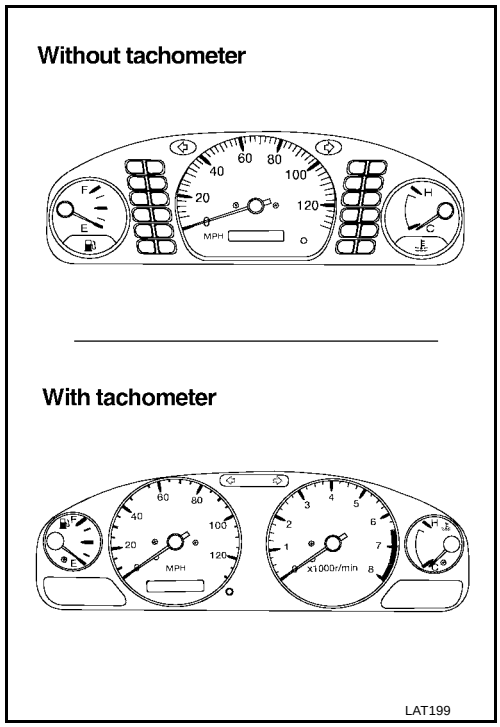
DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR

PFP:24814

Description

ECS005YG

The vehicle speed sensor·MTR is built into the speedometer assembly. The sensor functions as an auxiliary device to the revolution sensor when it is malfunctioning. The TCM will then use a signal sent from the vehicle speed sensor·MTR.



ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when ...	Check items (Possible cause)
: VHCL SPEED SEN·MTR	TCM does not receive the proper voltage signal from the sensor.	● Harness or connectors (The sensor circuit is open or shorted.) ● Vehicle speed sensor
: 2nd judgement flicker		

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

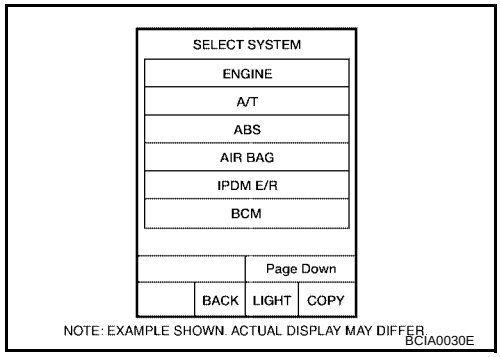
CAUTION:

- **Always drive vehicle at a safe speed.**
- **If conducting this "DTC CONFIRMATION PROCEDURE" again, always turn ignition switch "OFF" and wait at least 5 seconds before continuing.**

After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

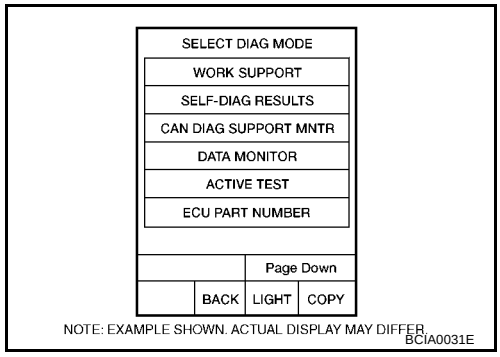
1. Turn ignition switch "ON" and select "DATA MONITOR" mode for "A/T" with CONSULT-II.



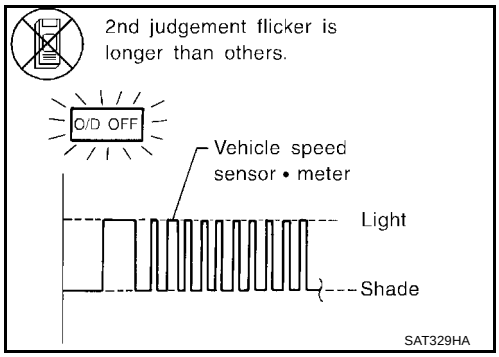
2. Start engine and accelerate vehicle from 0 to 25 km/h (0 to 16 MPH).

Without CONSULT-II

1. Start engine.
2. Drive vehicle under the following conditions:
   Selector lever in "D" and vehicle speed higher than 25 km/h (16 MPH).

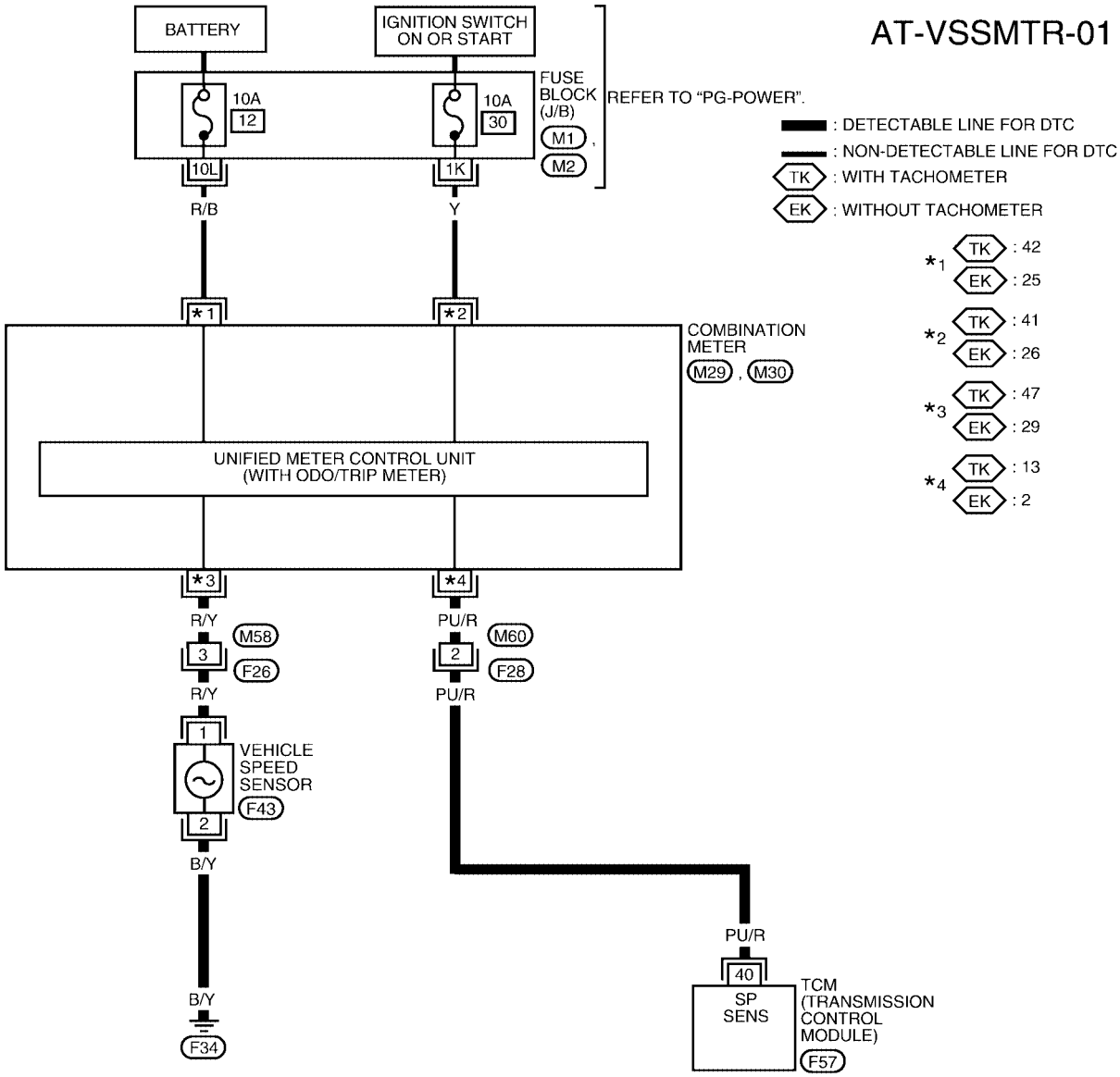


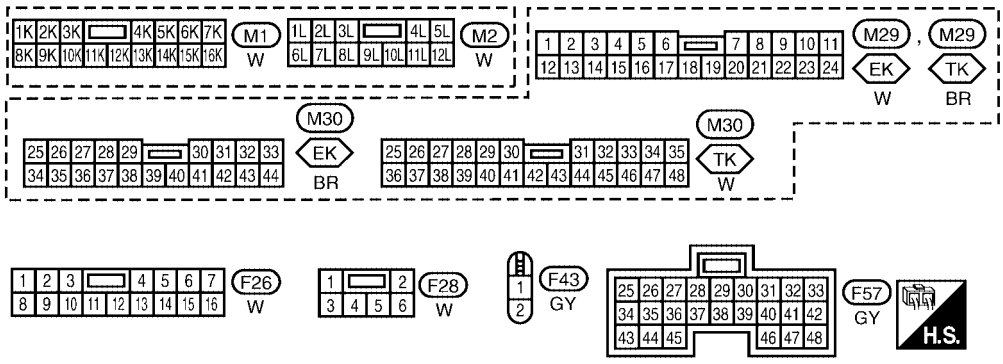
3. Perform self-diagnosis.
   Refer to “TCM Self-diagnostic Procedure (No Tools)”, AT-51, "TCM Self-diagnostic Procedure (No Tools)" .



Wiring Diagram — AT — VSSMTR

ECS005YH





WCWA0122E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
40	PU/R	VEHICLE SPEED SENSOR	WHEN MOVING VEHICLE AT 2 TO 3 KM/H (1 TO 2 MPH) FOR 1 m (3ft) OR MORE	VOLTAGE VARIES FROM GREATER THAN 1V TO LESS THAN 4.5 V

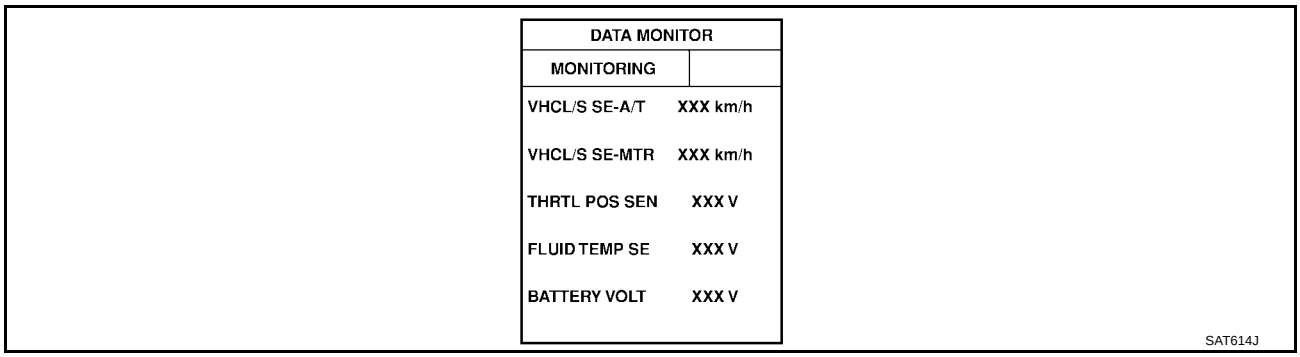
Diagnostic Procedure

ECS005YI

1. CHECK INPUT SIGNAL

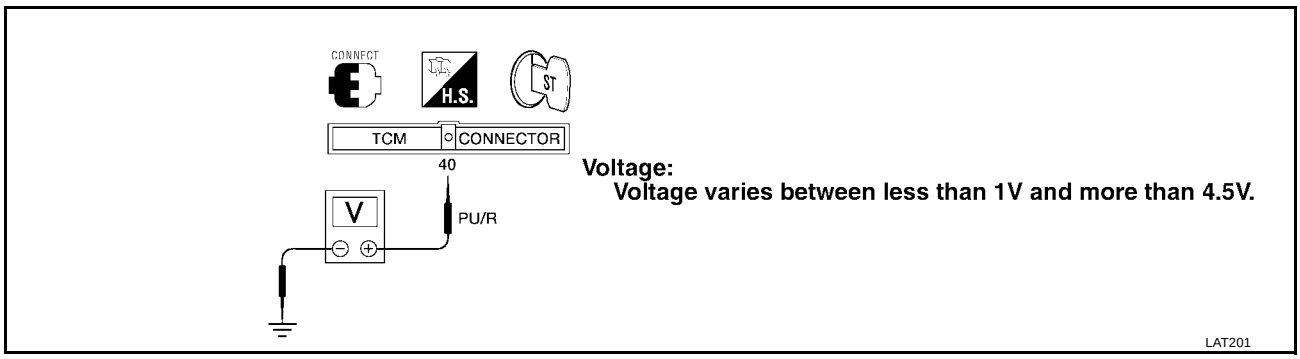
With CONSULT-II

1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “VHCL/S SE·MTR” while driving.
   Check the value changes according to driving speed.



Without CONSULT-II

1. Start engine.
2. Check voltage between TCM terminal 40 and ground while driving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.



OK or NG

OK >> GO TO 2.
NG >> Check the following items:

- Vehicle speed sensor and ground circuit for vehicle speed sensor
  Refer to DI-26, "VEHICLE SPEED SENSOR SIGNAL CHECK" .
- Harness for short or open between TCM and vehicle speed sensor (Main harness)

2. CHECK DTC

Perform AT-203, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

DTC U1000 CAN COMMUNICATION LINE

PFP:23710

Description

ECS006GM

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

ECS006GN

- This is an OBD-II self-diagnostic item.
- Diagnostic trouble code “CAN COMM CIRCUIT” with CONSULT-II or U1000 without CONSULT-II is detected when TCM cannot communicate to other control unit.

Possible Cause

ECS006GO

Harness or connectors
(CAN communication line is open or shorted.)

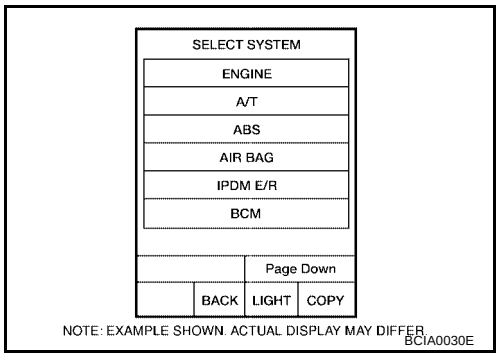
DTC Confirmation Procedure

ECS006GP

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch to ON position. (Do not start engine.)
2. Select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
3. Start engine and wait for at least 6 seconds.
4. If DTC is detected, go to AT-210, "Diagnostic Procedure" .



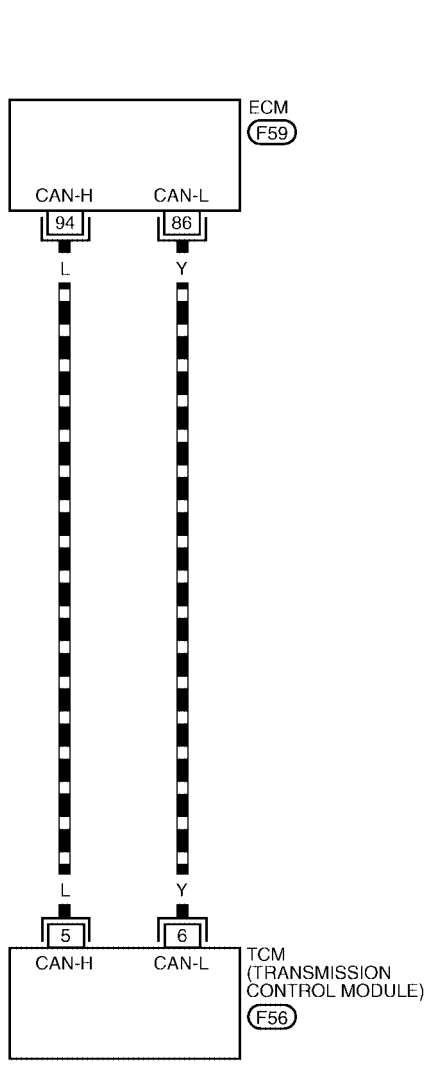
WITH GST

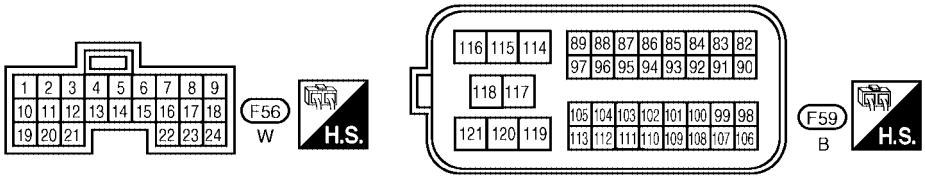
Follow the procedure “WITH CONSULT-II”.

Wiring Diagram — AT — CAN

ECS006GQ

AT-CAN-01





BCWA0247E

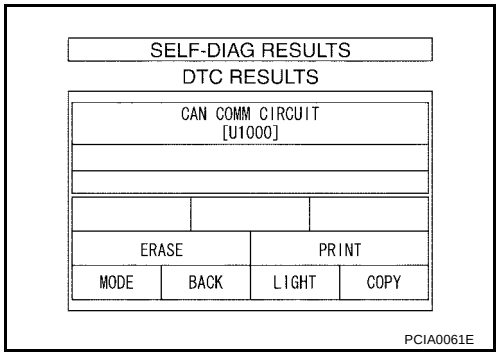
Diagnostic Procedure

ECS006GR

1. CHECK CAN COMMUNICATION CIRCUIT

With CONSULT-II

1. Turn ignition switch "ON" and start engine.
2. Select “SELF-DIAG RESULTS" mode for "A/T" with CONSULT-II.



Is any malfunction of the "CAN COMM CIRCUIT" indicated?

Yes >> Print out CONSULT-II screen, GO TO LAN section. Refer to LAN - LAN-4, "CAN Communication Unit"

No >> **INSPECTION END**.

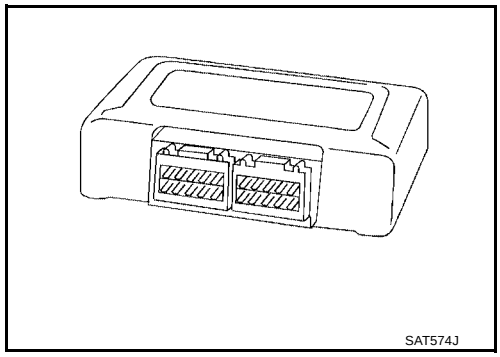
DTC CONTROL UNIT (RAM), CONTROL UNIT (ROM)

PFP:31036

Description

ECS005YJ

The TCM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the A/T.


SAT574J

ON BOARD DIAGNOSIS LOGIC

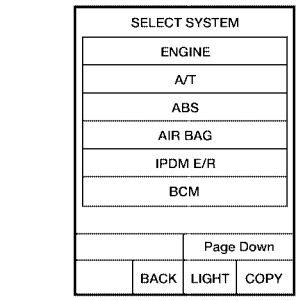
Diagnostic Trouble Code No.	Malfunction is detected when	Check Item (Possible Cause)
: CONTROL UNIT (RAM), CONTROL UNIT (ROM)	TCM memory (RAM) or (ROM) is malfunctioning.	● TCM

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NOTE:
If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch “OFF” and wait at least 5 seconds before conducting the next test.

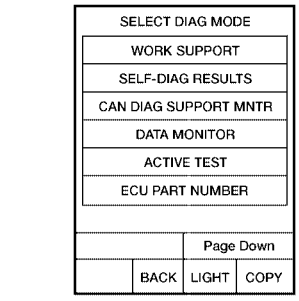
With CONSULT-II

1. Turn ignition switch “ON” and select “DATA MONITOR” mode for "A/T" with CONSULT-II.
2. Start engine.



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0030E

3. Run engine for at least 2 seconds at idle speed.



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0031E

Diagnostic Procedure

ECS005YK

1. INSPECTION START (WITH CONSULT-II)

With CONSULT-II

1. Turn ignition switch “ON” and select “SELF DIAGNOSIS” mode for A/T with CONSULT-II.
2. Touch “ERASE”.

>> GO TO 2.

2. CHECK DTC

Perform AT-211, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

>> GO TO 3.

3. CHECK DTC AGAIN

Is the “CONTROL UNIT (RAM)” or “CONTROL UNIT (ROM)” displayed again?

Yes or No

Yes >> Replace TCM.
No >> **INSPECTION END**

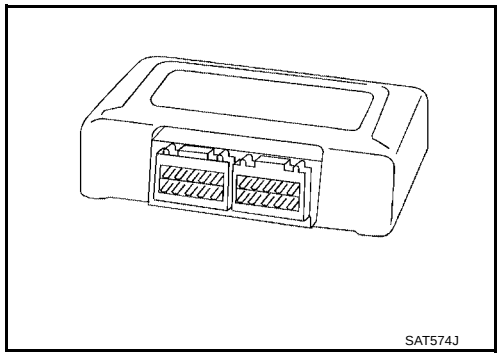
DTC CONTROL UNIT (EEP ROM)

PFP:31036

Description

ECS005YL

The TCM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the A/T.


SAT574J

ON BOARD DIAGNOSIS LOGIC

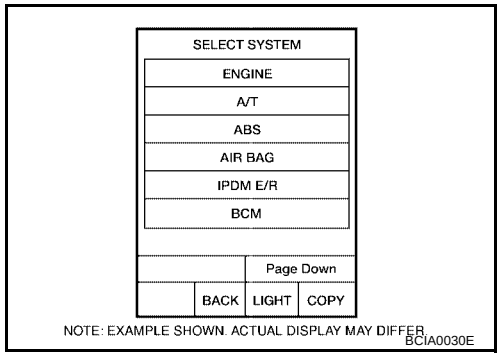
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: CONT UNIT (EEP ROM)	TCM memory (EEP ROM) is malfunctioning.	● TCM

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch "OFF" and wait at least 5 seconds before conducting the next test.

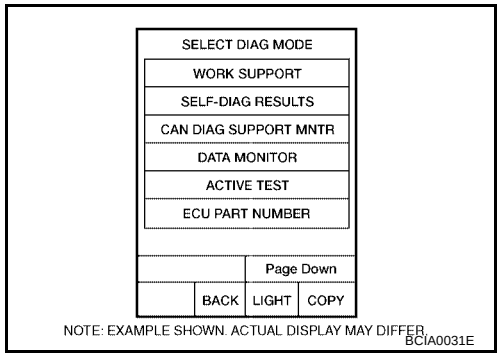
With CONSULT-II

1. Turn ignition switch "ON" and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2. Start engine.



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER
BCIA0030E

3. Run engine for at least 2 seconds at idle speed.



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER
BCIA0031E

Diagnostic Procedure

ECS005YM

1. CHECK DTC

With CONSULT-II

1. Turn ignition switch “ON” and select “SELF DIAGNOSIS” mode for A/T with CONSULT-II.
2. Move selector lever to “R” position.
3. Depress accelerator pedal (Full throttle position).
4. Touch “ERASE”.
5. Turn ignition switch “OFF” position for 10 seconds.

Perform AT-213, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

Is the “CONT UNIT (EEP ROM)” displayed again?

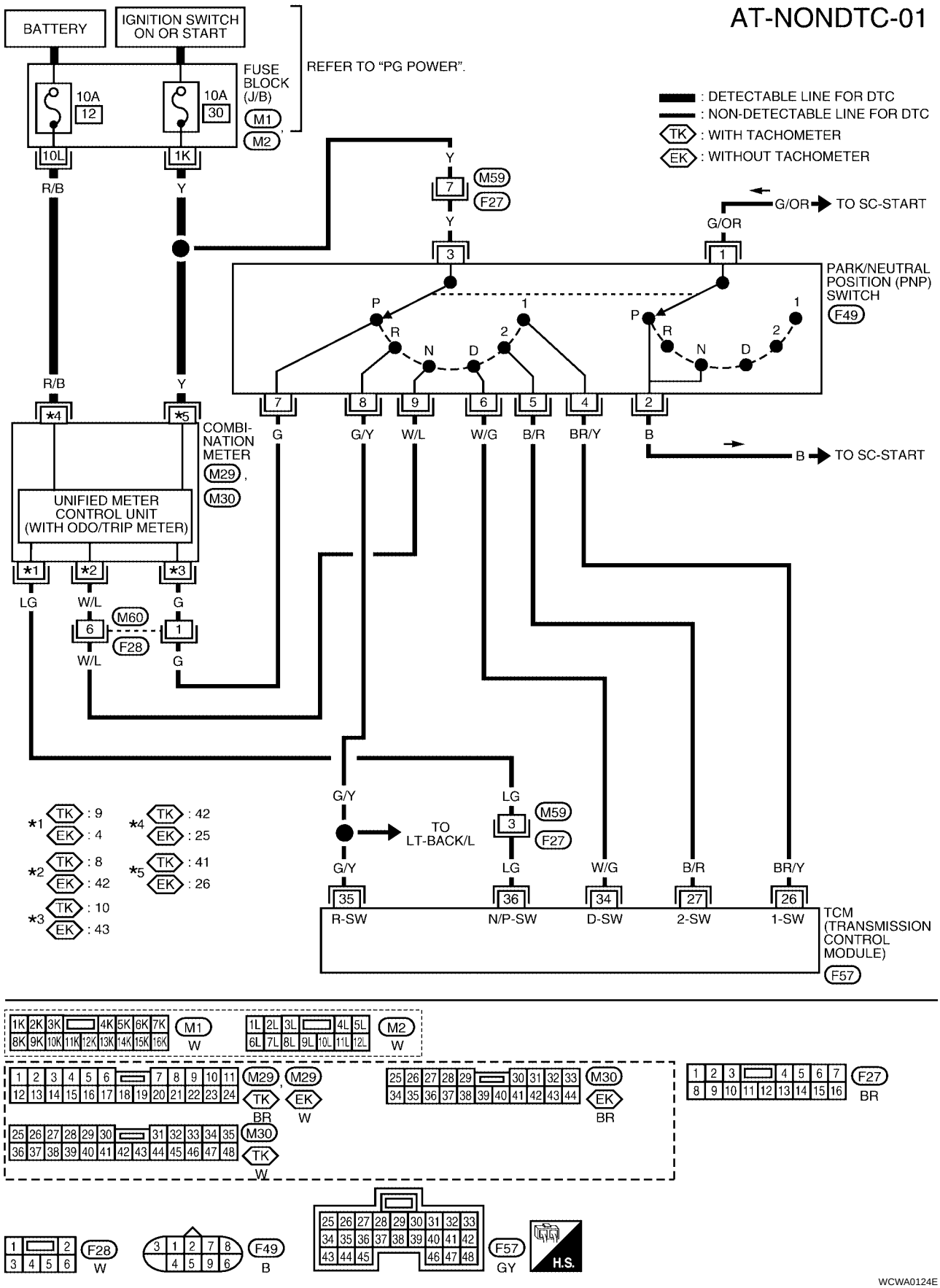
Yes >> Replace TCM.
No >> **INSPECTION END**

TROUBLE DIAGNOSES FOR SYMPTOMS

PFP:00007

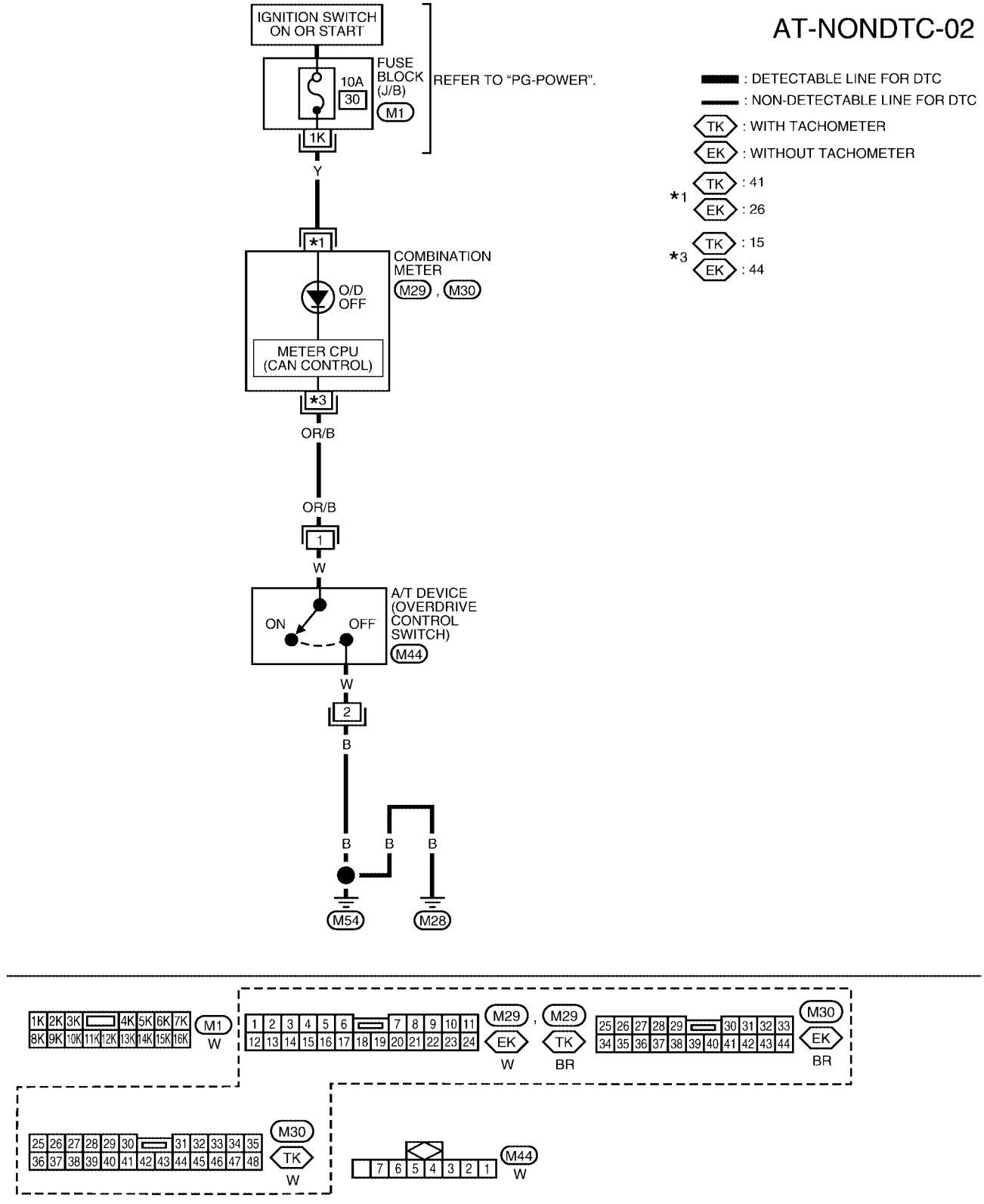
Wiring Diagram — AT — NONDTC

ECS005YN



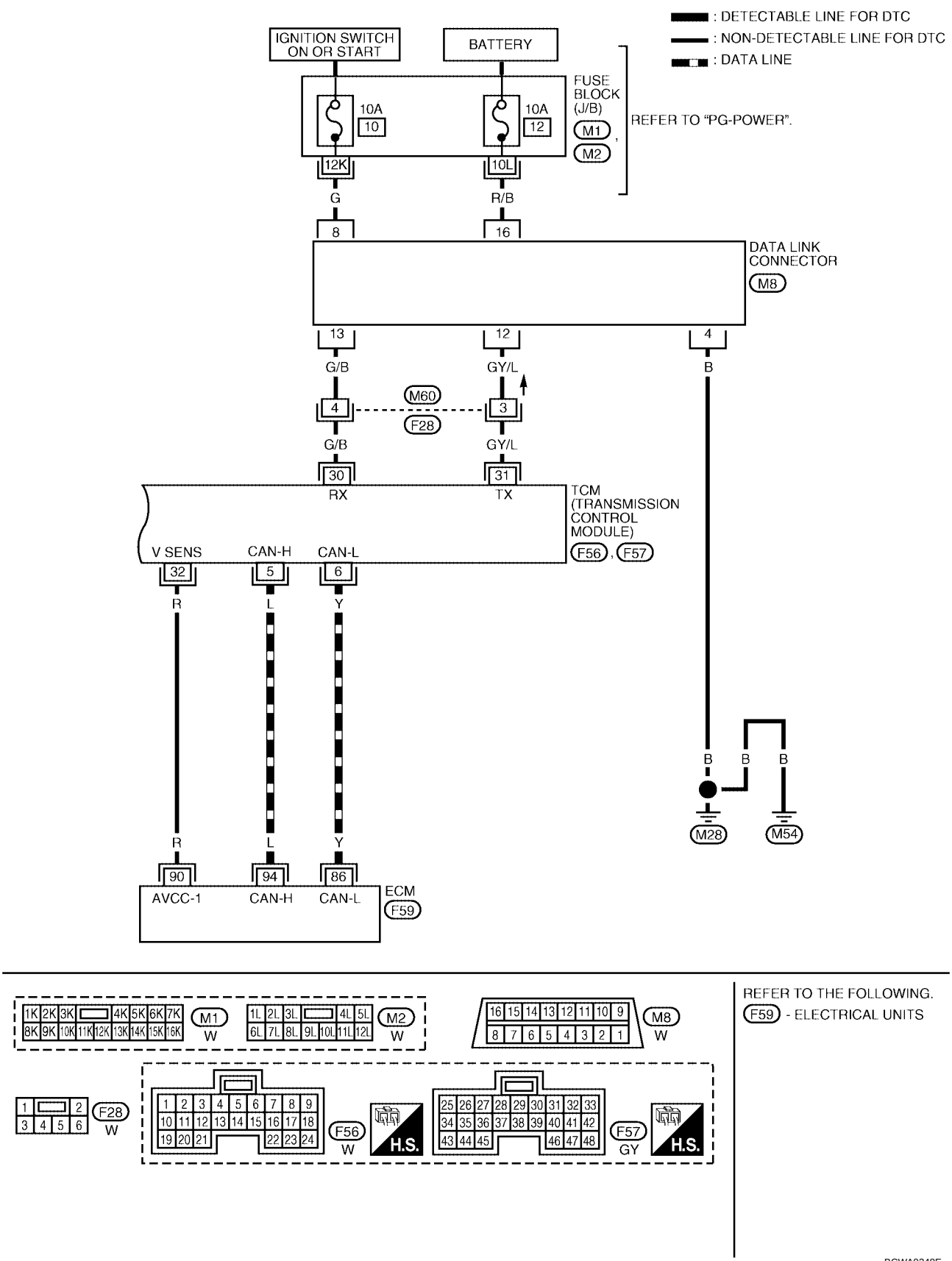
WCWA0124E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
26	BR/Y	PNP SWITCH "1" POSITION	WHEN SETTING SELECTOR LEVER TO "1" POSITION	BATTERY VOLTAGE
			WHEN SETTING SELECTOR LEVER TO OTHER POSITIONS	0V
27	B/R	PNP SWITCH "2" POSITION	WHEN SETTING SELECTOR LEVER TO "2" POSITION	BATTERY VOLTAGE
			WHEN SETTING SELECTOR LEVER TO OTHER POSITIONS	0V
34	W/G	PNP SWITCH "D" POSITION	WHEN SETTING SELECTOR LEVER TO "D" POSITION	BATTERY VOLTAGE
			WHEN SETTING SELECTOR LEVER TO OTHER POSITIONS	0V
35	G/Y	PNP SWITCH "R" POSITION	WHEN SETTING SELECTOR LEVER TO "R" POSITION	BATTERY VOLTAGE
			WHEN SETTING SELECTOR LEVER TO OTHER POSITIONS	0V
36	LG	PNP SWITCH "N" OR "P" POSITION	WHEN SETTING SELECTOR LEVER TO "N" OR "P" POSITION	BATTERY VOLTAGE
			WHEN SETTING SELECTOR LEVER TO OTHER POSITIONS	0V


AT-NONDTC-02
IGNITION SWITCH ON OR START
FUSE BLOCK (J/B)
10A
30
M1
1K
REFER TO "PG-POWER".
Y
*1
COMBINATION METER
M29 , M30
O/D OFF
METER CPU (CAN CONTROL)
*3
OR/B
OR/B
1
W
A/T DEVICE (OVERDRIVE CONTROL SWITCH)
ON
OFF
M44
W
2
B
B B B
M54
M28
: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
TK : WITH TACHOMETER
EK : WITHOUT TACHOMETER
*1 TK : 41
EK : 26
*3 TK : 15
EK : 44
M1
W
M29 , M29
EK
W
TK
BR
M30
EK
BR
M30
TK
W
M44
W

WCWA0074E

AT-NONDTC-03



BCWA0248E

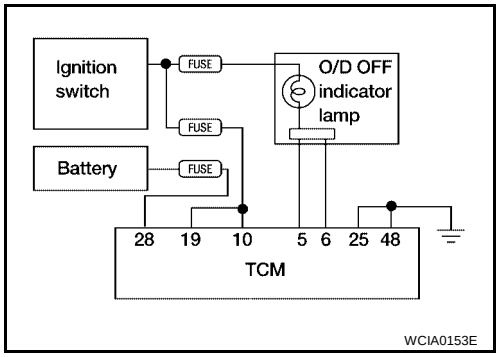
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
5	L	CAN-H	—	—
6	Y	CAN-L	—	—
30	G/B	DATA LINK CONNECTOR (RX)	—	—
31	GY/L	DATA LINK CONNECTOR (TX)	—	—
32	R	SENSOR POWER	IGNITION SWITCH ON	APPROX. 4.5 - 5.5V
			IGNITION SWITCH OFF	APPROX. 0V

1. O/D OFF Indicator Lamp Does Not Come On

ECS005YO

SYMPTOM:
O/D OFF indicator lamp does not come on for about 2 seconds when turning ignition switch to “ON”.



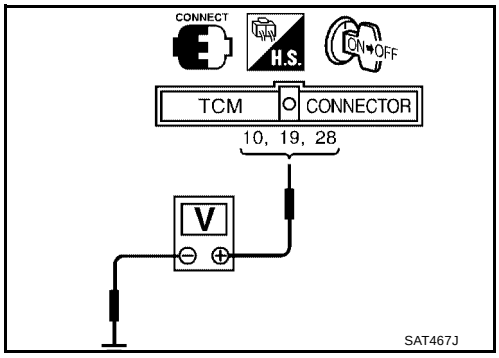
1. CHECK TCM POWER SOURCE

1. Turn ignition switch to “ON” position.
   (Do not start engine.)
2. Check voltage between TCM terminals 10, 19, 28 and ground.

   Voltage : Battery voltage

3. Turn ignition switch to “OFF” position.
4. Check voltage between TCM terminal 28 and ground.

   Voltage : Battery voltage



OK or NG

OK >> GO TO 2.
NG >> Check the following items:

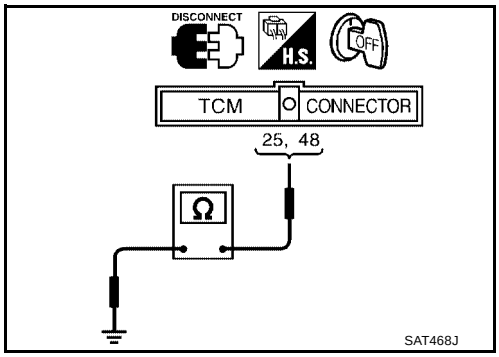
- Harness for short or open between ignition switch and TCM (Main harness). Refer to AT-112, "Wiring Diagram — AT — MAIN" .
- Harness for short or open between battery and TCM (Main harness) Refer to AT-112, "Wiring Diagram — AT — MAIN" .
- Ignition switch and fuse. Refer to PG-3, "POWER SUPPLY ROUTING" .

2. CHECK TCM GROUND CIRCUIT

1. Turn ignition switch to “OFF” position.
2. Disconnect TCM harness connector.
3. Check continuity between TCM terminals 25, 48 and ground.

   Continuity should exist.

   If OK, check harness for short to ground and short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors. Refer to AT-112, "Wiring Diagram — AT — MAIN" .

3. CHECK SELF-DIAGNOSIS RESULTS

With CONSULT-II
Does "SELECTION FORM MENU" in "DATA MONITOR" show damage to O/D OFF indicator lamp (SELF D DP LMP) signal circuit?

No Tools
Execute the self-diagnosis. Is a malfunction in the CAN communication indicated in the results?

YES or NO

YES >> Check the CAN communication line. Refer to AT-208, "DTC U1000 CAN COMMUNICATION LINE" .
NO >> GO TO 4.

4. CHECK O/D OFF INDICATOR LAMP CIRCUIT

1. Turn ignition switch to "OFF" position.
2. Check the combination meter.
   Refer to DI-7, "Combination Meter"

OK or NG

OK >> GO TO 5.
NG >> Replace the combination meter.

5. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

2. Engine Cannot Be Started In “P” and “N” Position

ECS005YP

SYMPTOM:

- **Engine cannot be started with selector lever in “P” or “N” position.**
- **Engine can be started with selector lever in “D”, “2”, “1” or “R” position.**

1. CHECK PNP SWITCH CIRCUIT

With CONSULT-II

Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to PNP switch circuit?

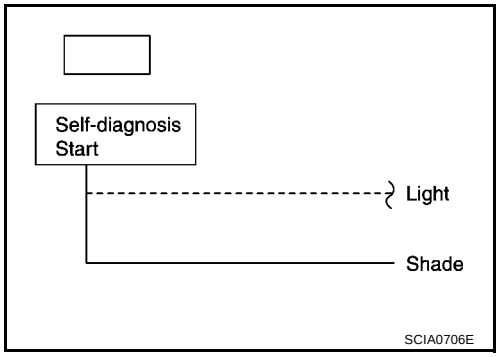
Without CONSULT-II

Does self-diagnosis show damage to PNP switch circuit?

Yes or No

Yes >> Check PNP switch circuit. Refer to AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" .

No >> GO TO 2.



2. CHECK PNP SWITCH INSPECTION

Check for short or open of PNP switch harness connector terminals 1 and 2.
Refer to AT-117, "Diagnostic Procedure" .

OK or NG

OK >> GO TO 3.

NG >> Repair or replace PNP switch.

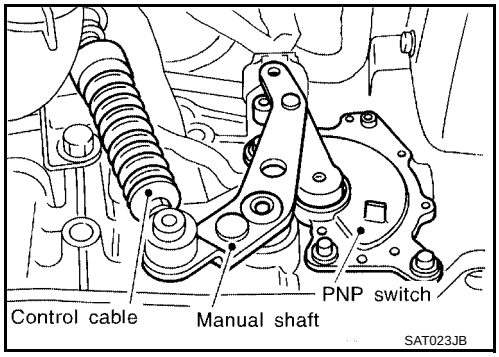
3. CHECK CONTROL CABLE

Check control cable. Refer to AT-262, "Control Cable Adjustment"

OK or NG

OK >> GO TO 4.

NG >> Adjust control cable. Refer to AT-262, "Control Cable Adjustment" .



4. CHECK STARTING SYSTEM

Check starting system. Refer to SC-9, "STARTING SYSTEM" .

OK or NG

OK >> **INSPECTION END**

NG >> Repair or replace damaged parts.

3. In “P” Position, Vehicle Moves Forward Or Backward When Pushed

ECS005YQ

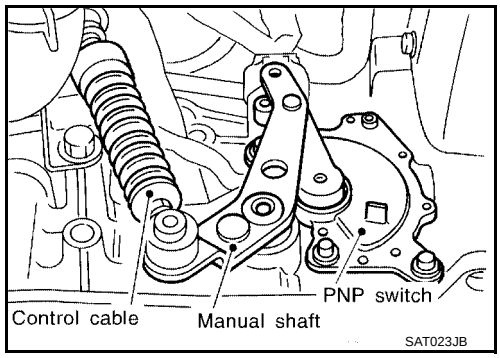
SYMPTOM:
Vehicle moves when it is pushed forward or backward with selector lever in “P” position.

1. CHECK CONTROL CABLE

Check control cable. Refer to AT-262, "Control Cable Adjustment"

OK or NG

OK >> GO TO 2.
NG >> Adjust control cable. Refer to AT-262, "Control Cable Adjustment" .

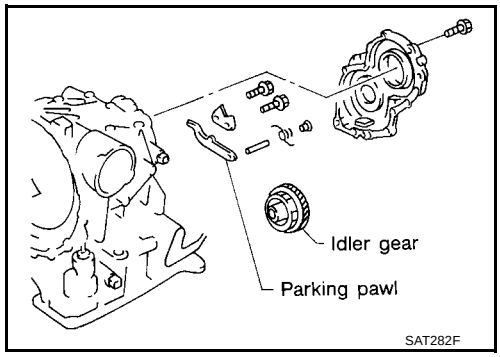


2. CHECK PARKING COMPONENTS

Check parking components. Refer to AT-267, "Components" .

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.



4. In “N” Position, Vehicle Moves

ECS005YR

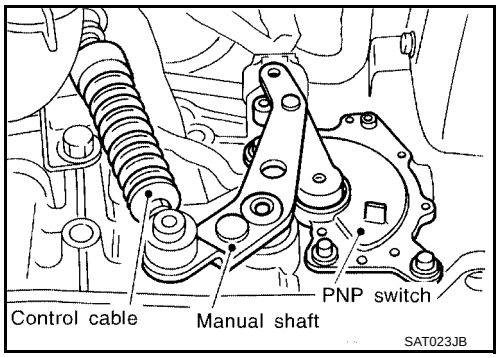
SYMPTOM:
Vehicle moves forward or backward when selecting “N” position.

1. CHECK CONTROL CABLE

Check control cable. Refer to AT-262, "Control Cable Adjustment" .

OK or NG

OK >> GO TO 2.
NG >> Adjust control cable. Refer to AT-262, "Control Cable Adjustment" .

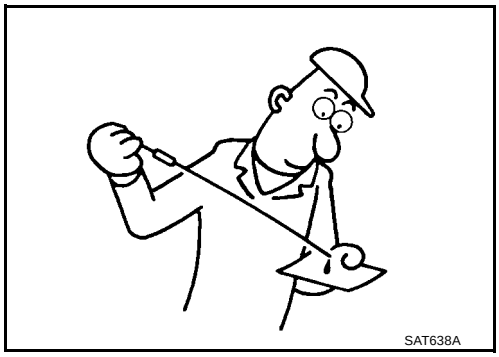


2. CHECK A/T FLUID LEVEL

Check A/T fluid level again.

OK or NG

OK >> GO TO 3.
NG >> Refill ATF.

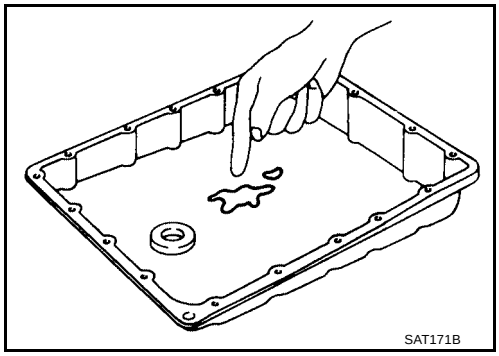


3. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.

OK or NG

OK >> GO TO 4.
NG >> 1. Disassemble A/T.
2. Check the following items:
- Forward clutch assembly
- Overrun clutch assembly
- Reverse clutch assembly



4. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

5. Large Shock. “N” → “R” Position

ECS005YS

SYMPTOM:
There is large shock when changing from “N” to “R” position.

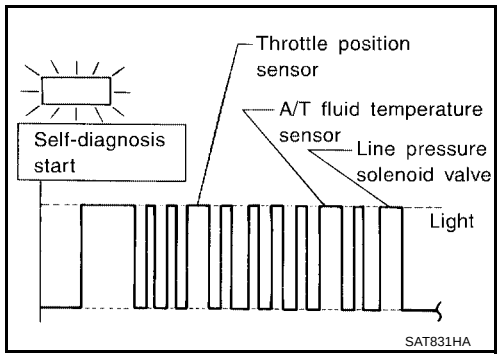
1. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to A/T fluid temperature sensor, line pressure solenoid valve or throttle position sensor [accelerator pedal position (APP) sensor] circuit?

Yes or No

Yes >> Check damaged circuit. Refer to AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" , AT-173, "DTC P0745 LINE PRESSURE SOLENOID VALVE" or AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]" .

No >> GO TO 2.



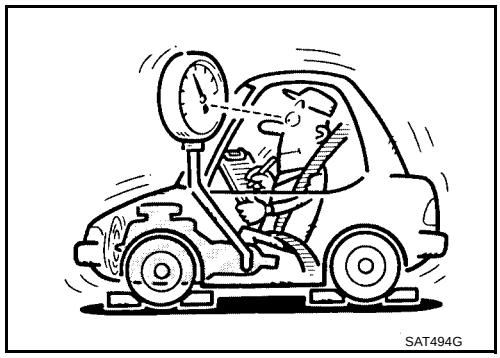
2. CHECK LINE PRESSURE

Check line pressure at idle with selector lever in “D” position. Refer to AT-67, "Line Pressure Test" .

OK or NG

OK >> GO TO 3.

NG >> 1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve
- Oil pump assembly



3. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**

NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

6. Vehicle Does Not Creep Backward In “R” Position

ECS005YT

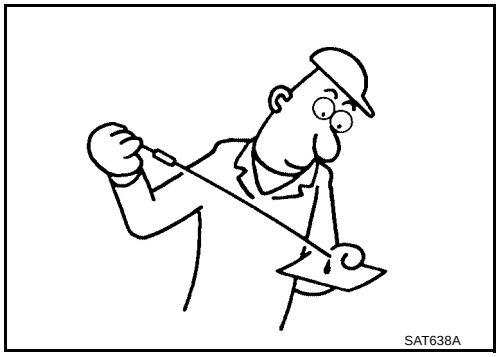
SYMPTOM:
Vehicle does not creep backward when selecting “R” position.

1. CHECK A/T FLUID LEVEL

Check A/T fluid level again.

OK or NG

OK >> GO TO 2.
NG >> Refill ATF.


SAT638A

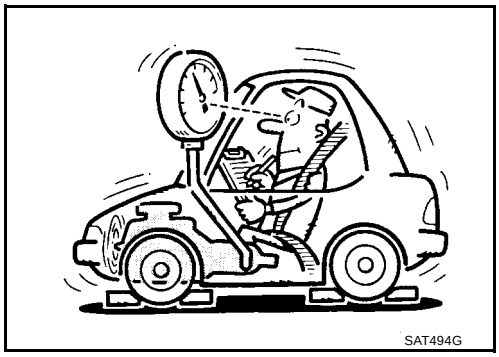
2. CHECK LINE PRESSURE

Check line pressure at idle with selector lever in “R” position. Refer to AT-67, "Line Pressure Test" .

OK or NG

OK >> GO TO 3.
NG >> 1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

3. Disassemble A/T.
4. Check the following item:
- Oil pump assembly


SAT494G

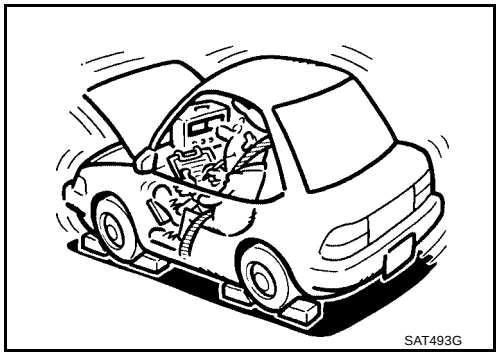
3. CHECK STALL TEST

Check stall revolution with selector lever in “1” and “R” positions.

OK or NG

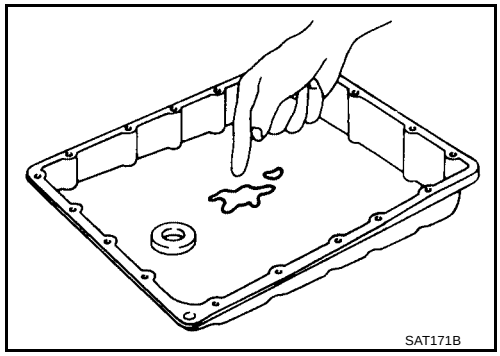
OK >> GO TO 4.
OK in “1” position, NG in “R” position>>1.Disassemble A/T.
2. Check the following items:
- Reverse clutch assembly

NG in both “1” and “R” positions>> GO TO 6.


SAT493G

4. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



OK or NG

OK >> GO TO 5.
NG >> GO TO 6.

5. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

6. DETECT MALFUNCTIONING ITEM

1. Disassemble A/T.
2. Check the following items:

- Reverse clutch assembly
- High clutch assembly
- Low & reverse brake assembly
- Forward clutch assembly
- Overrun clutch assembly

OK or NG

OK >> GO TO 4.
NG >> Repair or replace damaged parts.

7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position

ECS005YU

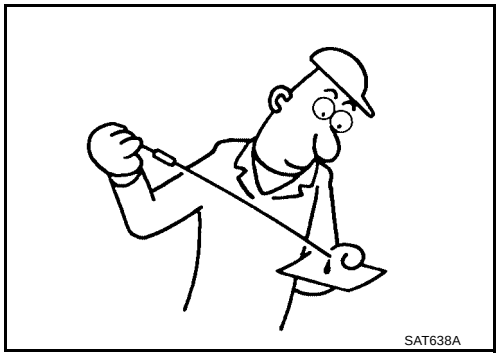
SYMPTOM:
Vehicle does not creep forward when selecting “D”, “2” or “1” position.

1. CHECK A/T FLUID LEVEL

Check A/T fluid level again.

OK or NG

OK >> GO TO 2.
NG >> Refill ATF.


SAT638A

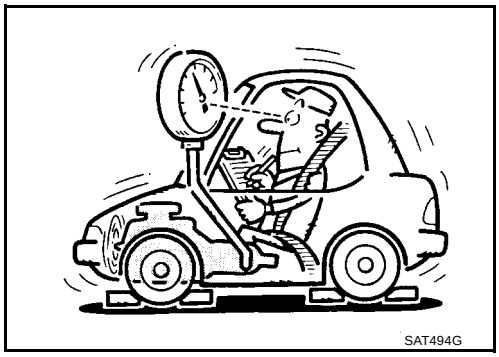
2. CHECK LINE PRESSURE

Check line pressure at idle with selector lever in “D” position. Refer to AT-67, "Line Pressure Test" .

OK or NG

OK >> GO TO 3.
NG >> 1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

3. Disassemble A/T.
4. Check the following item:
- Oil pump assembly

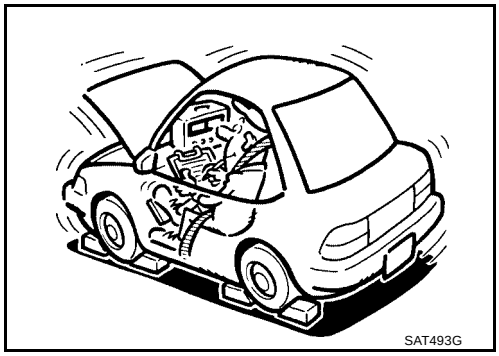

SAT494G

3. CHECK STALL TEST

Check stall revolution with selector lever in “D” position. Refer to AT-63, "Stall Test" .

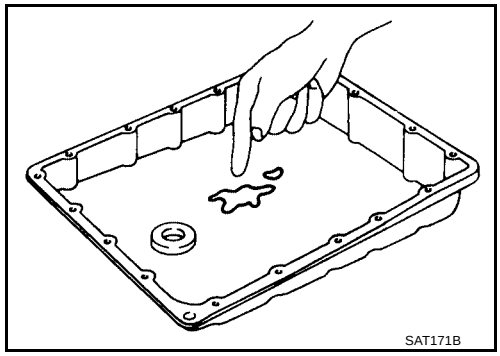
OK or NG

OK >> GO TO 4.
NG >> GO TO 6.


SAT493G

4. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



OK or NG

OK >> GO TO 5.
NG >> GO TO 6.

5. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

6. DETECT MALFUNCTIONING ITEM

1. Disassemble A/T.
2. Check the following items:

- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- Reverse clutch assembly
- High clutch assembly

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

8. Vehicle Cannot Be Started From D1

ECS005YV

SYMPTOM:
Vehicle cannot be started from D1 on Cruise Test — Part 1.

1. CHECK SYMPTOM

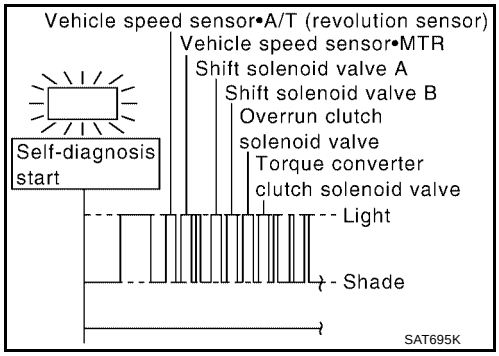
Is “6. Vehicle Does Not Creep Backward In R Position” OK?

Yes or No

Yes >> GO TO 2.
No >> Go to AT-226, "6. Vehicle Does Not Creep Backward In “R” Position" .

2. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to vehicle speed sensor·A/T (revolution sensor), overrun clutch solenoid valve, torque converter clutch solenoid valve, shift solenoid valve A, B or vehicle speed sensor·MTR after cruise test?

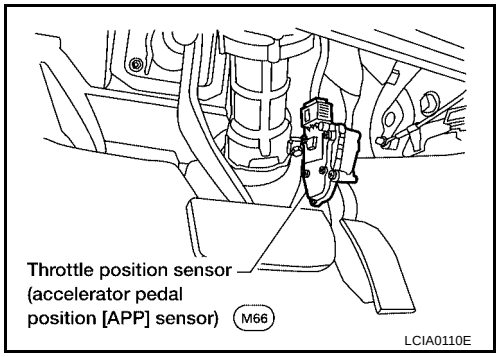


Yes or No

Yes >> Check damaged circuit. Refer to AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE" , AT-179, "DTC P0750 SHIFT SOLENOID VALVE A" , AT-183, "DTC P0755 SHIFT SOLENOID VALVE B" , AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" or AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" .
No >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-212, "DTC P0122, P0123 TP SENSOR" .

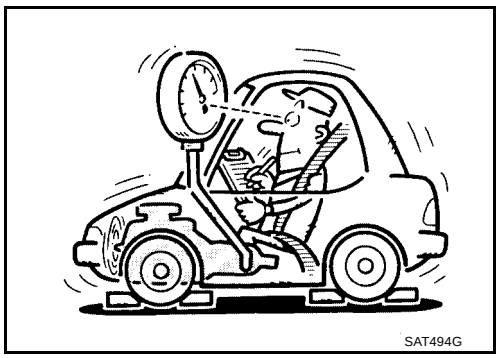


OK or NG

OK >> GO TO 4.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].

4. CHECK LINE PRESSURE

Check line pressure at stall point with selector lever in “D” position. Refer to AT-67, "Line Pressure Test" .

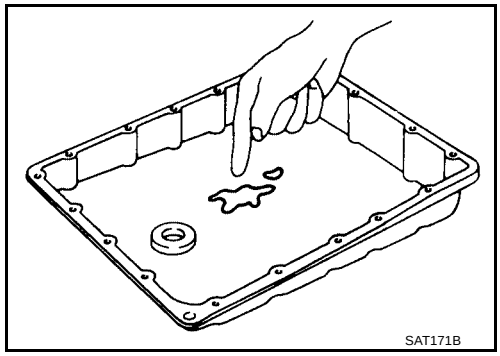


OK or NG

OK >> GO TO 5.
NG >> GO TO 8.

5. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



OK or NG

OK >> GO TO 6.
NG >> GO TO 8.

6. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

OK >> GO TO 7.
NG >> Repair or replace damaged parts.

7. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

8. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check the following items:
- High clutch assembly
- Torque converter
- Oil pump assembly
- Reverse clutch assembly
- Low and reverse brake assembly

OK or NG

OK >> GO TO 7.
NG >> Repair or replace damaged parts.

9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$

ECS005YW

SYMPTOM:
A/T does not shift from D_1 to D_2 at the specified speed.
A/T does not shift from D_4 to D_2 when depressing accelerator pedal fully at the specified speed.

1. CHECK SYMPTOM

Are “7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position” and “8. Vehicle Cannot Be Started From D_1 ” OK?

Yes or No

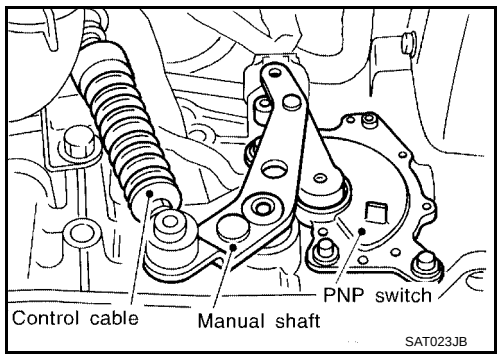
Yes >> GO TO 2.
No >> Go to AT-228, "7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position" , AT-230, "8. Vehicle Cannot Be Started From D_1" .

2. CHECK CONTROL CABLE

Check control cable. Refer to AT-262, "Control Cable Adjustment"

OK or NG

OK >> GO TO 3.
NG >> Adjust control cable. Refer to AT-262, "Control Cable Adjustment" .



3. CHECK VEHICLE SPEED SENSOR·A/T AND CHECK VEHICLE SPEED SENSOR·MTR CIRCUIT

Check vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuit. Refer to AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" .

OK or NG

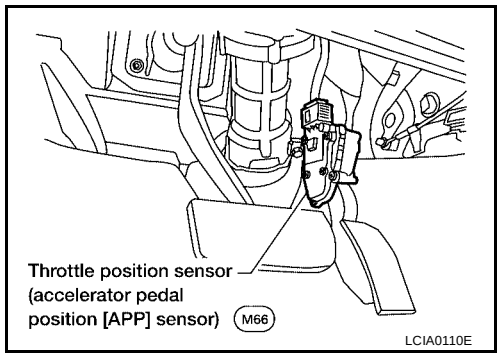
OK >> GO TO 4.
NG >> Repair or replace vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuits.

4. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-212, "DTC P0122, P0123 TP SENSOR" .

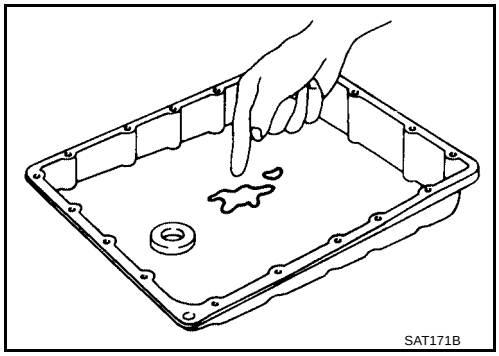
OK or NG

OK >> GO TO 5.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



5. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



OK or NG

OK >> GO TO 6.
NG >> GO TO 8.

6. DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

OK >> GO TO 7.
NG >> Repair or replace damaged parts.

7. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

8. DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter

3. Disassemble A/T.
4. Check the following items:

- Servo piston assembly
- Brake band

OK or NG

OK >> GO TO 7.
NG >> Repair or replace damaged parts.

10. A/T Does Not Shift: $D_2 \rightarrow D_3$

ECS005YX

SYMPTOM:
A/T does not shift from D_2 to D_3 at the specified speed.

1. CHECK SYMPTOM

Are “7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position” and “8. Vehicle Cannot Be Started From D_1 ” OK?

Yes or No

Yes >> GO TO 2.
No >> Go to AT-228, "7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position" , AT-230, "8. Vehicle Cannot Be Started From D_1" .

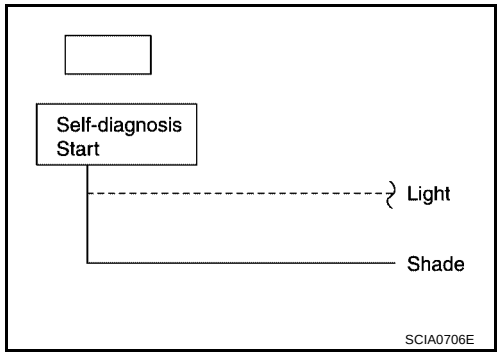
2. CHECK PNP SWITCH CIRCUIT

With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to PNP switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to PNP switch circuit?

Yes or No

Yes >> Check PNP switch circuit. Refer to AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" .
No >> GO TO 3.

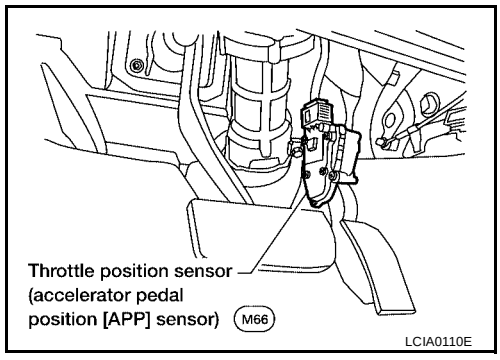


3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-212, "DTC P0122, P0123 TP SENSOR" .

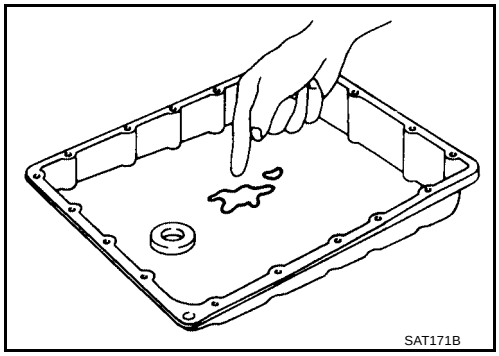
OK or NG

OK >> GO TO 4.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



4. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



OK or NG

OK >> GO TO 5.
NG >> GO TO 7.

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

6. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

7. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter

3. Disassemble A/T.
4. Check the following items:

- Servo piston assembly
- High clutch assembly
- Brake band

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

11. A/T Does Not Shift: $D_3 \rightarrow D_4$

ECS005YY

SYMPTOM:

- **A/T does not shift from D_3 to D_4 at the specified speed.**
- **A/T must be warm before D_3 to D_4 shift will occur.**

1. CHECK SYMPTOM

Are “7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position” and “8. Vehicle Cannot Be Started From D_1 ” OK?

Yes or No

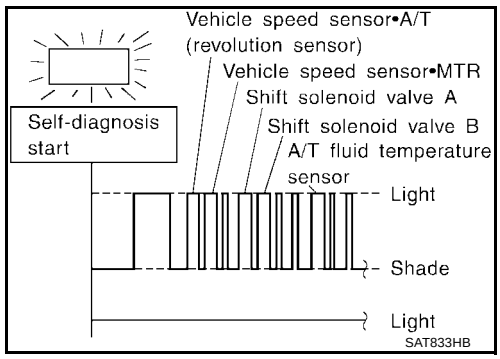
Yes >> GO TO 2.
No >> Go to AT-228, "7. Vehicle Does Not Creep Forward In “D”, “2” Or “1” Position" , AT-230, "8. Vehicle Cannot Be Started From D_1" .

2. CHECK SELF-DIAGNOSTIC RESULTS

With CONSULT-II

Does self-diagnosis, after cruise test, show damage to any of the following circuits?

- PNP switch
- Overdrive control switch
- A/T fluid temperature sensor
- Vehicle speed sensor·A/T (revolution sensor)
- Shift solenoid valve A or B
- Vehicle speed sensor·MTR



Yes or No

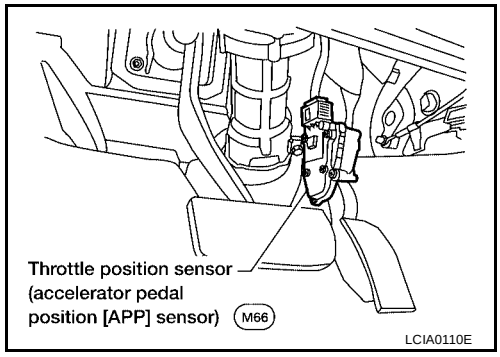
Yes >> Check damaged circuit. Refer to AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" , AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" , AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-179, "DTC P0750 SHIFT SOLENOID VALVE A" , AT-183, "DTC P0755 SHIFT SOLENOID VALVE B" , AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" .
No >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-212, "DTC P0122, P0123 TP SENSOR" .

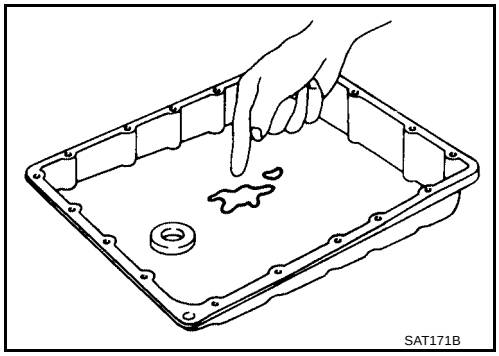
OK or NG

OK >> GO TO 4.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



4. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



OK or NG

OK >> GO TO 5.
NG >> GO TO 7.

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Shift valve A
- Overrun clutch control valve
- Shift solenoid valve A
- Pilot valve
- Pilot filter

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

6. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

7. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Shift valve A
- Overrun clutch control valve
- Shift solenoid valve A
- Pilot valve
- Pilot filter

3. Disassemble A/T.
4. Check the following items:

- Servo piston assembly
- Brake band

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

12. A/T Does Not Perform Lock-up

ECS005YZ

SYMPTOM:
A/T does not perform lock-up at the specified speed.

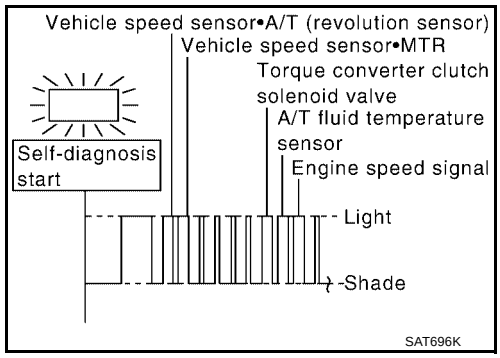
1. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to A/T fluid temperature sensor, vehicle speed sensor·A/T (revolution sensor), engine speed signal, torque converter clutch solenoid valve, or vehicle speed sensor·MTR circuit after cruise test?

Yes or No

Yes >> Check torque converter clutch solenoid valve circuit. Refer to AT-120, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" , AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-131, "DTC P0725 ENGINE SPEED SIGNAL" , AT-159, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE" , and AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" .

No >> GO TO 2.



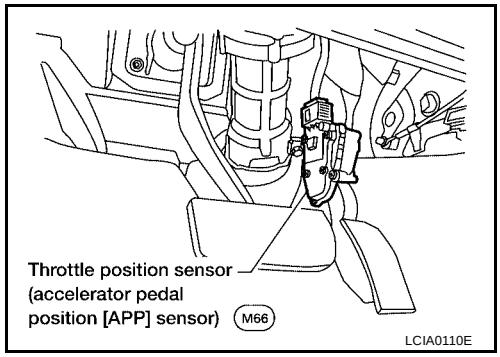
2. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-212, "DTC P0122, P0123 TP SENSOR" .

OK or NG

OK >> GO TO 3.

NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



3. DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Torque converter clutch control valve
- Torque converter relief valve
- Pilot valve
- Pilot filter

3. Remove A/T.
4. Check torque converter.

OK or NG

OK >> GO TO 4.

NG >> Repair or replace damaged parts.

4. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**

NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

13. A/T Does Not Hold Lock-up Condition

ECS005Z0

SYMPTOM:
A/T does not hold lock-up condition for more than 30 seconds.

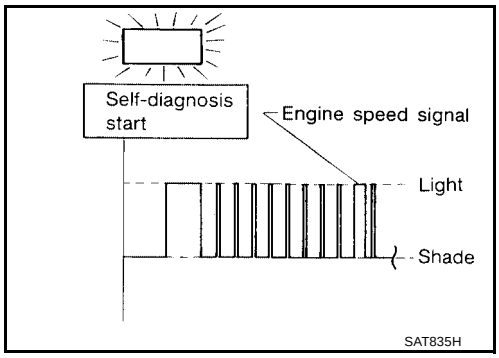
1. CHECK DIAGNOSTIC RESULTS

Does self-diagnosis show damage to engine speed signal circuit after cruise test?

Yes or No

Yes >> Check engine speed signal circuit. Refer to AT-131, "DTC P0725 ENGINE SPEED SIGNAL" .

No >> GO TO 2.



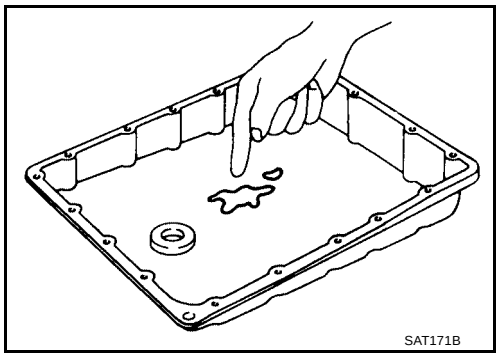
2. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.

OK or NG

OK >> GO TO 3.

NG >> GO TO 5.



3. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Torque converter clutch control valve
- Pilot valve
- Pilot filter

OK or NG

OK >> GO TO 4.

NG >> Repair or replace damaged parts.

4. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**

NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:
- Torque converter clutch control valve
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check torque converter and oil pump assembly.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace damaged parts.

14. Lock-up Is Not Released

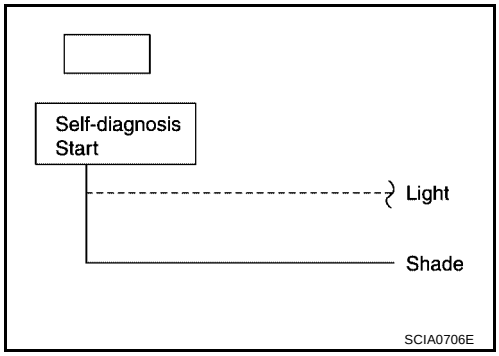
ECS005Z1

SYMPTOM:
Lock-up is not released when accelerator pedal is released.

1. CHECK THROTTLE POSITION SWITCH CIRCUIT

With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to closed throttle position switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to closed throttle position switch circuit?



Yes or No

Yes >> Check closed throttle position switch circuit. Refer to AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" .
No >> GO TO 2.

2. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

15. Engine Speed Does Not Return To Idle (Light Braking D4 → D3)

ECS005Z2

SYMPTOM:

- **Engine speed does not smoothly return to idle when A/T shifts from D4 to D3 .**
- **Vehicle does not decelerate by engine brake when turning overdrive control switch OFF.**
- **Vehicle does not decelerate by engine brake when shifting A/T from “D” to “2” position.**

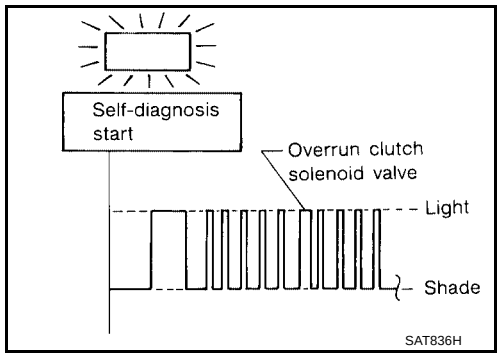
1. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to overrun clutch solenoid valve circuit after cruise test?

Yes or No

Yes >> Check overrun clutch solenoid valve circuit. Refer to AT-193, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" .

No >> GO TO 2.



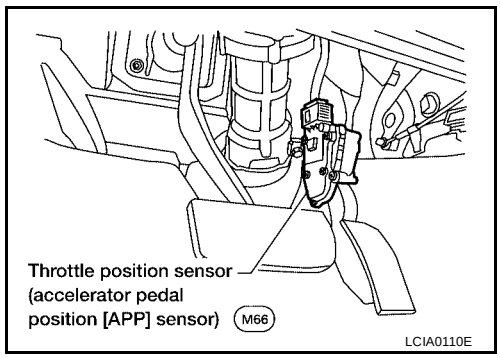
2. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-212, "DTC P0122, P0123 TP SENSOR" .

OK or NG

OK >> GO TO 3.

NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



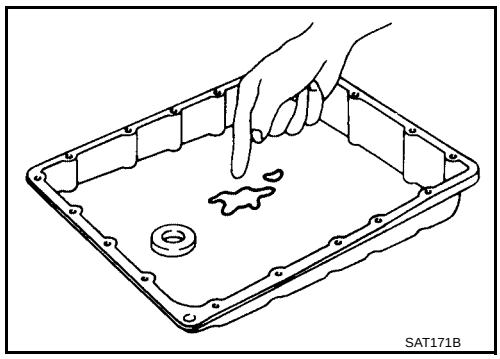
3. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.

OK or NG

OK >> GO TO 4.

NG >> GO TO 6.



4. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

5. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

6. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-259, "REMOVAL" .
2. Check the following items:

- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve

3. Disassemble A/T.
4. Check the following items:

- Overrun clutch assembly

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

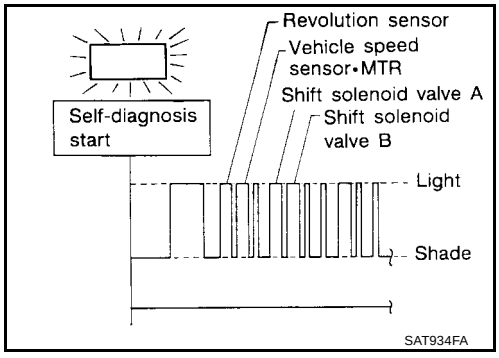
16. Vehicle Does Not Start From D1

ECS005Z3

SYMPTOM:
Vehicle does not start from D1 on Cruise test — Part 2.

1. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to vehicle speed sensor·A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor·MTR after cruise test?



Yes or No

Yes >> Check damaged circuit. Refer to AT-126, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-179, "DTC P0750 SHIFT SOLENOID VALVE A" , AT-183, "DTC P0755 SHIFT SOLENOID VALVE B" , AT-203, "DTC VHCL SPEED SEN·MTR VEHICLE SPEED SENSOR·MTR" .
No >> GO TO 2.

2. CHECK SYMPTOM

Check again.

OK or NG

OK >> Go to AT-230, "8. Vehicle Cannot Be Started From D1" .
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch “ON” → “OFF”

ECS005Z4

SYMPTOM:
A/T does not shift from D_4 to D_3 when changing overdrive control switch to “OFF” position.

1. CHECK OVERDRIVE CONTROL SWITCH CIRCUIT

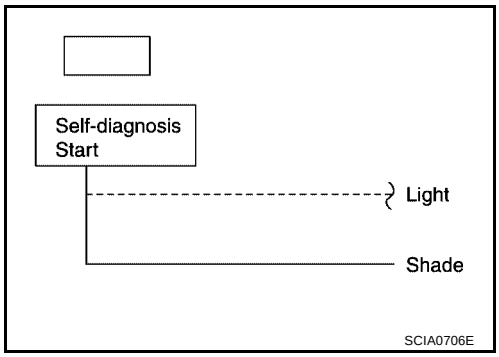
With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to overdrive control switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to overdrive control switch circuit?

Yes or No

Yes >> Check overdrive control switch circuit. Refer to AT-249, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}" .

No >> Go to AT-235, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" .



18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever “D” → “2” Position

ECS005Z5

SYMPTOM:
A/T does not shift from D_3 to 2_2 when changing selector lever from “D” to “2” position.

1. CHECK PNP SWITCH CIRCUIT

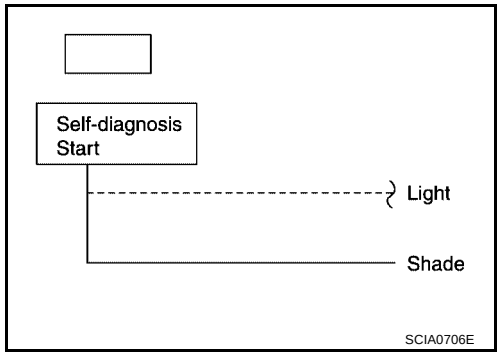
With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to PNP switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to PNP switch circuit?

Yes or No

Yes >> Check PNP switch circuit. Refer to AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH"

No >> Go to AT-233, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$" .



19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever “2” → “1” Position

ECS005Z6

SYMPTOM:
A/T does not shift from 2_2 to 1_1 when changing selector lever from “2” to “1” position.

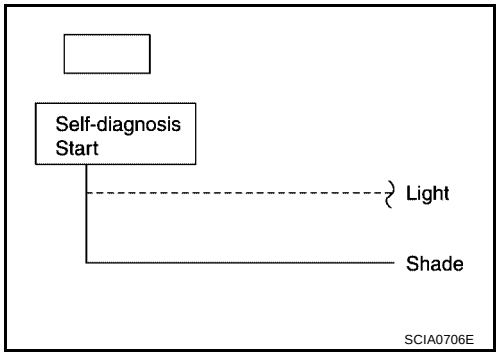
1. CHECK PNP SWITCH CIRCUIT

With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to PNP switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to PNP switch circuit?

Yes or No

Yes >> Check PNP switch circuit. Refer to AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH" .
No >> GO TO 2.

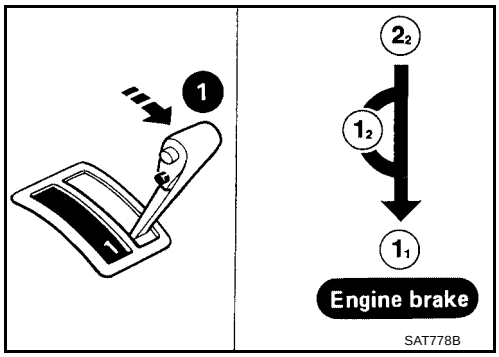


2. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> 1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.



20. Vehicle Does Not Decelerate By Engine Brake

ECS005Z7

SYMPTOM:
Vehicle does not decelerate by engine brake when shifting from 2_2 (1_2) to 1_1.

1. CHECK SYMPTOM

Is “6. Vehicle Does Not Creep Backward In R Position” OK?

Yes or No

Yes >> Go to AT-243, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)".
No >> Go to AT-226, "6. Vehicle Does Not Creep Backward In “R” Position".

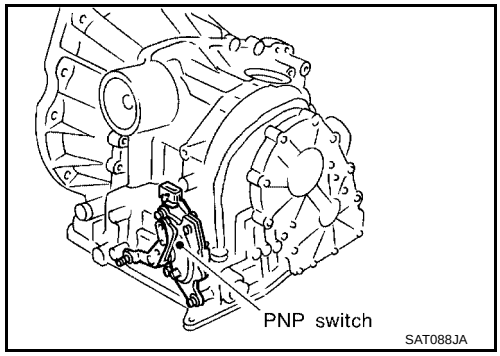
21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}

ECS006GY

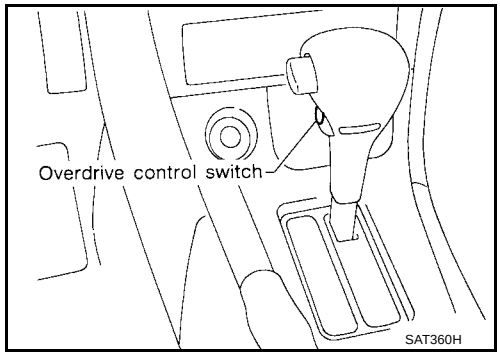
SYMPTOM:
O/D OFF indicator lamp does not come on in TCM self-diagnostic procedure even if the lamp circuit is good.

DESCRIPTION

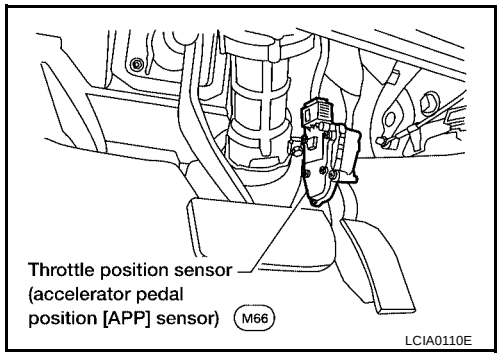
- Park/neutral position (PNP) switch
  The park/neutral (PNP) switch assembly includes a transmission range switch. The transmission range switch detects the selector lever position and sends a signal to the TCM.



- Overdrive control switch
  Detects the overdrive control switch position (ON or OFF) and sends a signal to the TCM.



- Throttle position sensor [accelerator pedal position (APP) sensor]
  The throttle position sensor [accelerator pedal position (APP) sensor] is part of the system that controls the throttle position. This system also uses an electric throttle control actuator, which consists of a throttle control motor and throttle position sensors. Accelerator pedal position signal is sent to the ECM.



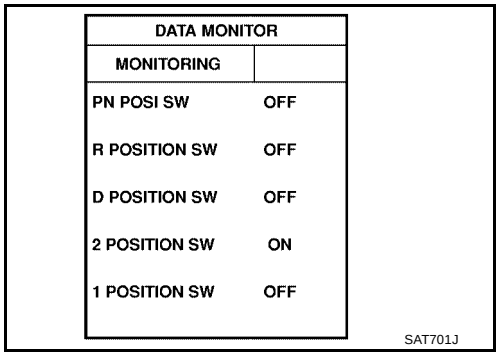
DIAGNOSTIC PROCEDURE

NOTE:
The diagnostic procedure includes inspections for the overdrive control switch circuits.

1. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT (WITH CONSULT-II)

With CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out P/N, R, D, 2 and 1 position switches moving selector lever to each position.
   Check that the signal of the selector lever position is indicated properly.



OK or NG

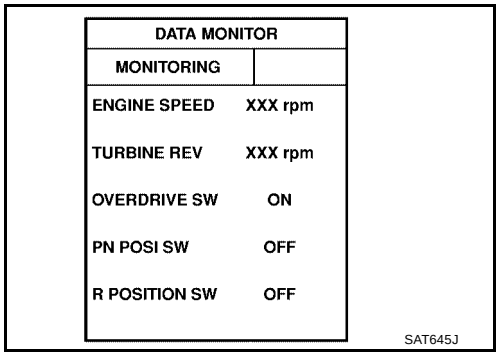
OK >> GO TO 2.
NG >> Check the following items:

- PNP switch (Refer to AT-115, "DTC P0705 PARK/NEUTRAL POSITION (PNP) SWITCH"
- Harness for short or open between ignition switch and PNP switch
- Harness for short or open between PNP switch and TCM

2. CHECK OVERDRIVE CONTROL SWITCH CIRCUIT (WITH CONSULT-II)

With CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out “OVERDRIVE SW”.
   Check the signal of the overdrive control switch is indicated properly.
   (Overdrive control switch “ON” displayed on CONSULT-II means overdrive “OFF”.)



OK or NG

OK >> GO TO 3.
NG >> Check the following items:

- Overdrive control switch (Refer to AT-251, "Overdrive Control Switch"
- Harness for short or open between TCM and overdrive control switch
- Harness of ground for overdrive control switch for short or open

3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

- Perform throttle position sensor [accelerator pedal position (APP) sensor] inspection. Refer to AT-187, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]" .

OK or NG

OK >> GO TO 4.
NG >> Repair or replace damaged parts.

4. CHECK TCM INSPECTION

1. Perform AT-250, "DIAGNOSTIC PROCEDURE"

OK or NG

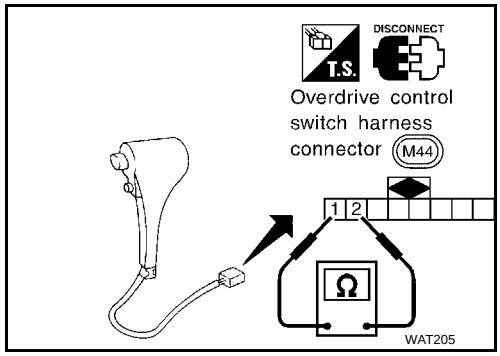
OK >> INSPECTION END.
NG >> ● Perform TCM input/output signal inspection.
● If NG, recheck TCM pin terminals for damage or loose connections with harness connector.

COMPONENT INSPECTION

Overdrive Control Switch

● Check continuity between terminals 1 and 2.

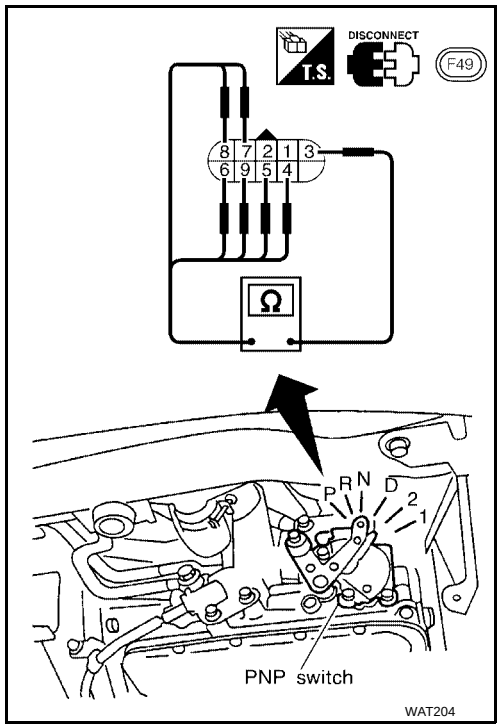
Switch position	Continuity
RELEASED	No
DEPRESSED	Yes



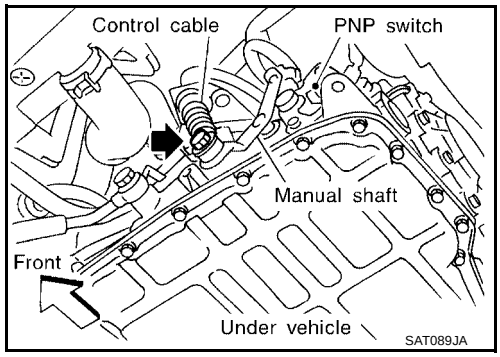
PNP Switch

1. Check continuity between terminals 1 and 2 and between terminals 3 and 4, 5, 6, 7, 8, 9 while moving manual shaft through each position.

Lever position	Terminal No.	
P	3 — 7	1 — 2
R	3 — 8	
N	3 — 9	1 — 2
D	3 — 6	
2	3 — 5	
1	3 — 4	



2. If NG, check again with manual control cable disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust manual control cable. Refer to AT-262, "Control Cable Adjustment" .
4. If NG on step 2, remove PNP switch from A/T and check continuity of PNP switch terminals. Refer to step 1.
5. If OK on step 4, adjust PNP switch. Refer to AT-262, "Park/Neutral Position (PNP) Switch Adjustment" .
6. If NG on step 4, replace PNP switch.



A/T SHIFT LOCK SYSTEM

PFP:34950

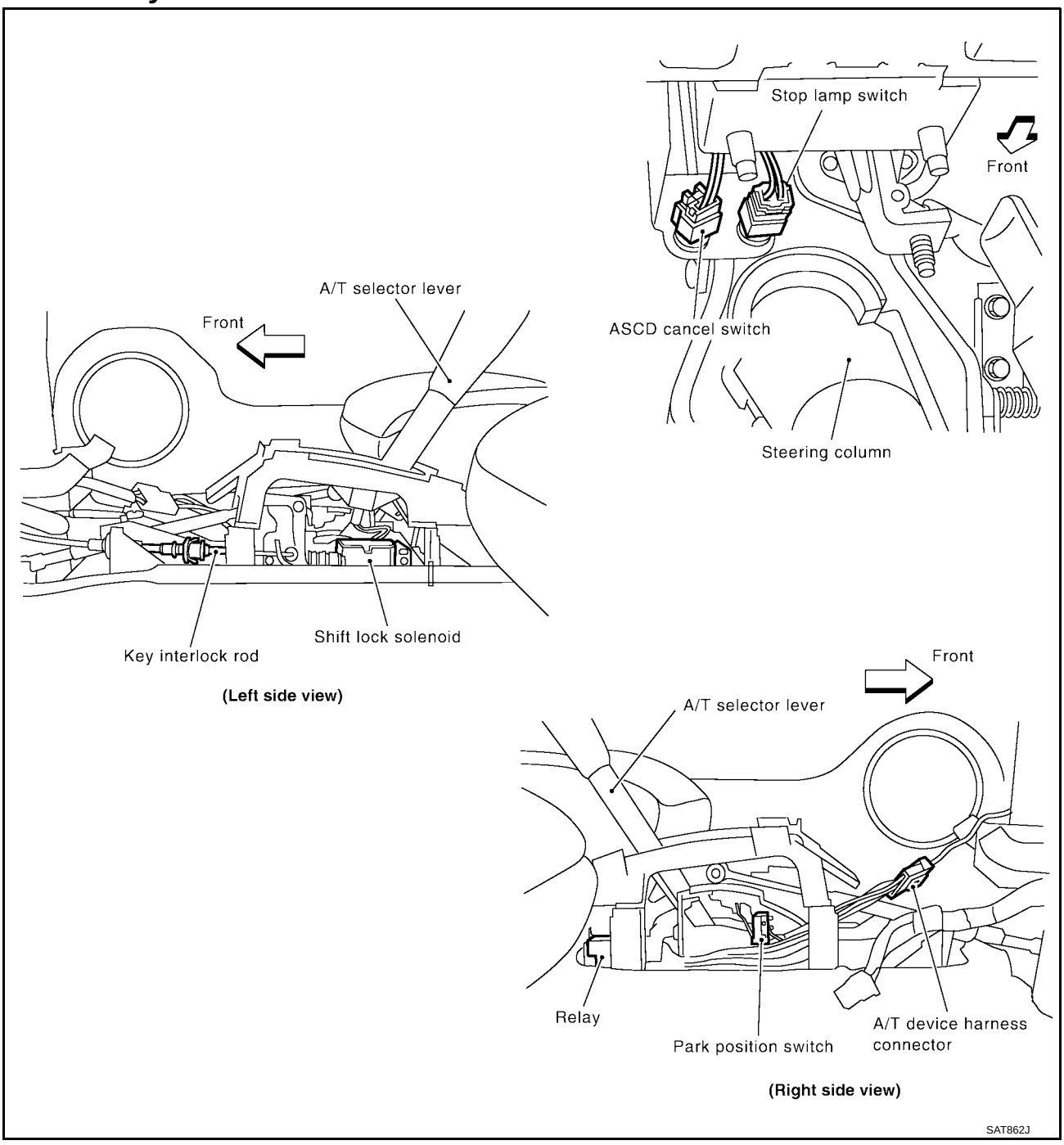
Description

ECS006H0

- The mechanical key interlock mechanism also operates as a shift lock:
  With the key switch turned to ON, the selector lever cannot be shifted from “P” (parking) to any other position unless the brake pedal is depressed.
  With the key removed, the selector lever cannot be shifted from “P” to any other position.
  The key cannot be removed unless the selector lever is placed in “P”.
- The shift lock and key interlock mechanisms are controlled by the ON-OFF operation of the shift lock solenoid and by the operation of the rotator and slider located inside the key cylinder.

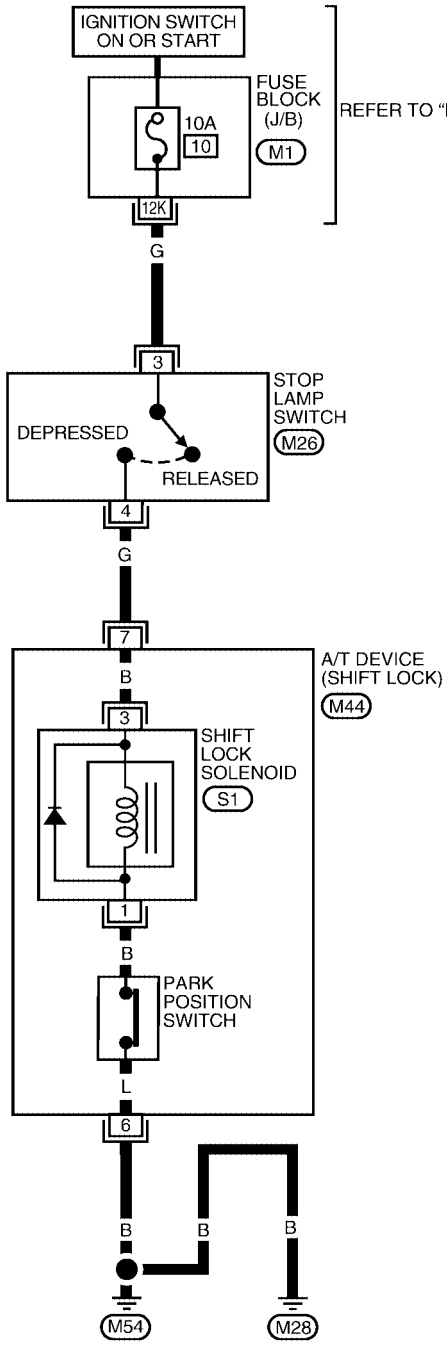
Shift Lock System Electrical Parts Location

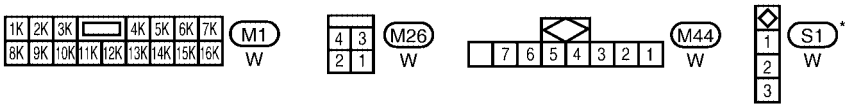
ECS006H1



Wiring Diagram — SHIFT —

ECS006H2





*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.

WCWA0126E

Diagnostic Procedure

ECS006H3

SYMPTOM 1:

- **Selector lever cannot be moved from “P” position with key in ON position and brake pedal applied.**
- **Selector lever can be moved from “P” position with key in ON position and brake pedal released.**
- **Selector lever can be moved from “P” position when key is removed from key cylinder.**

SYMPTOM 2:

Ignition key cannot be removed when selector lever is set to “P” position. It can be removed when selector lever is set to any position except “P”.

1. CHECK KEY INTERLOCK CABLE

Check key interlock cable for damage.

OK or NG

OK >> GO TO 2.
NG >> Repair key interlock cable. Refer to AT-637, "Components" .

2. CHECK SELECTOR LEVER POSITION

Check selector lever position for damage.

OK or NG

OK >> GO TO 3.
NG >> Check selector lever. Refer to AT-642, "Control Cable Adjustment" .

3. CHECK POWER SOURCE

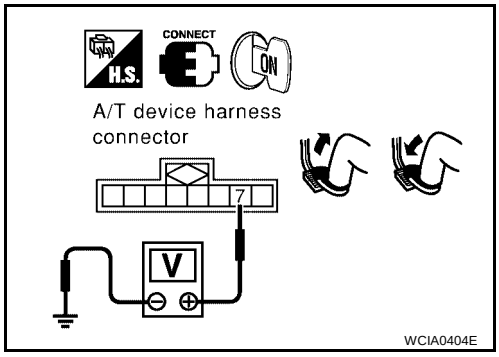
Turn ignition switch to “ON” position.
(Do not start engine.)

- Check voltage between A/T device harness connector M44 terminal 7 (G) and ground.

Voltage:

Brake pedal depressed: Battery voltage

Brake pedal released: 0V



OK or NG

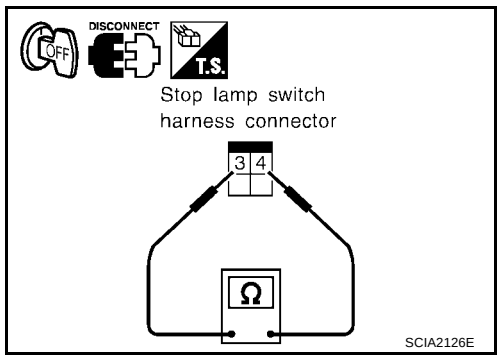
OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING ITEM

Check the following items.

1. Harness for open or short between fuse block (J/B) connector M1 terminal 12K and stop lamp switch harness connector M26 terminal 3.
2. Harness for open or short stop lamp switch harness connector M26 terminal 4 and A/T device harness connector M44 terminal 7 (G).
3. 10A fuse [10, located in the fuse block (J/B)].
4. Check continuity between stop lamp switch harness connector M26 terminals 3 (G) and 4 (G).

Condition	Continuity
When brake pedal is depressed	Yes
When brake pedal is released	No



Check stop lamp switch after adjusting brake pedal —refer to BR-12, "STOP LAMP SWITCH AND ASCD CANCEL SWITCH CLEARANCE"

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

5. CHECK GROUND CIRCUIT

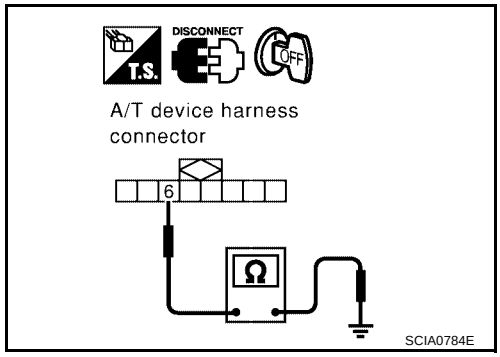
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T device harness connector.
3. Check continuity between A/T device harness M44 terminal 6 (B) and ground.

Continuity should exist

Continuity should exist.
If OK, check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit in harness.



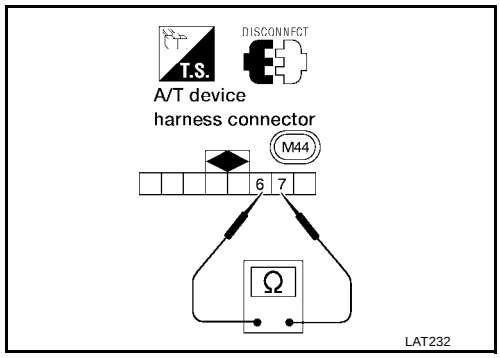
6. CHECK PARK POSITION SWITCH

Check continuity between A/T device harness connector M44 terminals 6 (B) and 7 (G).

Selector lever position	Continuity
"P" position	Yes
Other position	No

OK or NG

OK >> GO TO 7.
NG >> Replace park position switch.



7. CHECK SHIFT LOCK SOLENOID

1. Connect A/T device harness connector.
2. Turn ignition switch to "ON" position.
3. Check operation sound.

Condition	Brake pedal	Operation sound
When ignition switch is turned to "ON" position and selector lever is in the "P" position.	Depressed	Yes
	Released	No

OK or NG

OK >> GO TO 8.
NG >> Replace shift lock solenoid.

8. CHECK SHIFT LOCK OPERATION

1. Reconnect shift lock harness connector.
2. Turn ignition switch from “OFF” to “ON” position. (Do not start engine.)
3. Recheck shift lock operation.

OK or NG

OK >> INSPECTION END
NG >> GO TO .9

9. CHECK A/T DEVICE INSPECTION

1. Perform A/T device input/output signal inspection test.
2. If NG, recheck harness connector connection.

OK or NG

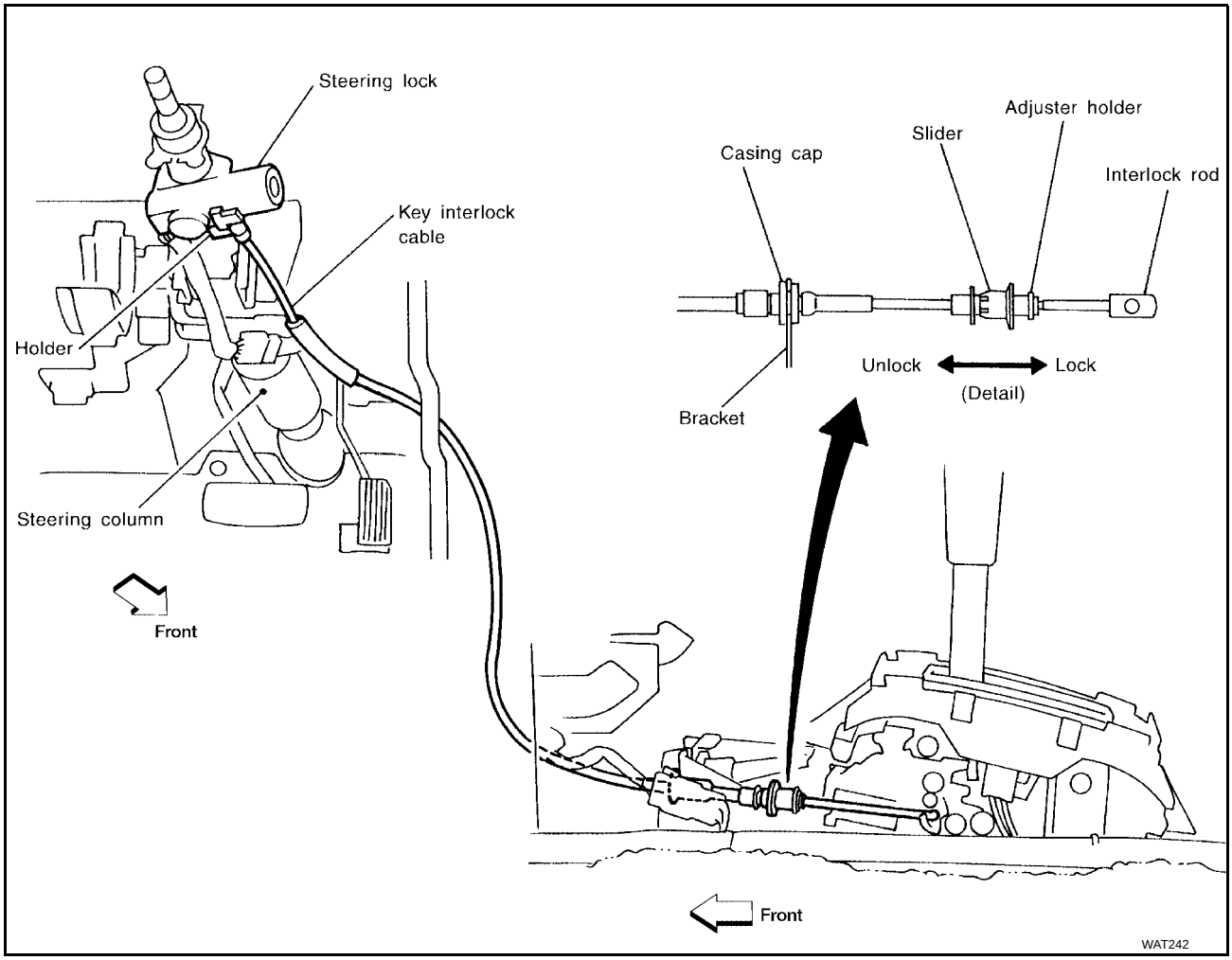
OK >> INSPECTION END
NG >> Repair or replace damaged parts.

KEY INTERLOCK CABLE

PFP:34908

Components

ECS005ZD



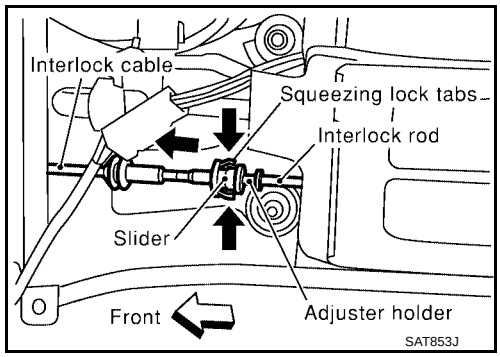
CAUTION:

- **Install key interlock cable in such a way that it will not be damaged by sharp bends, twists or interference with adjacent parts.**
- **After installing key interlock cable to control device, make sure that casing cap and bracket are firmly secured in their positions.**

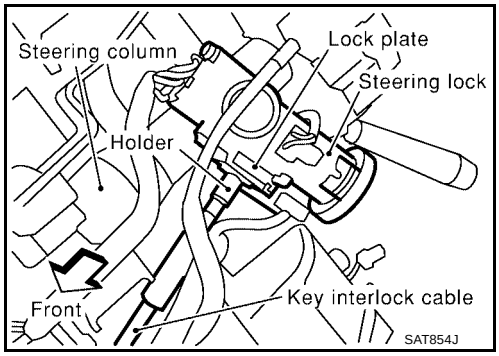
Removal

ECS005ZE

1. Unlock slider by squeezing lock tabs on slider from adjuster holder and remove interlock rod from cable.



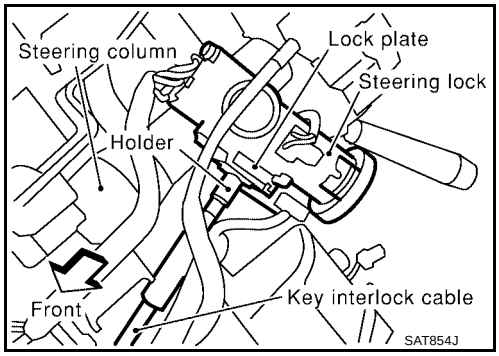
2. Remove lock plate from steering lock assembly and remove key interlock cable.



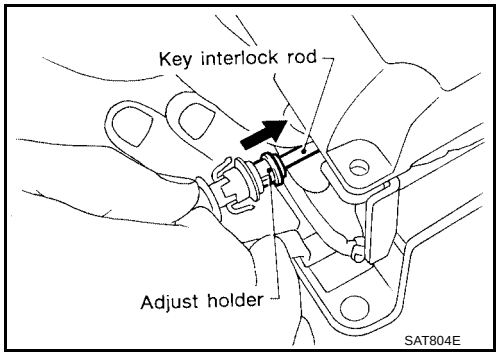
Installation

ECS005ZF

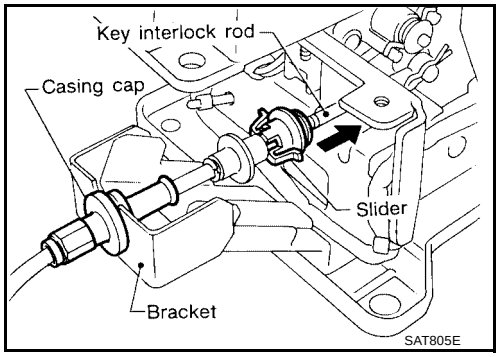
1. Turn ignition key to lock position.
2. Set A/T selector lever to "P" position.
3. Set key interlock cable to steering lock assembly and install lock plate.
4. Clamp cable to steering column and attach to control cable with band.



5. Insert interlock rod into adjuster holder.



6. Install casing cap to bracket.
7. Move slider in order to connect adjuster holder to interlock rod.



ON-VEHICLE SERVICE

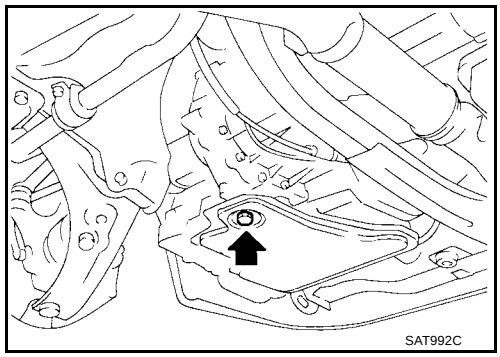
PFP:00000

Control Valve Assembly and Accumulators

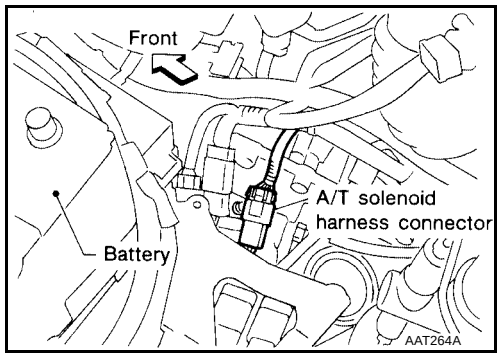
ECS005ZG

REMOVAL

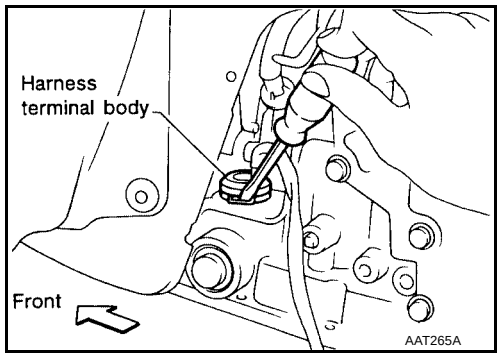
1. Drain ATF from transaxle.
2. Remove oil pan and gasket.
   - **Always replace oil pan bolts as they are self-sealing bolts.**



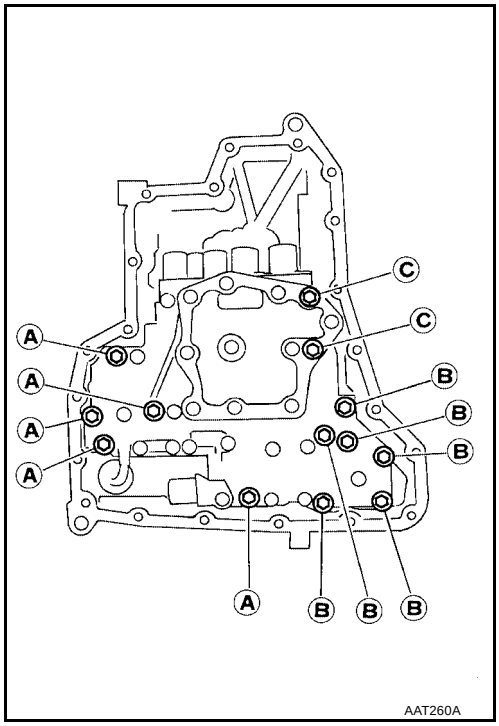
3. Disconnect A/T solenoid valve harness connector.



4. Remove stopper ring from A/T solenoid harness terminal body.
5. Remove A/T solenoid harness by pushing terminal body into transmission case.



6. Remove control valve assembly mounting bolts A, B and C.

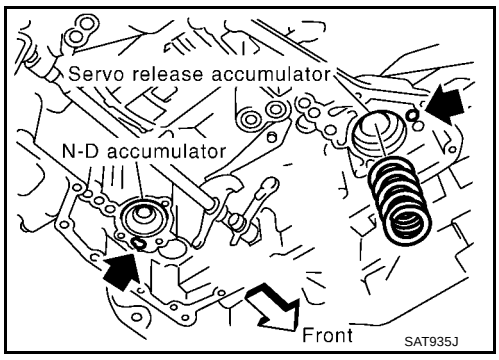


Bolt length, number and location:

Bolt symbol	A	B	C
Bolt length "l"	40.0 mm (1.575 in)	33.0 mm (1.299 in)	43.5 mm (1.713 in)
Number of bolts	5	6	2

- **Be careful not to drop manual valve and servo release accumulator return springs.**

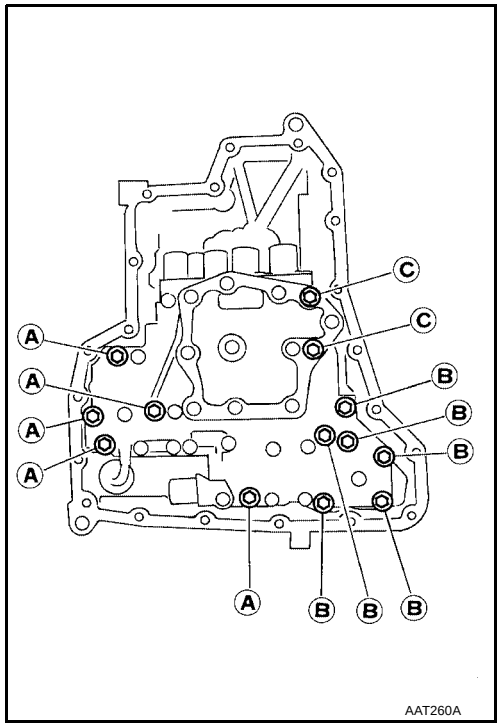
7. Disassemble and inspect control valve assembly if necessary. Refer to AT-297, "Components" .
8. Remove servo release and N-D accumulators by applying compressed air if necessary.
   - **Hold each piston with a clean, lint-free towel.**



INSTALLATION

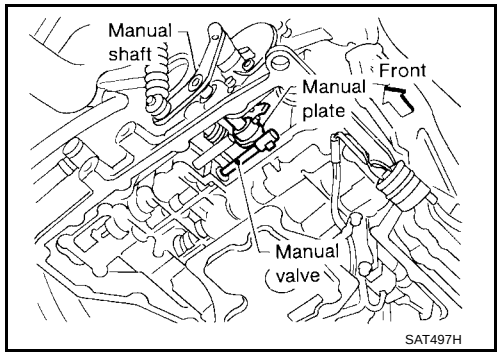
- **Tighten mounting bolts A, B and C to specification.**

  : **7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)**



AAT260A

- **Set manual shaft in Neutral position, then align manual plate with groove in manual valve.**
- **After installing control valve assembly to transmission case, make sure that selector lever can be moved to all positions.**



SAT497H

Control Cable Adjustment

ECS005ZH

Move selector lever from the “P” position to the “1” position. You should be able to feel the detents in each position. If the detents cannot be felt or if the pointer indicating the position is improperly aligned, the control cable needs adjustment.

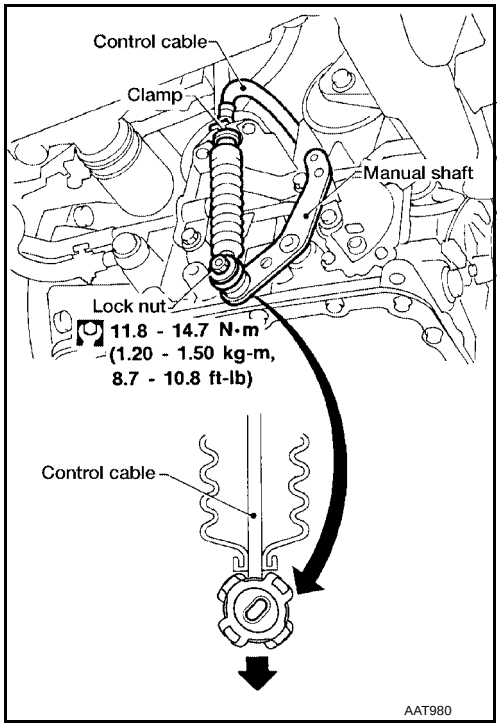
1. Place selector lever in “P” position.
2. Loosen control cable lock nut and place manual shaft in “P” position.
3. Push control cable, by specified force, in the direction of the arrow shown in the illustration.

Specified force : 9.8 N (1.0 kg, 2.2 lb)

4. Release control cable in the opposite direction of the arrow for 1.0 mm (0.039 in).
5. Tighten control cable lock nut by hand.
6. Tighten control cable lock nut.

: 11.8 - 14.7 N·m (1.20 - 1.50 kg-m, 8.7 - 10.8 ft-lb)

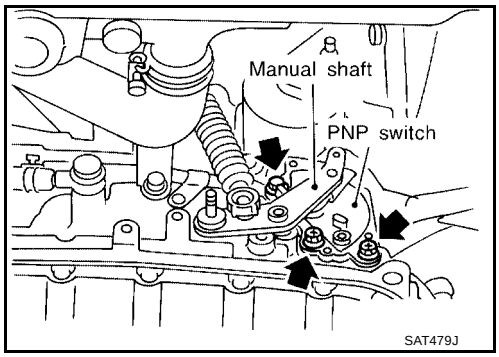
7. Move selector lever from “P” to “1” position again. Make sure that selector lever moves smoothly.
8. Apply grease to contacting areas of selector lever and control cable. Install any part removed.



Park/Neutral Position (PNP) Switch Adjustment

ECS005ZI

1. Remove control cable end from manual shaft.
2. Set manual shaft in “N” position.
3. Loosen PNP switch fixing bolts.

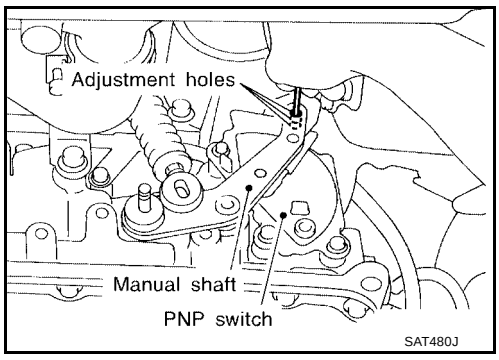


4. Use a 4 mm (0.157 in) pin for this adjustment.

a. Insert the pin straight into the manual shaft adjustment hole.

b. Rotate PNP switch until the pin can also be inserted straight into hole in PNP switch.

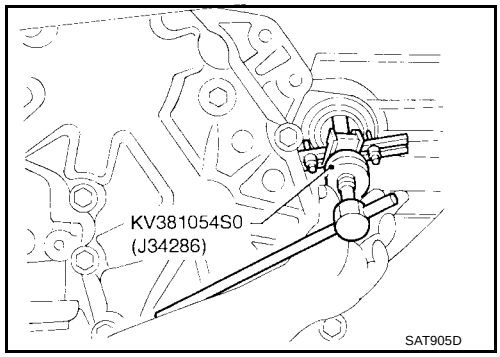
5. Tighten PNP switch fixing bolts.
6. Remove pin from adjustment hole after adjusting PNP switch.
7. Reinstall any part removed.
8. Adjust control cable. Refer to AT-262, "Control Cable Adjustment" .
9. Check continuity of PNP switch. Refer to AT-119, "Component Inspection" .



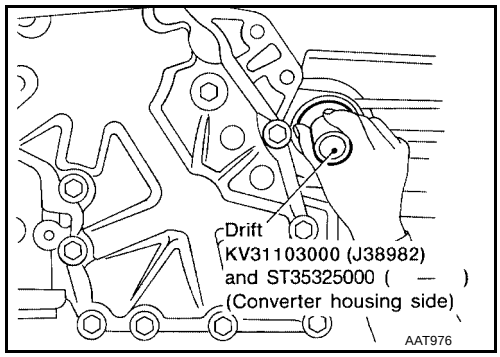
Differential Side Oil Seal Replacement

ECS005ZJ

1. Remove drive shaft assemblies using Tool. Refer to FAX-14, "Removal" .
2. Remove oil seals.



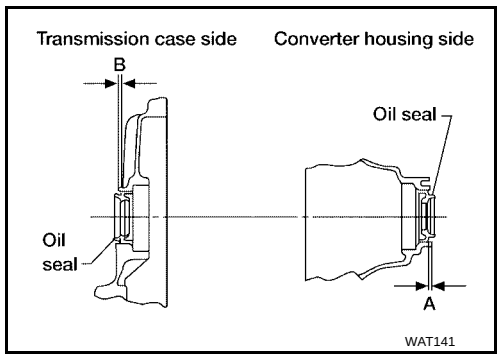
3. Install oil seals using Tool.
   - **Apply ATF to oil seal surface before installing.**



   - **Install oil seals so that dimensions “A” and “B” are within specifications.**

Unit: mm (in)

A	B
5.5 - 6.5 (0.217 - 0.256)	–0.5 to 0.5 (–0.020 to 0.020)



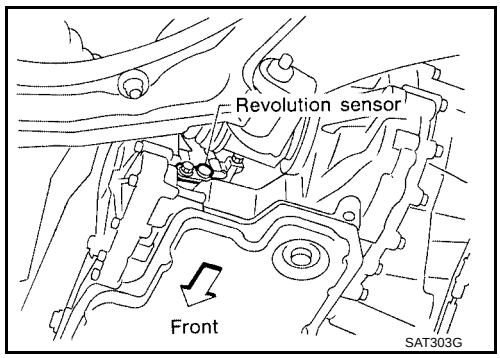
4. Reinstall any part removed.

Revolution Sensor Replacement

ECS005ZK

1. Disconnect revolution sensor harness connector.
2. Remove harness bracket from A/T.
3. Remove revolution sensor from A/T.
4. Reinstall any part removed.

Always use new sealing parts.



REMOVAL AND INSTALLATION

PFP:00000

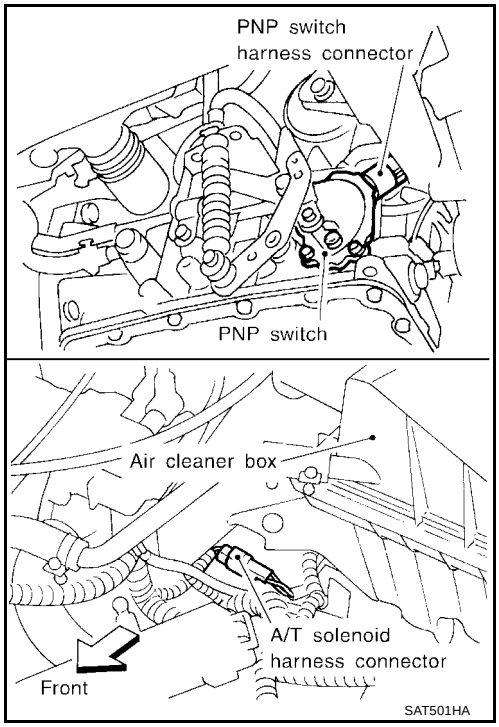
Removal

ECS005ZL

CAUTION:

Before separating transaxle from engine, remove the crankshaft position sensor (OBD) from transaxle. Be careful not to damage sensor.

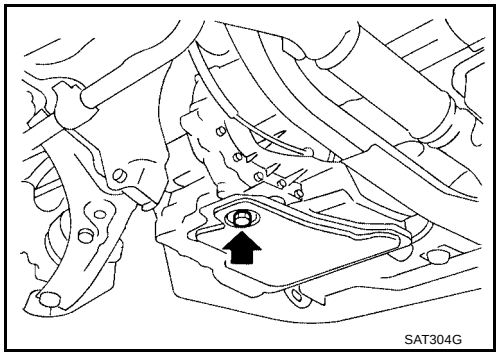
1. Remove battery and bracket.
2. Remove air duct between throttle body and air cleaner.
3. Disconnect terminal cord assembly, PNP switch harness connector and revolution sensor harness connector.



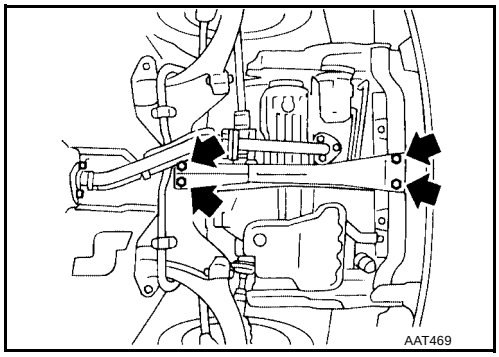
4. Drain ATF from transaxle.
5. Disconnect control cable from transaxle.
6. Disconnect oil cooler hoses.
7. Remove drive shafts. Refer to FAX-14, "Removal" .
8. Remove the intake manifold support bracket. Refer to EM-15, "Removal and Installation" .
9. Remove starter motor from transaxle.

Tighten bolts to specified torque.

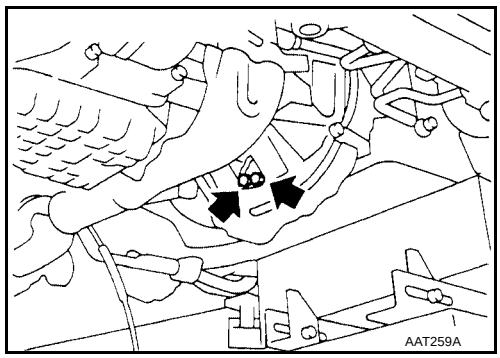
: 33.3 - 46.1 N·m (3.4 - 4.7 kg-m, 25 - 34 ft-lb)



10. Remove upper bolts fixing transaxle to engine.
11. Support transaxle with a jack.
12. Remove center member.
    - Tighten center member fixing bolts to specified torque, Refer to EM-68, "INSTALLATION" .



13. Remove rear plate cover.
14. Remove torque converter bolts.
    Rotate crankshaft to gain access to securing bolts.
15. Remove rear transaxle to engine bracket. Refer to EM-66, "REMOVAL" .
16. Support engine with a jack.
17. Remove rear transaxle mount. Refer to EM-65 .
18. Remove lower bolts fixing transaxle to engine.
19. Lower transaxle while supporting it with a jack.

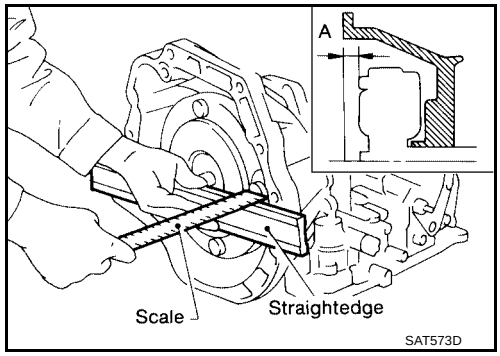


Installation

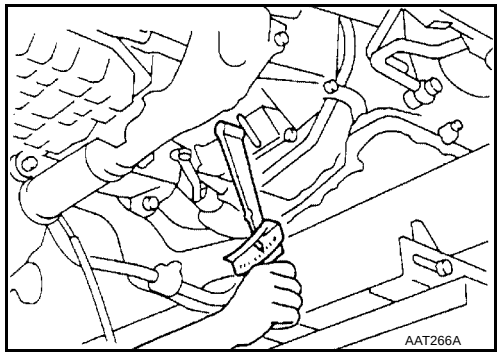
ECS005ZM

1. When connecting torque converter to transaxle, measure distance “A” to be certain that they are correctly assembled.

   Distance “A” : 21.1 mm (0.831 in)

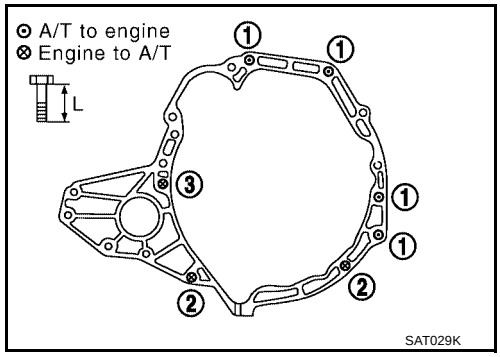


2. Install torque converter to drive plate.
   - **With converter installed, rotate crankshaft several turns to check that transaxle rotates freely without binding.**

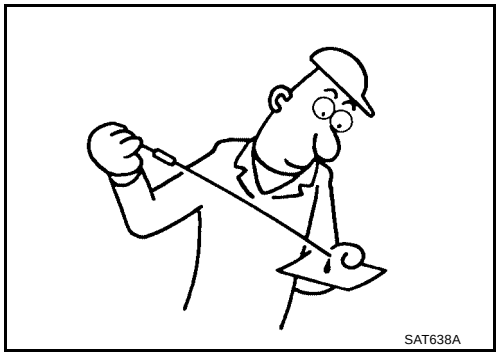


3. Tighten bolts fixing transaxle.

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	Bolt length “l ” mm (in)
1	30 - 40 (3.1 - 4.1, 23 - 29)	50 (1.97)
2	16 - 20 (1.6 - 2.1, 12 - 15)	25 (0.98)
3	31 - 40 (3.1 - 4.1, 23 - 29)	30 (1.18)



4. Reinstall any part removed.
5. Adjust control cable. Refer to AT-262, "Control Cable Adjustment" .
6. Check continuity of PNP switch. Refer to AT-119, "PARK/NEUTRAL POSITION SWITCH" .
7. Refill transaxle with ATF and check fluid level.
8. Move selector lever through all positions to be sure that transaxle operates correctly. With parking brake applied, idle engine. Move selector lever through “N” to “D”, to “2”, to “1” and “R” positions. A slight shock should be felt through the hand gripping the selector each time the transaxle is shifted.
9. Perform road test. Refer to AT-68, "Road Test" .


SAT638A

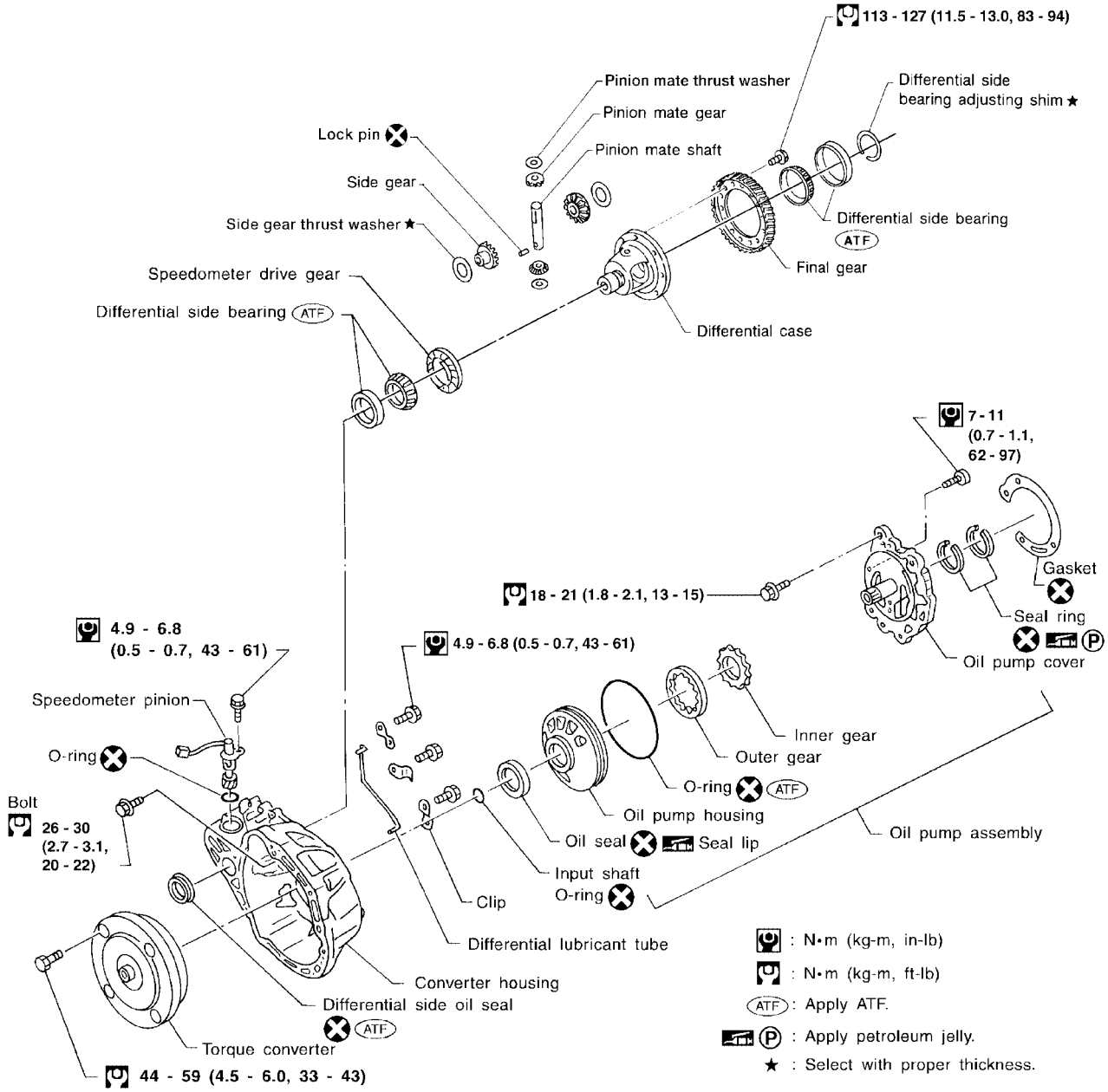
OVERHAUL

PFP:00000

Components

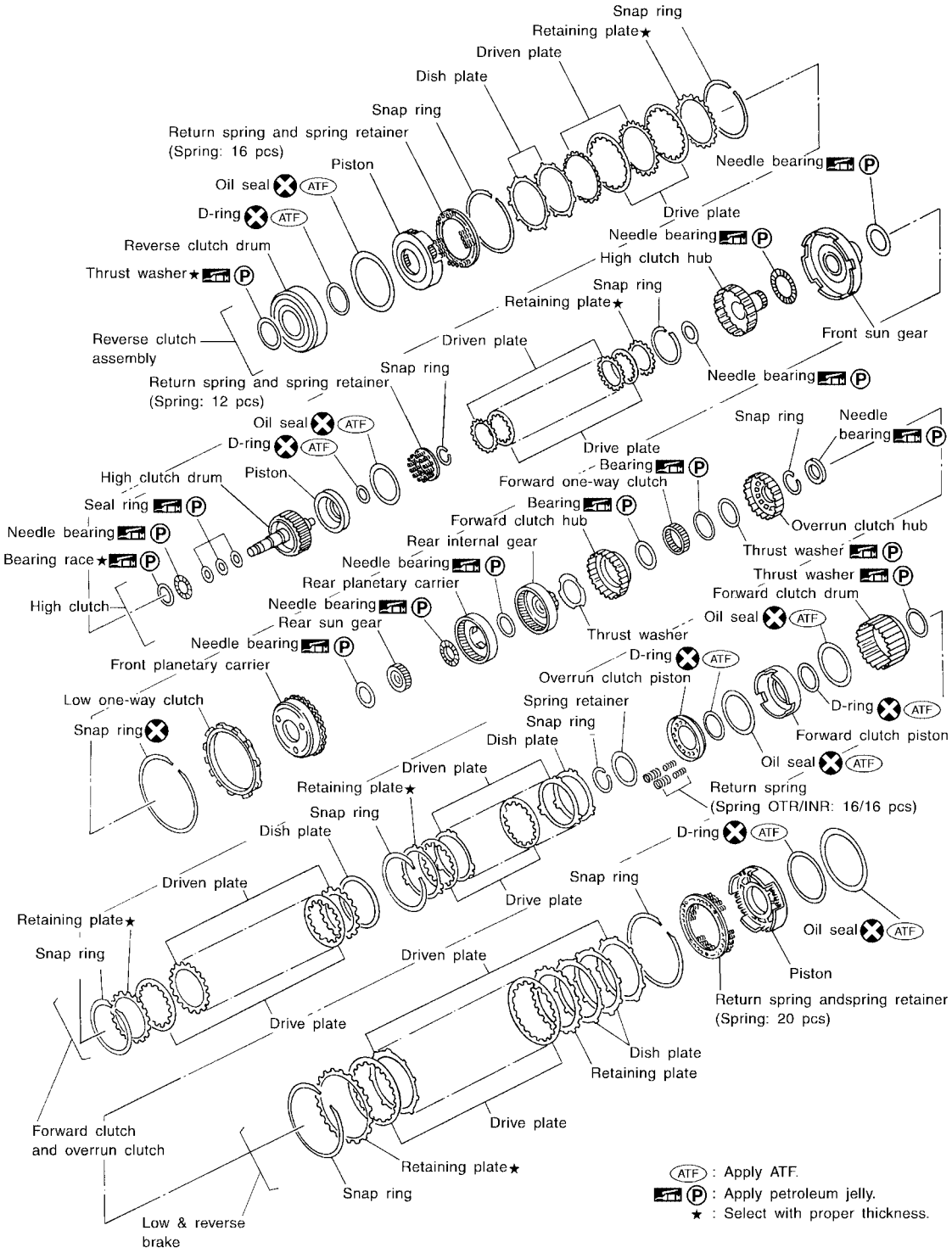
ECS005ZN

SEC. 311•313•327•381



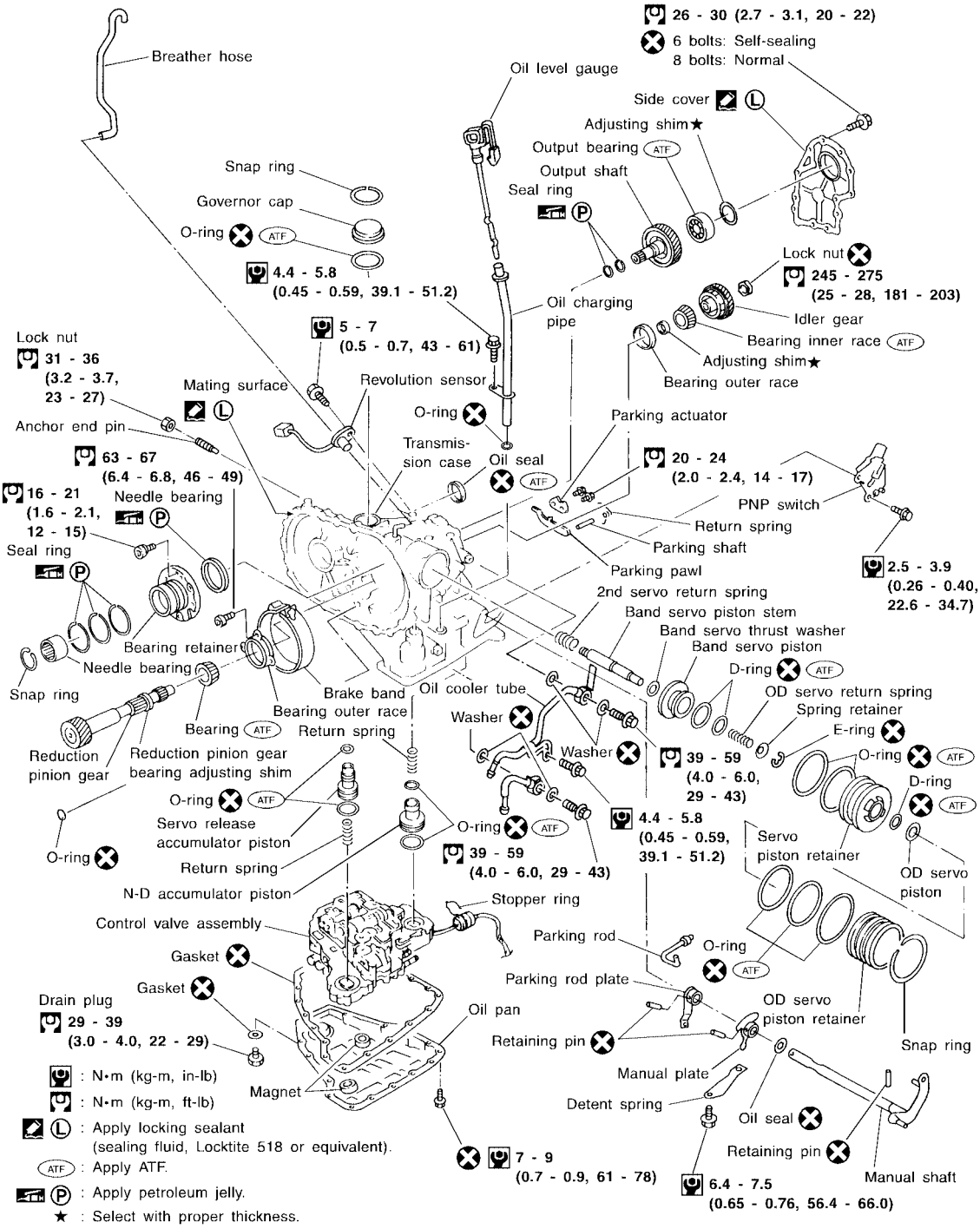
WAT404

SEC. 315



WCIA0218E

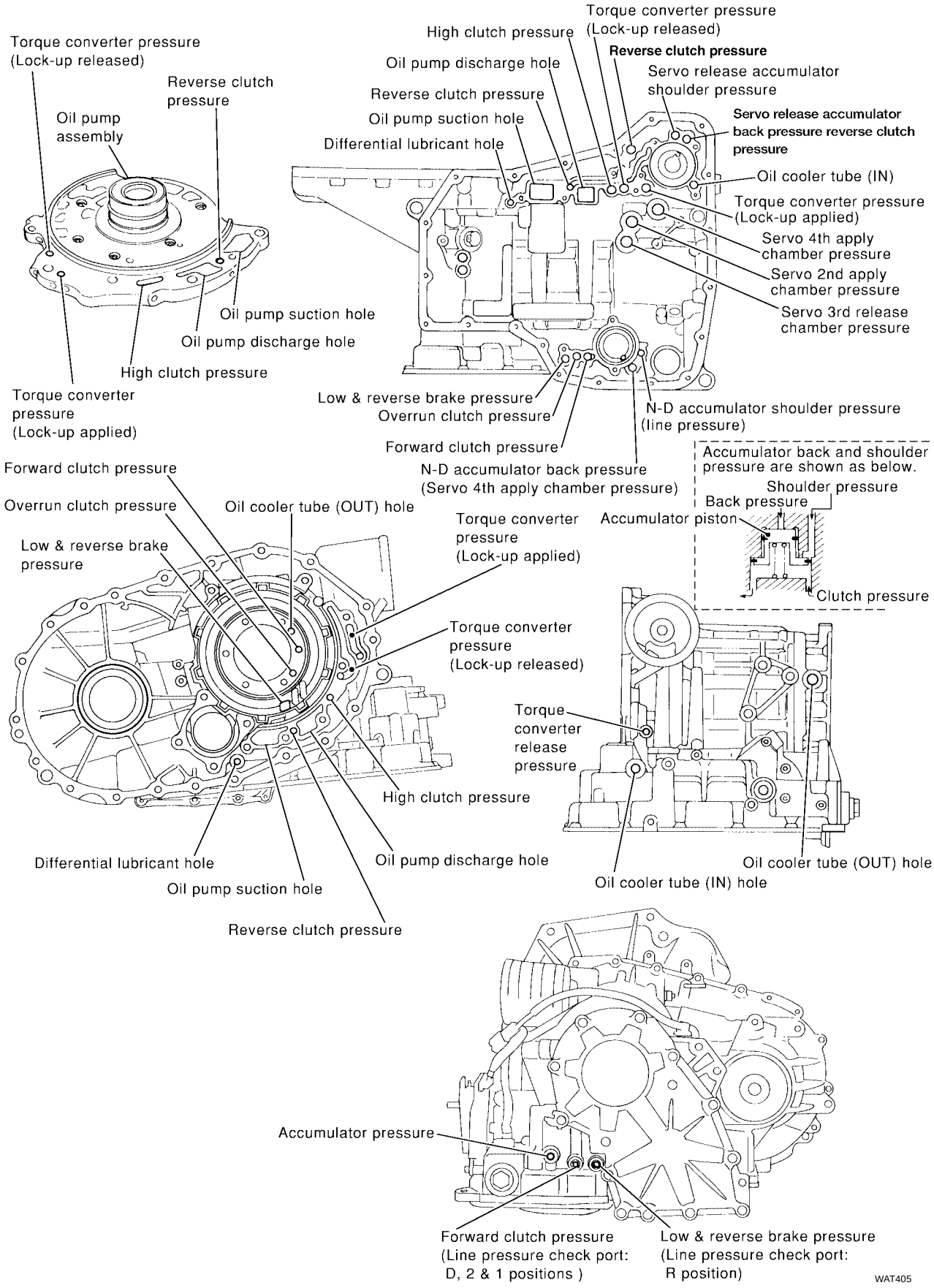
SEC. 310•315•317•319



WCIA0219E

Oil Channel

ECS005ZO



Locations of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings

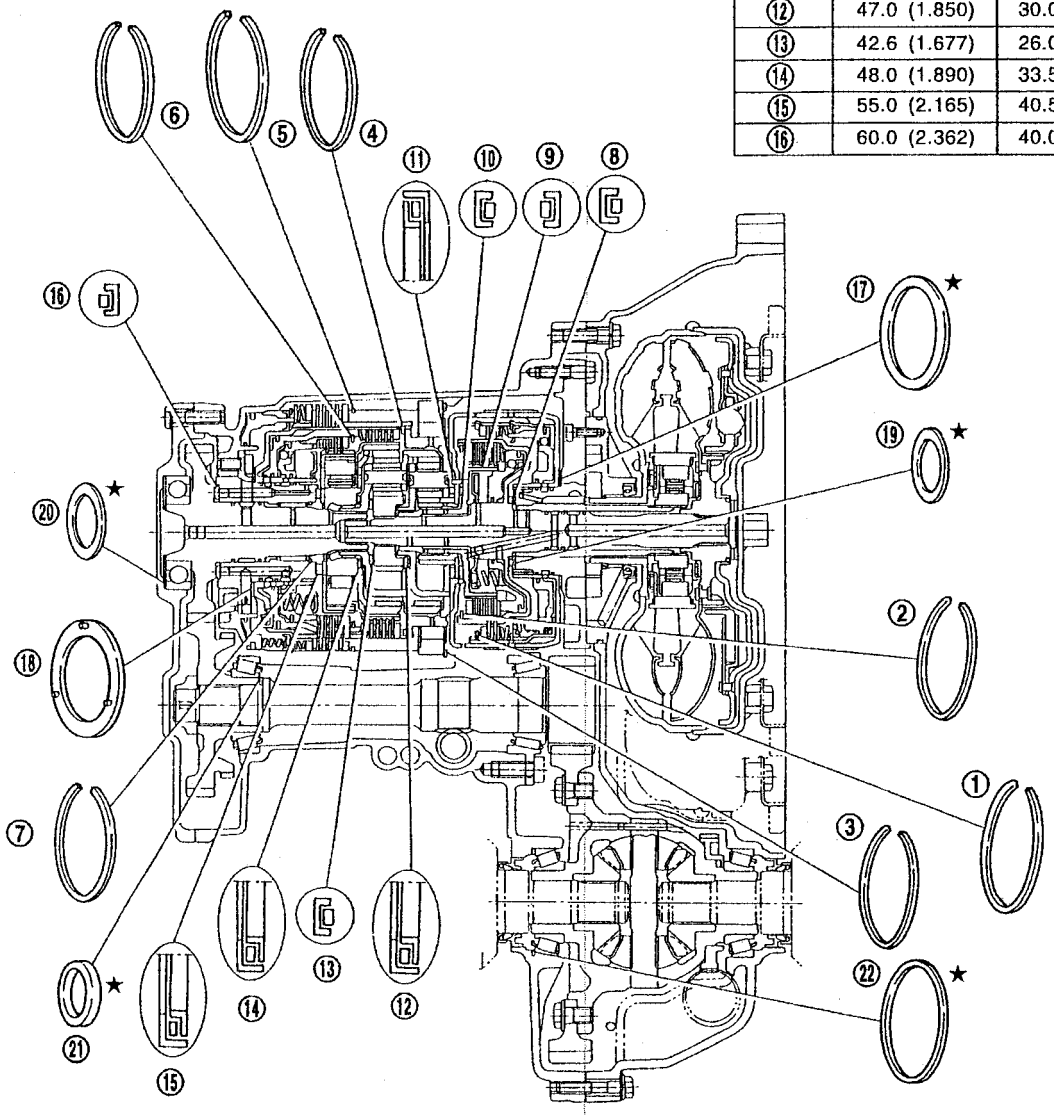
ECS005ZP

Outer diameter and color of thrust washers

Item number	Outer diameter mm (in)	Color
⑰	72.0 (2.835)	Black
⑱	78.5 (3.091)	

Outer and inner diameter of needle bearings

Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑧	47.0 (1.850)	32.0 (1.260)
⑨	35.0 (1.378)	20.1 (0.791)
⑩	60.0 (2.362)	42.0 (1.657)
⑪	60.0 (2.362)	45.0 (1.772)
⑫	47.0 (1.850)	30.0 (1.181)
⑬	42.6 (1.677)	26.0 (1.024)
⑭	48.0 (1.890)	33.5 (1.319)
⑮	55.0 (2.165)	40.5 (1.594)
⑯	60.0 (2.362)	40.0 (1.579)



★ : Select proper thickness.

Outer and inner diameter of bearing race and adjusting shims

Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑲	48.0 (1.890)	33.0 (1.299)
⑳	72.0 (2.835)	61.0 (2.402)
㉑	34.5 (1.358)	26.1 (1.028)
㉒	68.0 (2.677)	60.0 (2.362)

Outer diameter of snap rings

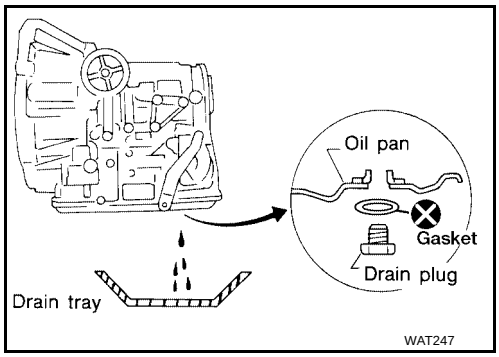
Item number	Outer diameter mm (in)
①	142.0 (5.59)
②	113.0 (4.45)
③	162.4 (6.39)
④	135.4 (5.33)
⑤	162.3 (6.39)
⑥	126.0 (4.96)
⑦	40.5 (1.594)

WAT246

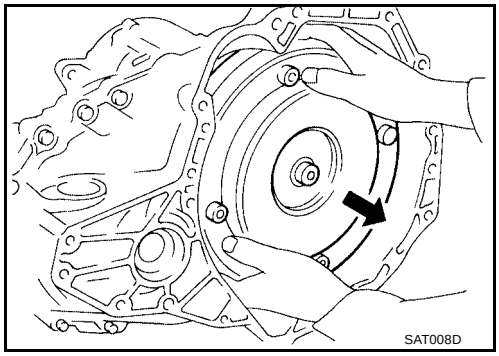
Disassembly

ECS005ZQ

1. Drain ATF through drain plug.



2. Remove torque converter.

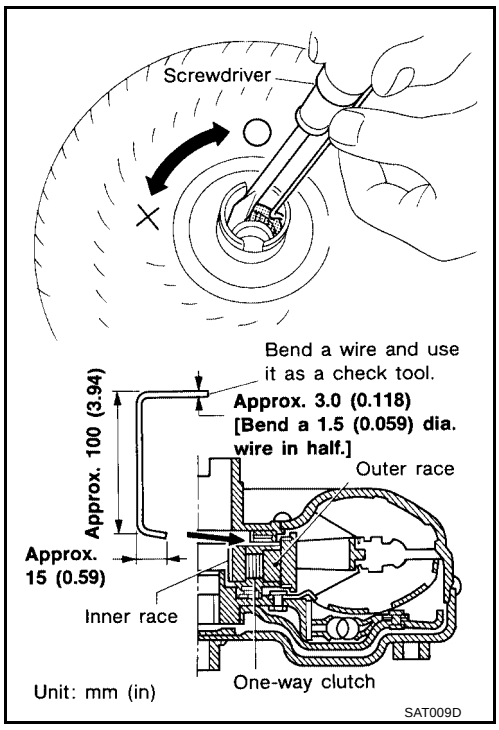


3. Check torque converter one-way clutch using check tool as shown.

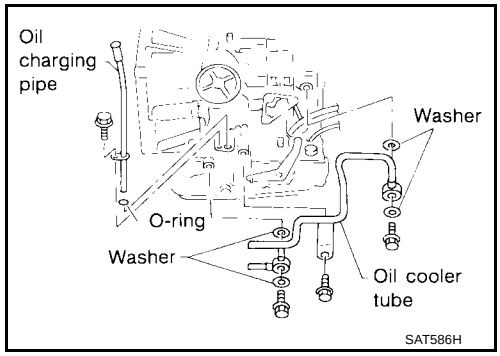
a. Insert check tool into the groove of bearing support built into one-way clutch outer race.

b. While fixing bearing support with check tool, rotate one-way clutch spline using flat-bladed screwdriver.

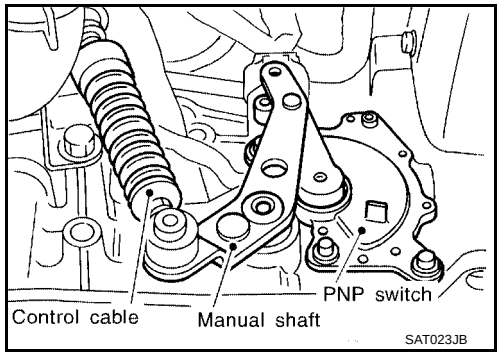
c. Check to make sure the inner race rotates clockwise only. If not, replace torque converter assembly.



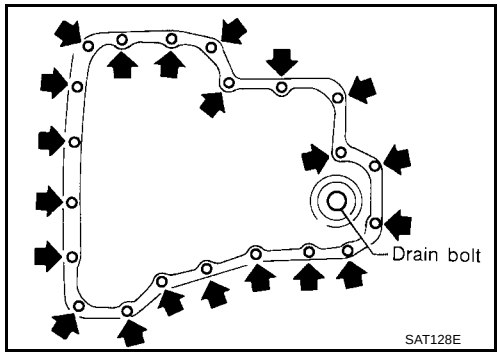
4. Remove oil charging pipe and oil cooler tube.



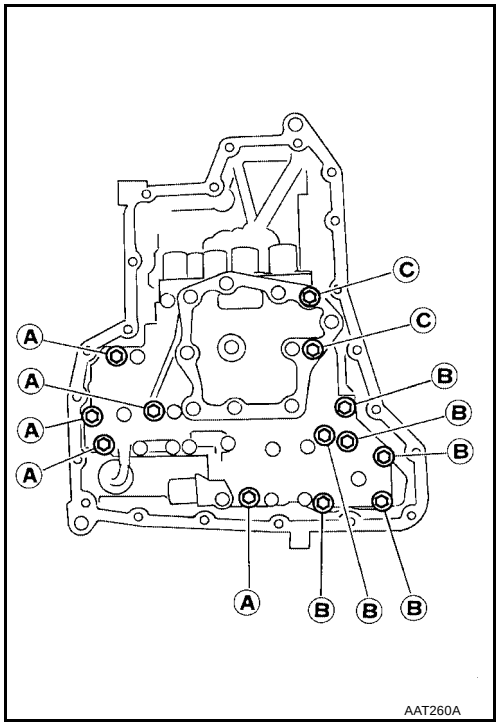
5. Set manual shaft to “P” position.
6. Remove PNP switch.



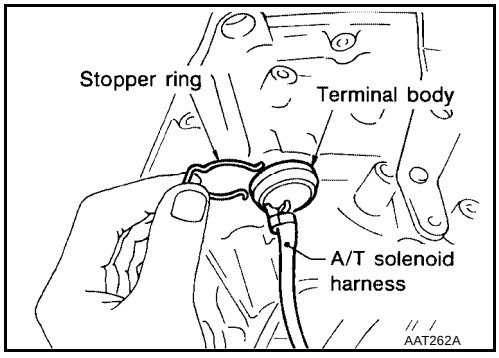
7. Remove oil pan and oil pan gasket.
   - **Always replace oil pan bolts as they are self-sealing bolts.**
8. Check foreign materials in oil pan to help determine cause of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. Varnish can cause valves, servo, and clutches to stick and may inhibit pump pressure.
   - **If frictional material is detected, replace radiator after repair of A/T. Refer to CO-14, "Removal and Installation" .**
9. Remove control valve assembly according to the following procedures.



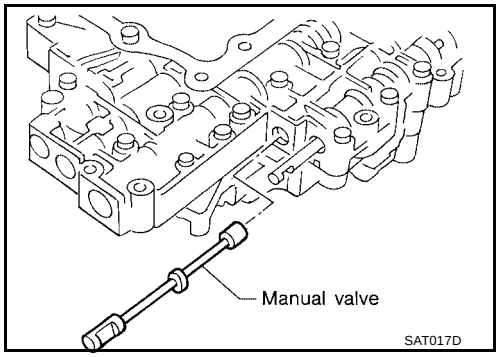
a. Remove control valve assembly mounting bolts A, B and C.



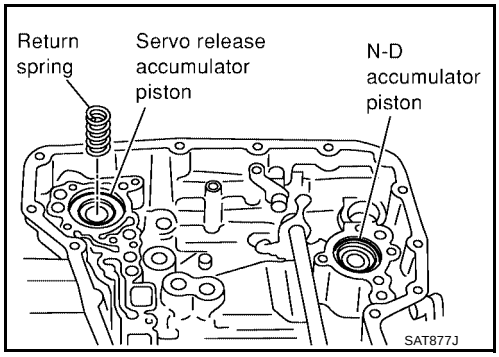
b. Remove stopper ring from terminal body.
c. Push terminal body into transmission case and draw out solenoid harness.



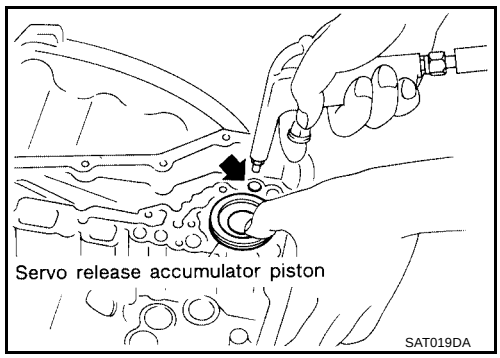
10. Remove manual valve from control valve assembly as a precaution.



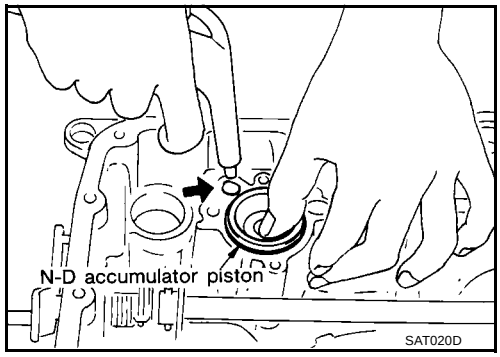
11. Remove return spring from servo release accumulator piston.



12. Remove servo release accumulator piston with compressed air.
13. Remove O-rings from servo release accumulator piston.

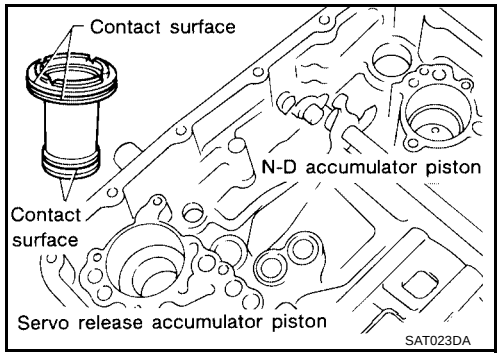


14. Remove N-D accumulator piston and return spring with compressed air.
15. Remove O-rings from N-D accumulator piston.

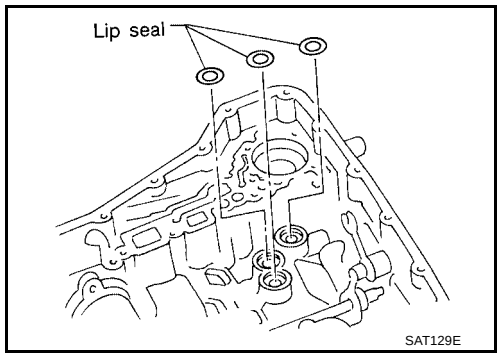


16. Check accumulator pistons and contact surface of transmission case for damage.
17. Check accumulator return springs for damage and free length.

Return springs : Refer to AT-393, "RETURN SPRING".

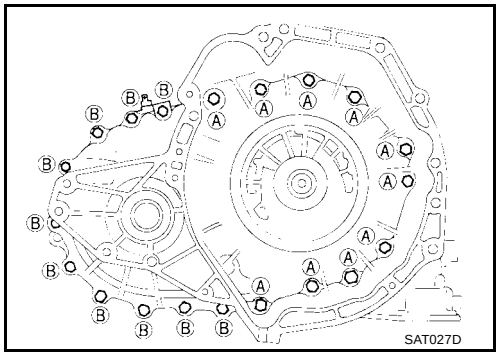


18. Remove lip seals from band servo oil port.

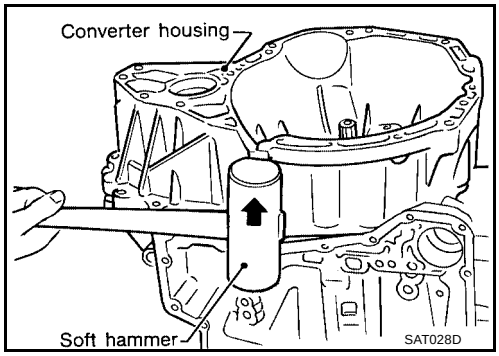


19. Remove converter housing according to the following procedures.

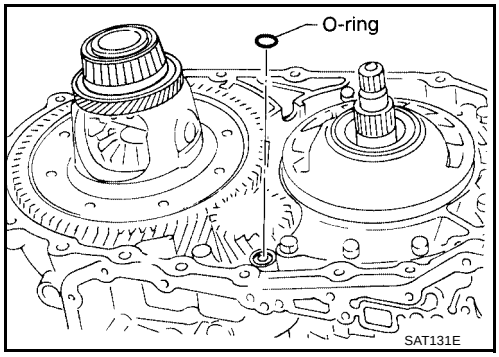
a. Remove converter housing mounting bolts A and B.



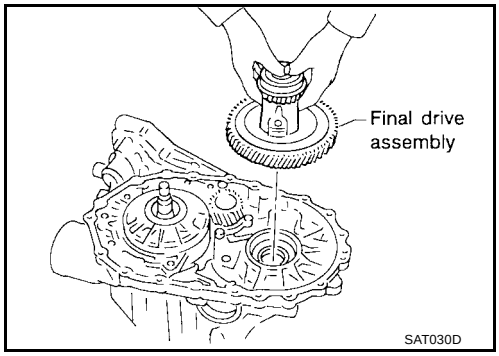
b. Remove converter housing.



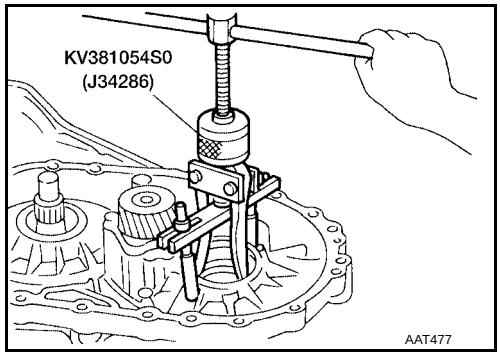
c. Remove O-ring from differential oil port.



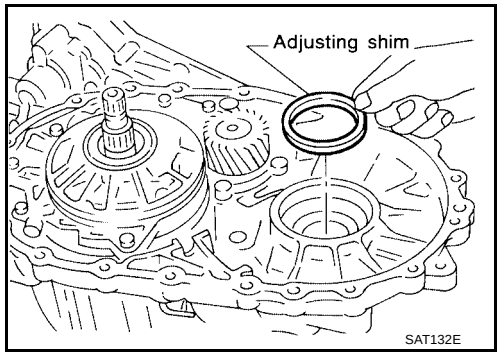
20. Remove final drive assembly from transmission case.



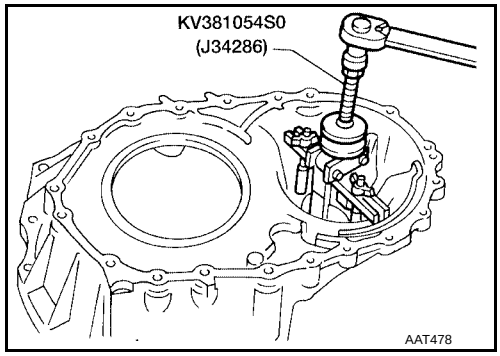
21. Remove differential side bearing outer race from transmission case using Tool.



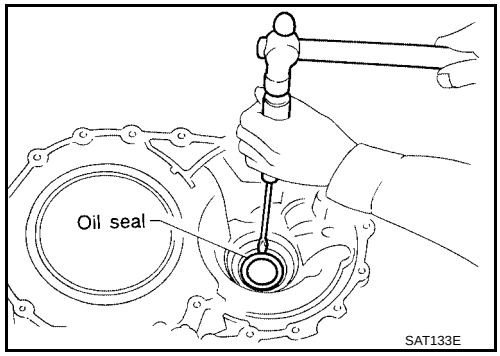
22. Remove differential side bearing adjusting shim from transmission case.



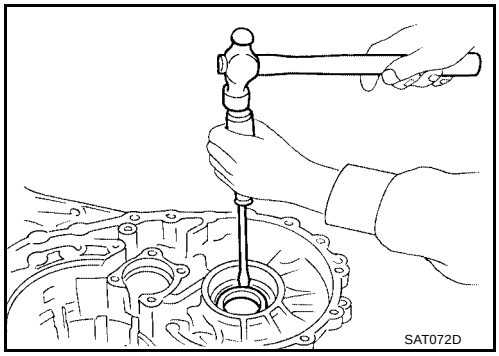
23. Remove differential side bearing outer race from converter housing using Tool.



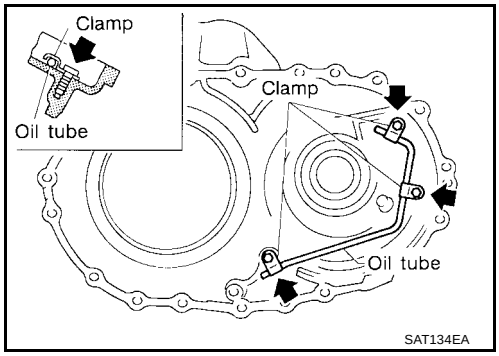
24. Remove oil seal from converter housing using a screwdriver.
    - **Be careful not to damage case.**



25. Remove side oil seal from transmission case using a screwdriver.

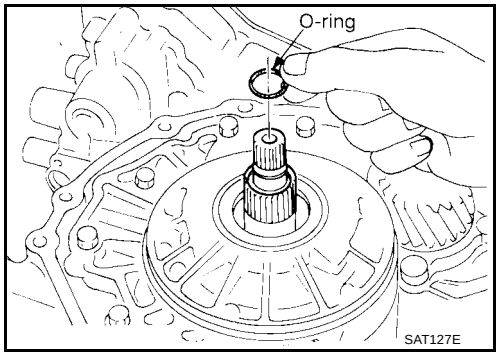


26. Remove oil tube from converter housing.

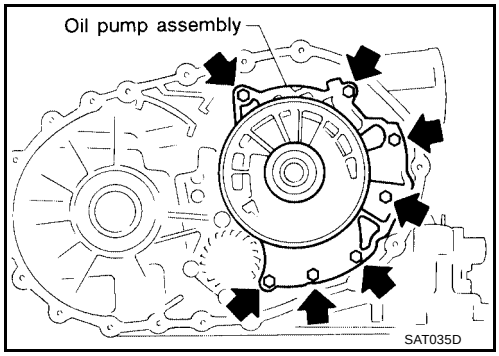


27. Remove oil pump according to the following procedures.

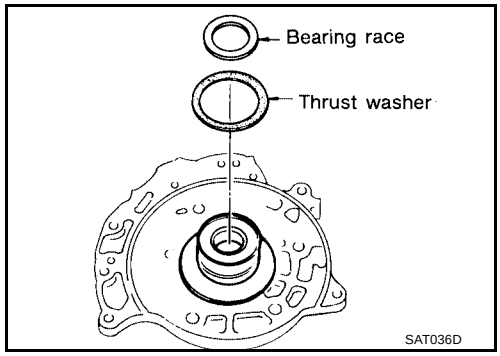
a. Remove O-ring from input shaft.



Remove oil pump assembly from transmission case.



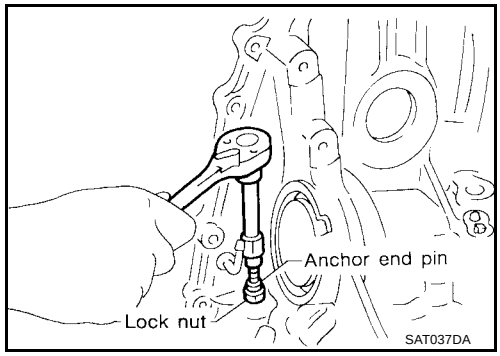
c. Remove thrust washer and bearing race from oil pump assembly.



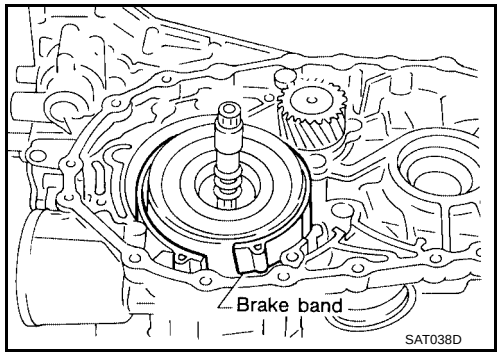
28. Remove brake band according to the following procedures.

a. Loosen lock nut, then back off anchor end pin.

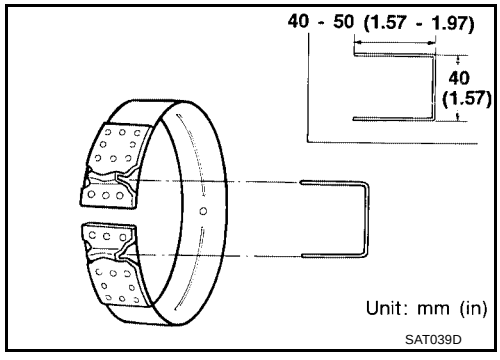
- **Do not reuse anchor end pin.**



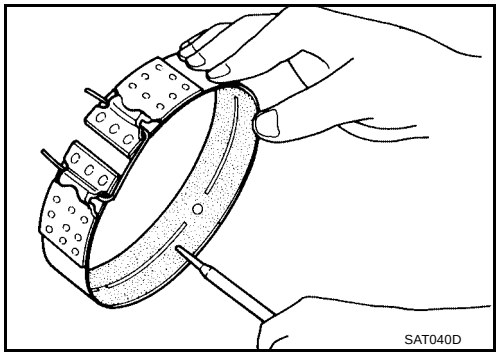
b. Remove brake band from transmission case.



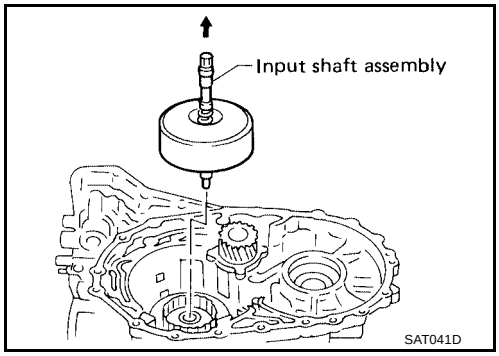
- **To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown. Leave the clip in position after removing the brake band.**



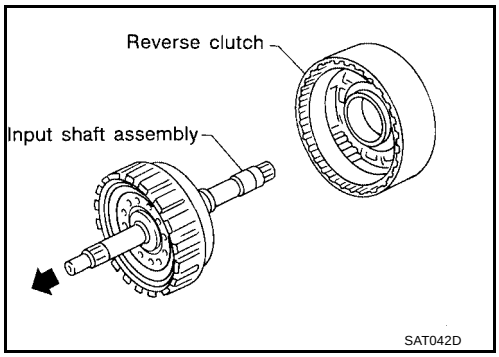
c. Check brake band facing for damage, cracks, wear or burns.



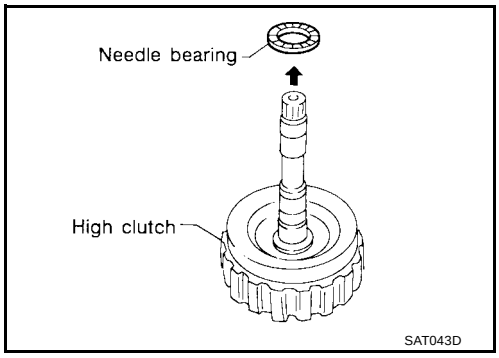
29. Remove input shaft assembly (high clutch) and reverse clutch according to the following procedures.



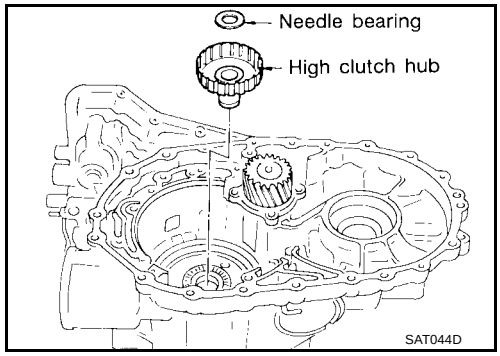
a. Remove input shaft assembly (high clutch) with reverse clutch.
b. Remove input shaft assembly (high clutch) from reverse clutch.



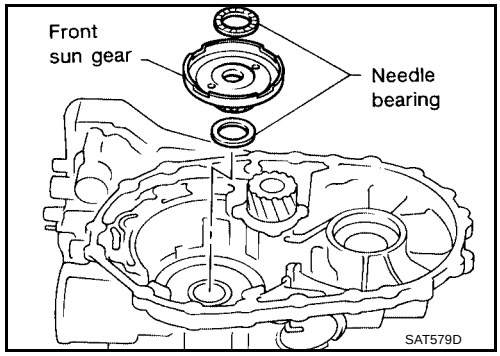
c. Remove needle bearing from high clutch drum.
d. Check input shaft assembly and needle bearing for damage or wear.



30. Remove high clutch hub and needle bearing from transmission case.
31. Check high clutch hub and needle bearing for damage or wear.

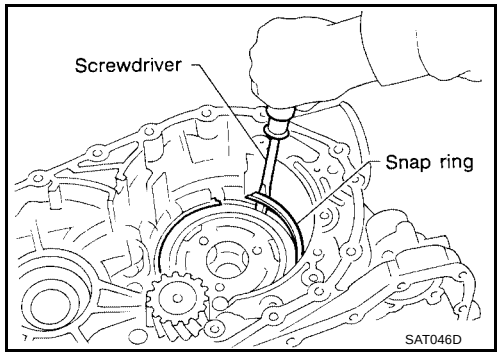


32. Remove front sun gear and needle bearings from transmission case.
33. Check front sun gear and needle bearings for damage or wear.

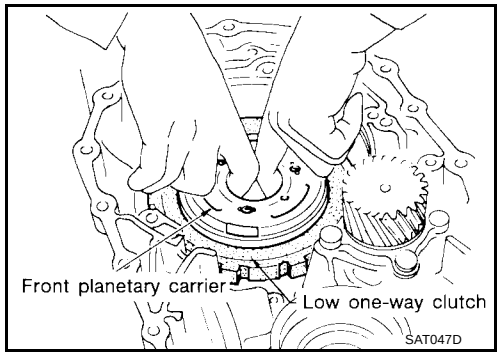


34. Remove front planetary carrier assembly and low one-way clutch according to the following procedures.

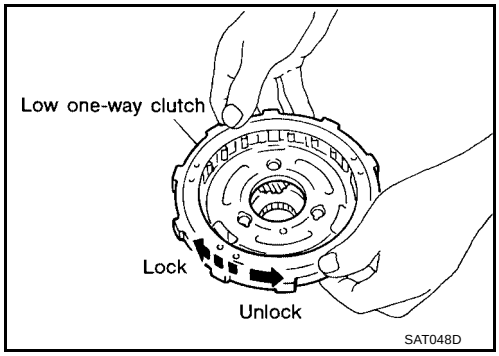
a. Remove snap ring using a screwdriver.
   - **Do not expand snap ring excessively.**



b. Remove front planetary carrier with low one-way clutch.

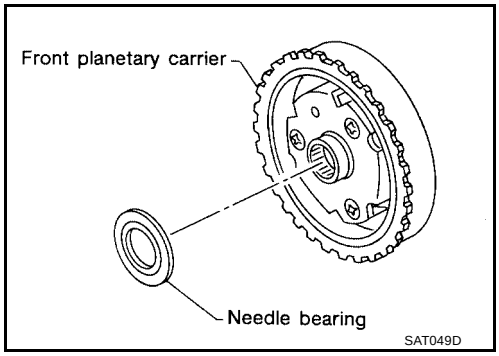


c. Check that low one-way clutch rotates in the direction of the arrow and locks in the opposite direction.



d. Remove low one-way clutch from front planetary carrier by rotating it in the direction of unlock.

e. Remove needle bearing from front planetary carrier.



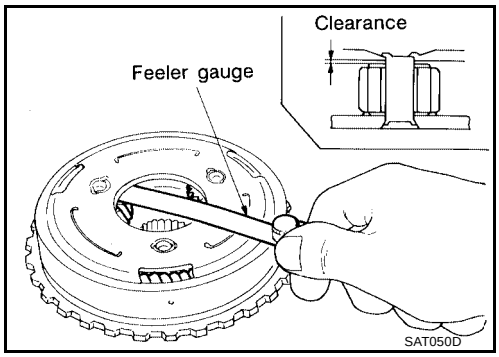
f. Check front planetary carrier, low one-way clutch and needle bearing for damage or wear.

g. Check clearance between pinion washer and planetary carrier using feeler gauge.

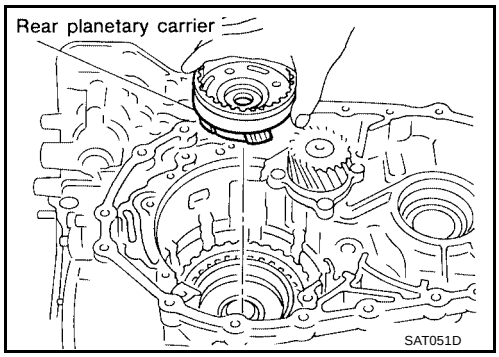
Standard clearance : 0.15 - 0.70 mm (0.0059 - 0.0276 in)

Allowable limit : 0.80 mm (0.0315 in)

Replace front planetary carrier if the clearance exceeds allowable limit.

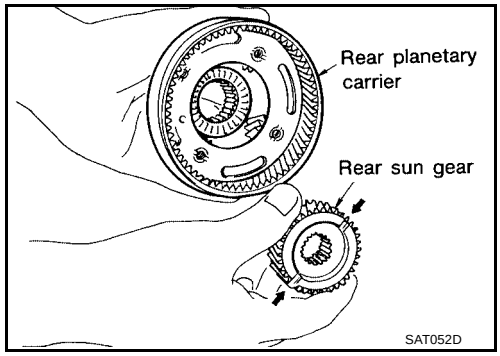


35. Remove rear planetary carrier assembly and rear sun gear according to the following procedures.

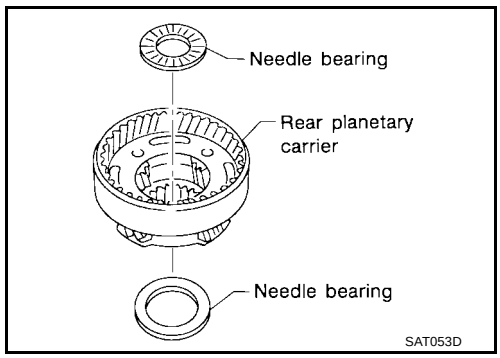


a. Remove rear planetary carrier assembly from transmission case.

b. Remove rear sun gear from rear planetary carrier.



c. Remove needle bearings from rear planetary carrier assembly.



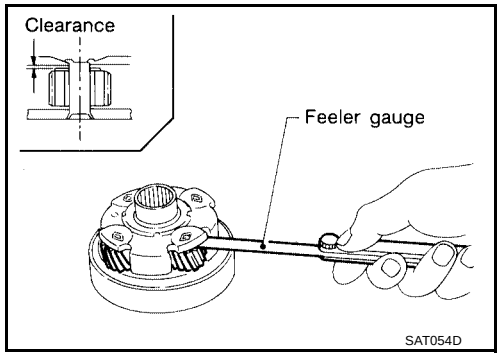
d. Check rear planetary carrier, rear sun gear and needle bearings for damage or wear.

e. Check clearance between pinion washer and rear planetary carrier using feeler gauge.

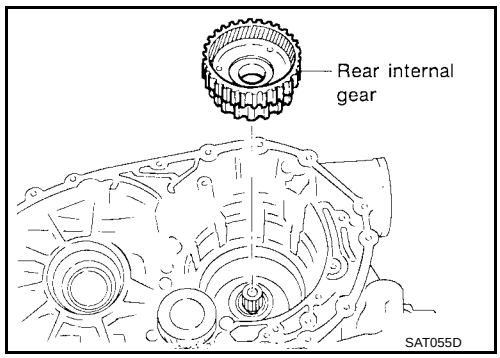
Standard clearance : 0.15 - 0.70 mm (0.0059 - 0.0276 in)

Allowable limit : 0.80 mm (0.0315 in)

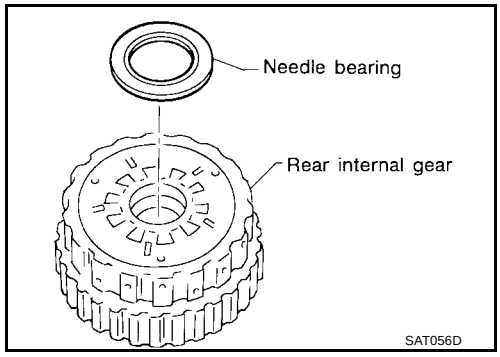
Replace rear planetary carrier if the clearance exceeds allowable limit.



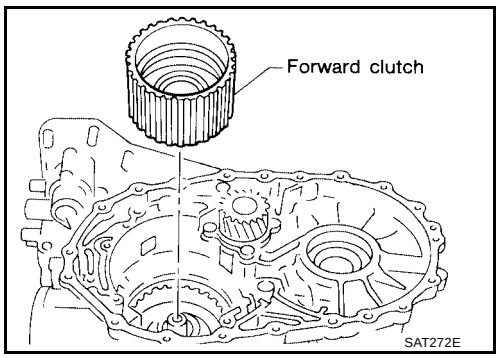
36. Remove rear internal gear from transmission case.



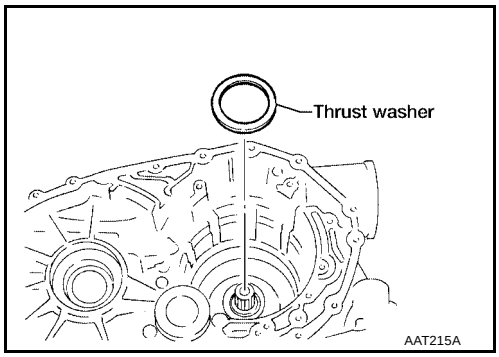
37. Remove needle bearing from rear internal gear.
    - Check needle bearing for damage or wear.



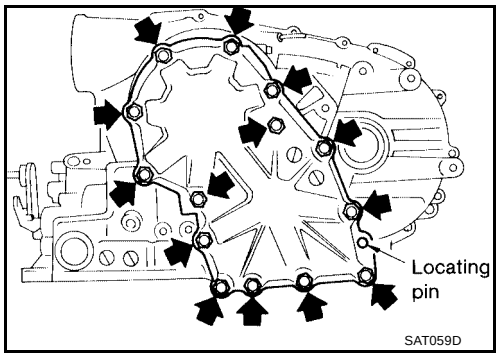
38. Remove forward clutch assembly from transmission case.



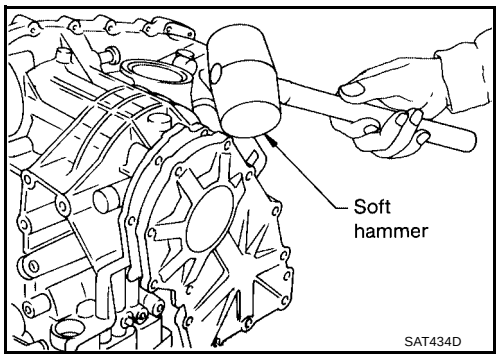
39. Remove thrust washer from transmission case.



40. Remove output shaft assembly according to the following procedures.

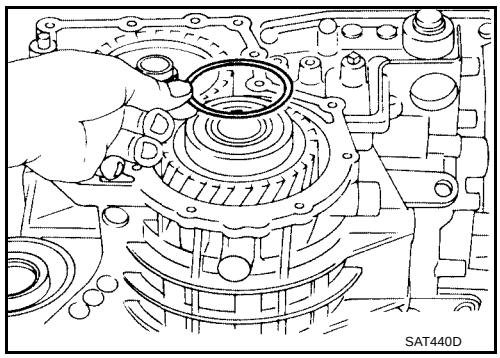


a. Remove side cover bolts.
b. Remove side cover by lightly tapping it with a soft hammer.

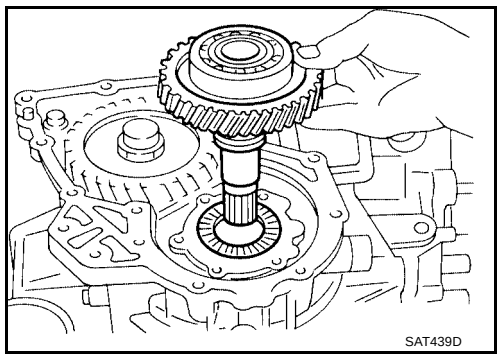


- **Be careful not to drop output shaft assembly. It might come out when removing side cover.**

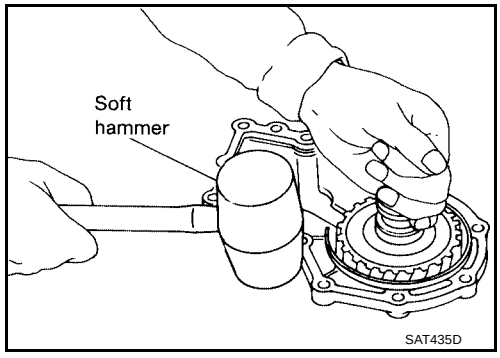
c. Remove adjusting shim.



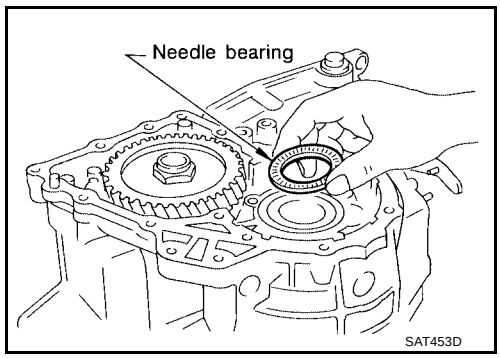
d. Remove output shaft assembly.



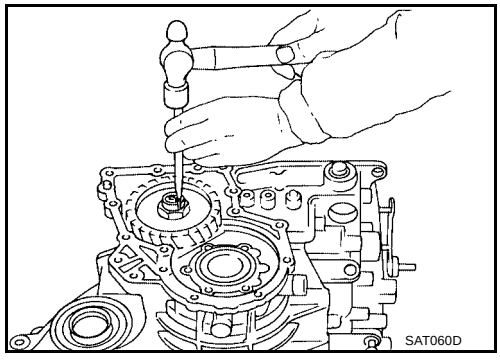
- If output shaft assembly came off with side cover, tap cover with a soft hammer to separate.



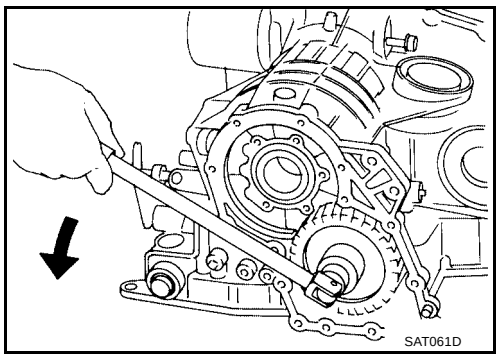
e. Remove needle bearing.



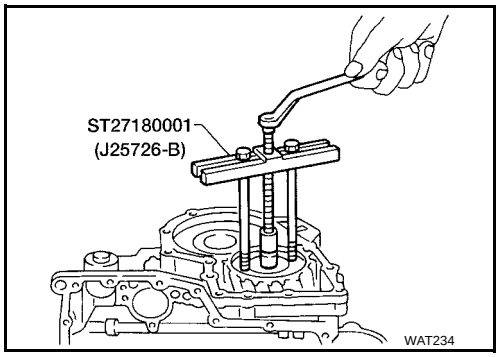
41. Disassemble reduction pinion gear according to the following procedures.



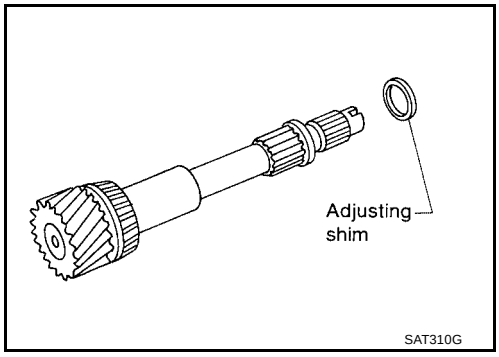
a. Set manual shaft to position “P” to fix idler gear.
b. Unlock idler gear lock nut using a pin punch.
c. Remove idler gear lock nut.
   - **Do not reuse idler gear lock nut.**



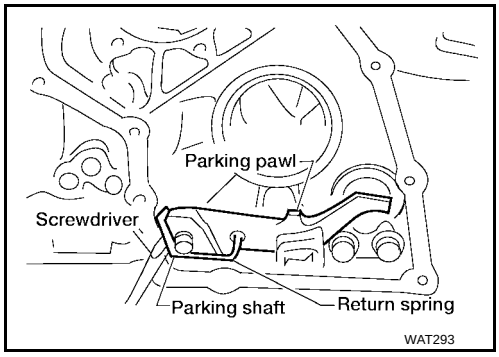
d. Remove idler gear with puller using Tool.



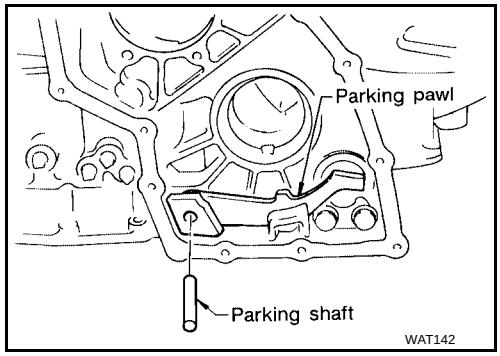
e. Remove reduction pinion gear.
f. Remove adjusting shim from reduction pinion gear.



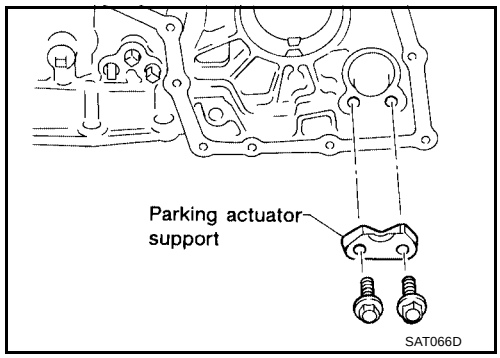
42. Remove return spring from parking shaft using a screwdriver.



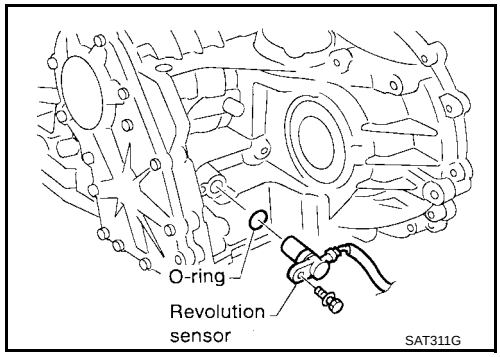
43. Draw out parking shaft and remove parking pawl from transmission case.
44. Check parking pawl and shaft for damage or wear.



45. Remove parking actuator support from transmission case.
    - Check parking actuator support for damage or wear.



46. Remove revolution sensor from transmission case.

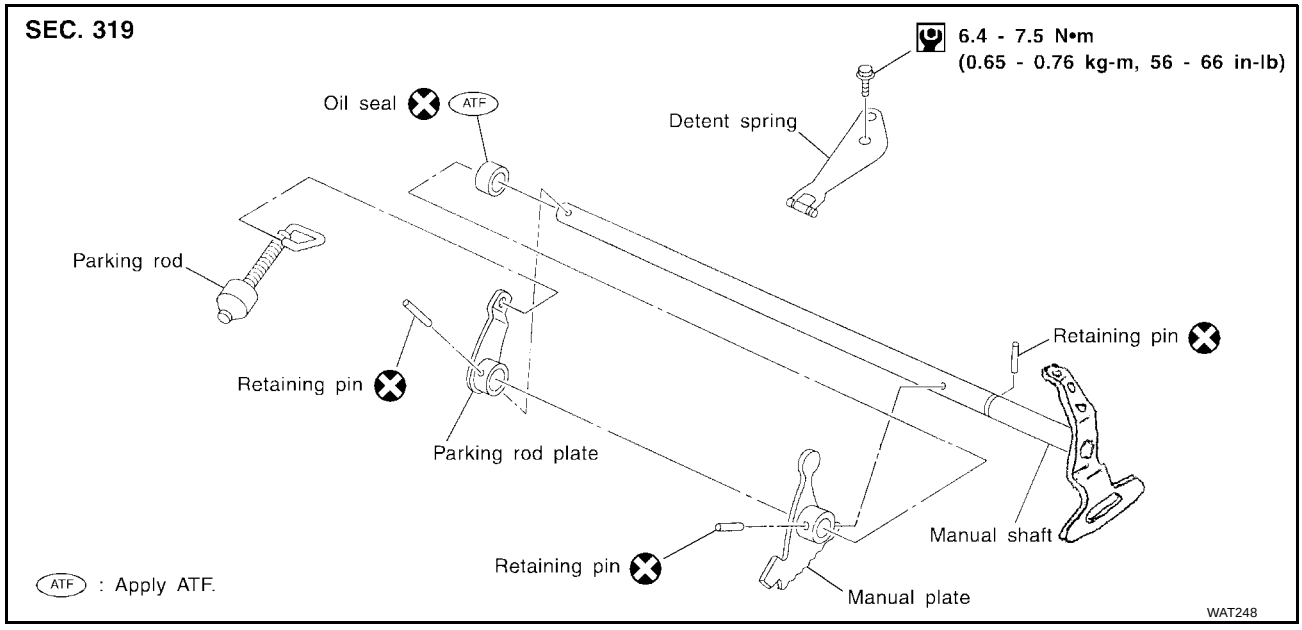


MANUAL SHAFT

PFP:31920

Components

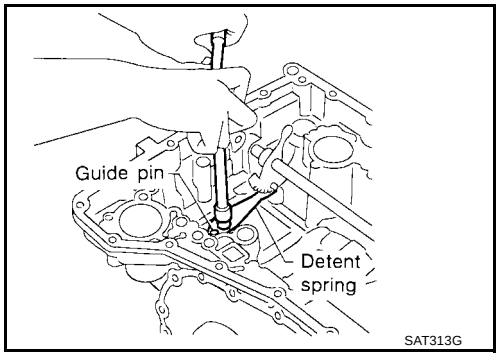
ECS005ZR



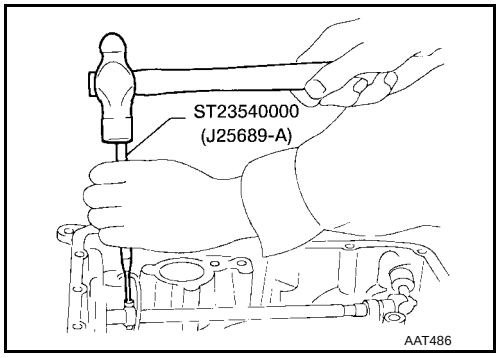
Removal

ECS005ZS

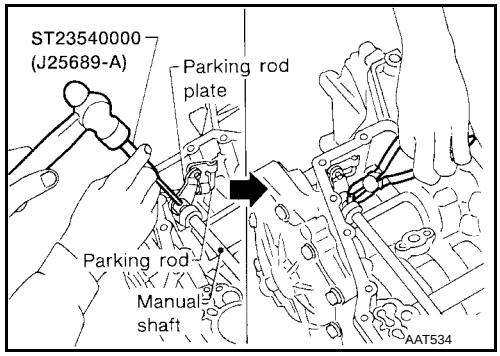
1. Remove detent spring from transmission case.



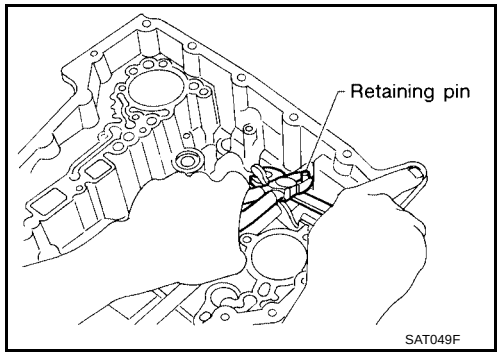
2. Drive out manual plate retaining pin using Tool.



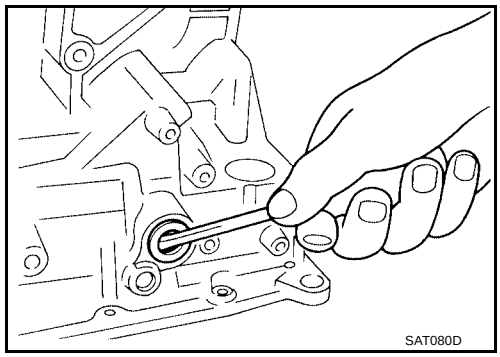
3. Drive and pull out parking rod plate retaining pin using Tool.
4. Remove parking rod plate from manual shaft.
5. Draw out parking rod from transmission case.



6. Pull out manual shaft retaining pin.



7. Remove manual shaft and manual plate from transmission case.
8. Remove manual shaft oil seal.



Inspection

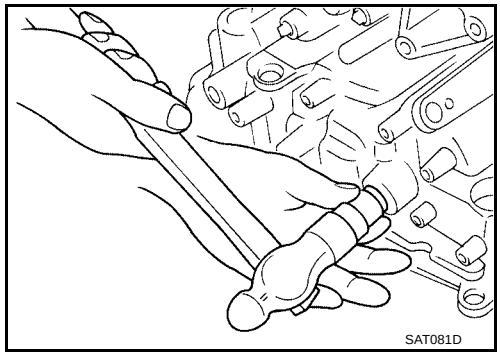
ECS005ZT

- Check component parts for wear or damage. Replace if necessary.

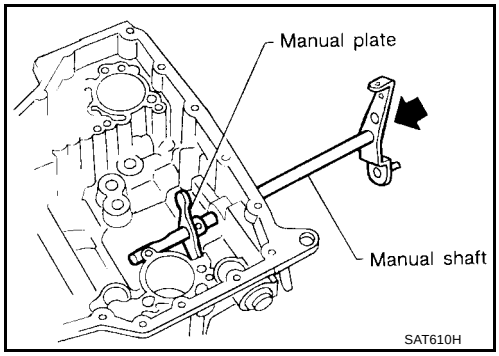
Installation

ECS005ZU

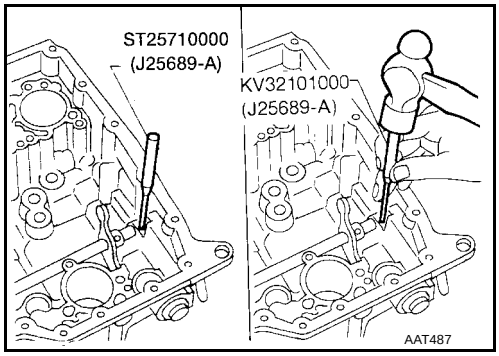
1. Install manual shaft oil seal using a suitable tool.
   - **Apply ATF to outer surface of oil seal.**



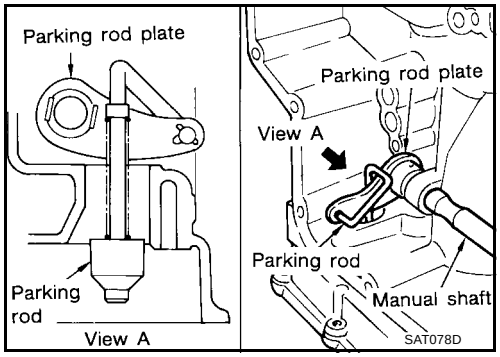
2. Install manual shaft and manual plate.



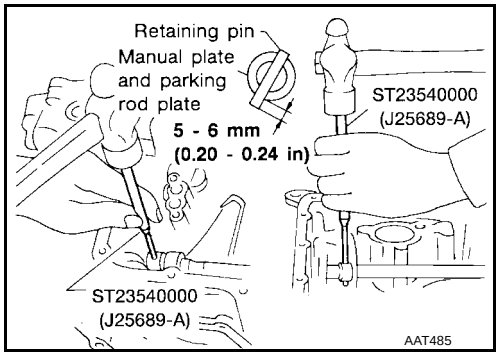
3. Align groove of manual shaft and hole of transmission case.
4. Install manual shaft retaining pin using Tool.



5. Install parking rod to parking rod plate.
6. Set parking rod assembly onto manual shaft.

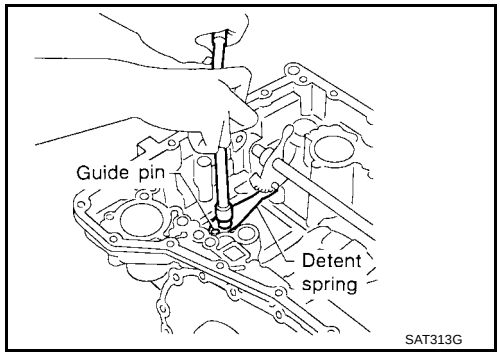


7. Drive in manual plate retaining pin and parking rod plate retaining pin using Tool.



8. Install detent spring.

: 6.4 - 7.5 N·m (0.65 - 0.76 kg-m, 56.4 - 66.0 in-lb)

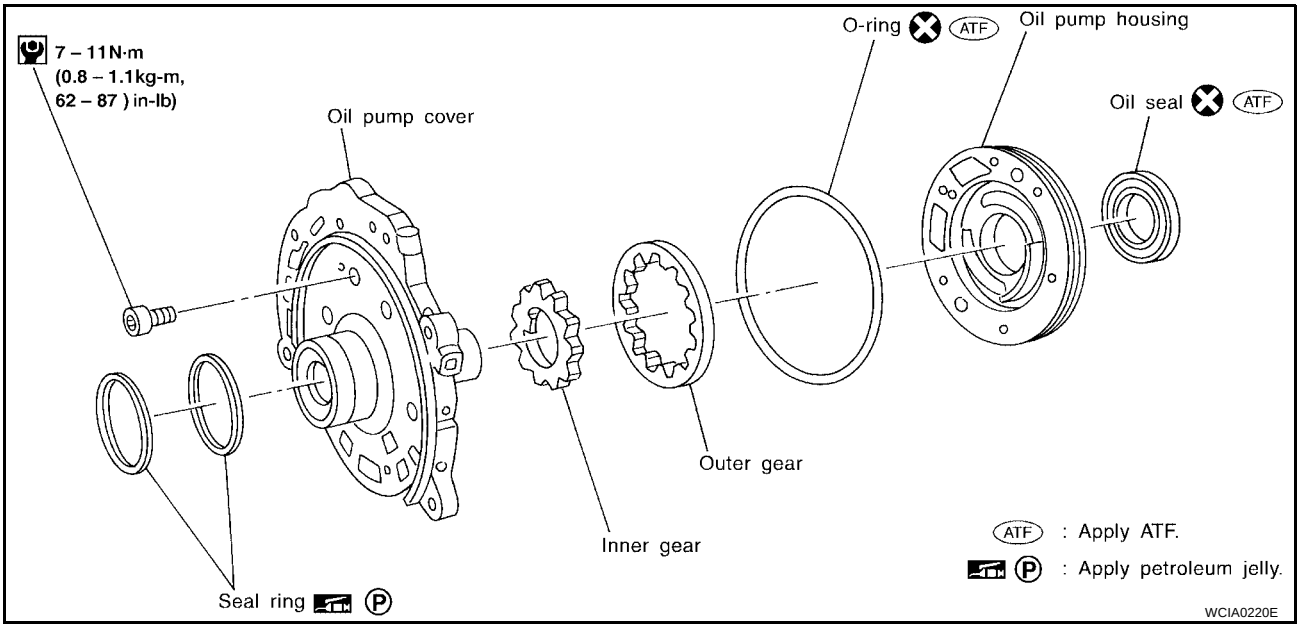


OIL PUMP

PFP:15010

Components

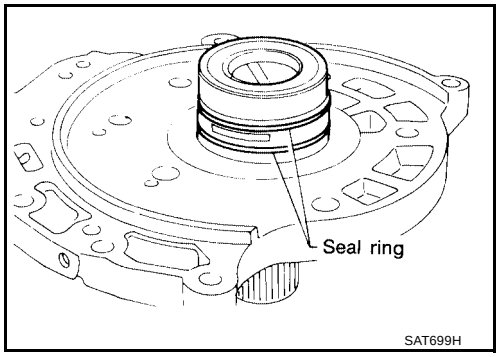
ECS005ZV



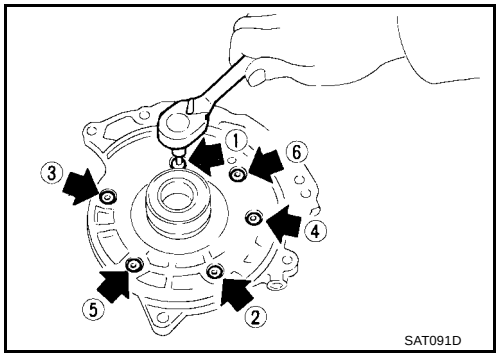
Disassembly

ECS005ZW

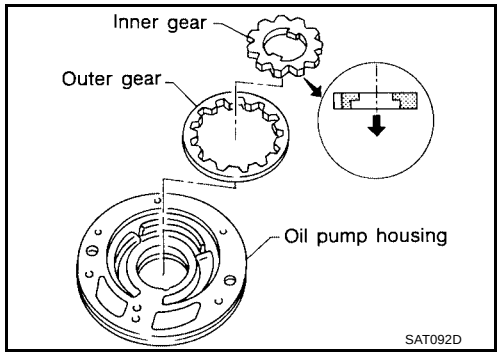
1. Remove seal rings.



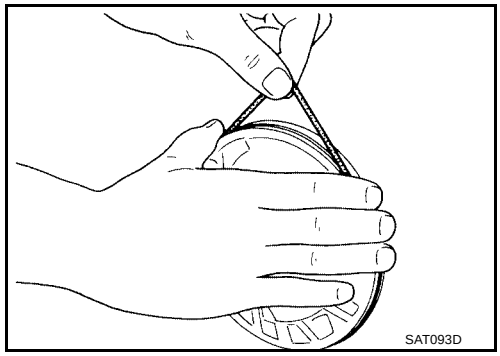
2. Loosen bolts in numerical order and remove oil pump cover.



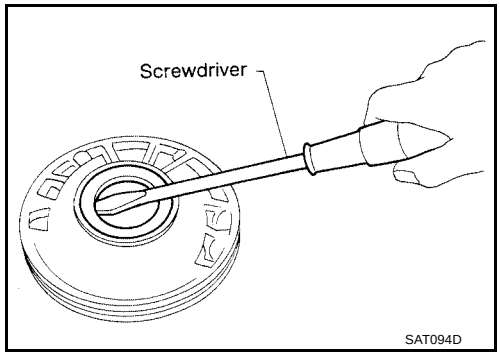
3. Remove inner and outer gear from oil pump housing.



4. Remove O-ring from oil pump housing.



5. Remove oil pump housing oil seal.



Inspection

ECS005ZX

OIL PUMP HOUSING, OIL PUMP COVER, INNER GEAR AND OUTER GEAR

- Check for wear or damage.

SIDE CLEARANCES

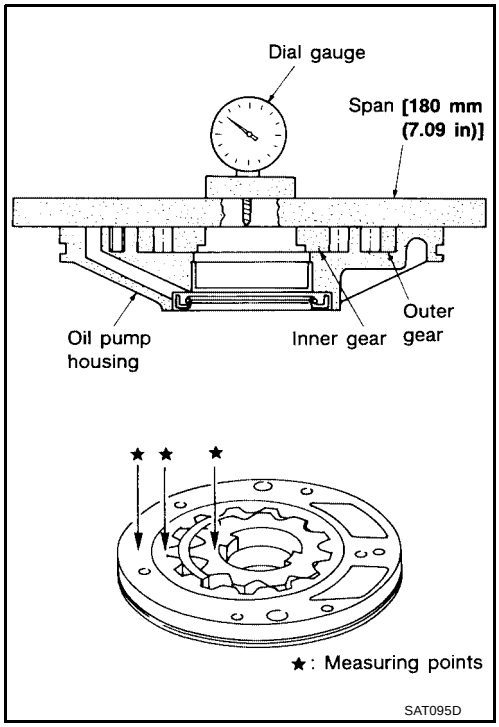
- Measure side clearance of inner and outer gears in at least four places around each outside edge. Maximum measured values should be within specified range.

  Standard clearance : 0.02 - 0.04 mm (0.0008 - 0.0016 in)

- If clearance is less than standard, select inner and outer gear as a set so that clearance is within specifications.

  Inner and outer gear : Refer to AT-294, "SIDE CLEARANCES" .

- If clearance is more than standard, replace whole oil pump assembly except oil pump cover.

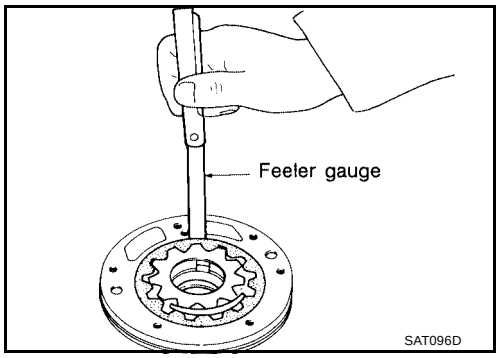


- Measure clearance between outer gear and oil pump housing.

  Standard clearance : 0.08 - 0.15 mm (0.0031 - 0.0059 in)

  Allowable limit : 0.15 mm (0.0059 in)

- If not within allowable limit, replace whole oil pump assembly except oil pump cover.



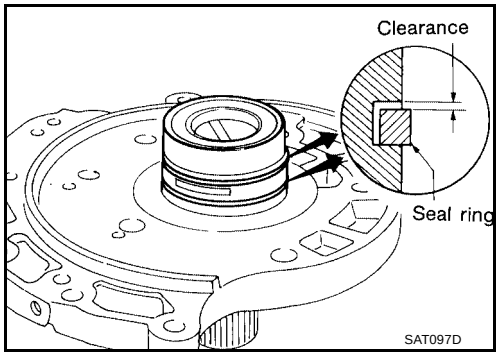
SIDE RING CLEARANCE

- Install new seal rings onto oil pump cover.
- Measure clearance between seal ring and ring groove.

  Standard clearance : 0.1 - 0.25 mm (0.0039 - 0.0098 in)

  Allowable limit : 0.25 mm (0.0098 in)

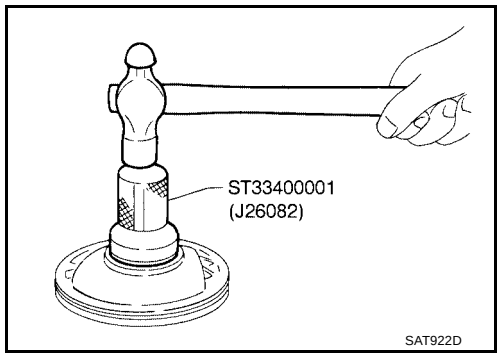
- If not within allowable limit, replace oil pump cover assembly.



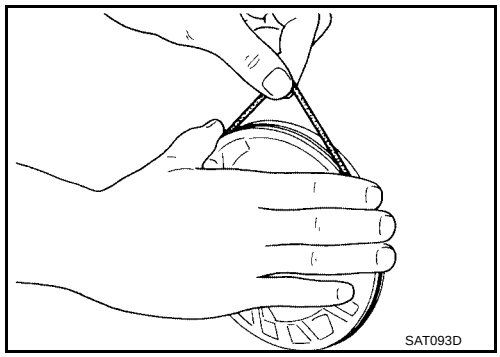
Assembly

ECS005ZY

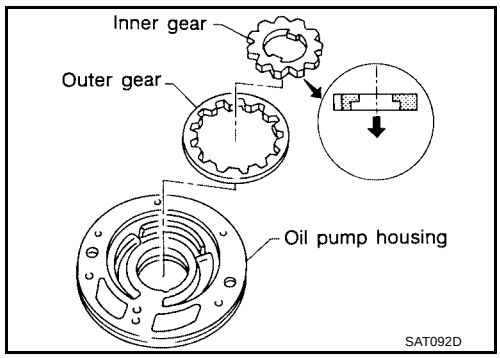
1. Install oil seal on oil pump housing using Tool.



2. Install O-ring on oil pump housing.
   - **Apply ATF to O-ring.**



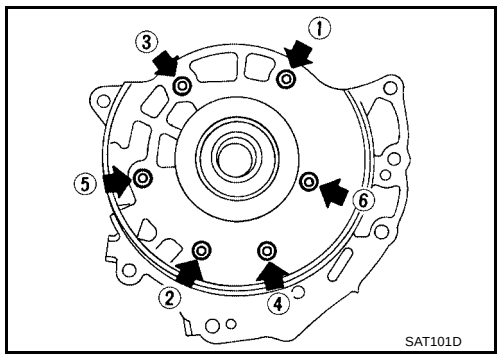
3. Install inner and outer gears on oil pump housing.
   - **Take care with the direction of the inner gear.**



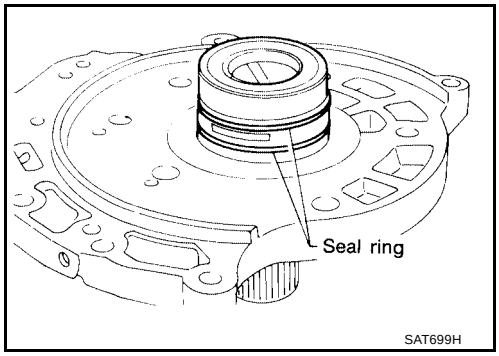
4. Install oil pump cover on oil pump housing.

a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly on oil pump housing assembly, then remove masking tape.

b. Tighten bolts in numerical order.



5. Install new seal rings carefully after packing ring groove with petroleum jelly.
   - **Do not spread gap of seal ring excessively while installing. It may deform the ring.**

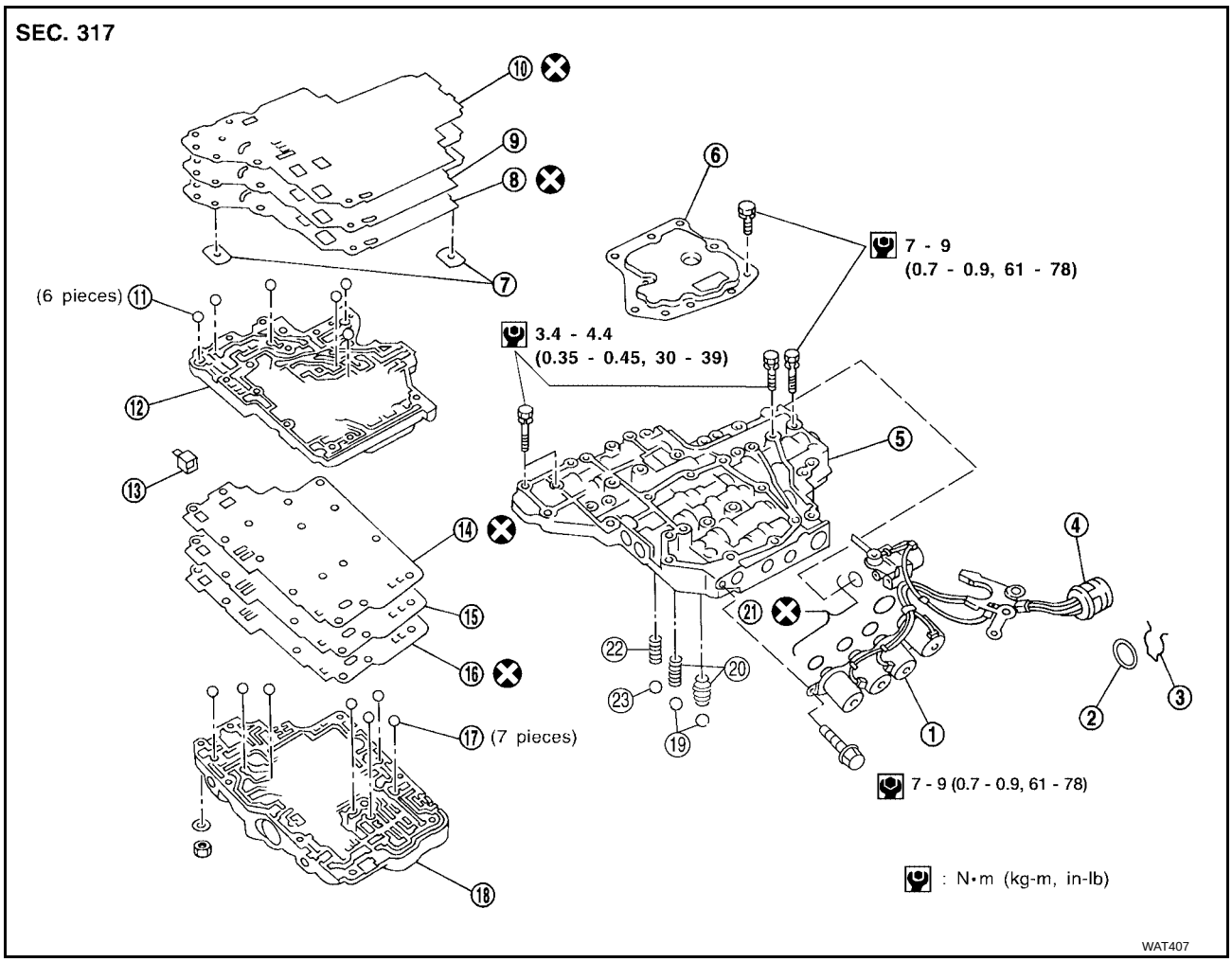


CONTROL VALVE ASSEMBLY

PFP:31705

Components

ECS005ZZ



1. Solenoid valve assembly
2. O-ring
3. Stopper ring
4. Terminal body
5. Control valve lower body
6. Oil strainer
7. Support plate
8. Lower inter separating gasket
9. Separating plate
10. Lower separating gasket
11. Steel ball
12. Control valve inter body
13. Pilot filter
14. Upper inter separating gasket
15. Separating plate
16. Upper separating gasket
17. Steel ball
18. Control valve upper body
19. Check ball
20. Oil cooler relief valve spring
21. O-ring
22. T/C pressure holding spring
23. Check ball

Disassembly

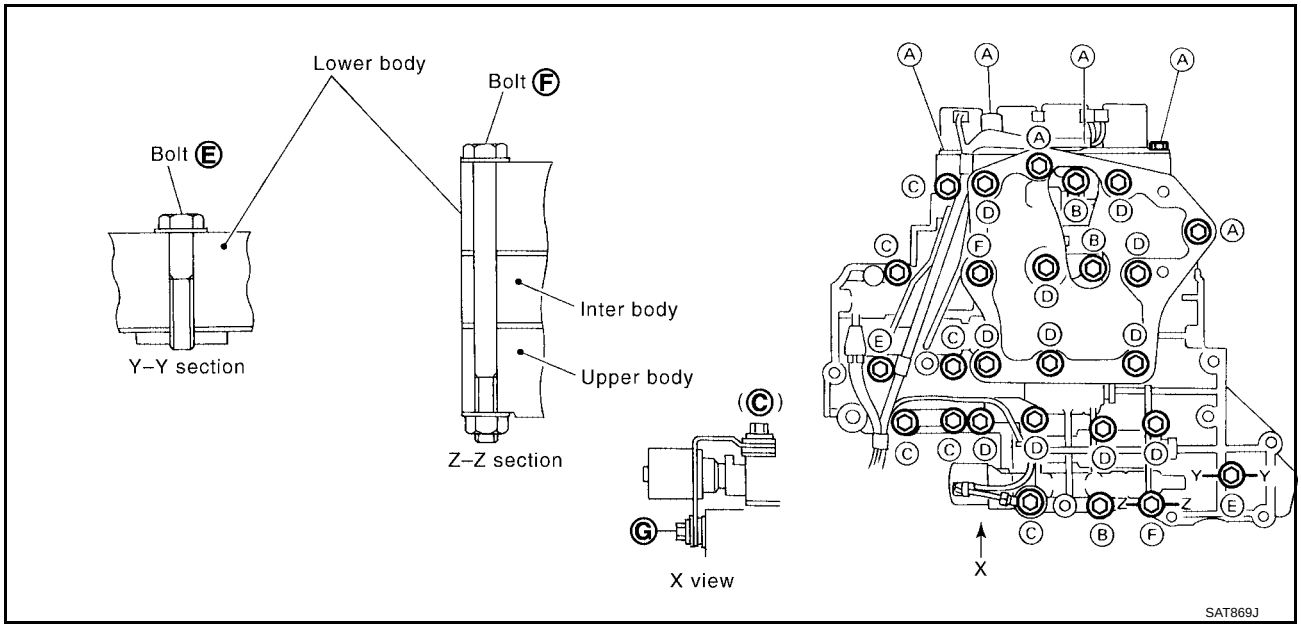
ECS00600

- Disassemble upper, inter and lower bodies.

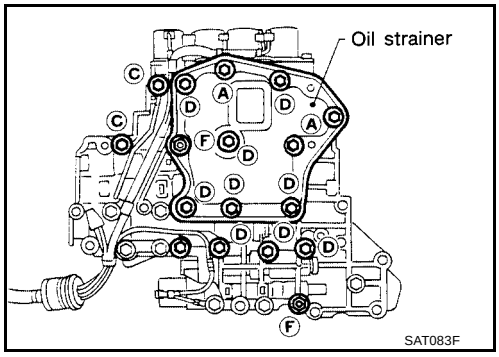
Bolt length, number and location:

Bolt symbol	A	B	C	D	E	F	G
Bolt length "l"	13.5 mm (0.531 in)	58.0 mm (2.283 in)	40.0 mm (1.575 in)	66.0 mm (2.598 in)	33.0 mm (1.299 in)	78.0 mm (3.071 in)	18.0 mm (0.709 in)
Number of bolts	6	3	6	11	2	2	1

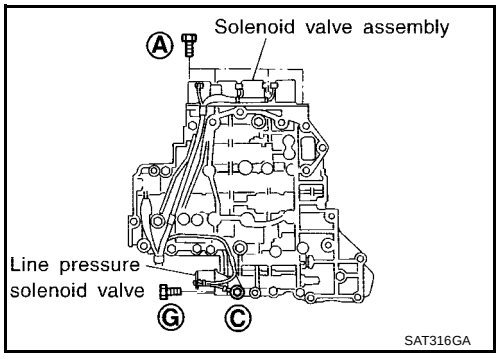
F: Reamer bolt with nut



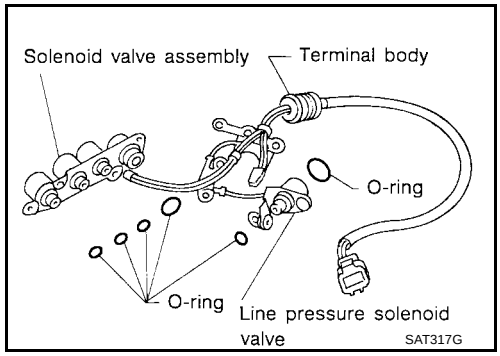
1. Remove bolts A, D and F, and remove oil strainer from control valve assembly.



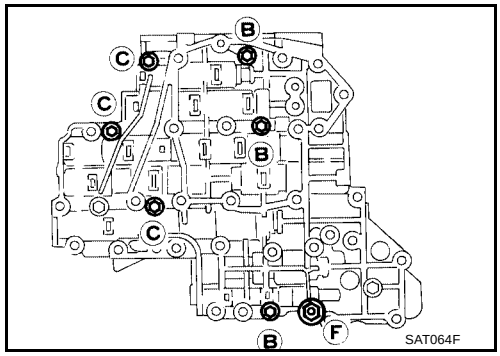
2. Remove solenoid valve assembly and line pressure solenoid valve from control valve assembly.
   - **Be careful not to lose the line pressure solenoid valve spring.**



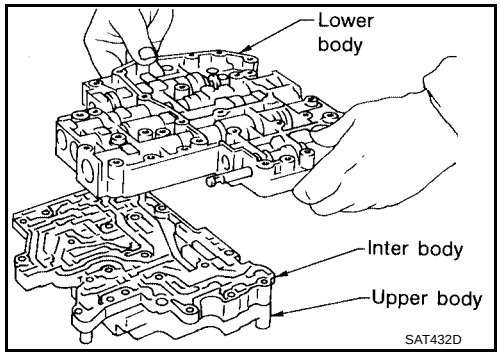
3. Remove O-rings from solenoid valves and terminal body.



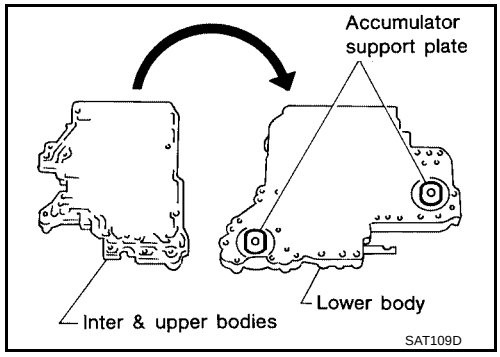
4. Place upper body face down, and remove bolts B, C and F.



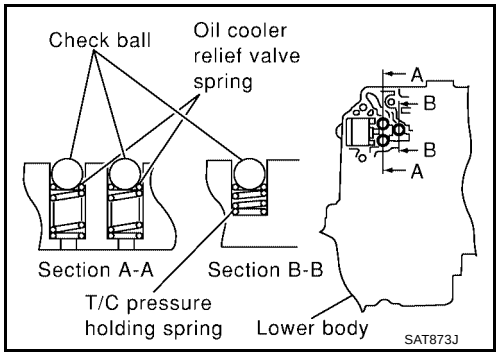
5. Remove lower body from inter body.



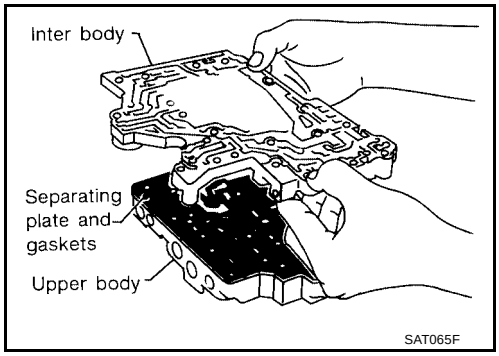
6. Turn over lower body, and accumulator support plates.



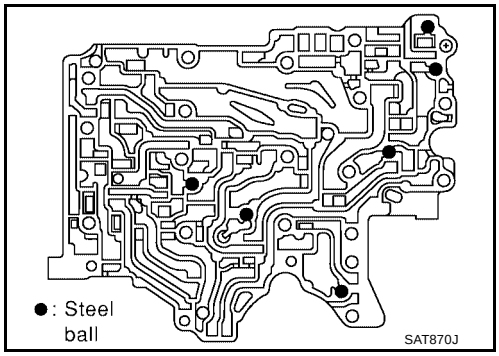
7. Remove bolts E, separating plate and separating gaskets from lower body.
8. Remove check balls, oil cooler relief valve springs and T/C pressure holding spring from lower body.
   - **Be careful not to lose steel balls and relief valve springs.**



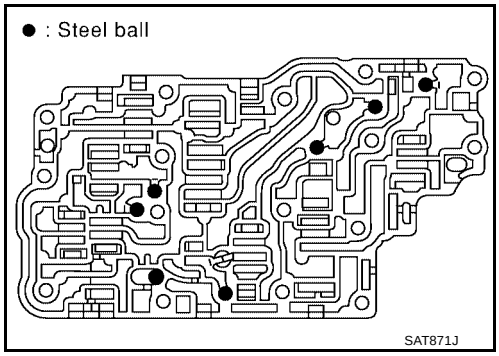
9. Remove inter body from upper body.
10. Remove pilot filter, separating plate and gaskets from upper body.



11. Check to see that steel balls are properly positioned in inter body and then remove them.
    - **Be careful not to lose steel balls.**



12. Check to see that steel balls are properly positioned in upper body and then remove them.
    - **Be careful not to lose steel balls.**

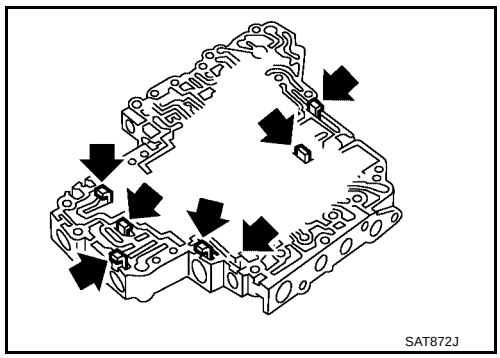


Inspection

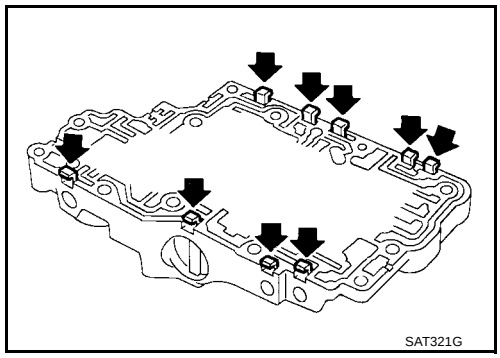
ECS00601

LOWER AND UPPER BODIES

- Check to see that retainer plates are properly positioned in lower body.

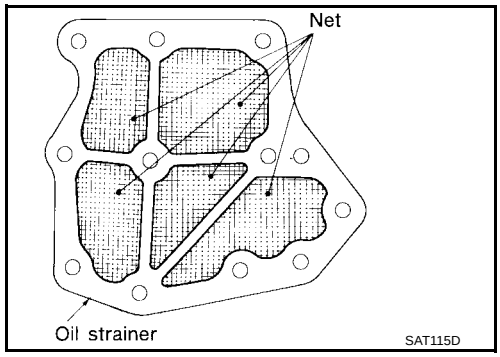


- Check to see that retainer plates are properly positioned in upper body.



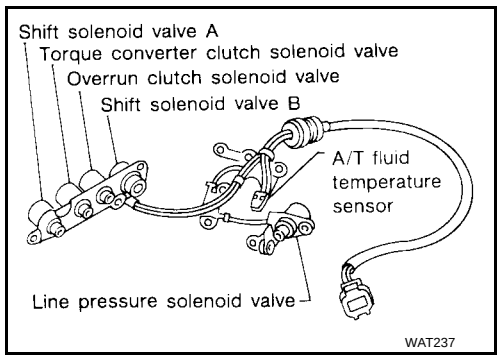
OIL STRAINER

- Check wire netting of oil strainer for damage.



SHIFT SOLENOID VALVES A AND B, LINE PRESSURE SOLENOID VALVE, TORQUE CONVERTER CLUTCH SOLENOID VALVE AND OVERRUN CLUTCH SOLENOID VALVE

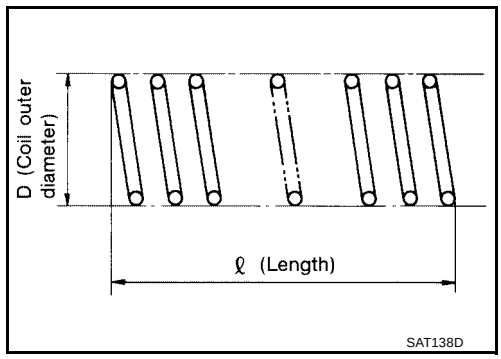
- Refer to AT-182, "SHIFT SOLENOID VALVE A" , AT-186, "SHIFT SOLENOID VALVE B" , AT-177, "LINE PRESSURE SOLENOID VALVE" , AT-177, "LINE PRESSURE SOLENOID VALVE" and AT-196, "OVERRUN CLUTCH SOLENOID VALVE" .



OIL COOLER RELIEF VALVE SPRING

- Check springs for damage or deformation.
- Measure free length and outer diameter.

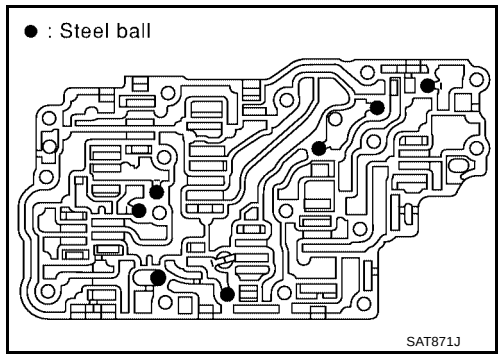
Inspection standard **: Refer to AT-388, "Clutch and Brake Return Springs"**



Assembly

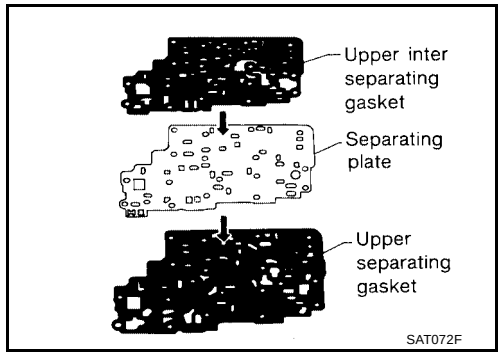
ECS00602

1. Install upper, inter and lower body.



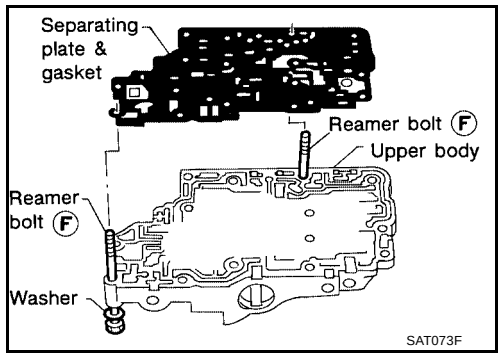
a. Place oil circuit of upper body face up. Install steel balls in their proper positions.

b. Install upper separating gasket, upper inter separating gasket and upper separating plate in order shown in illustration.

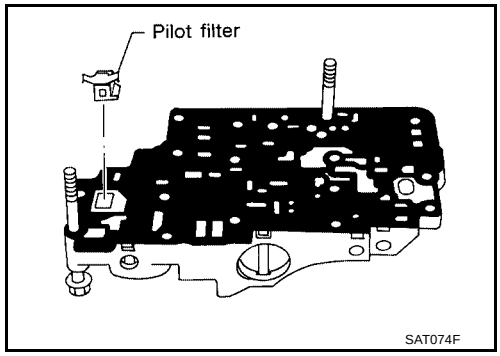


- **Always use new gaskets.**

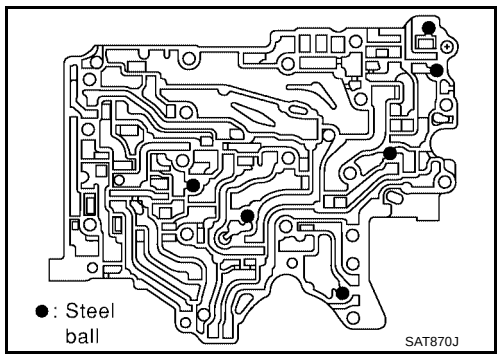
c. Install reamer bolts **F** from bottom of upper body. Using reamer bolts as guides, install separating plate and gaskets as a set.



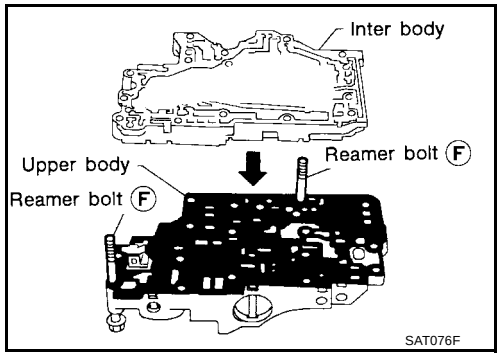
d. Install pilot filter.



e. Place inter body as shown in the illustration. Install steel balls in their proper positions.

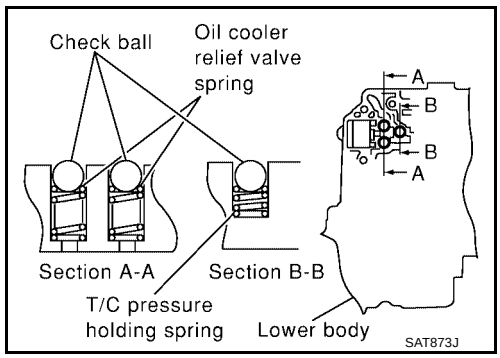


f. Install inter body on upper body using reamer bolts **F** as guides.

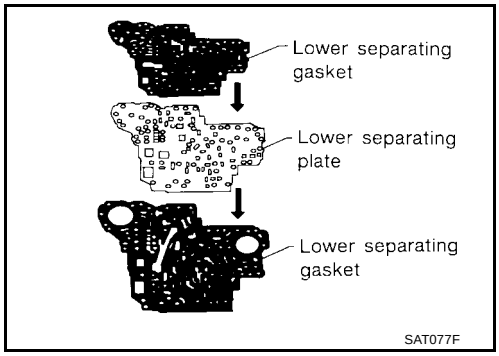


- **Be careful not to dislocate or drop steel balls.**

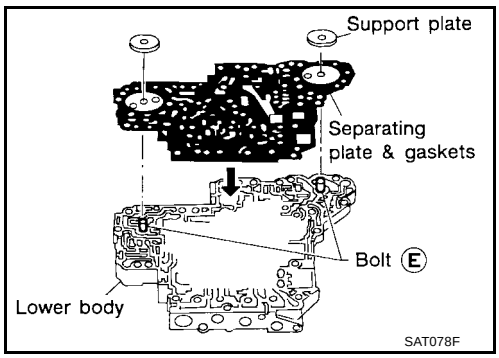
g. Install steel balls, oil cooler relief valve springs and T/C pressure holding spring in their proper positions in lower body.



h. Install lower separating gasket, inter separating gasket and lower separating plate in order shown in the illustration.

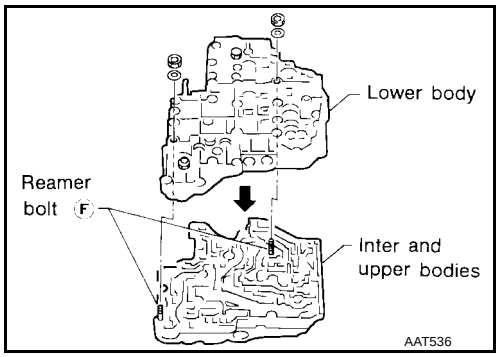


i. Install bolts **E** from bottom of lower body. Using bolts **E** as guides, install separating plate and gaskets as a set.

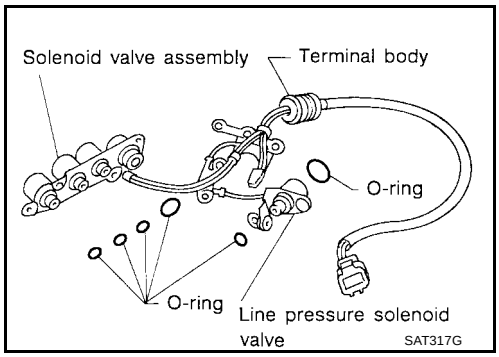


j. Install support plates on lower body.

k. Install lower body on inter body using reamer bolts **F** as guides and tighten reamer bolts **F** slightly.



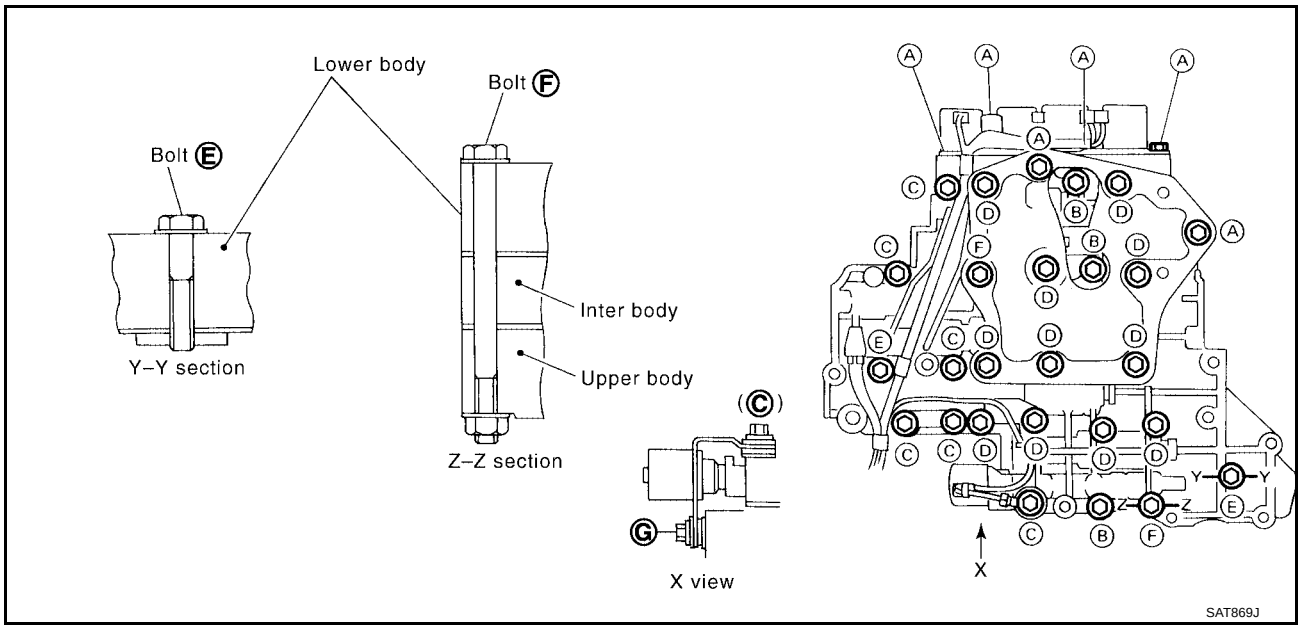
2. Install O-rings to solenoid valves and terminal body.
   - **Apply ATF to O-rings.**
3. Install and tighten bolts.



Bolt length, number and location:

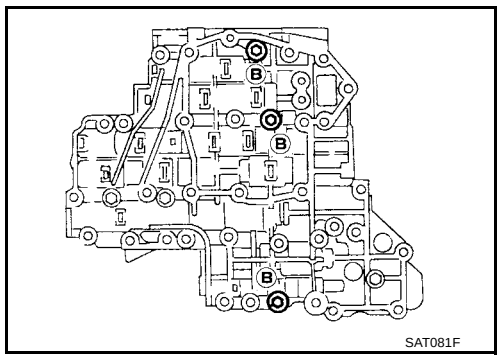
Bolt symbol	A	B	C	D	E	F	G
Bolt length "l"	13.5 mm (0.531 in)	58.0 mm (2.283 in)	44.0 mm (1.732 in)	66.0 mm (2.598 in)	33.0 mm (1.299 in)	78.0 mm (3.071 in)	18.0 mm (0.709 in)
Number of bolts	6	3	6	11	2	2	1

F: Reamer bolt with nut

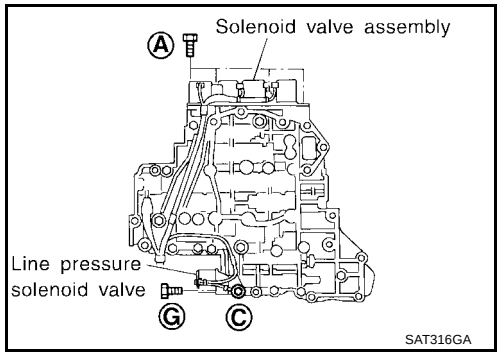


a. Install and tighten bolts **B** to specified torque.

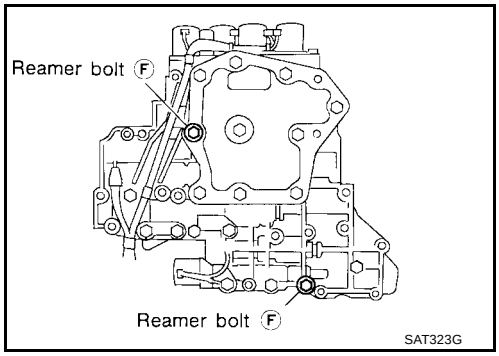
: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)



b. Install solenoid valve assembly and line pressure solenoid valve to lower body.



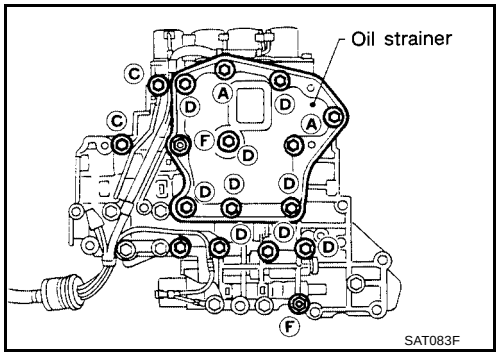
c. Remove reamer bolts **F** and set oil strainer on control valve assembly.



d. Reinstall reamer bolts **F** from lower body side.

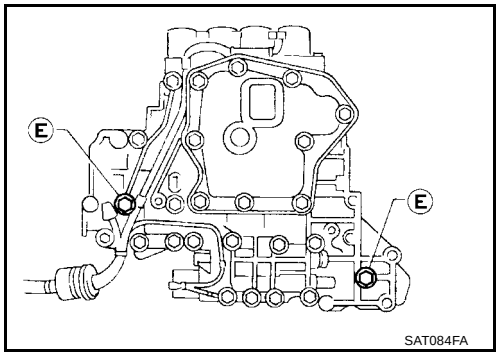
e. Tighten bolts **A** , **C** , **D** and **F** to specified torque.

: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)



f. Tighten bolts **E** to specified torque.

: 3.4 - 4.4 N·m (0.35 - 0.45 kg-m, 30.4 - 39.1 in-lb)



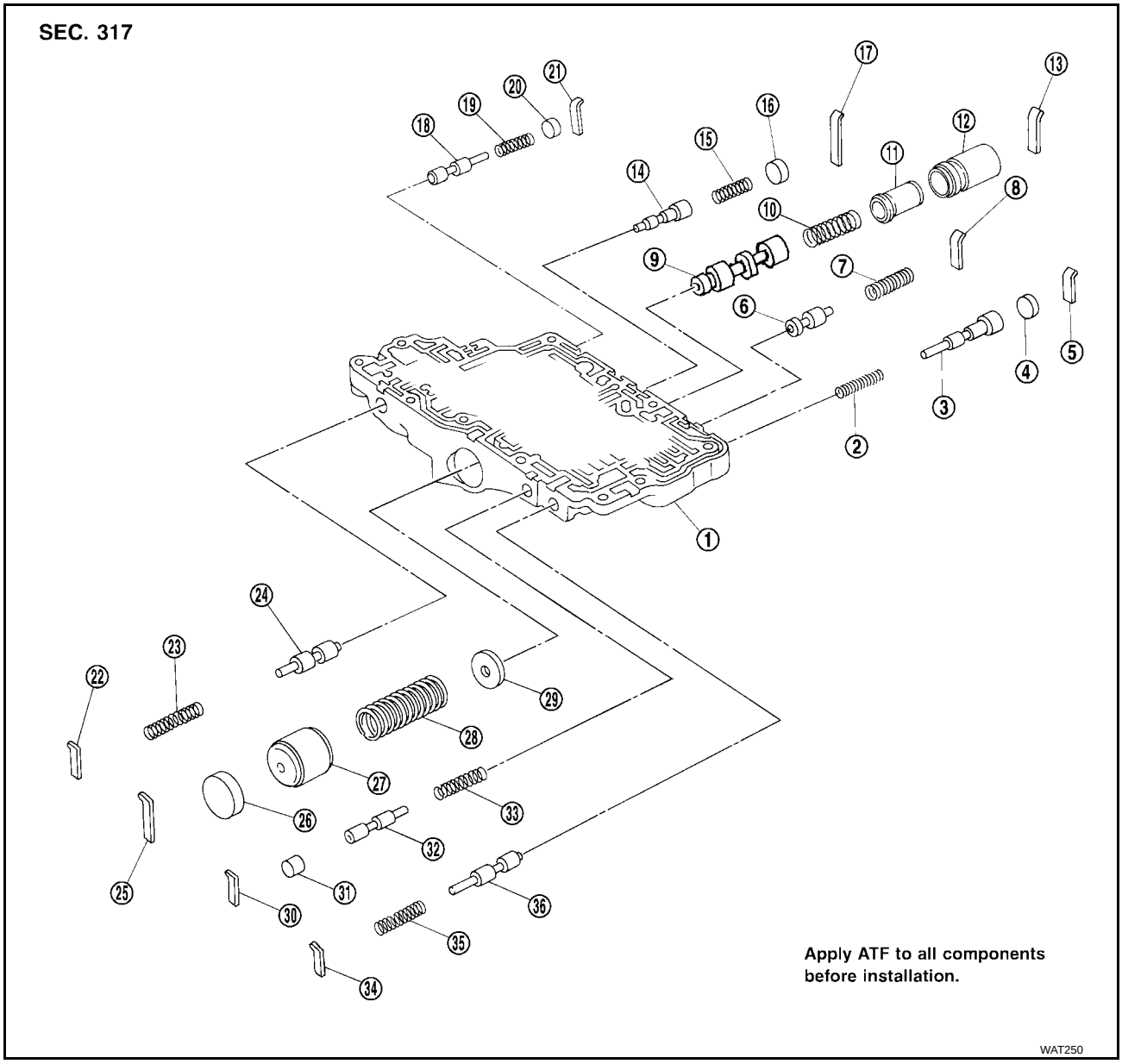
CONTROL VALVE UPPER BODY

PFP:31711

Components

ECS00603

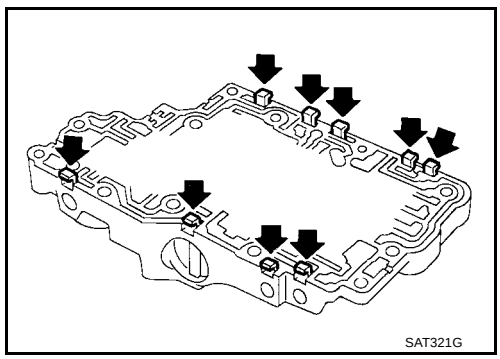
Numbers preceding valve springs correspond with those shown in AT-386, "CONTROL VALVE AND PLUG RETURN SPRINGS" .



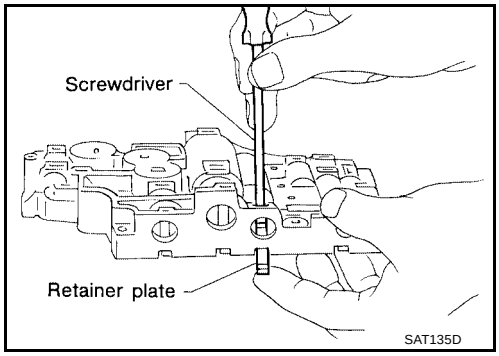
Disassembly

ECS00604

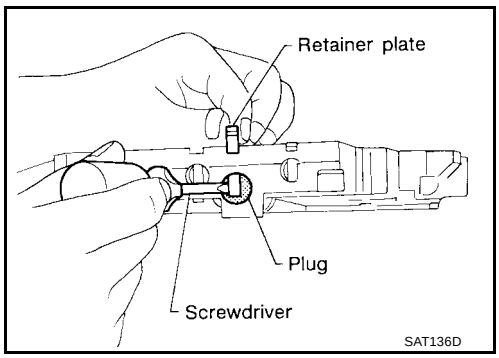
1. Remove valves at retainer plates.
   - **Do not use a magnetic “hand”.**



a. Use a screwdriver to remove retainer plates.

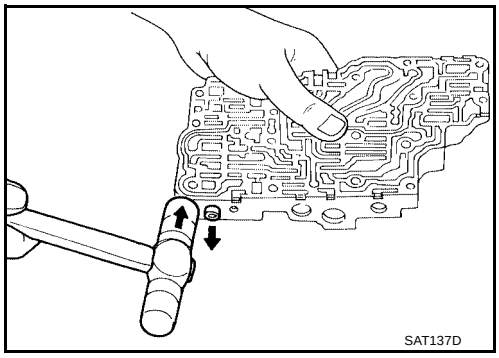


b. Remove retainer plates while holding spring, plugs or sleeves.



- **Remove plugs slowly to prevent internal parts from jumping out.**

c. Place mating surface of valve body face down, and remove internal parts.
   - **If a valve is hard to remove, place valve body face down and lightly tap it with a soft hammer.**
   - **Be careful not to drop or damage valves and sleeves.**



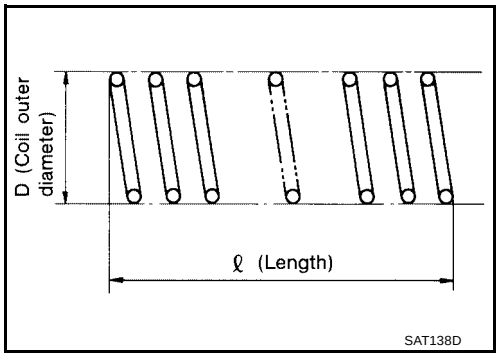
Inspection

ECS00605

VALVE SPRING

- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.

  Inspection standard : **Refer to** **AT-386, "CONTROL VALVE AND PLUG RETURN SPRINGS"** **.**



- Replace valve springs if deformed or fatigued.

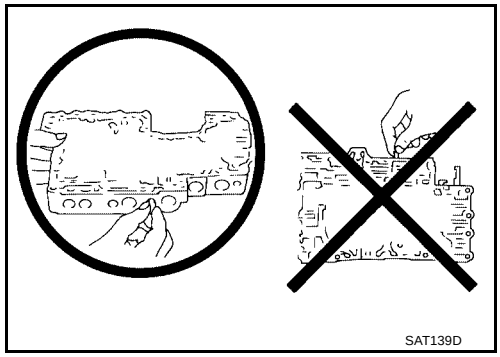
CONTROL VALVES

- Check sliding surfaces of valves, sleeves and plugs.

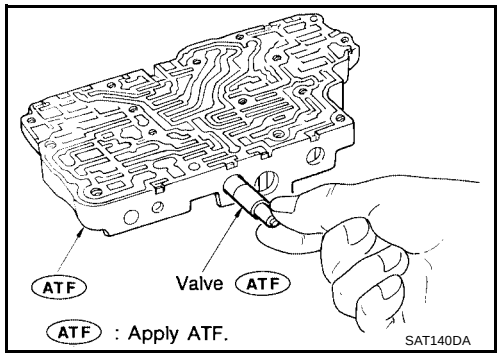
Assembly

ECS00606

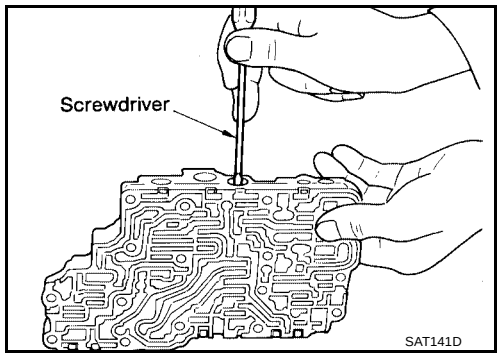
- **Lay control valve body down when installing valves. Do not stand the control valve body upright.**



1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.

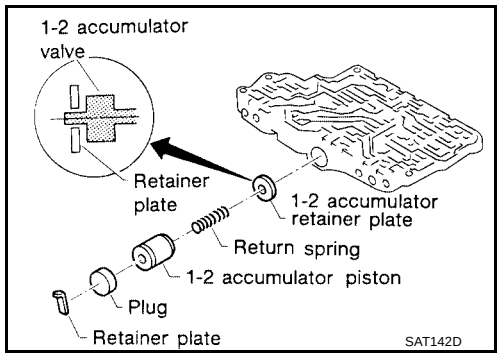


- **Be careful not to scratch or damage valve body.**
- Wrap a small screwdriver with vinyl tape and use it to insert the valves into their proper positions.

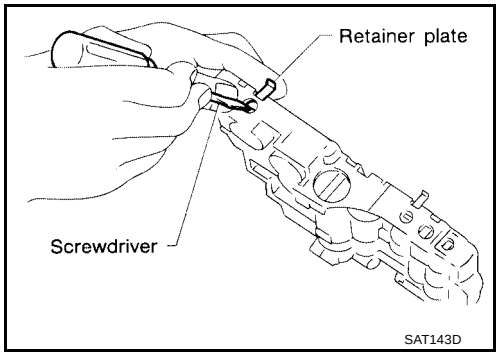


1-2 ACCUMULATOR VALVE

- Install 1-2 accumulator valve. Align 1-2 accumulator retainer plate from opposite side of control valve body.
- Install return spring, 1-2 accumulator piston and plug.

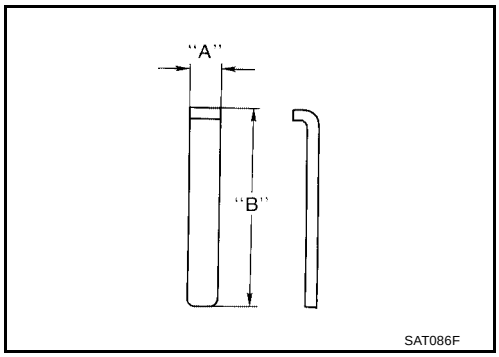


1. Install retainer plates.
   - Install retainer plate while pushing plug or return spring.



RETAINER PLATE (FOR CONTROL VALVE UPPER BODY)

Refer to AT-307, "CONTROL VALVE UPPER BODY" .



Unit: mm (in)

Name of valve and piston	No.	Width A	Length B
Pilot valve	22	6.0 (0.236)	21.5 (0.846)
1-2 accumulator valve	17		40.5 (1.594)
1-2 accumulator piston	25		
1st reducing valve	30		21.5 (0.846)
Overrun clutch reducing valve	5		24.0 (0.945)
Torque converter relief valve	8		21.5 (0.846)
Torque converter clutch control valve	13		28.0 (1.102)
3-2 timing valve	34		21.5 (0.846)
Cooler check valve	21		24.0 (0.945)

- Install proper retainer plates.

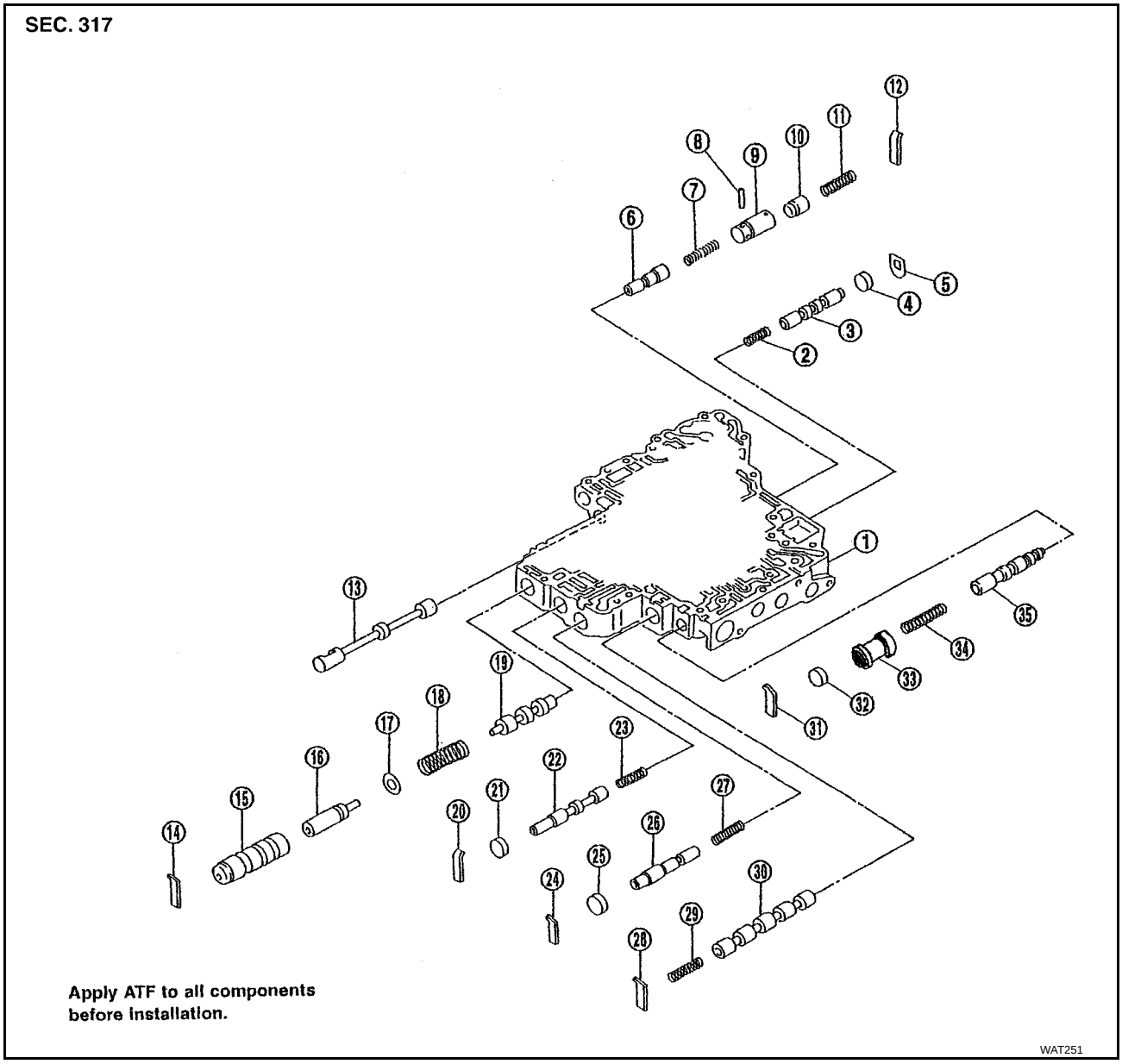
CONTROL VALVE LOWER BODY

PFP:31713

Components

ECS00607

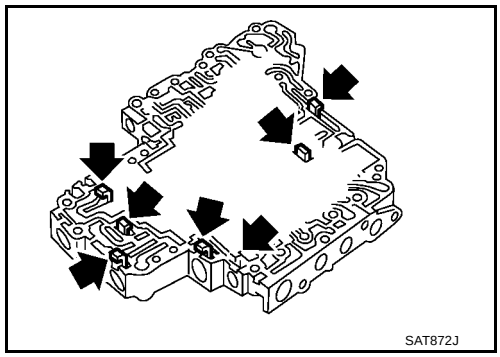
Numbers preceding valve springs correspond with those shown in AT-386, "CONTROL VALVE AND PLUG RETURN SPRINGS" .



Disassembly

ECS00608

Remove valves at retainer plate.
For removal procedures, refer to AT-311, "Disassembly" .



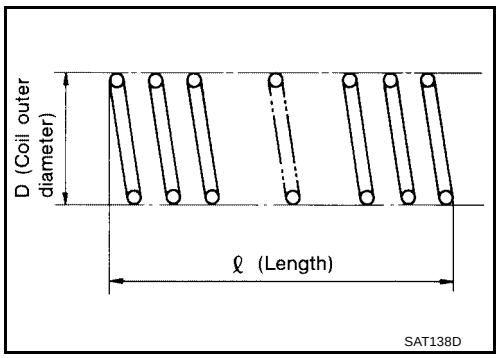
Inspection

ECS00609

VALVE SPRINGS

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.

Inspection standard **: Refer to AT-386, "CONTROL VALVE AND PLUG RETURN SPRINGS" .**



- Replace valve springs if deformed or fatigued.

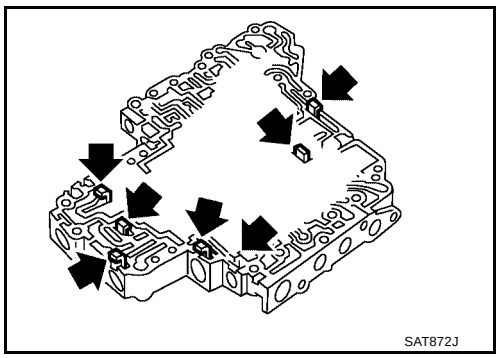
CONTROL VALVES

- Check sliding surfaces of control valves, sleeves and plugs for damage.

Assembly

ECS0060A

- Install control valves.
  For installation procedures, refer to AT-312, "Assembly" .

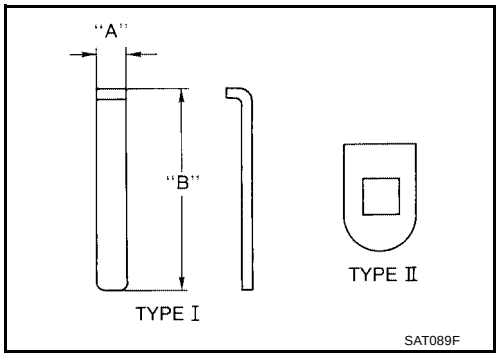


RETAINER PLATE (FOR CONTROL VALVE LOWER BODY)

Refer to AT-311, "CONTROL VALVE LOWER BODY" .

Unit: mm (in)

Name of control valve	No.	Width A	Length B	Type
Pressure regulator valve	14	6.0 (0.236)	28.0 (1.102)	I
Accumulator control valve	24			
Shift valve A	28			
Overrun clutch control valve	20			
Pressure modifier valve	12			
Shuttle control valve	31			
Shift valve B	5	—	—	II



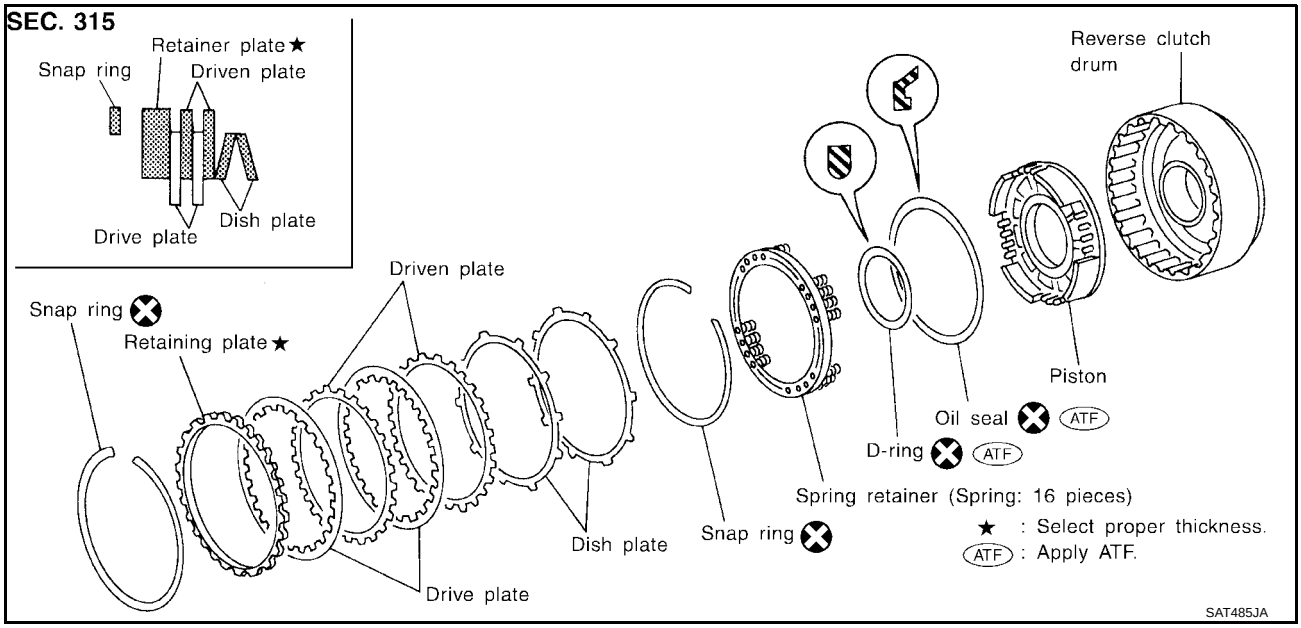
- Install proper retainer plates.

REVERSE CLUTCH

PFP:31510

Components

ECS0060B



Disassembly

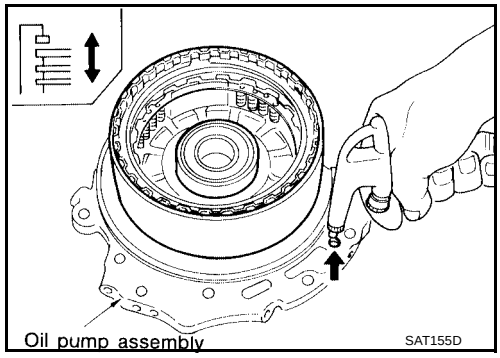
ECS0060C

1. Check operation of reverse clutch.

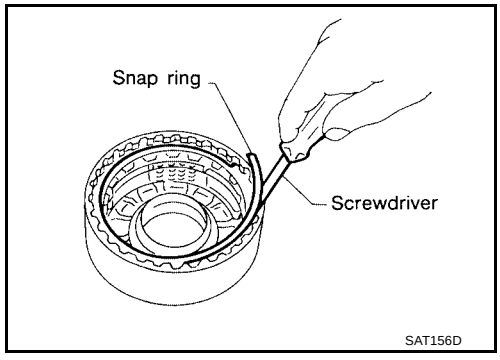
a. Install seal ring onto drum support of oil pump cover and install reverse clutch assembly. Apply compressed air to oil hole.

b. Check to see that retaining plate moves to snap ring.

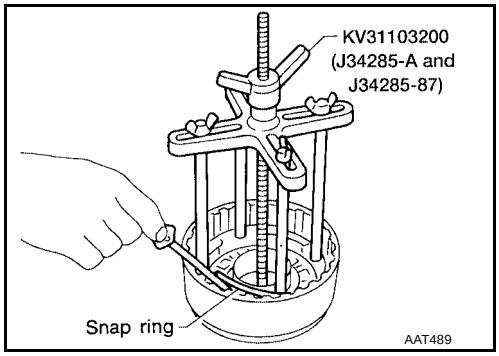
c. If retaining plate does not contact snap ring:
   - D-ring might be damaged.
   - Oil seal might be damaged.
   - Fluid might be leaking past piston check ball.



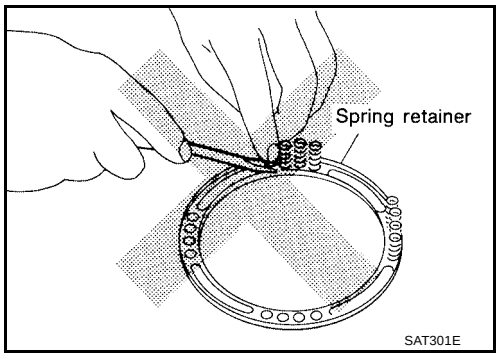
2. Remove snap ring.
   - **Do not expand snap ring excessively.**
3. Remove drive plates, driven plates, retaining plate, and dish plates.



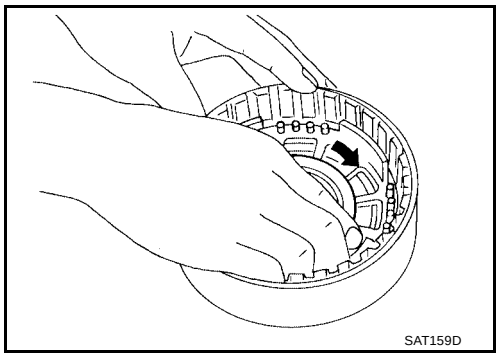
4. Set Tool on spring retainer and remove snap ring from reverse clutch drum while compressing return springs.
   - **Set Tool directly above springs.**
   - **Do not expand snap ring excessively.**



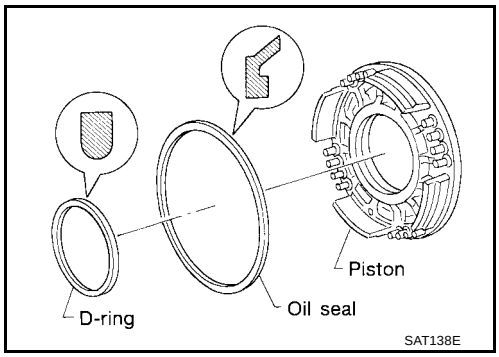
5. Remove spring retainer and return springs.
   - **Do not remove return springs from spring retainer.**



6. Remove piston from reverse clutch drum by turning it.



7. Remove D-ring and oil seal from piston.



Inspection

ECS0060D

REVERSE CLUTCH SNAP RING, SPRING RETAINER AND RETURN SPRINGS

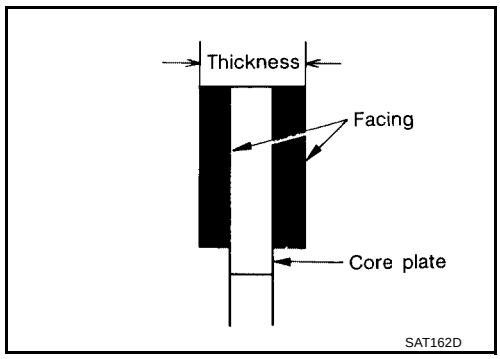
- Check for deformation, fatigue or damage.
- Replace if necessary.
- **When replacing spring retainer and return springs, replace them as a set.**

REVERSE CLUTCH DRIVE PLATES

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate
Standard value : 2.0 mm (0.079 in)
Wear limit : 1.8 mm (0.071 in)

- If not within wear limit, replace.

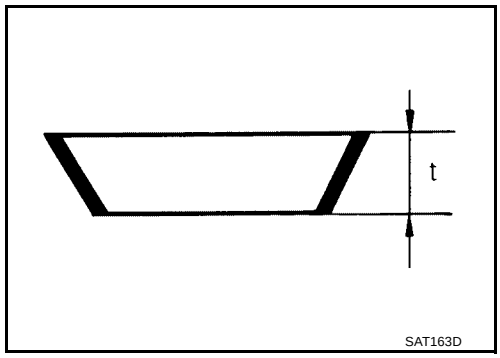


REVERSE CLUTCH DISH PLATES

- Check for deformation or damage.
- Measure thickness of dish plate.

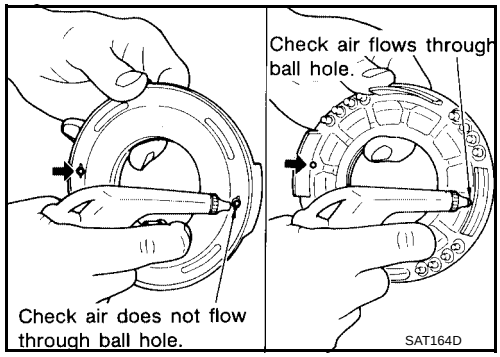
Thickness of dish plate "t" : 2.8 mm (0.110 in)

- If deformed or fatigued, replace.



REVERSE CLUTCH PISTON

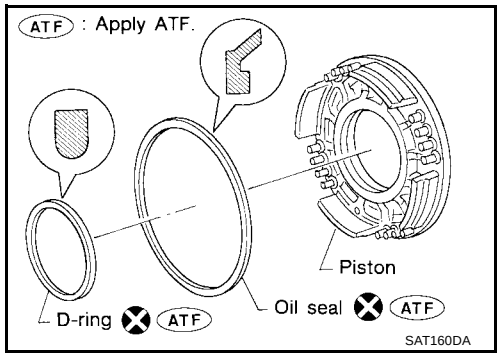
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure that there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure air leaks past ball.



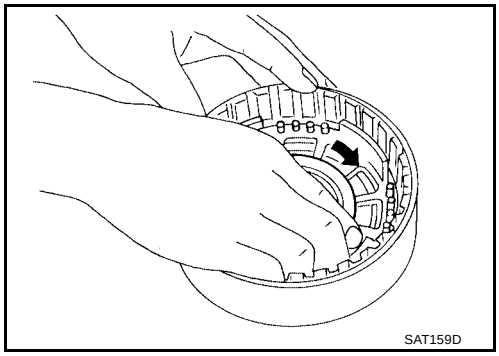
ECS0060E

Assembly

1. Install D-ring and oil seal on piston.
   - **Take care with the direction of the oil seal.**
   - **Apply ATF to both parts.**

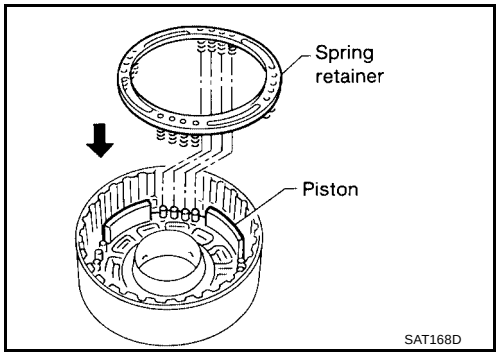


2. Install piston assembly by turning it slowly.
   - **Apply ATF to inner surface of drum.**

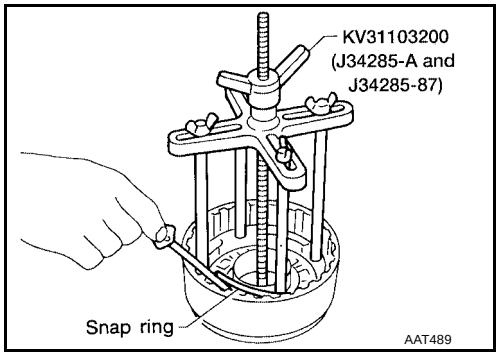


3. Install return springs and spring retainer on piston.

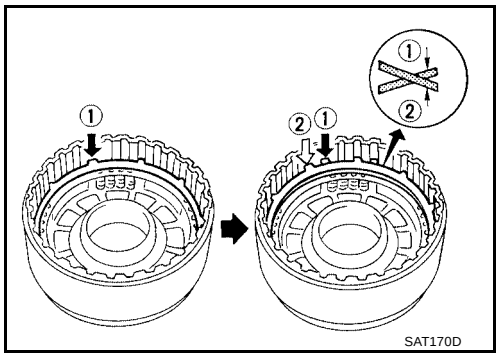
Return spring	**: Refer to AT-388, "Clutch and Brake Return Springs" .**



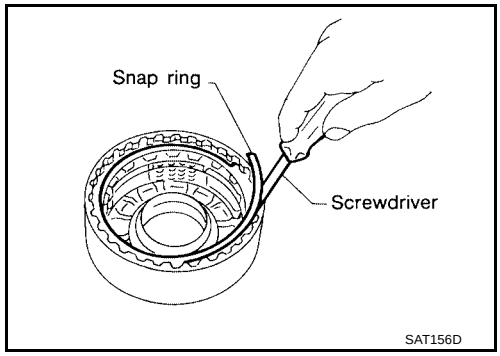
4. Set Tool on spring retainer and install snap ring while compressing return springs.
   - **Set Tool directly above return springs.**



5. Install drive plates, driven plates, retaining plate and dish plates.
   - **Do not align the projections of any two dish plates.**
   - **Take care with the order and direction of plates.**

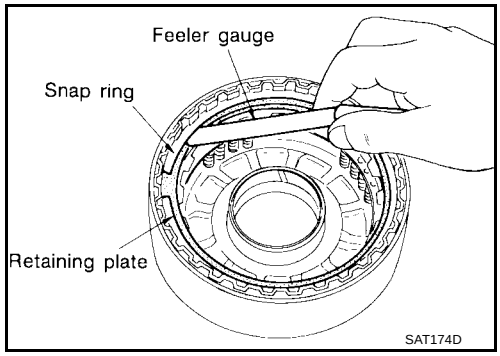


6. Install snap ring.
   - **Do not expand snap ring excessively.**

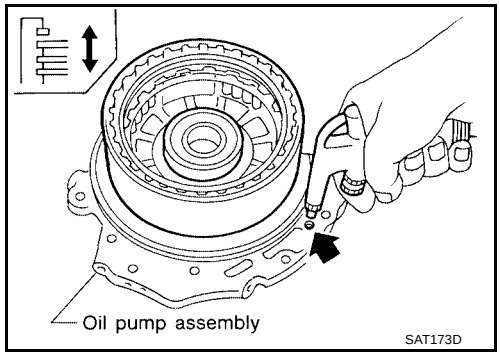


7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

Specified clearance	
Standard	**: 0.5 - 0.8 mm (0.020 - 0.031 in)**
Allowable limit	**: 1.2 mm (0.047 in)**
Retaining plate	**: Refer to AT-386, "REVERSE CLUTCH"**



8. Check operation of reverse clutch.
   Refer to AT-313, "Components" .

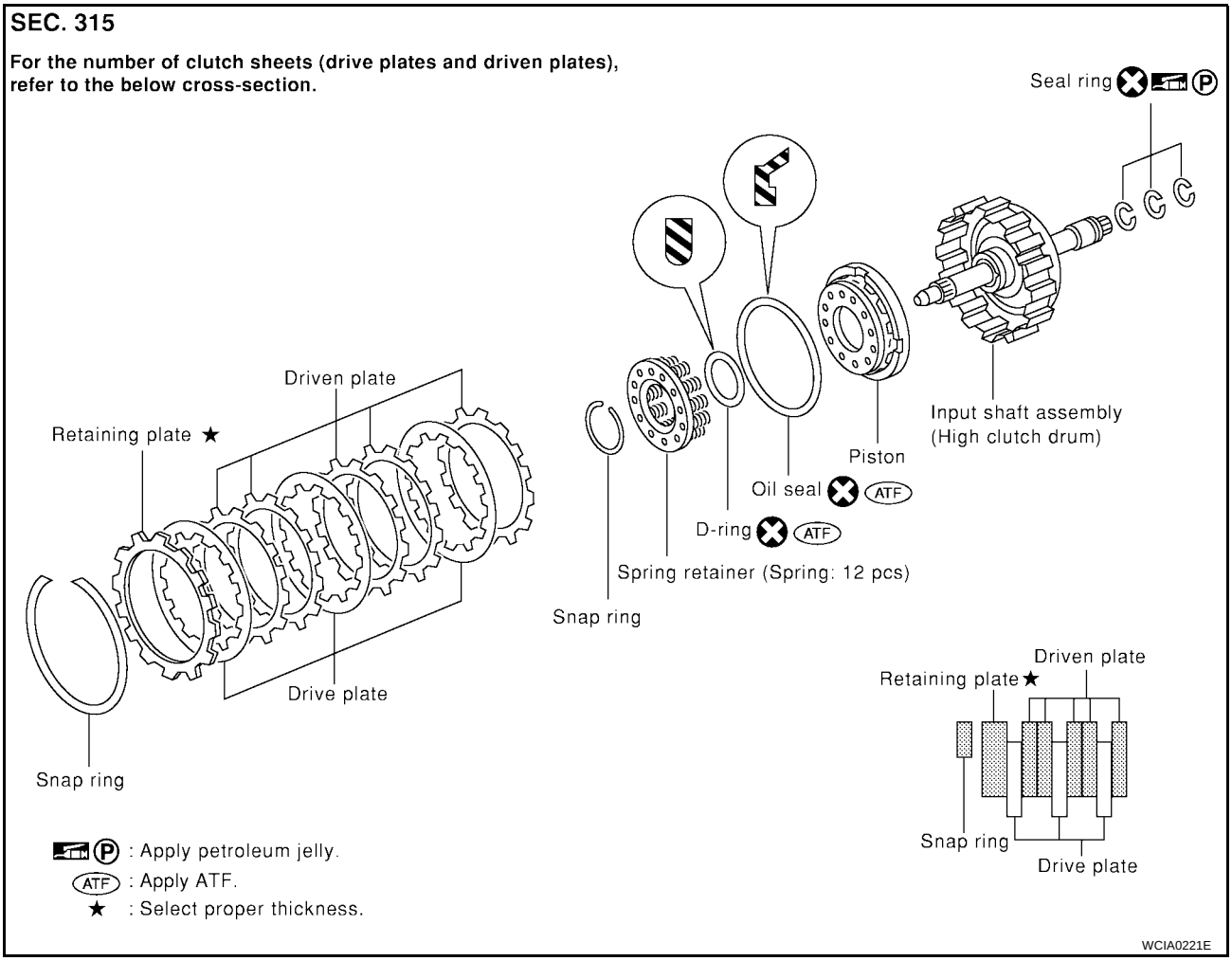


HIGH CLUTCH

PFP:31410

Components

ECS0060F



Disassembly

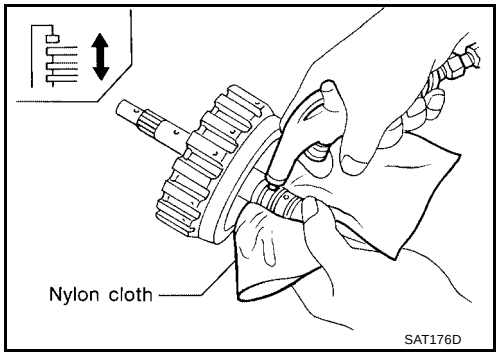
ECS0060G

1. Check operation of high clutch.

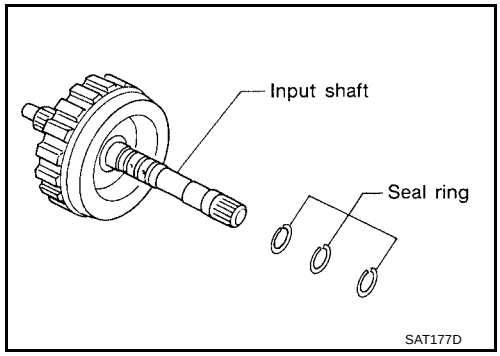
a. Apply compressed air to oil hole of input shaft.
   - **Stop up a hole on opposite side of input shaft.**

b. Check to see that retaining plate moves to snap ring.

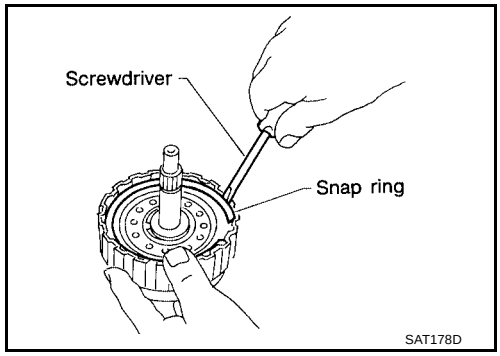
c. If retaining plate does not contact snap ring:
   - D-ring might be damaged.
   - Oil seal might be damaged.
   - Fluid might be leaking past piston check ball.



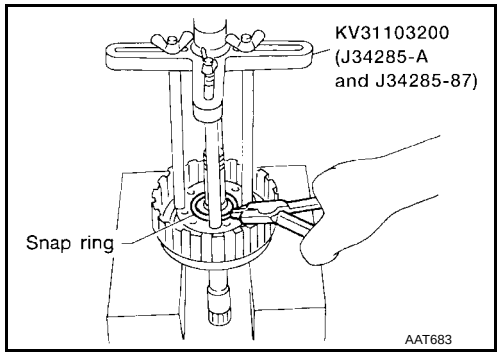
2. Remove seal rings from input shaft.

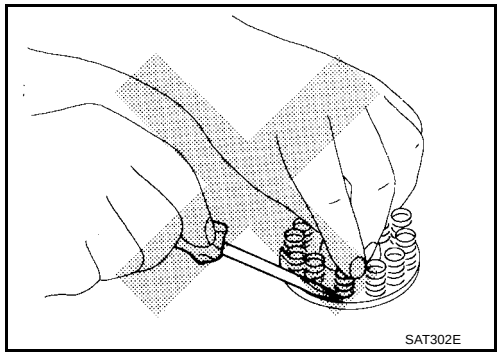


3. Remove snap ring.
   - **Do not expand snap ring excessively.**
4. Remove drive plates, driven plates and retaining plate.

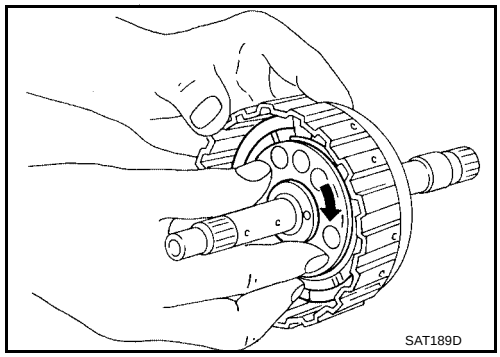


5. Set Tool on spring retainer and remove snap ring from high clutch drum while compressing return springs.
   - **Set Tool directly above springs.**
   - **Do not expand snap ring excessively.**
6. Remove spring retainer and return springs.
   - **Do not remove return spring from spring retainer.**

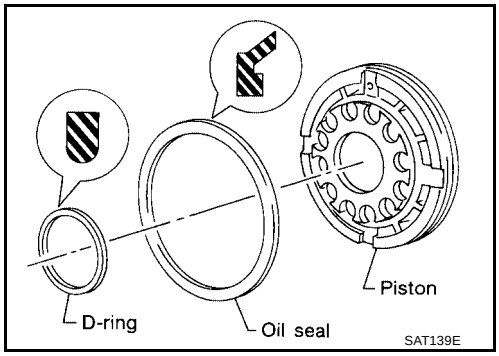




7. Remove piston from high clutch drum by turning it.



8. Remove D-ring and oil seal from piston.



Inspection

ECS0060H

REVERSE CLUTCH SNAP RING, SPRING RETAINER AND RETURN SPRINGS

- Check for deformation, fatigue or damage.
- Replace if necessary.
- **When replacing spring retainer and return springs, replace them as a set.**

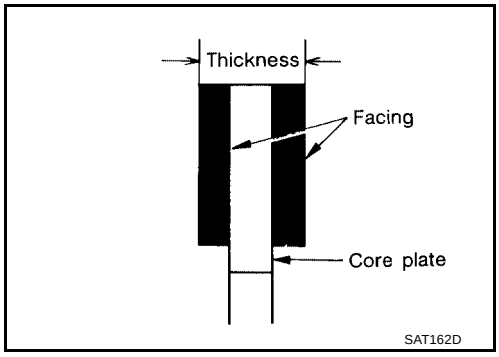
HIGH CLUTCH DRIVE PLATES

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate

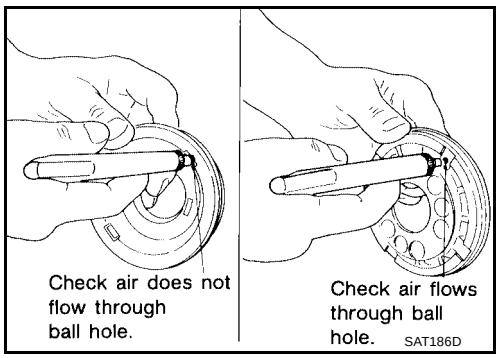
Standard value	**: 2.0 mm (0.079 in)**
Wear limit	**: 1.8 mm (0.071 in)**

- If not within wear limit, replace.



HIGH CLUTCH PISTON

- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure air leaks past ball.

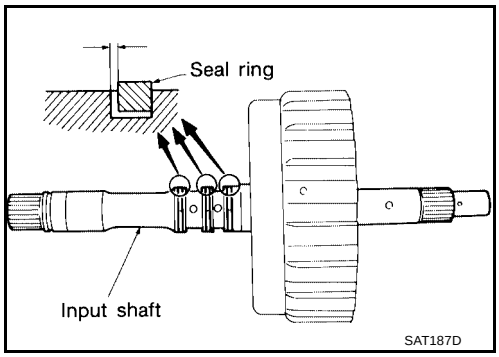


SEAL RING CLEARANCE

- Install new seal rings onto input shaft.
- Measure clearance between seal ring and ring groove.

Standard clearance	**: 0.08 - 0.23 mm (0.0031 - 0.0091 in)**
Allowable limit	**: 0.23 mm (0.0091 in)**

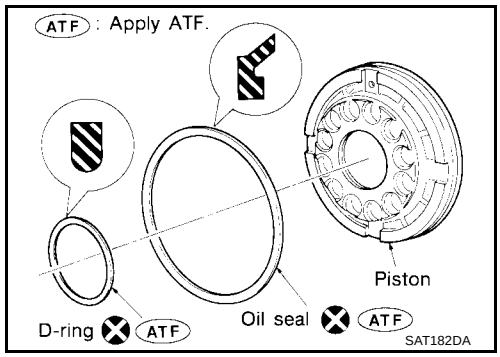
- If not within wear limit, replace input shaft assembly.



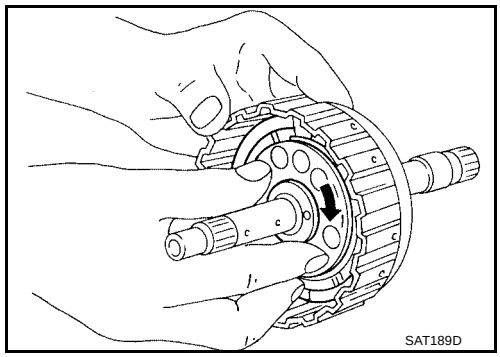
Assembly

ECS0060I

1. Install D-ring and oil seal on piston.
   - **Take care with the direction of the oil seal.**
   - **Apply ATF to both parts.**

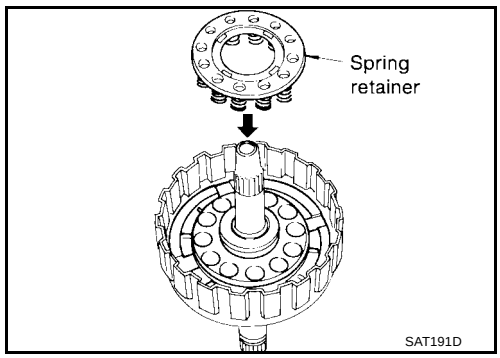


2. Install piston assembly by turning it slowly.
   - **Apply ATF to inner surface of drum.**

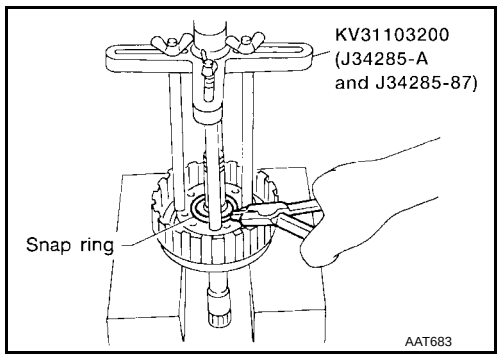


3. Install return springs and spring retainer on piston.

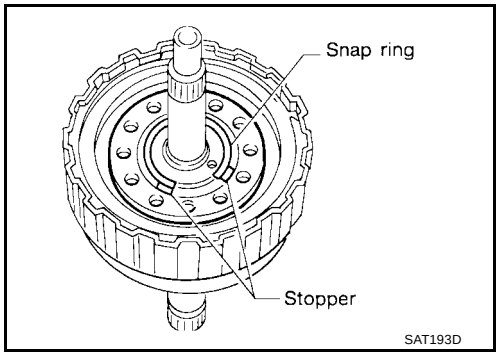
   Return spring : Refer to AT-388, "Clutch and Brake Return Springs" .



4. Set Tool on spring retainer and install snap ring while compressing return springs.
   - **Set Tool directly above return springs.**
   - **Do not expand snap ring excessively.**



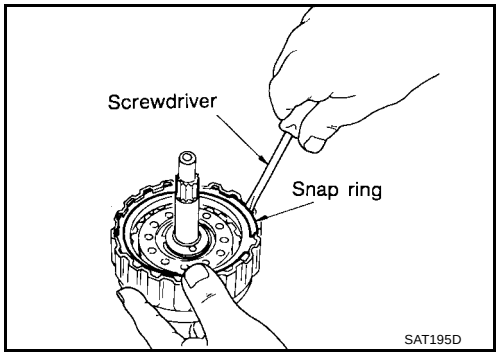
- **Do not align snap ring gap with spring retainer stopper.**



5. Install drive plates, driven plates and retaining plate.

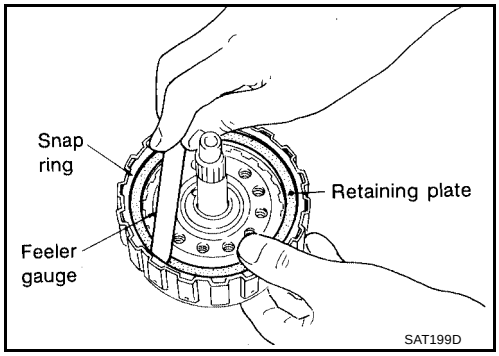
Take care with the order and direction of plates.

6. Install snap ring.
   - **Do not expand snap ring excessively.**

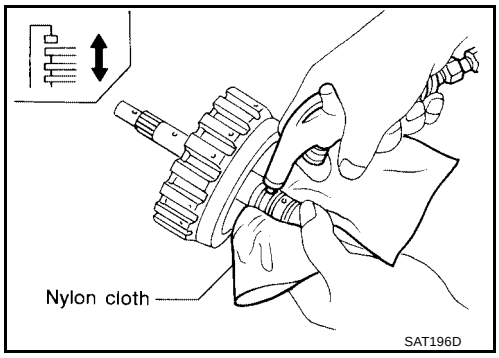


7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

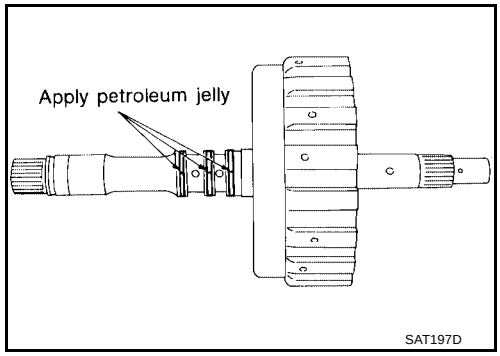
Specified clearance	
Standard	**: 1.4 - 1.8 mm (0.055 - 0.071 in)**
Allowable limit	**: 2.4 mm (0.094 in)**
Retaining plate	**: Refer to AT-387, "HIGH CLUTCH" .**



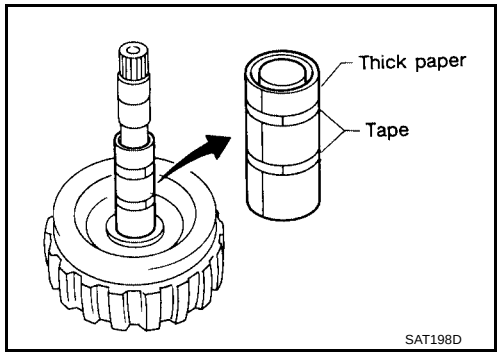
8. Check operation of high clutch.
   Refer to AT-318, "HIGH CLUTCH" .



9. Install seal rings to input shaft.
   - **Apply petroleum jelly to seal rings.**



   - **Roll paper around seal rings to prevent seal rings from spreading.**

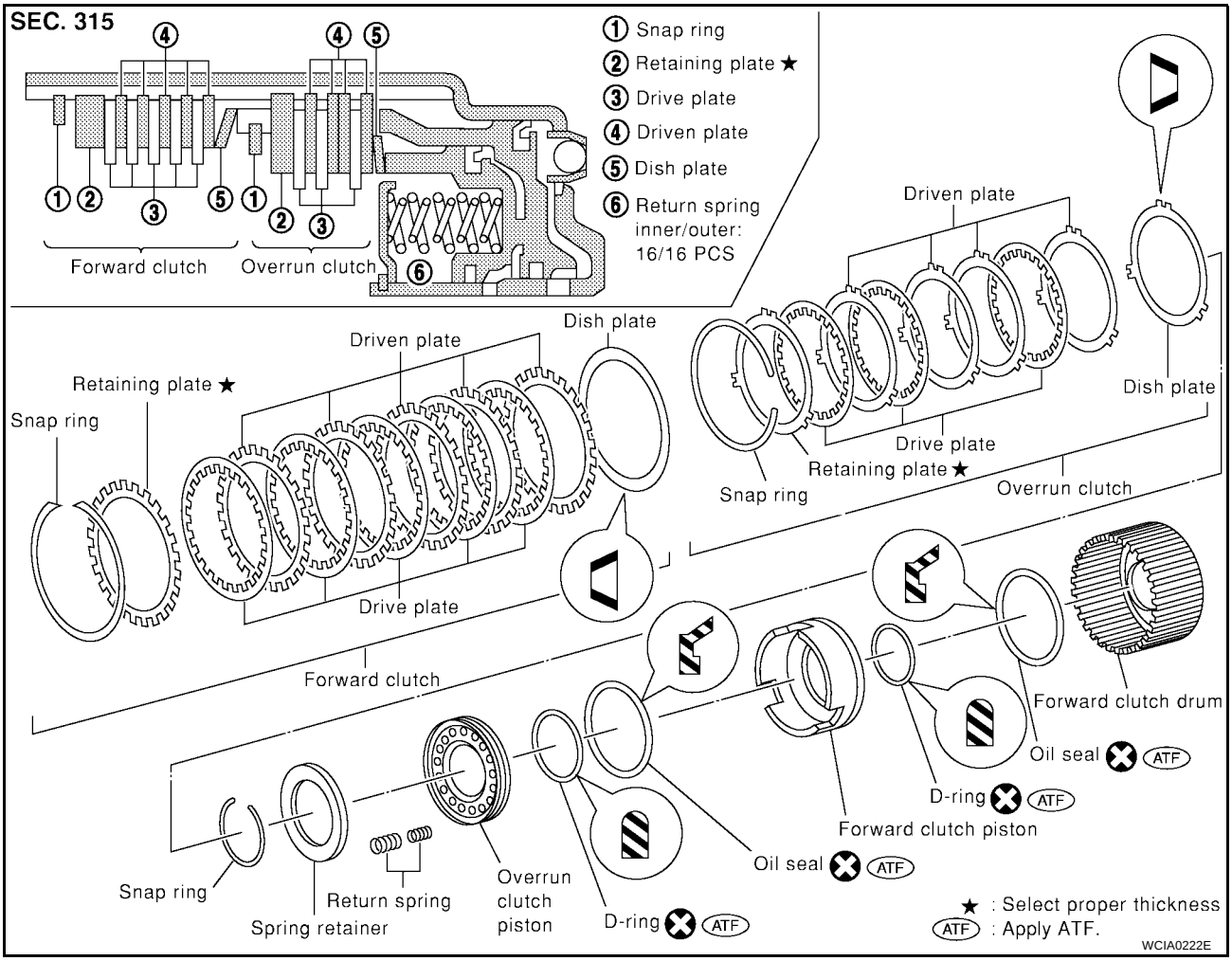


FORWARD CLUTCH AND OVERRUN CLUTCH

PFP:31570

Components

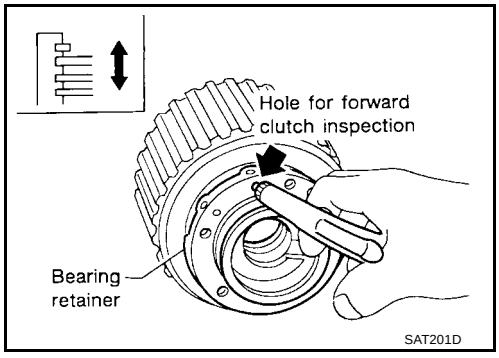
ECS0060J



Disassembly

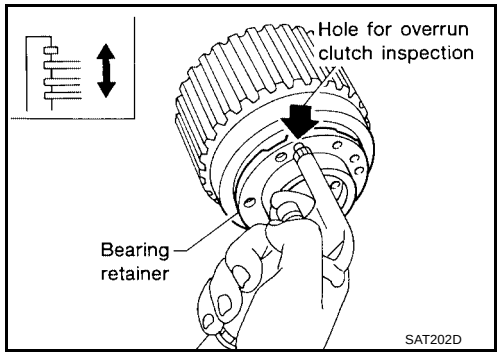
ECS0060K

1. Check operation of forward clutch and overrun clutch.

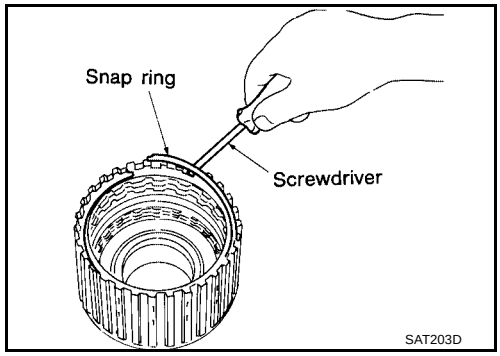


a. Install bearing retainer on forward clutch drum.
b. Apply compressed air to oil hole of forward clutch drum.
c. Check to see that retaining plate moves to snap ring.

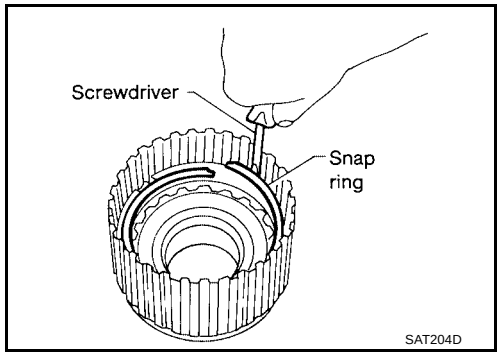
d. If retaining plate does not contact snap ring:
   - D-ring might be damaged.
   - Oil seal might be damaged.
   - Fluid might be leaking past piston check ball.



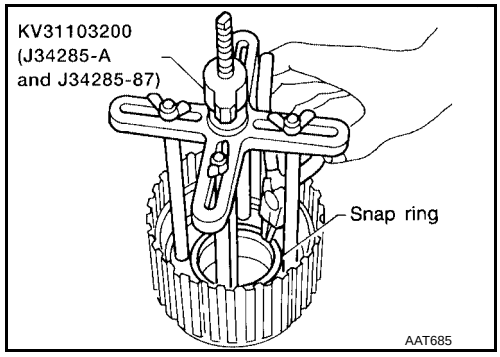
2. Remove snap ring for forward clutch.
   - **Do not expand snap ring excessively.**
3. Remove drive plates, driven plates, retaining plate and dish plate for forward clutch.



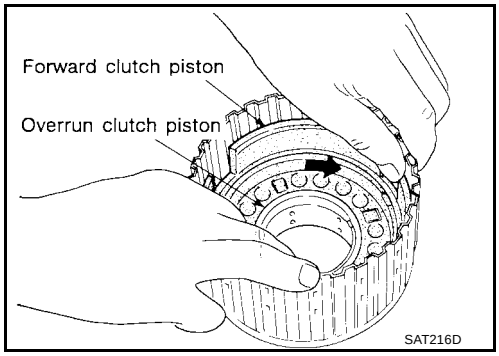
4. Remove snap ring for overrun clutch.
   - **Do not expand snap ring excessively.**
5. Remove drive plates, driven plates, retaining plate and dish plate for overrun clutch.



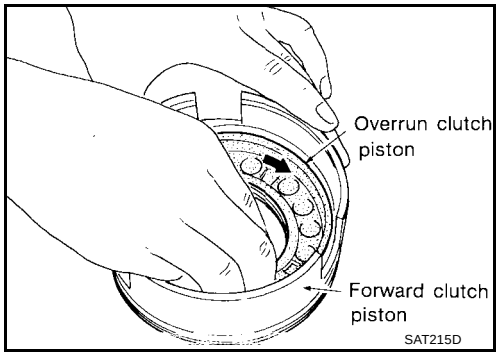
6. Set Tool on spring retainer and remove snap ring from forward clutch drum while compressing return springs.
   - **Set Tool directly above return springs.**
   - **Do not expand snap ring excessively.**
7. Remove spring retainer and return springs.



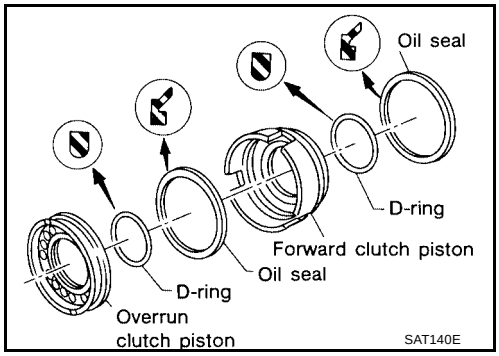
8. Remove forward clutch piston with overrun clutch piston from forward clutch drum by turning it.



9. Remove overrun clutch piston from forward clutch piston by turning it.



10. Remove D-rings and oil seals from forward clutch piston and overrun clutch piston.



Inspection

ECS0060L

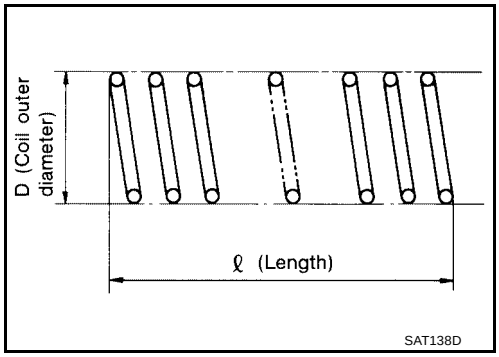
SNAP RINGS AND SPRING RETAINER

- Check for deformation, fatigue or damage.

FORWARD CLUTCH AND OVERRUN CLUTCH RETURN SPRINGS

- Check for deformation or damage.
- Measure free length and outer diameter.

Inspection standard : **Refer to AT-388, "Clutch and Brake Return Springs"** .

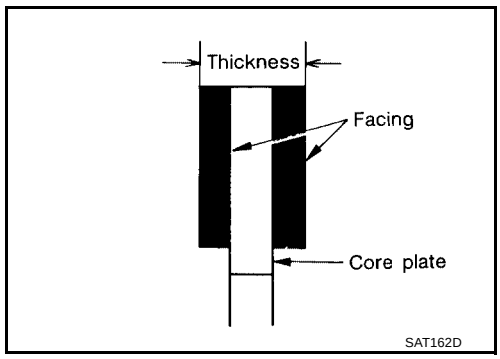


- Replace if deformed or fatigued.

FORWARD CLUTCH AND OVERRUN CLUTCH DRIVE PLATES

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate
Forward clutch
Standard value : 1.8 mm (0.071 in)
Wear limit : 1.6 mm (0.063 in)
Overrun clutch
Standard value : 1.6 mm (0.063 in)
Wear limit : 1.4 mm (0.055 in)

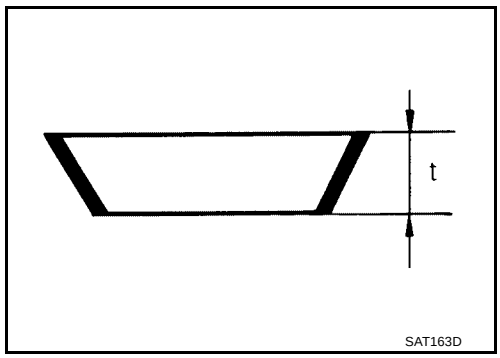


- If not within wear limit, replace.

FORWARD CLUTCH AND OVERRUN CLUTCH DISH PLATES

- Check for deformation or damage.
- Measure thickness of dish plate.

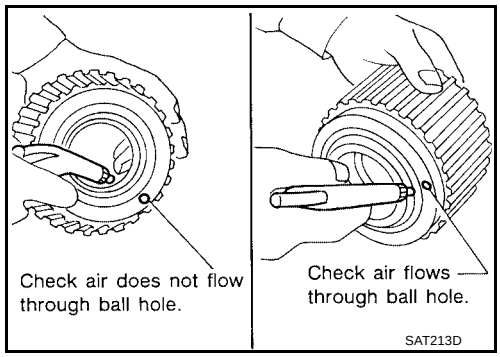
Thickness of dish plate "t"
Forward clutch : 2.5 mm (0.098 in)
Overrun clutch : 2.15 mm (0.0846 in)



- If deformed or fatigued, replace.

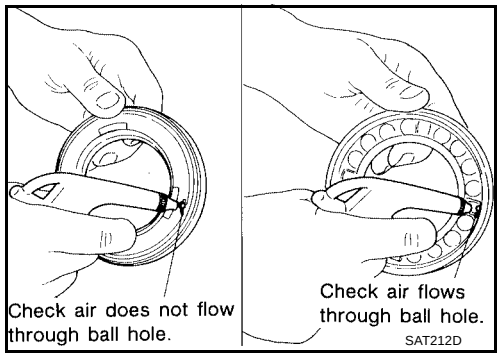
FORWARD CLUTCH DRUM

- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole from outside of forward clutch drum. Make sure air leaks past ball.
- Apply compressed air to oil hole from inside of forward clutch drum. Make sure there is no air leakage.



OVERRUN CLUTCH PISTON

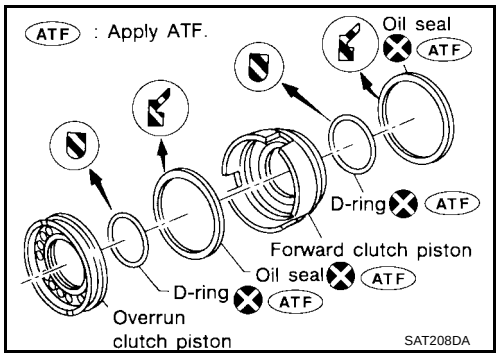
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side. Make sure air leaks past ball.



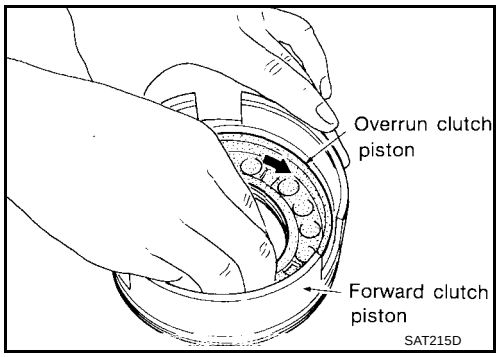
Assembly

ECS0060M

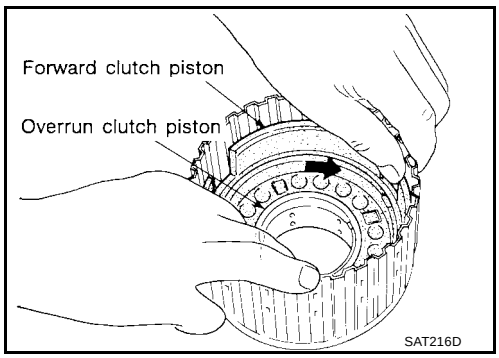
1. Install D-rings and oil seals on forward clutch piston and overrun clutch piston.
   - **Take care with direction of oil seal.**
   - **Apply ATF to both parts.**



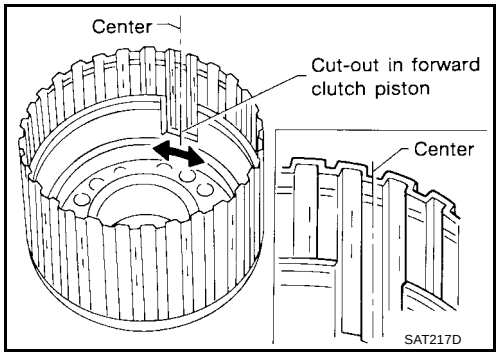
2. Install overrun clutch piston assembly on forward clutch piston while turning it slowly.
   - **Apply ATF to inner surface of forward clutch piston.**



3. Install forward clutch piston assembly on forward clutch drum while turning it slowly.
   - **Apply ATF to inner surface of drum.**

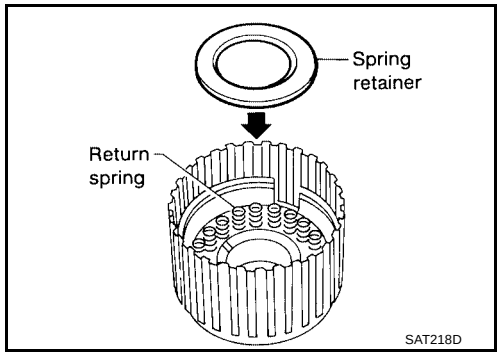


4. Align notch in forward clutch piston with groove in forward clutch drum.

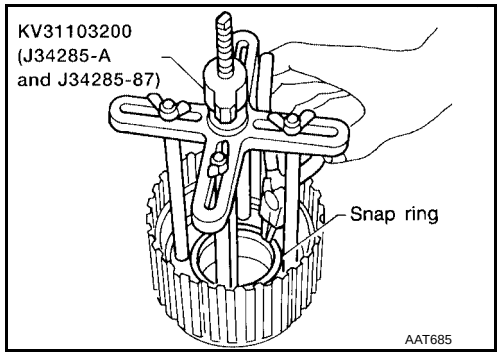


5. Install return spring on piston.
6. Install spring retainer on return springs.

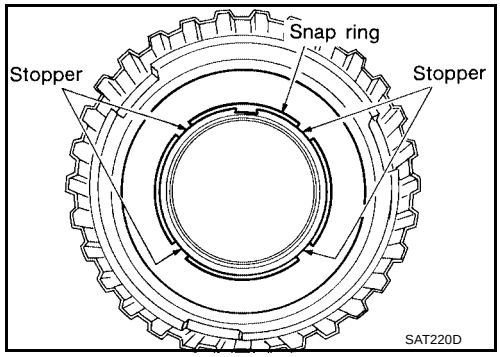
Return spring	**: Refer to AT-388, "Clutch and Brake Return Springs" .**



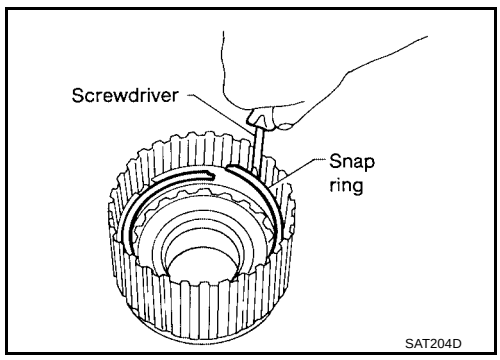
7. Set Tool on spring retainer and install snap ring while compressing return springs.
   - **Set Tool directly above return springs.**
   - **Do not expand snap ring excessively.**



   - **Do not align snap ring gap with spring retainer stopper.**

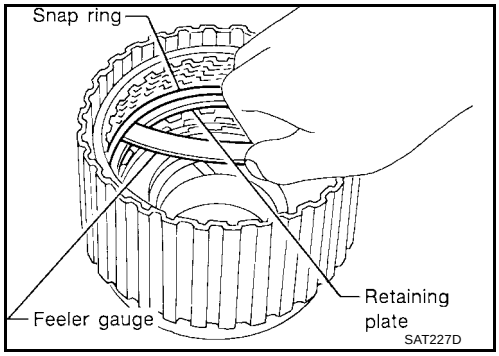


8. Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.
9. Install snap ring for overrun clutch.
   - Do not expand snap ring excessively.



10. Measure clearance between overrun clutch retaining plate and snap ring.
If not within allowable limit, select proper retaining plate.

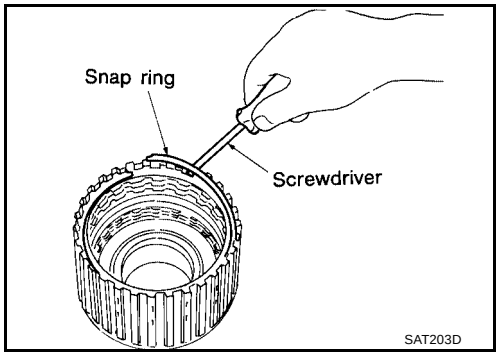
Specified clearance	
Standard	: 1.0 - 1.4 mm (0.039 - 0.055 in)
Allowable limit	: 2.0 mm (0.079 in)
Overrun clutch retaining plate	: Refer to AT-387, "OVERRUN CLUTCH" .



11. Install drive plates, driven plates, retaining plate and dish plate for forward clutch.

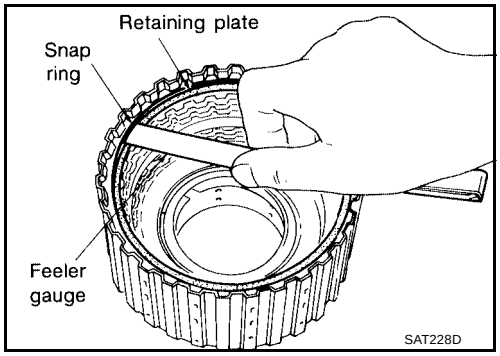
Take care with the order and direction of plates.

12. Install snap ring for forward clutch.
- Do not expand snap ring excessively.

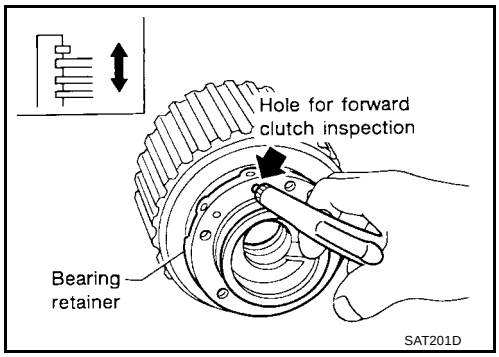


13. Measure clearance between forward clutch retaining plate and snap ring.
If not within allowable limit, select proper retaining plate.

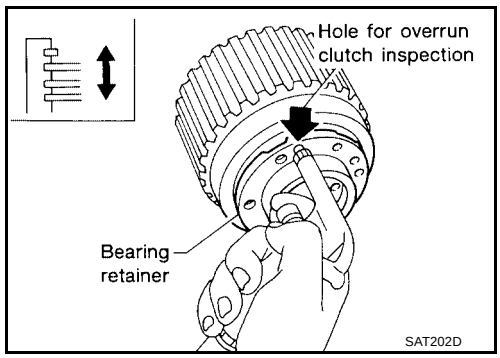
Specified clearance	
Standard	: 0.45 - 0.85 mm (0.0177 - 0.0335 in)
Allowable limit	: 1.85 mm (0.0728 in)
Forward clutch retaining plate	: Refer to AT-387, "FORWARD CLUTCH"



14. Check operation of forward clutch.
Refer to AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH" .



15. Check operation of overrun clutch.
Refer to AT-324, "FORWARD CLUTCH AND OVERRUN CLUTCH" .

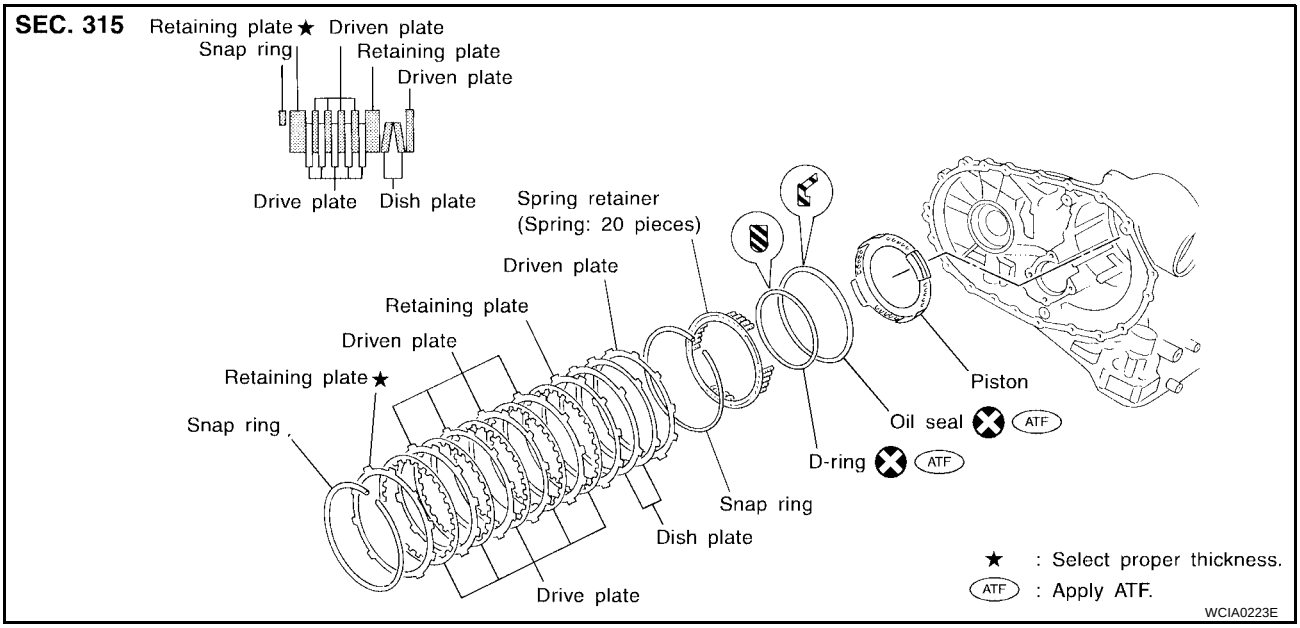


LOW & REVERSE BRAKE

PFP:31645

Components

ECS0060N

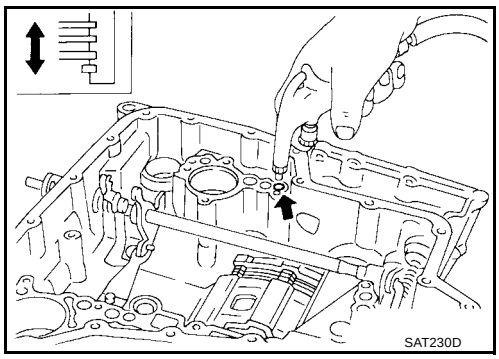


Disassembly

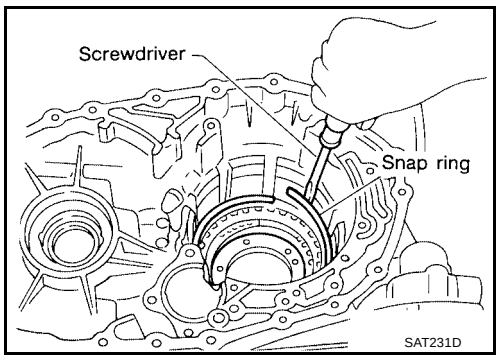
ECS0060O

1. Check operation of low & reverse brake.

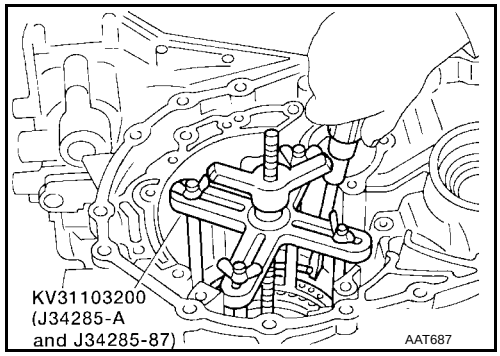
a. Apply compressed air to oil hole of transmission case.
b. Check to see that retaining plate moves to snap ring.
c. If retaining plate does not contact snap ring:
   - D-ring might be damaged.
   - Oil seal might be damaged.
   - Fluid might be leaking past piston check ball.



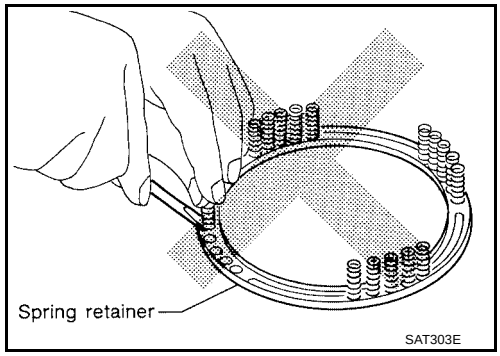
2. Stand transmission case.
3. Remove snap ring.
   - **Do not expand snap ring excessively.**
4. Remove drive plates, driven plates, retaining plate from transmission case.



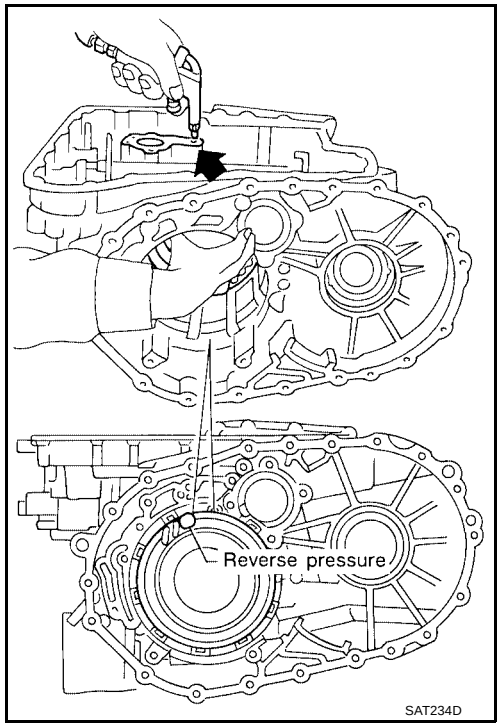
5. Set Tool on spring retainer and remove snap ring while compressing return springs.
   - **Set Tool directly above return springs.**
   - **Do not expand snap ring excessively.**
6. Remove spring retainer and return springs.



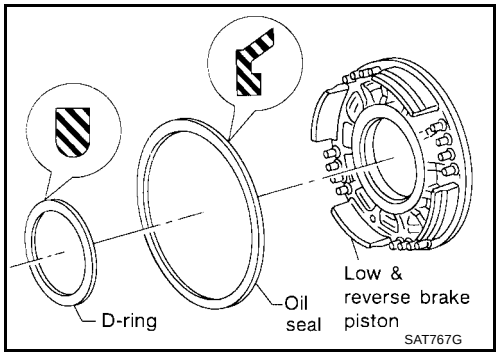
- **Do not remove return springs from spring retainer.**



7. Apply compressed air to oil hole of transmission case while holding piston.
8. Remove piston from transmission case by turning it.



9. Remove D-ring and oil seal from piston.



Inspection

ECS0060P

LOW & REVERSE CLUTCH SNAP RING, SPRING RETAINER AND RETURN SPRINGS

- Check for deformation, fatigue or damage.
- Replace if necessary.
- **When replacing spring retainer and return springs, replace them as a set.**

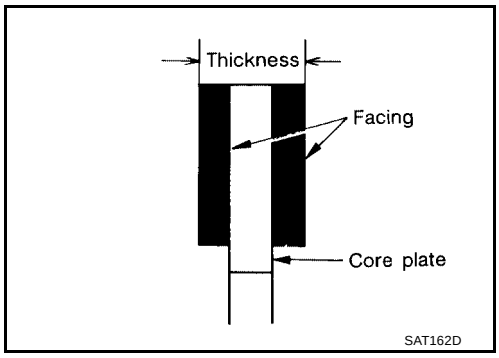
LOW & REVERSE BRAKE DRIVE PLATES

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate

Standard value	**: 2.0 mm (0.079 in)**
Wear limit	**: 1.8 mm (0.071 in)**

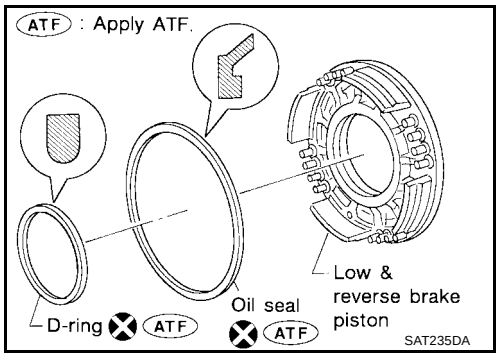
- If not within wear limit, replace.



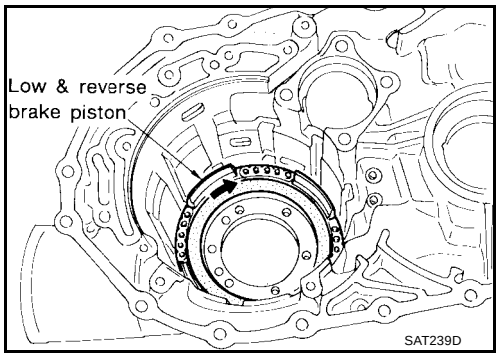
Assembly

ECS0060Q

1. Install D-ring and oil seal on piston.
   - **Take care with the direction of the oil seal.**
   - **Apply ATF to both parts.**

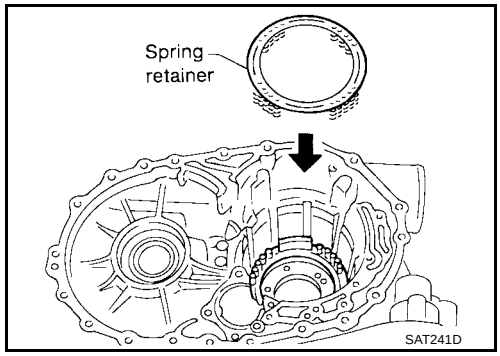


2. Stand transmission case.
3. Install piston assembly on transmission case while turning it slowly.
   - **Apply ATF to inner surface of transmission case.**

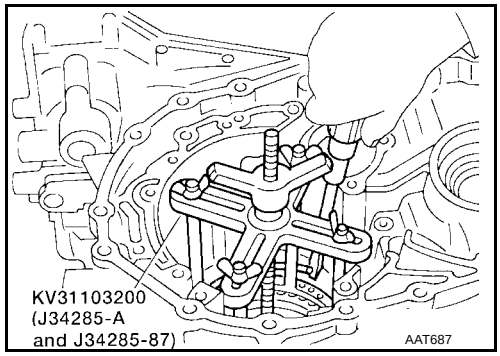


4. Install return springs and spring retainer on piston.

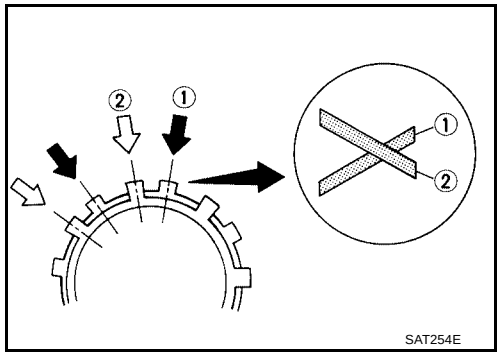
Return spring **:Refer to AT-388, "Clutch and Brake Return Springs" .**



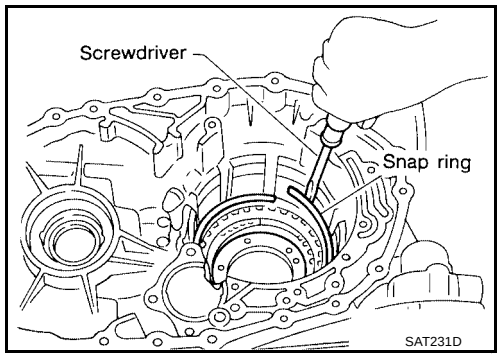
5. Install snap ring while compressing return springs.
   - **Set Tool directly above return springs.**



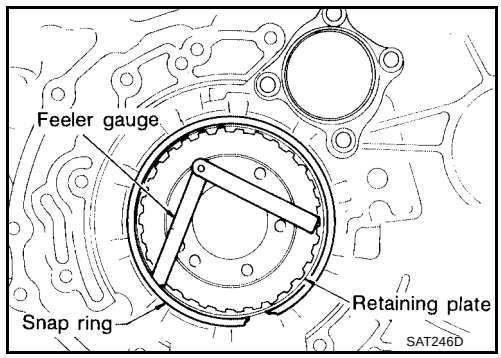
6. Install drive plates, driven plates, retaining plates and dished plates.
   - **Do not align the projections on the two dished plates.**
   - **Make sure to put the plates in the correct order and direction.**



7. Install snap ring.
   - **Do not expand snap ring excessively.**



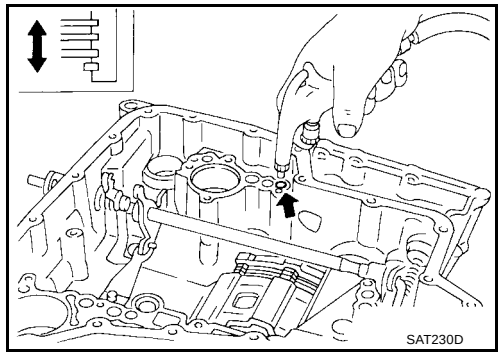
8. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate (front side).



Specified clearance

Standard	**: 1.4 - 1.8 mm (0.055 - 0.071 in)**
Allowable limit	**: 2.8 mm (0.110 in)**
Retaining plate	**: Refer to AT-387, "LOW & REVERSE BRAKE" .**

9. Check operation of low and reverse brake.
Refer to AT-332, "LOW & REVERSE BRAKE" .

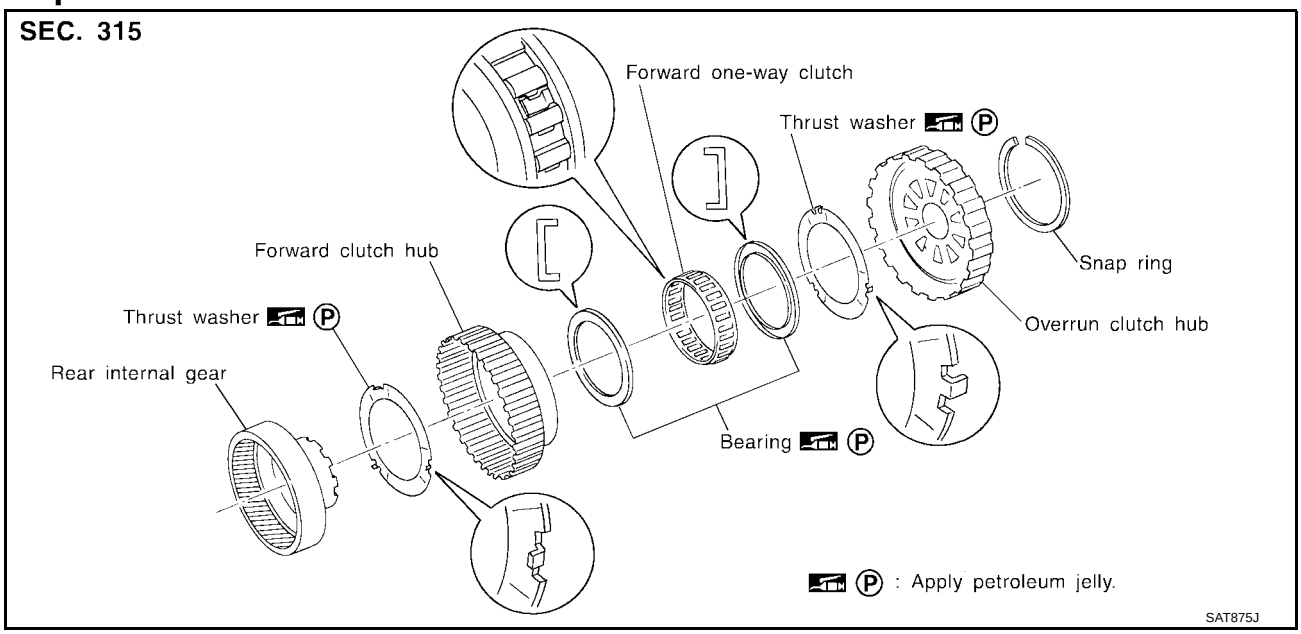


REAR INTERNAL GEAR, FORWARD CLUTCH HUB AND OVERRUN CLUTCH HUB

PFP:31450

Components

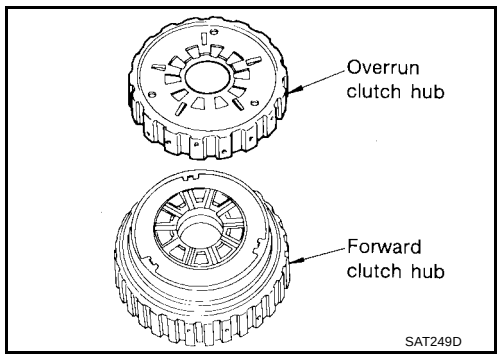
ECS0060R



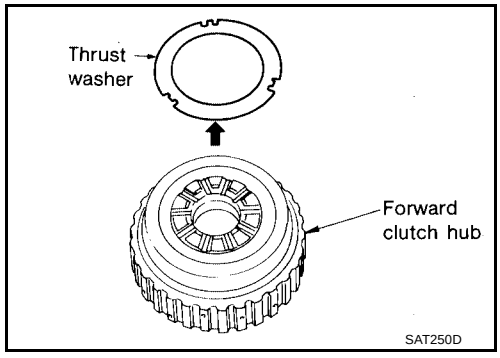
Disassembly

ECS0060S

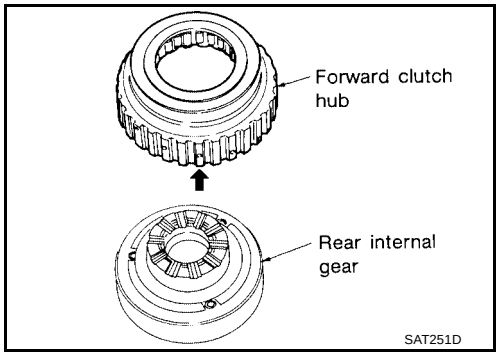
1. Remove snap ring from overrun clutch hub.
2. Remove overrun clutch hub from forward clutch hub.



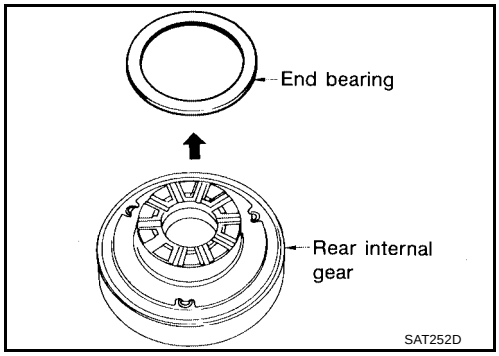
3. Remove thrust washer from forward clutch hub.



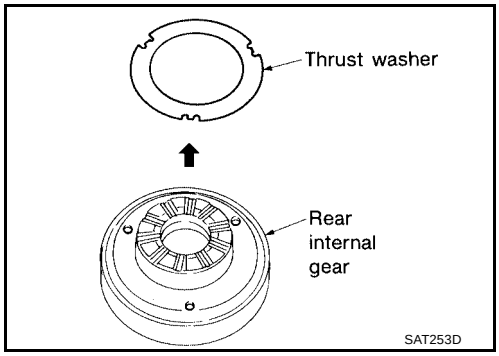
4. Remove forward clutch hub from rear internal gear.



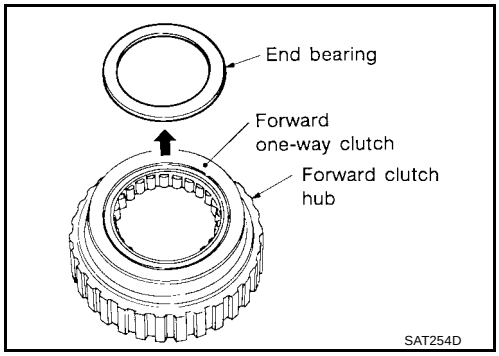
5. Remove end bearing from rear internal gear.



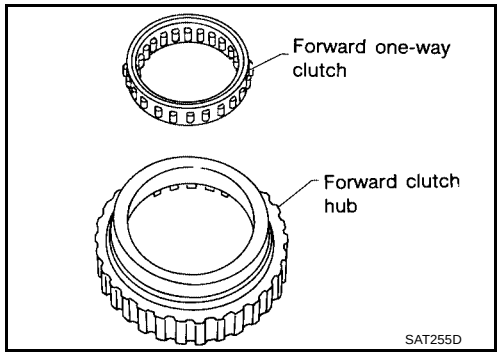
6. Remove thrust washer from rear internal gear.



7. Remove end bearing from forward one-way clutch.



8. Remove one-way clutch from forward clutch hub.

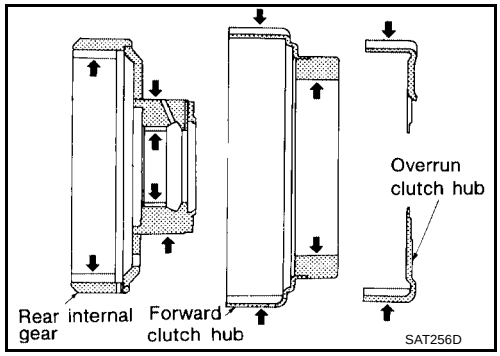


Inspection

ECS0060T

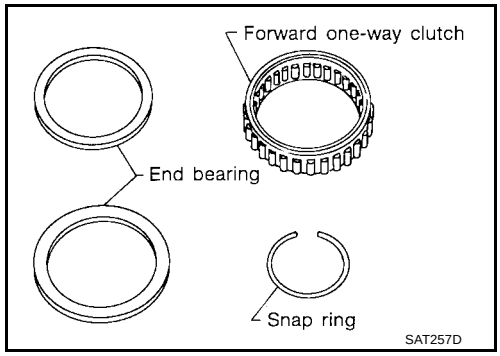
REAR INTERNAL GEAR, FORWARD CLUTCH HUB AND OVERRUN CLUTCH HUB

- Check rubbing surfaces for wear or damage.



SNAP RING, END BEARINGS AND FORWARD ONE-WAY CLUTCH

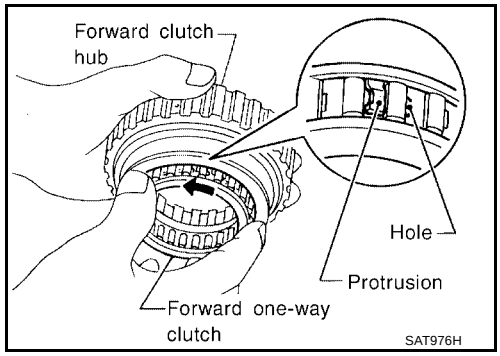
- Check snap ring and end bearings for deformation and damage.
- Check forward one-way clutch for wear and damage.



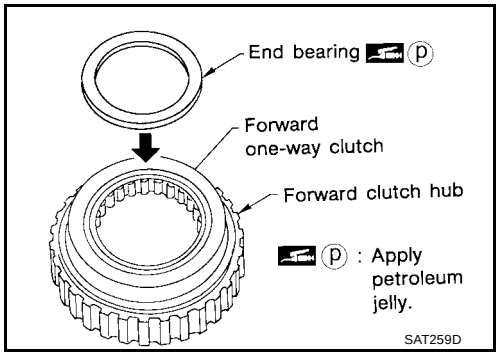
Assembly

ECS0060U

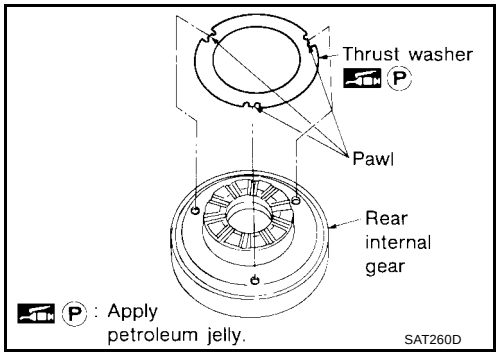
1. Install forward one-way clutch on forward clutch.
   - **Take care with the direction of forward one-way clutch.**



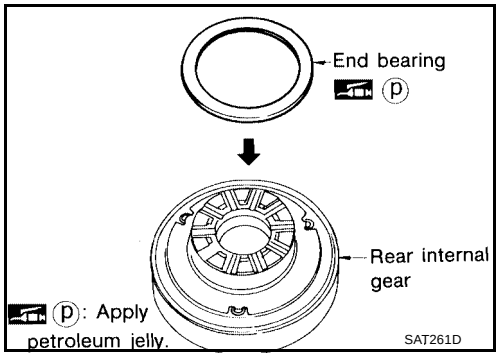
2. Install end bearing on forward one-way clutch.
   - **Apply petroleum jelly to end bearing.**



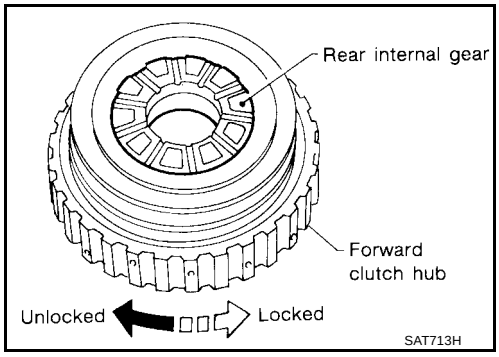
3. Install thrust washer on rear internal gear.
   - **Apply petroleum jelly to thrust washer.**
   - **Align pawls of thrust washer with holes of rear internal gear.**



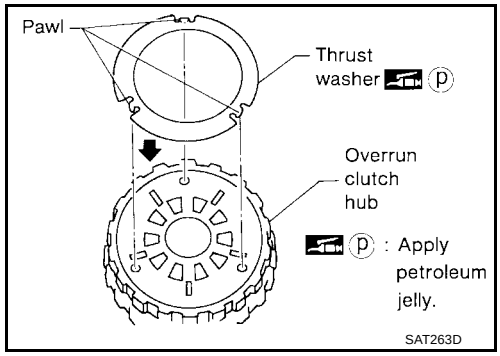
4. Install end bearing on rear internal gear.
   - **Apply petroleum jelly to end bearing.**



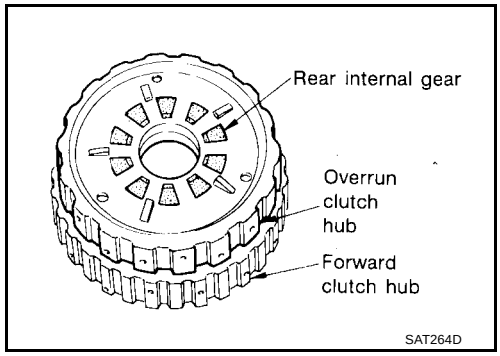
5. Install forward clutch hub on rear internal gear.
   - **Check operation of forward one-way clutch.**
     Hold rear internal gear and turn forward clutch hub. Check forward clutch hub for correct locking and unlocking directions.
   - **If not as shown in illustration, check installation direction of forward one-way clutch.**



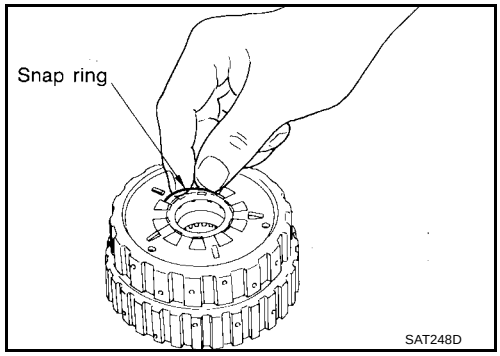
6. Install thrust washer and overrun clutch hub.
   - **Apply petroleum jelly to thrust washer.**
   - **Align pawls of thrust washer with holes of overrun clutch hub.**



7. Install overrun clutch hub on rear internal gear.
   - **Align projections of rear internal gear with holes of overrun clutch hub.**



8. Install snap ring to groove of rear internal gear.

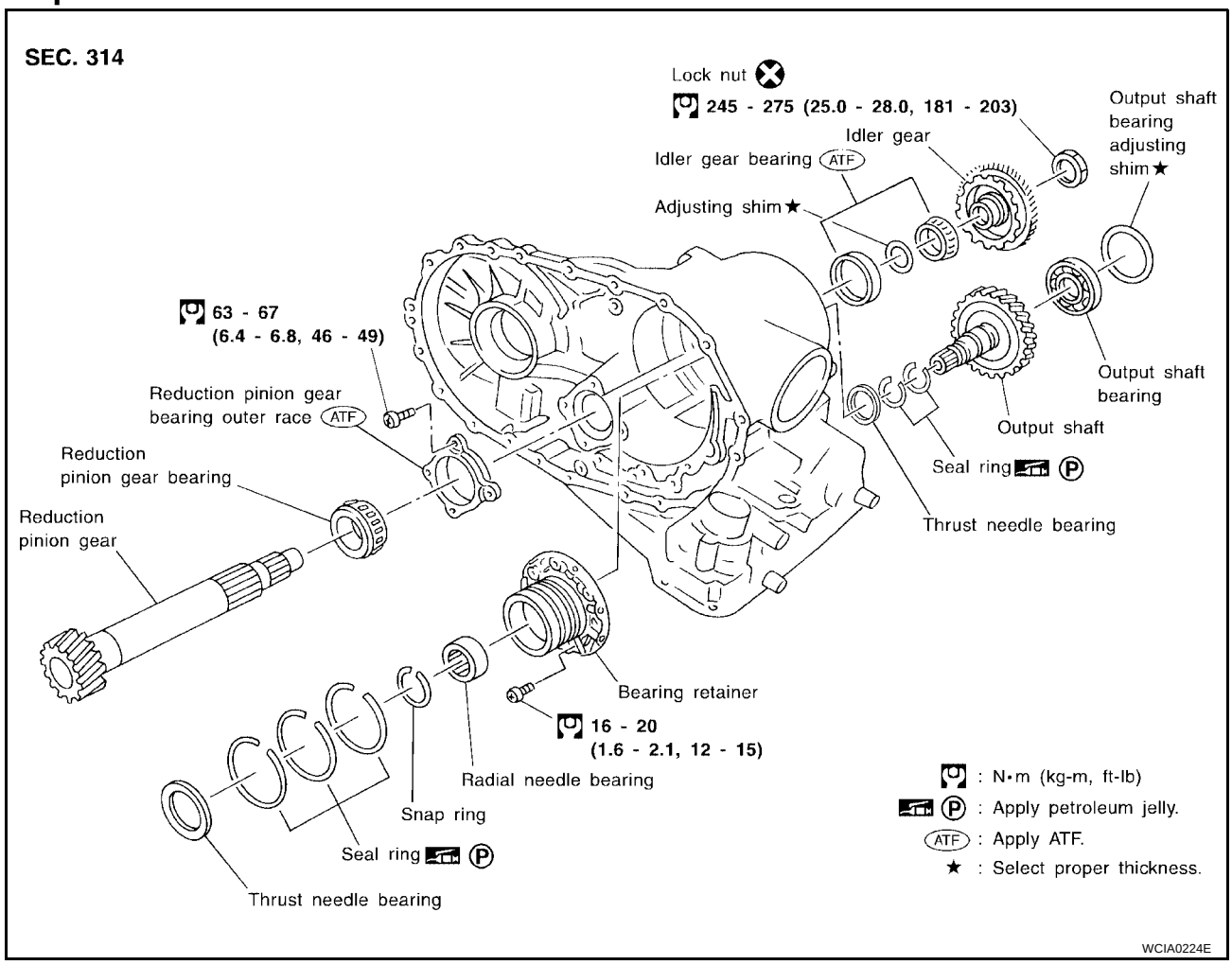


OUTPUT SHAFT, IDLER GEAR, REDUCTION PINION GEAR AND BEARING RETAINER

PFP:31480

Components

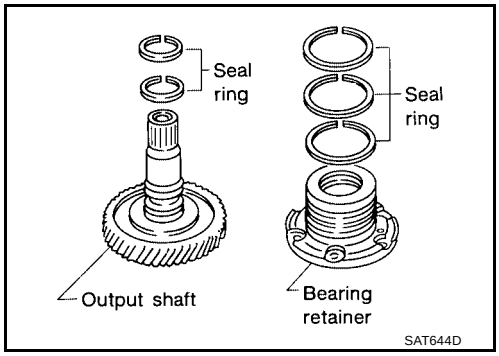
ECS0060V



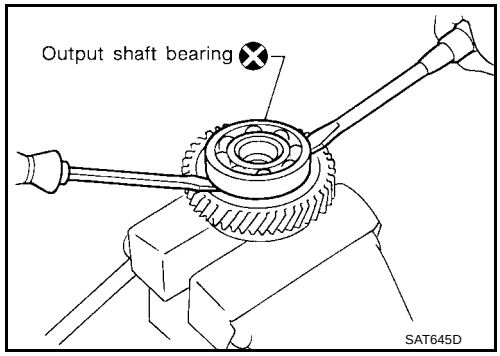
Disassembly

ECS0060W

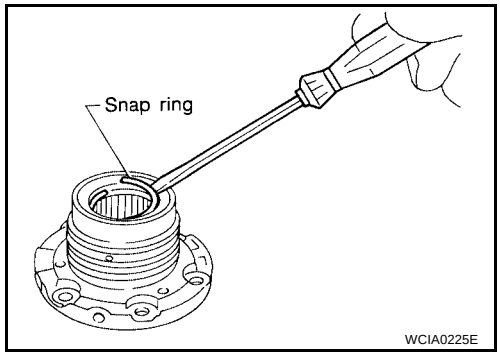
1. Remove seal rings from output shaft and bearing retainer.



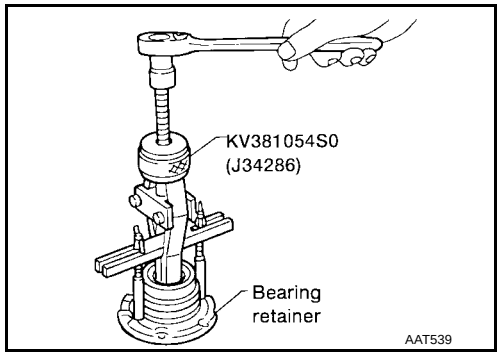
2. Remove output shaft bearing with screwdrivers.
   - **Always replace bearing with a new one when removed.**
   - **Do not damage output shaft.**



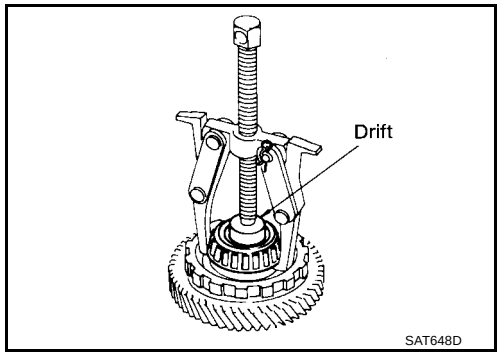
3. Remove snap ring from bearing retainer.
   - **Do not expand snap ring excessively.**



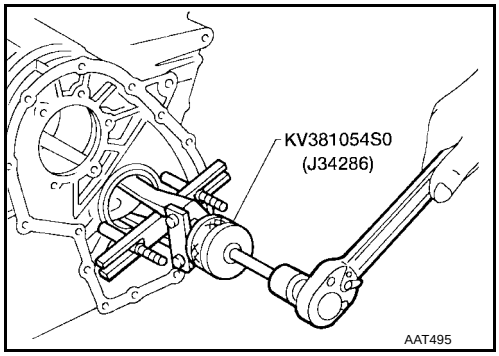
4. Remove needle bearing from bearing retainer.



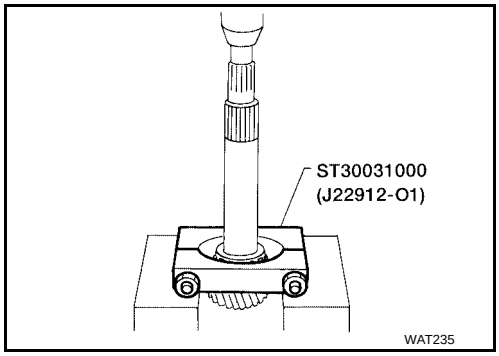
5. Remove idler gear bearing inner race from idler gear.



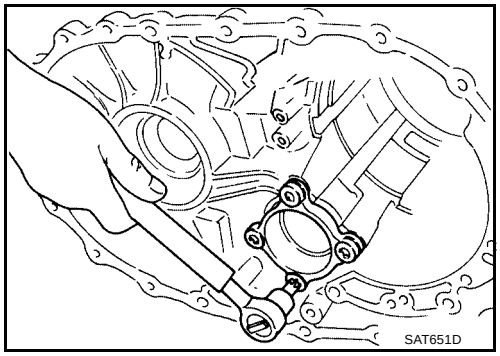
6. Remove idler gear bearing outer race from transmission case.



7. Press out reduction pinion gear bearing from reduction pinion gear.



8. Remove reduction pinion gear bearing outer race from transmission case.



Inspection

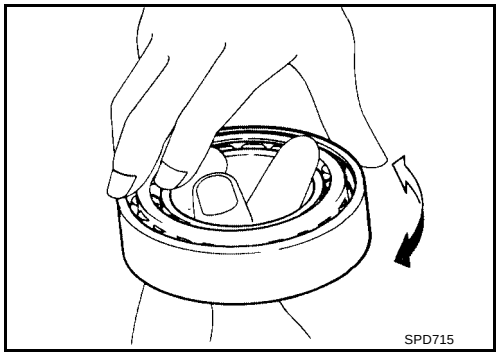
ECS0060X

OUTPUT SHAFT, IDLER GEAR AND REDUCTION PINION GEAR

- Check shafts for cracks, wear or bending.
- Check gears for wear, chips and cracks.

BEARING

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**



SEAL RING CLEARANCE

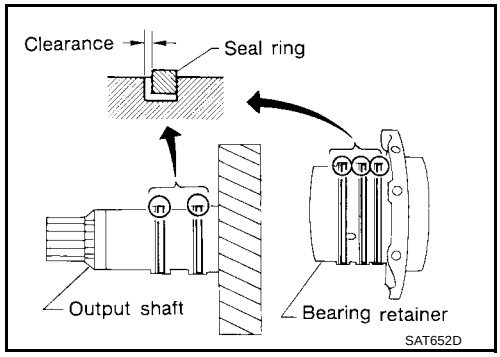
- Install new seal rings to output shaft.
- Measure clearance between seal ring and ring groove of output shaft.

Standard clearance : 0.10 - 0.25 mm (0.0039 - 0.0098 in)
Allowable limit : 0.25 mm (0.0098 in)

- If not within allowable limit, replace output shaft.
- Install new seal rings to bearing retainer.
- Measure clearance between seal ring and ring groove of bearing retainer.

Standard clearance : 0.10 - 0.25 mm (0.0039 - 0.0098 in)
Allowable limit : 0.25 mm (0.0098 in)

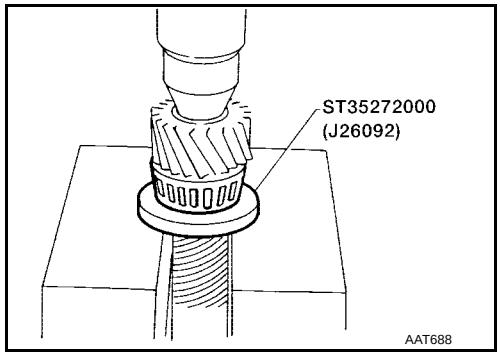
- If not within allowable limit, replace bearing retainer.



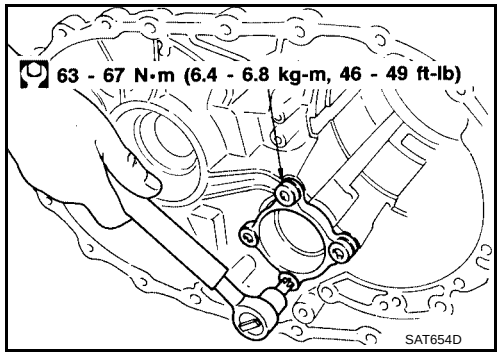
Assembly

ECS0060Y

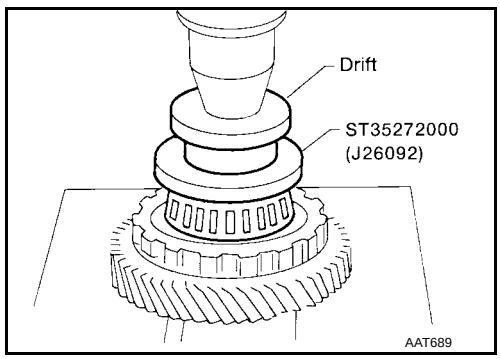
1. Press reduction pinion gear bearing on reduction pinion gear.



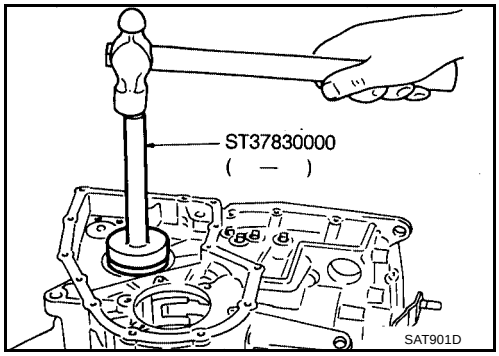
2. Install reduction pinion gear bearing outer race on transmission case.



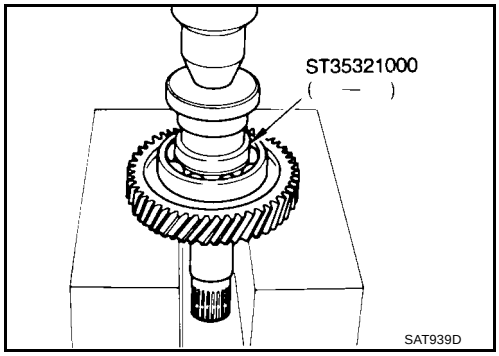
3. Press idler gear bearing inner race on idler gear.



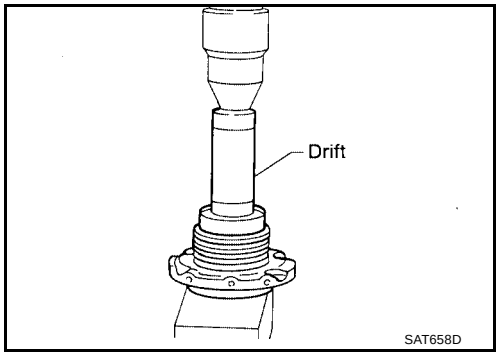
4. Install idler gear bearing outer race on transmission case.



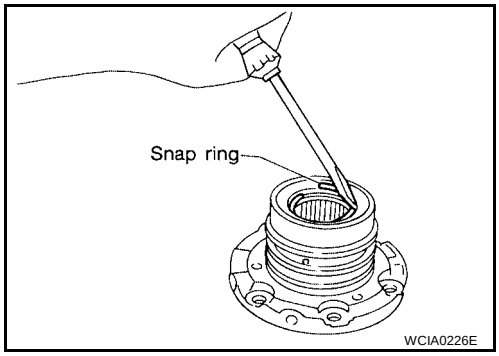
5. Press output shaft bearing on output shaft.



6. Press needle bearing on bearing retainer.

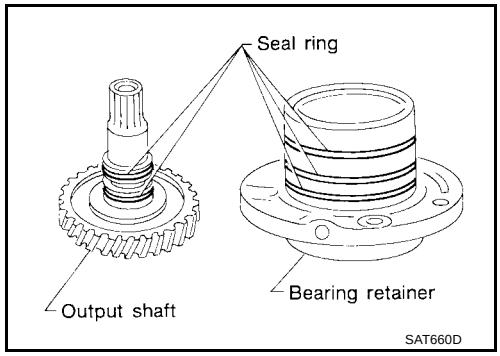


7. Install snap ring to bearing retainer.

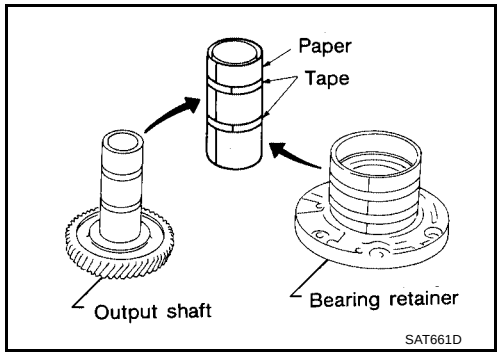


8. After packing ring grooves with petroleum jelly, carefully install new seal rings on output shaft and bearing retainer.

   NOTE:
   Do not align gaps in seal rings.



- **Roll paper around seal rings to prevent seal rings from spreading.**

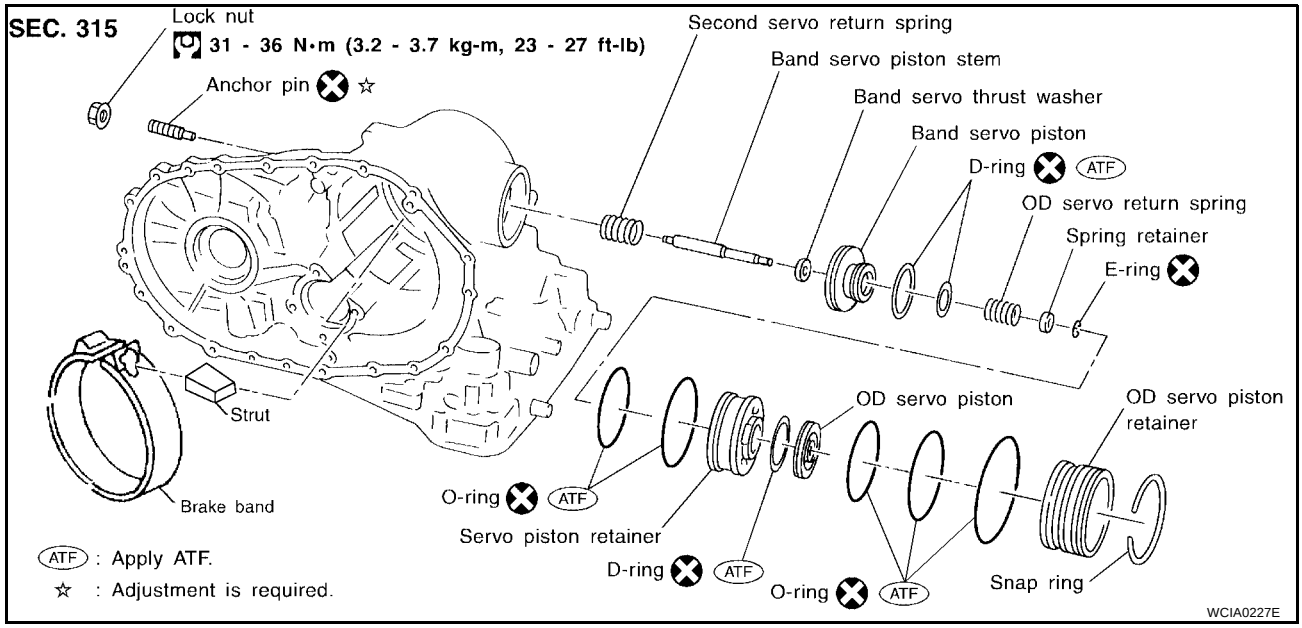


BAND SERVO PISTON ASSEMBLY

PFP:31615

Components

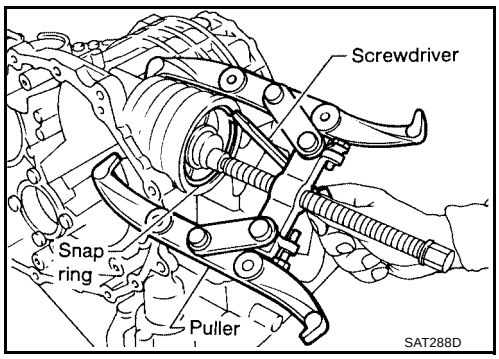
ECS0060Z



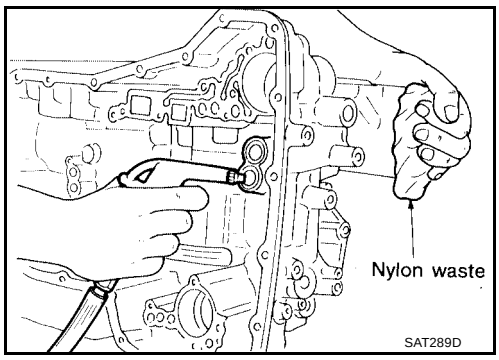
Disassembly

ECS00610

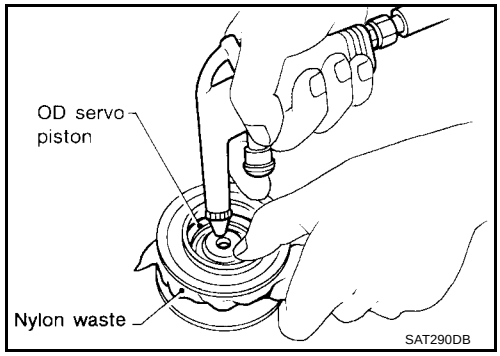
1. Remove band servo piston snap ring.



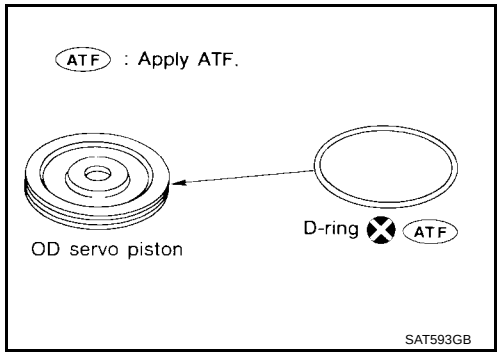
2. Apply compressed air to oil hole in transmission case to remove OD servo piston retainer and band servo piston assembly.
   - **Hold band servo piston assembly with a rag or nylon waste.**



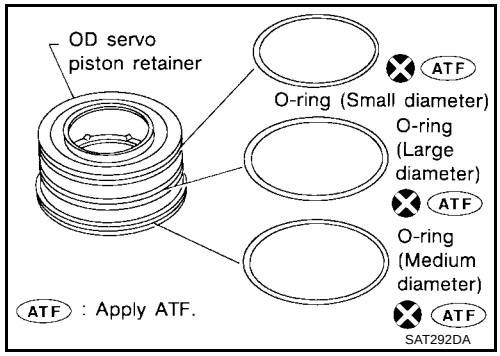
3. Apply compressed air to oil hole in OD servo piston retainer to remove OD servo piston from retainer.
   - **Hold OD servo piston while applying compressed air.**



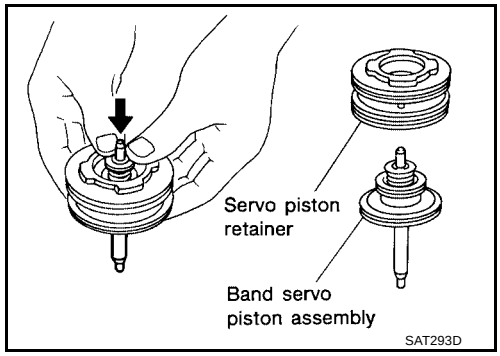
4. Remove D-ring from OD servo piston.



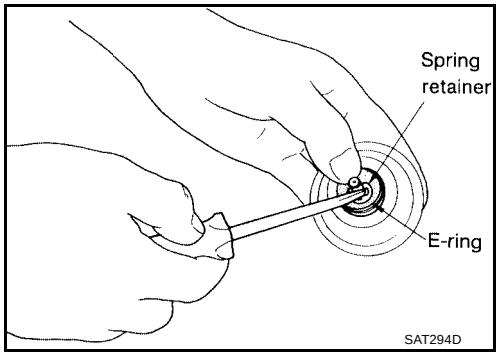
5. Remove O-rings from OD servo piston retainer.



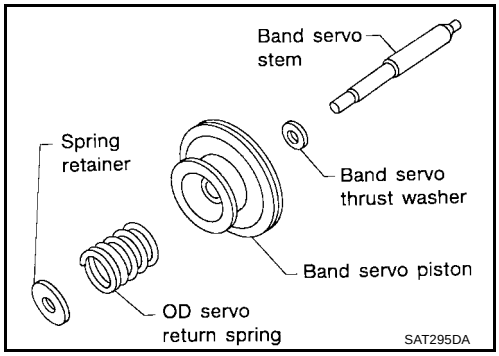
6. Remove band servo piston assembly from servo piston retainer by pushing it forward.



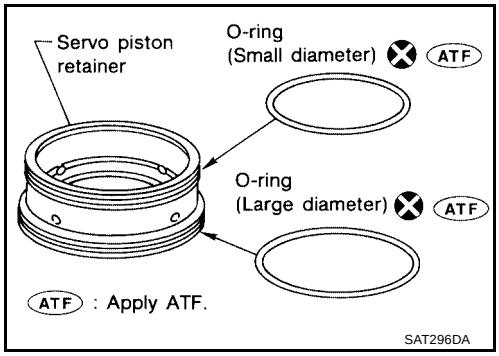
7. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.



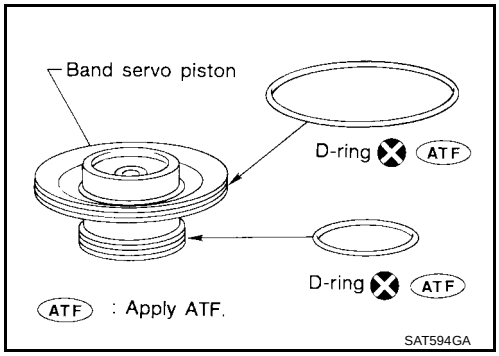
8. Remove OD servo return spring, band servo thrust washer and band servo piston stem from band servo piston.



9. Remove O-rings from servo piston retainer.



10. Remove D-rings from band servo piston.

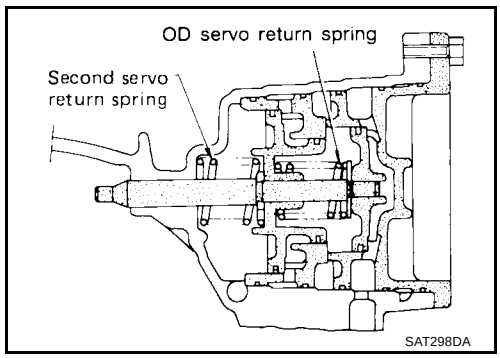


Inspection

ECS00611

PISTONS, RETAINERS AND PISTON STEM

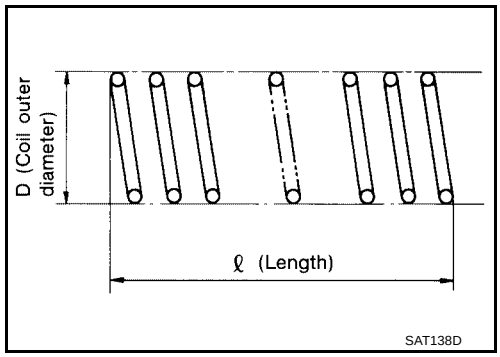
- Check frictional surfaces for abnormal wear or damage.



RETURN SPRINGS

- Check for deformation or damage.
- Measure free length and outer diameter.

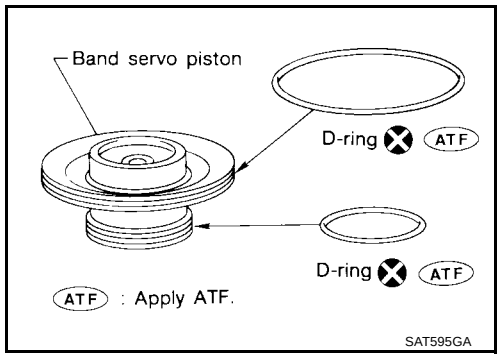
Band servo inspection standard : Refer to AT-393, "RETURN SPRING" .



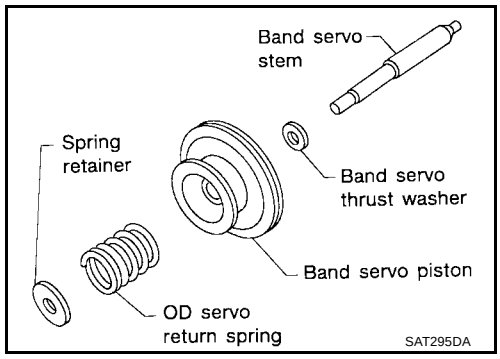
Assembly

ECS00612

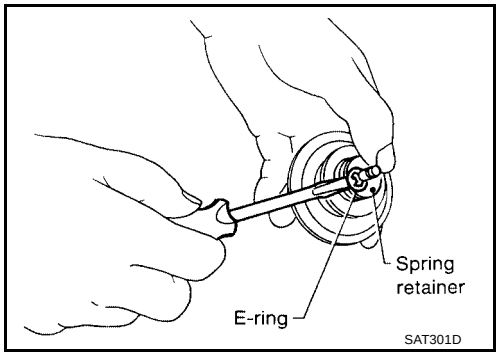
1. Install D-rings to band servo piston retainer.
   - **Apply ATF to D-rings.**
   - **Pay attention to position of each D-ring.**



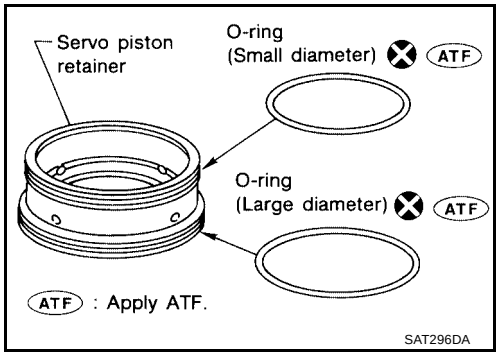
2. Install band servo piston stem, band servo thrust washer, OD servo return spring and spring retainer to band servo piston.



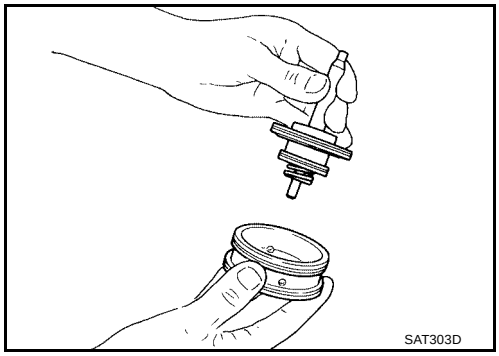
3. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



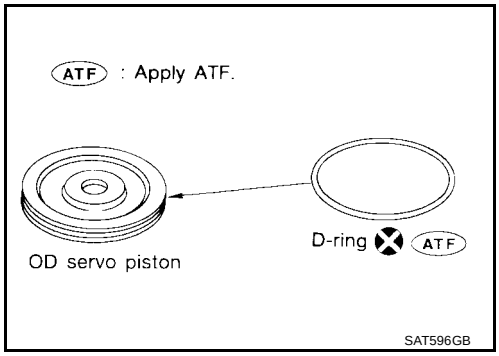
4. Install O-rings to servo piston retainer.
   - **Apply ATF to O-rings.**
   - **Pay attention to the positions of the O-rings.**



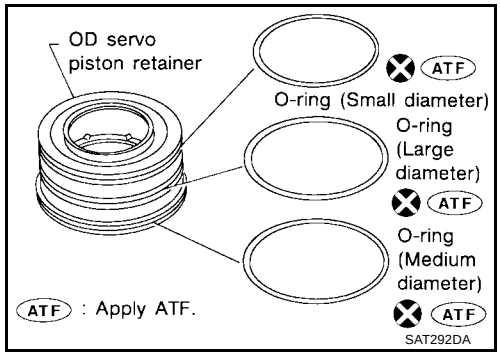
5. Install band servo piston assembly to servo piston retainer by pushing it inward.



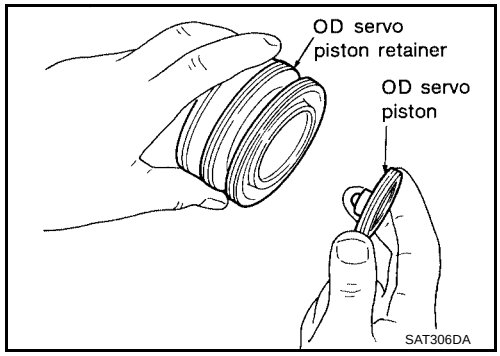
6. Install D-ring to OD servo piston.
   - **Apply ATF to D-ring.**



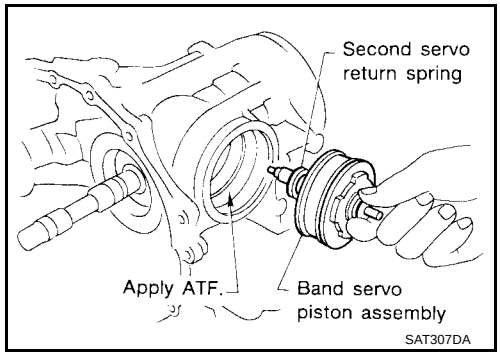
7. Install O-rings to OD servo piston retainer.
   - **Apply ATF to O-rings.**
   - **Pay attention to the positions of the O-rings.**



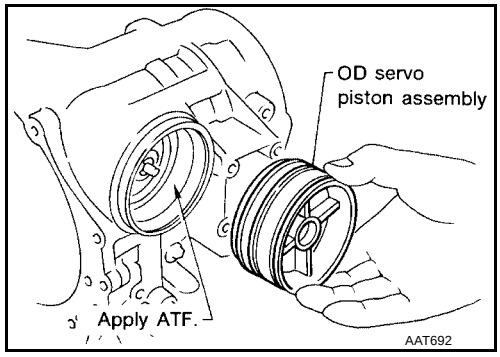
8. Install OD servo piston to OD servo piston retainer.



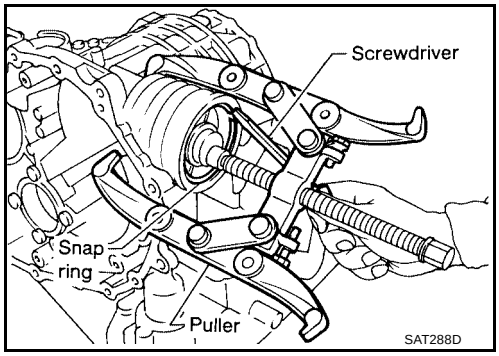
9. Install band servo piston assembly and 2nd servo return spring to transmission case.
   - **Apply ATF to O-ring of band servo piston and transmission case.**



10. Install OD servo piston assembly to transmission case.
    - **Apply ATF to O-ring of band servo piston and transmission case.**



11. Install band servo piston snap ring to transmission case.

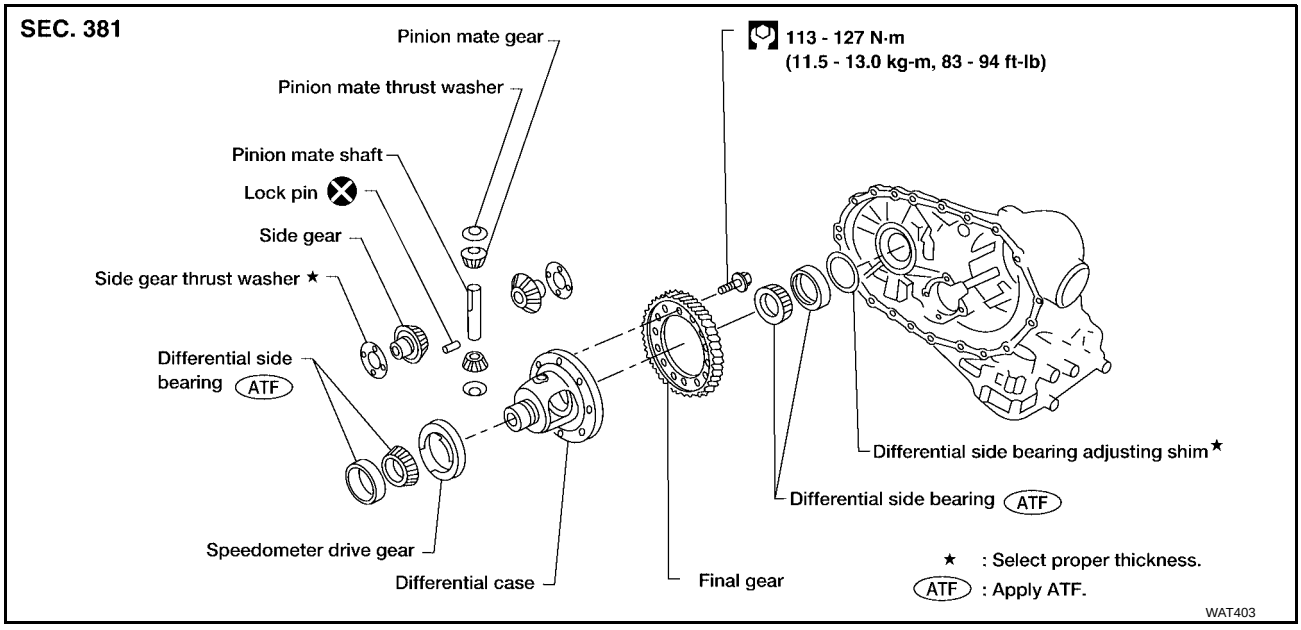


FINAL DRIVE

PFP:38411

Components

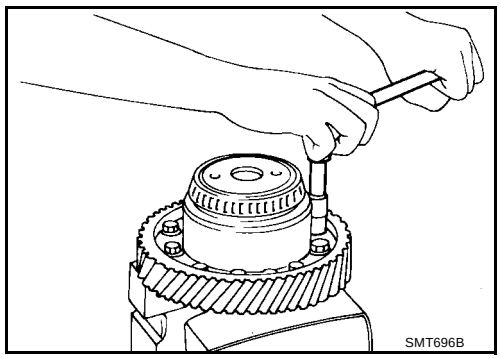
ECS00613



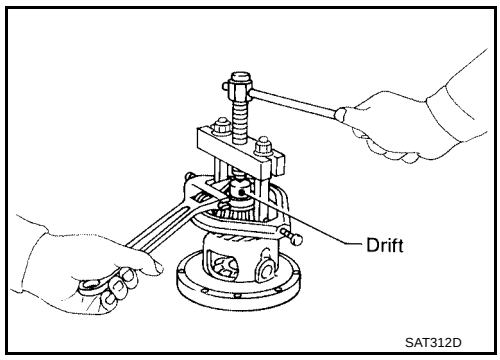
Disassembly

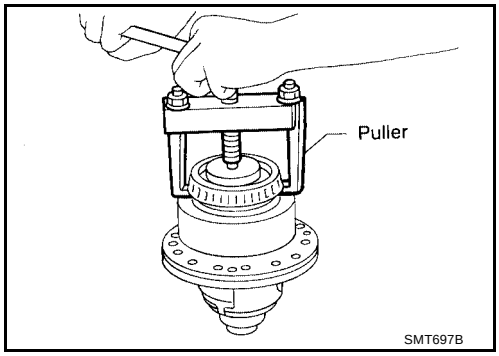
ECS00614

1. Remove final gear.

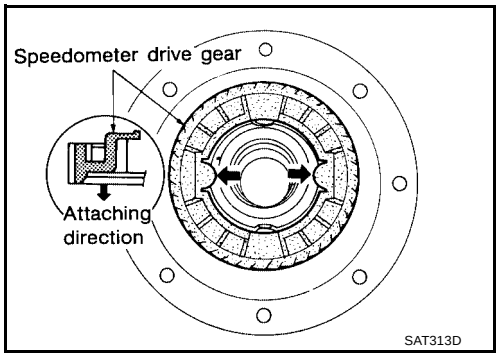


2. Press out differential side bearings.

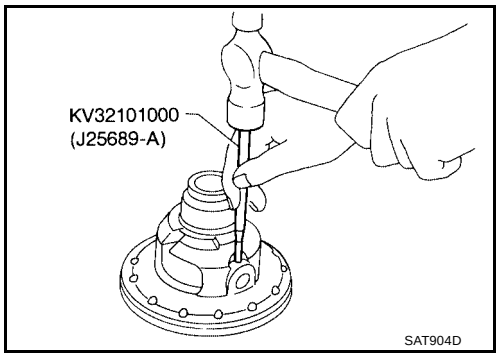




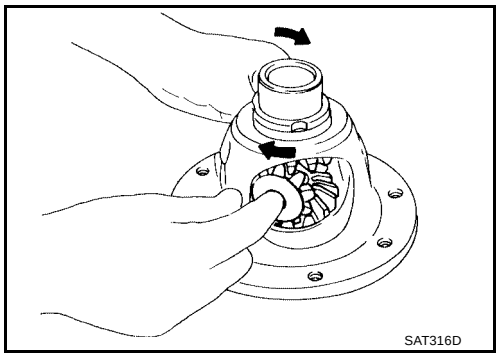
3. Remove speedometer drive gear.



4. Drive out pinion mate shaft lock pin.



5. Draw out pinion mate shaft from differential case.
6. Remove pinion mate gears and side gears.

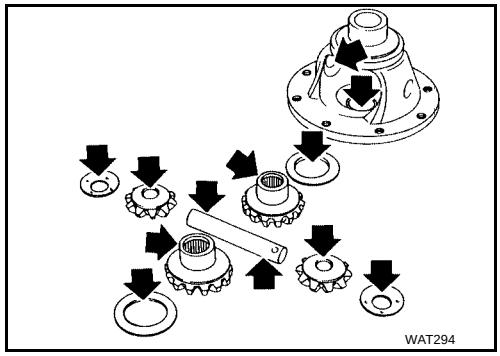


Inspection

ECS00615

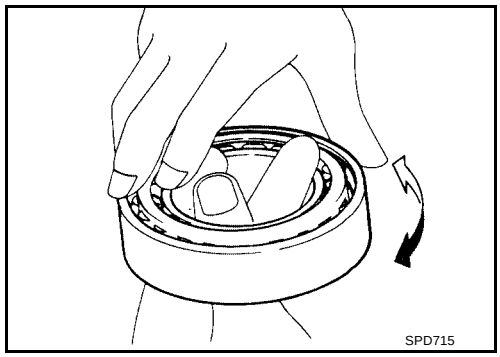
GEAR, WASHER, SHAFT AND CASE

- Check mating surfaces of differential case, side gears and pinion mate gears.
- Check washers for wear.



BEARINGS

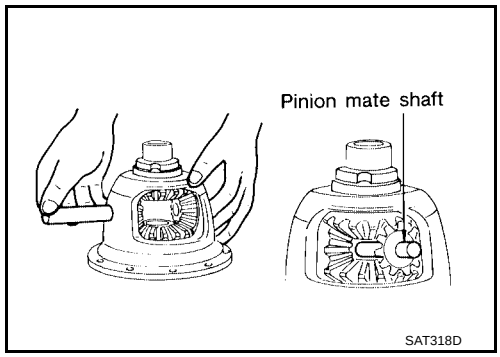
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**



Assembly

ECS00616

1. Install side gear and thrust washers in differential case.
2. Install pinion mate gears and thrust washers in differential case while rotating them.
   - **When inserting, be careful not to damage pinion mate gear washers.**
   - **Apply ATF to any parts.**

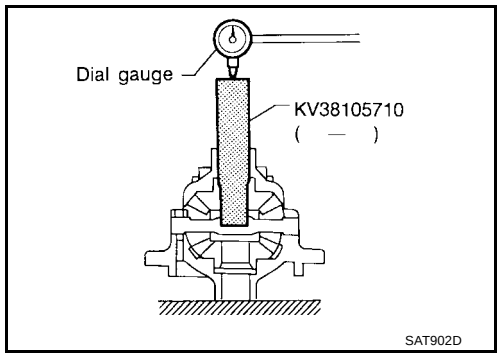


3. Measure clearance between side gear and differential case with washers using the following procedure.

a. Set Tool and dial indicator on side gear.

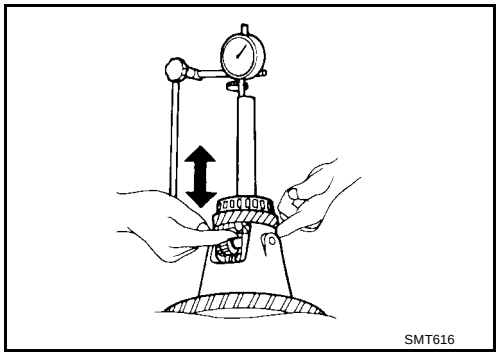
b. Move side gear up and down to measure dial indicator deflection. Always measure indicator deflection on both side gears.

Clearance between side gear and differential case with washers : 0.1 - 0.2 mm (0.004 - 0.008 in)

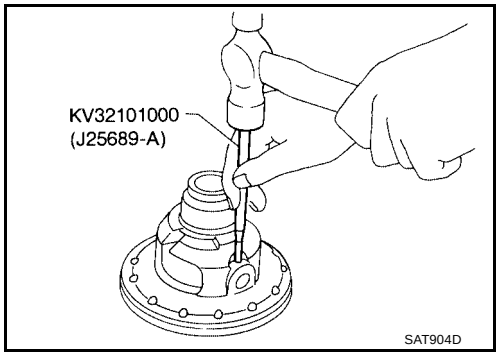


c. If not within specification adjust clearance by changing thickness of side gear thrust washers.

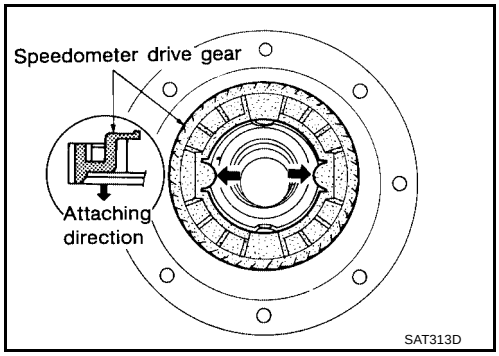
Side gear thrust washer	**: Refer to AT-389, "DIFFERENTIAL SIDE GEAR THRUST WASHERS" .**



4. Install lock pin.
   - **Make sure that lock pin is flush with case.**

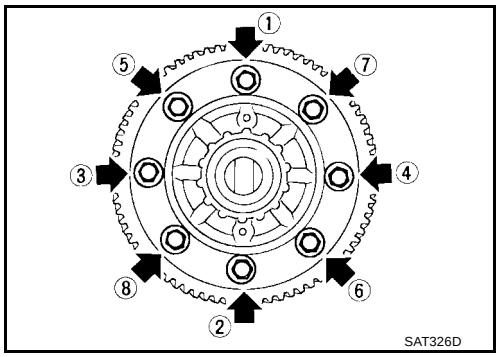


5. Install speedometer drive gear on differential case.
   - **Align the projection of speedometer drive gear with the groove of differential case.**

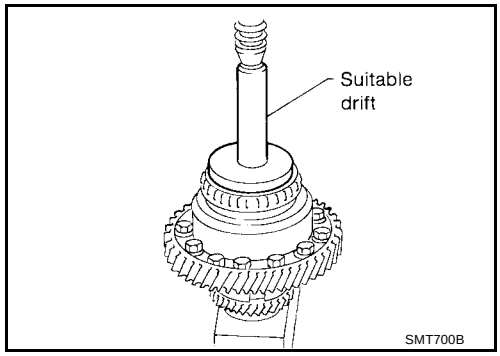


6. Install final gear and tighten fixing bolts in numerical order.

   : 113 - 127 N·m (11.5 - 13.0 kg-m, 83 - 94 ft-lb)



7. Press on differential side bearings.



ASSEMBLY

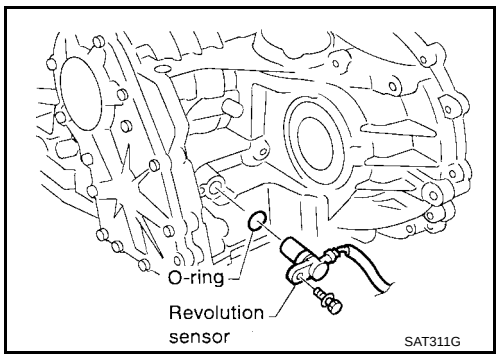
PFP:00000

Assembly (1)

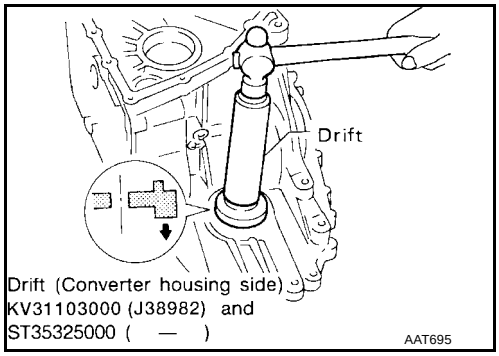
ECS00617

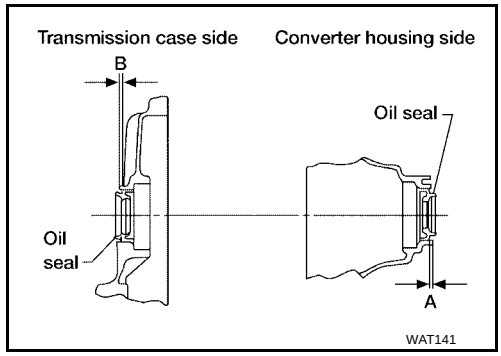
1. Install revolution sensor onto transmission case.

Always use new sealing parts.



2. Install differential side oil seals on transmission case and converter housing, so that “A” and “B” are within specifications.

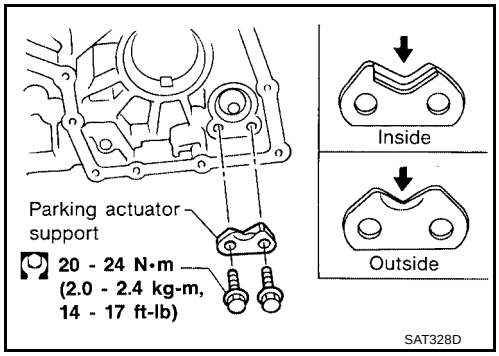




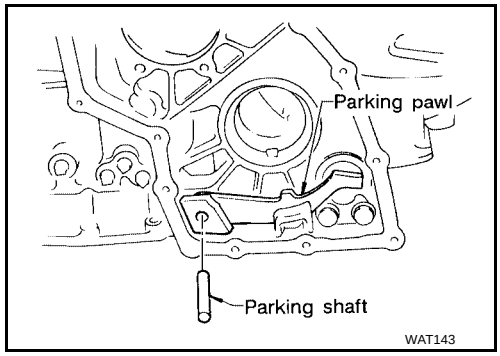
Unit: mm (in)

A	B
5.5 - 6.5 (0.217 - 0.256)	–0.5 to 0.5 (–0.020 to 0.020)

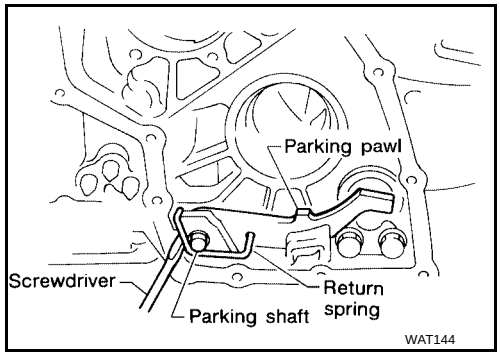
3. Install parking actuator support to transmission case.
   - **Pay attention to direction of parking actuator support.**



4. Install parking pawl on transmission case and fix it with parking shaft.



5. Install return spring.

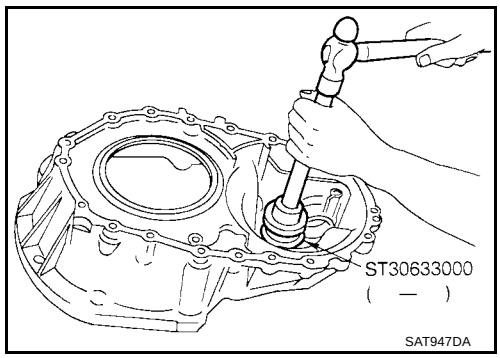


Adjustment (1)

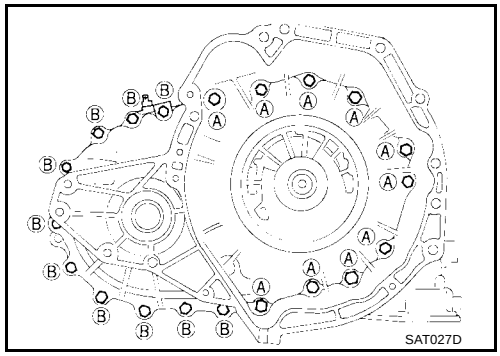
ECS00618

DIFFERENTIAL SIDE BEARING PRELOAD

1. Install differential side bearing outer race without adjusting shim on transmission case.
2. Install differential side bearing outer race on converter housing.



3. Place final drive assembly on transmission case.
4. Install transmission case on converter housing. Tighten transmission case fixing bolts **A** and **B** to the specified torque.

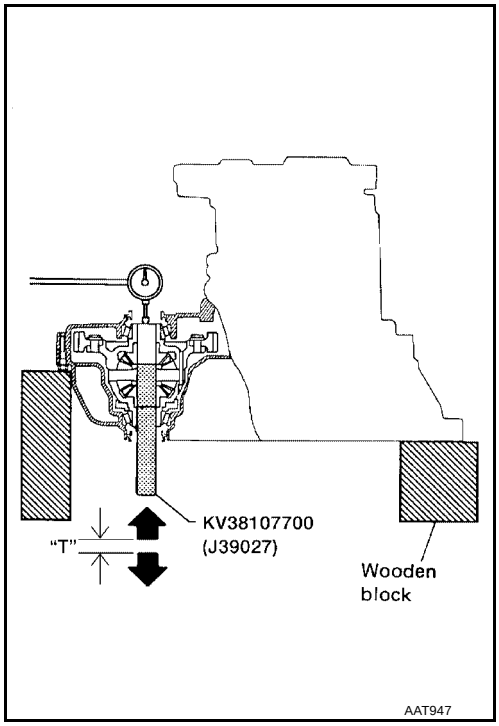


5. Attach dial indicator on differential case at transmission case side.
6. Insert Tool into differential side gear from converter housing.
7. Move Tool up and down and measure dial indicator deflection.

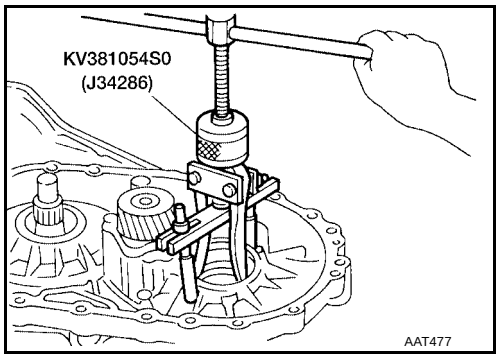
Differential side bearing preload "T" **: 0.04 - 0.09 mm (0.0016 - 0.0035 in)**

8. Select proper thickness of differential side bearing adjusting shim(s) using SDS table as a guide.

Differential side bearing adjusting shim **: Refer to AT-389, "DIFFERENTIAL SIDE BEARING ADJUSTING SHIMS" .**



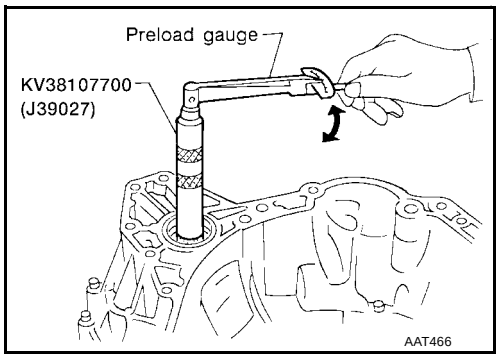
9. Remove converter housing from transmission case.
10. Remove final drive assembly from transmission case.
11. Remove differential side bearing outer race from transmission case.
12. Reinstall differential side bearing outer race and shim(s) selected from SDS table on transmission case.
13. Reinstall converter housing on transmission case and tighten transmission case fixing bolts to the specified torque.



14. Insert Tool into differential case and measure turning torque of final drive assembly.
    - **Turn final drive assembly in both directions several times to seat bearing rollers correctly.**

Turning torque of final drive assembly (New bearing) **: 0.49 - 1.08 N·m (5.0 - 11.0 kg-cm, 4.3 - 9.5 in-lb)**

    - **When old bearing is used again, turning torque will be slightly less than the above.**
    - **Make sure torque is within the specified range.**

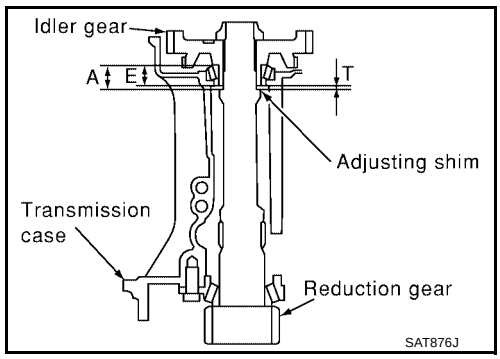


REDUCTION PINION GEAR BEARING PRELOAD

- Be sure to remove final drive assembly before doing this procedure.
- Using caliper and straightedge, calculate a dimension “T” (adjuster shim thickness) using the following formula. Adjust the inspection standard for preload (rotating slide torque) as shown below.

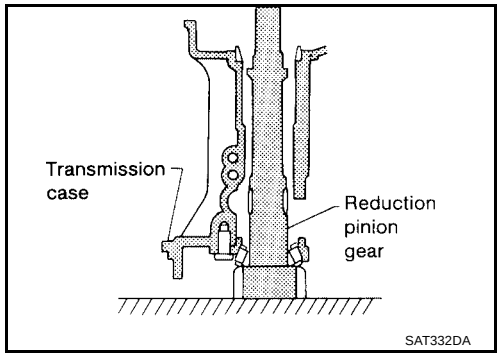
T = A – E

Inspection standard for preload	**:0.1 - 0.69 N·m (1.1 - 7.0 kg-cm, 0.95 - 6.08 in-lb)**



1. Remove transmission case and final drive assembly from converter housing.
2. Select proper thickness of reduction pinion gear bearing adjusting shim using the following procedures.

a. Place reduction pinion gear on transmission case as shown.

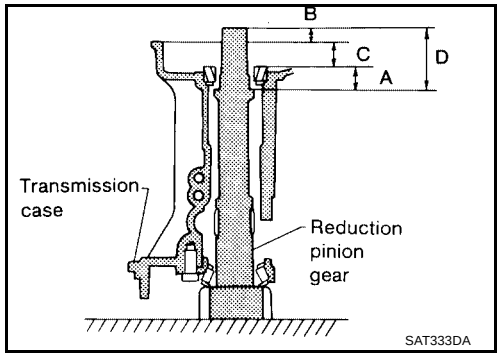


b. Place idler gear bearing on transmission case.

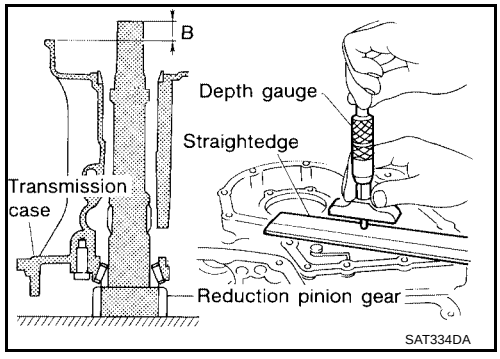
c. Measure dimensions “B”, “C” and “D” and calculate dimension “A”.

A = D – (B + C)

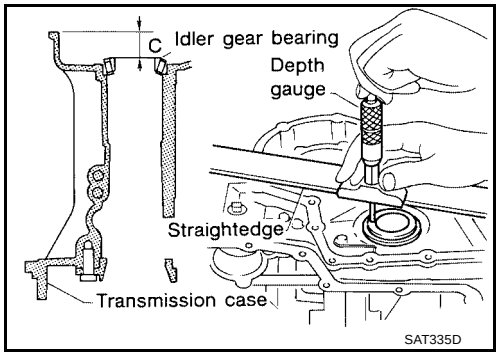
“A”	**: Distance between the surface of idler gear bearing inner race and the adjusting shim mating surface of reduction pinion gear.**



- Measure dimension “B” between the end of reduction pinion gear and the surface of transmission case.
- **Measure dimension “B” in at least two places.**

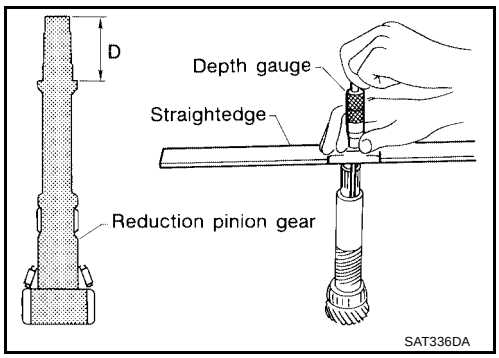


- Measure dimension “C” between the surface of idler gear bearing inner race and the surface of transmission case.
- **Measure dimension “C” in at least two places.**



- Measure dimension “D” between the end of reduction pinion gear and the adjusting shim mating surface of reduction pinion gear.
- **Measure dimension “D” in at least two places.**
- Calculate dimension “A”.

A = D – (B + C)

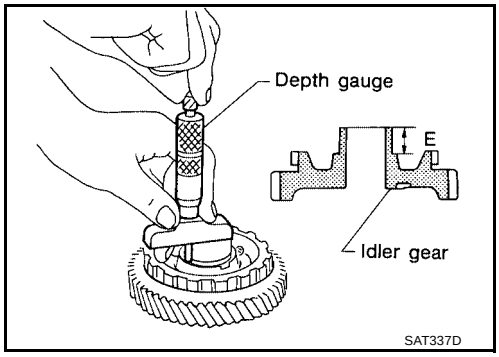


d. Measure dimension “E” between the end of idler gear and the idler gear bearing inner race mating surface of idler gear.
   - **Measure dimension “E” in at least two places.**

e. Calculate “T” and select proper thickness of reduction pinion gear bearing adjusting shim using SDS table as a guide.

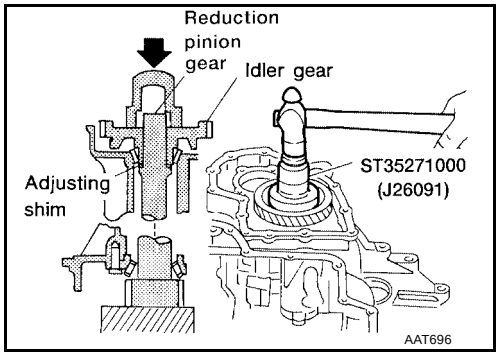
T = A – E – 0.05 mm (0.0020 in)*

Reduction pinion gear bearing adjusting shim	**: Refer to AT-391, "REDUCTION PINION GEAR BEARING ADJUSTING SHIMS" .**

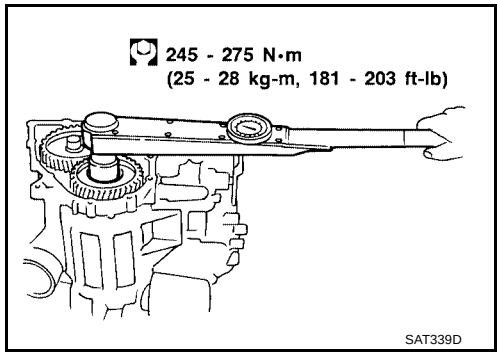


*: Bearing preload

3. Install reduction pinion gear and reduction pinion gear bearing adjusting shim selected in step 2-e on transmission case using Tool.
4. Press idler gear bearing inner race on idler gear.
5. Press idler gear on reduction pinion gear.
   - **Press idler gear so that idler gear can be locked by parking pawl.**

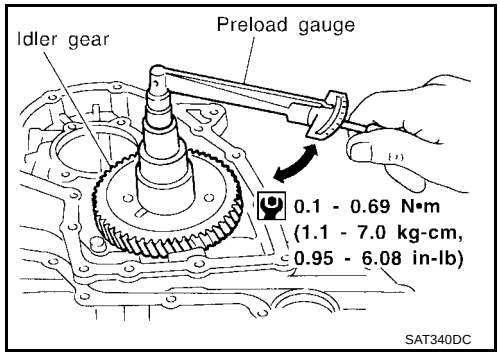


6. Tighten idler gear lock nut to the specified torque.
   - **Lock idler gear with parking pawl when tightening lock nut.**



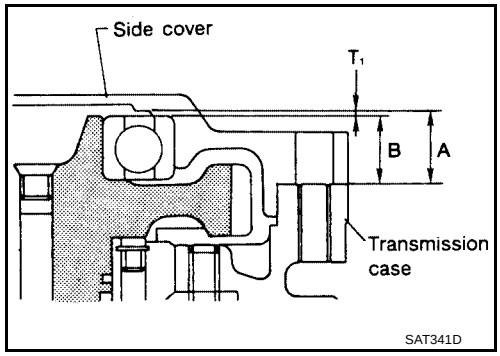
7. Measure turning torque of reduction pinion gear.
   - **When measuring turning torque, turn reduction pinion gear in both directions several times to seat bearing rollers correctly.**

Turning torque of reduction pinion gear	**: 0.1 - 0.69 N·m (1.1 - 7.0 kg-cm, 0.95 - 6.08 in-lb)**

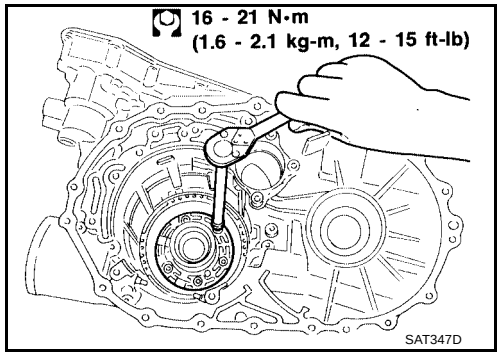


OUTPUT SHAFT END PLAY

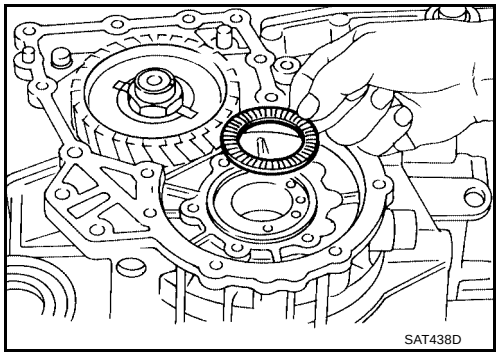
- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.



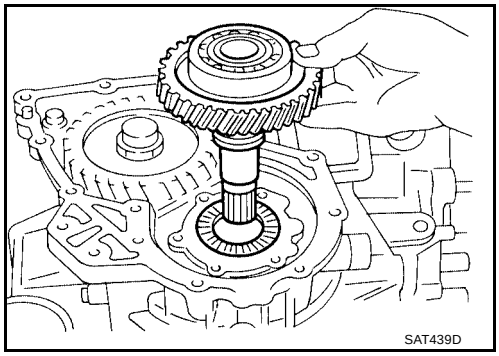
1. Install bearing retainer for output shaft.



2. Install output shaft thrust needle bearing on bearing retainer.



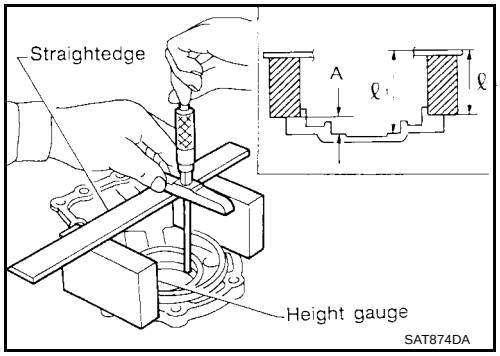
3. Install output shaft on transmission case.



4. Measure dimensions "l_1 " and "l_2 " at side cover and then calculate dimension "A".
   - **Measure dimension "l_1 " and "l_2 " in at least two places "A": Distance between transmission case fitting surface and adjusting shim mating surface**

   $A = l_1 - l_2$

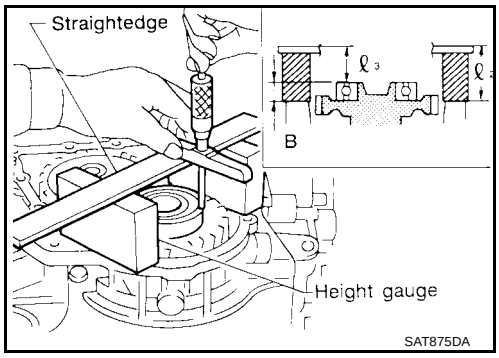
   l_2 : Height of gauge



5. Measure dimensions "l_2 " and "l_3 " and then calculate dimension "B".
   Measure "l_2 " and "l_3 " in at least two places.
   "B": Distance between the end of output shaft bearing outer race and the side cover fitting surface of transmission case

   $B = l_2 - l_3$

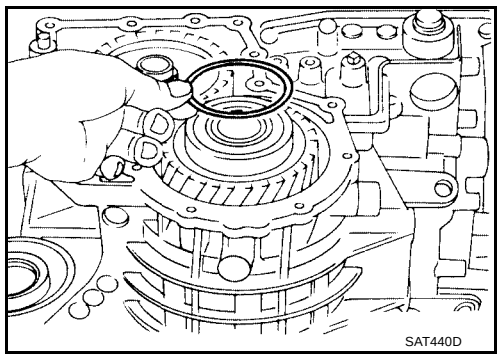
   l_2 : Height of gauge



6. Select proper thickness of adjusting shim so that output shaft end play (clearance between side cover and output shaft bearing) is within specifications.

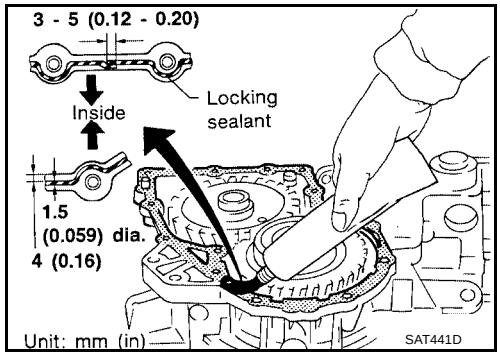
Output shaft end play (A – B) : 0 - 0.5 mm (0 - 0.020 in)

Output shaft end play adjusting shim : Refer to AT-392, "OUTPUT SHAFT END PLAY ADJUSTING SHIMS" .

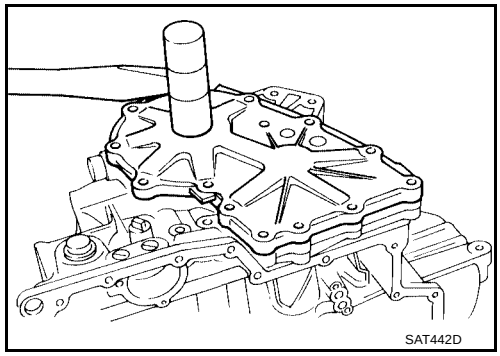


7. Install adjusting shim on output shaft bearing.

8. Apply locking sealant (Loctite 5/8 or equivalent) to transmission case as shown in illustration.



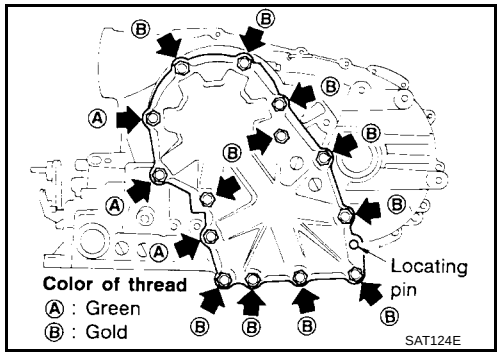
9. Install side cover on transmission case.
   - **Apply locking sealant to the mating surface of transmission case.**



10. Tighten side cover fixing bolts to specified torque.

: 26 - 30 N·m (2.7 - 3.1 kg-m, 20 - 22 ft-lb)

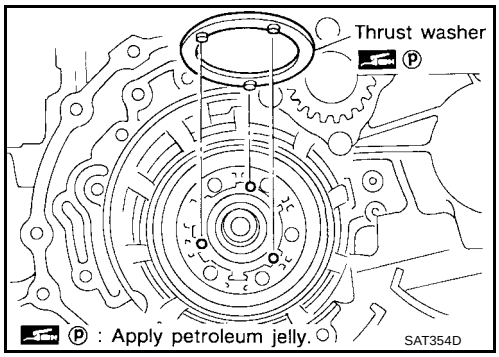
- **Do not mix bolts A and B.**
- **Always replace bolts A as they are self-sealing bolts.**



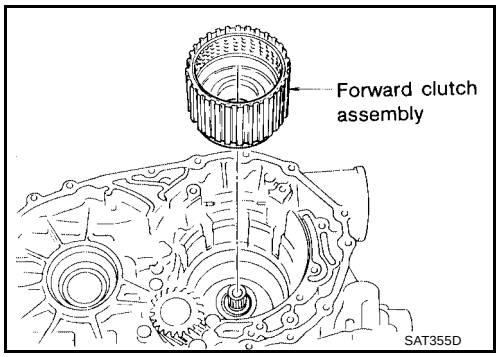
Assembly (2)

ECS00619

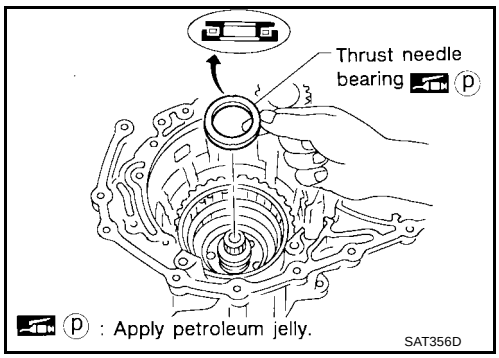
1. Remove paper rolled around bearing retainer.
2. Install thrust washer on bearing retainer.
   - **Apply petroleum jelly to thrust washer.**



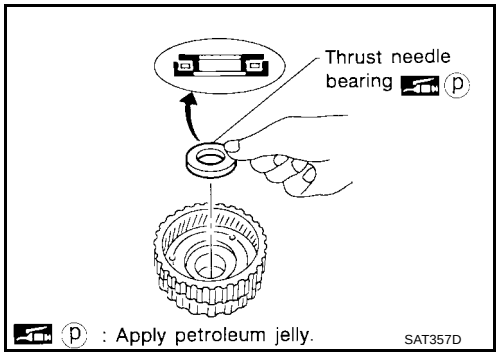
3. Install forward clutch assembly.
   - **Align teeth of low & reverse brake drive plates before installing.**
   - **Make sure that bearing retainer seal rings are not spread.**



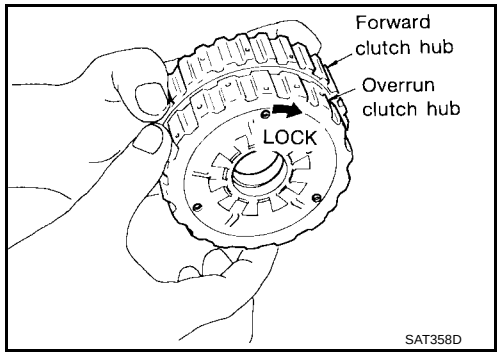
4. Install thrust needle bearing on bearing retainer.
   - **Apply petroleum jelly to thrust bearing.**
   - **Pay attention to direction of thrust needle bearing.**



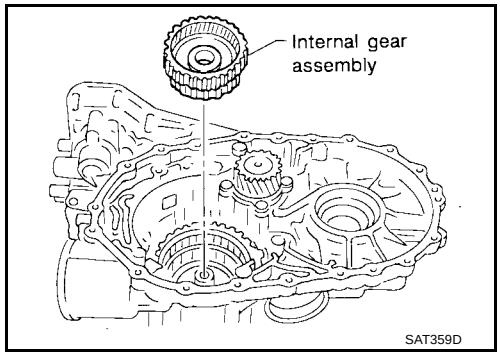
5. Install thrust needle bearing on rear internal gear.
   - **Apply petroleum jelly to thrust needle bearing.**
   - **Pay attention to direction of thrust needle bearing.**



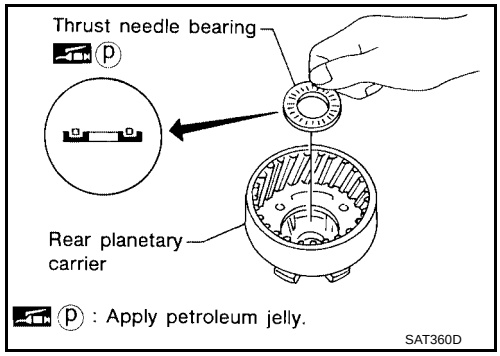
6. Hold forward clutch hub and turn overrun clutch hub.
   Check overrun clutch hub for directions of lock and unlock.
   - If not as shown in illustration, check installed direction of forward one-way clutch.



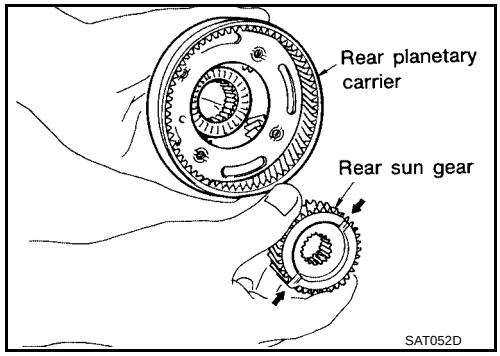
7. Install rear internal gear assembly.
   - **Align teeth of forward clutch and overrun clutch drive plate.**



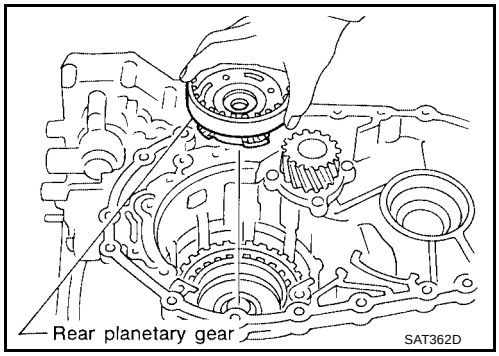
8. Install needle bearing on rear planetary carrier.
   - **Apply petroleum jelly to needle bearing.**
   - **Pay attention to direction of needle bearing.**



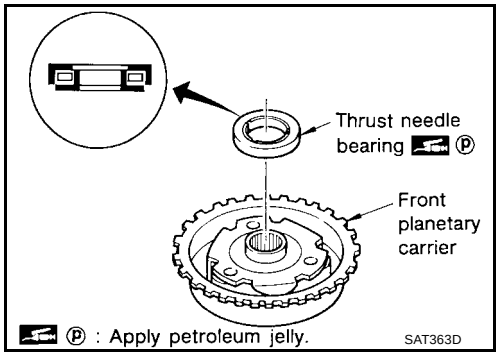
9. Install rear sun gear on rear planetary carrier.
   - **Pay attention to direction of rear sun gear.**



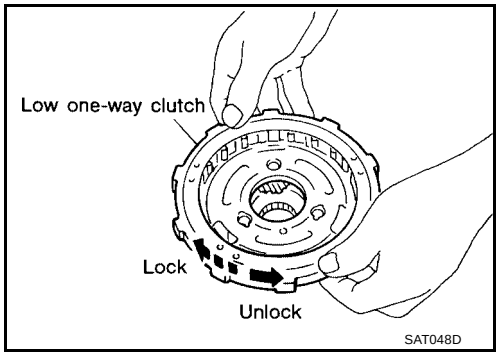
10. Install rear planetary carrier on transmission case.



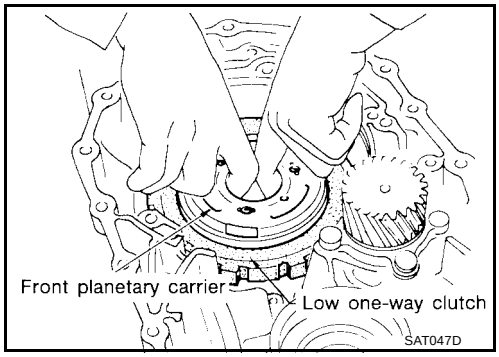
11. Install thrust needle bearing on front planetary carrier.
    - **Apply petroleum jelly to thrust needle bearing.**
    - **Pay attention to direction of thrust needle bearing.**



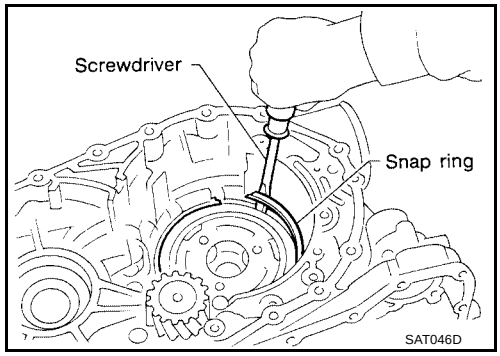
12. Install low one-way clutch to front planetary carrier by turning it in the direction of the arrow as shown.
13. While holding front planetary carrier, turn low one-way clutch. Check low one-way clutch for correct directions of lock and unlock.



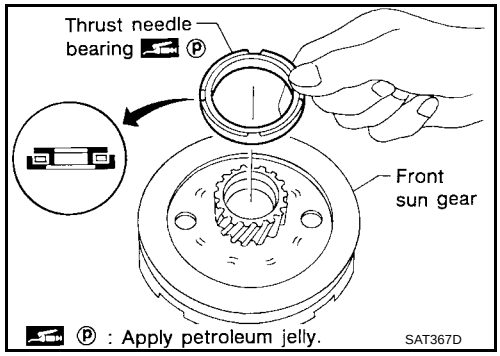
14. Install front planetary carrier assembly on transmission case.



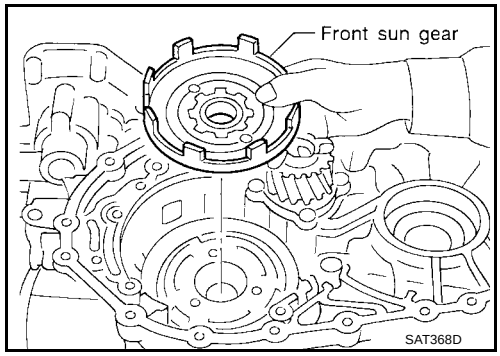
15. Install snap ring with screwdriver.
    - **Forward clutch and bearings must be correctly installed for snap ring to fit groove of transmission case.**



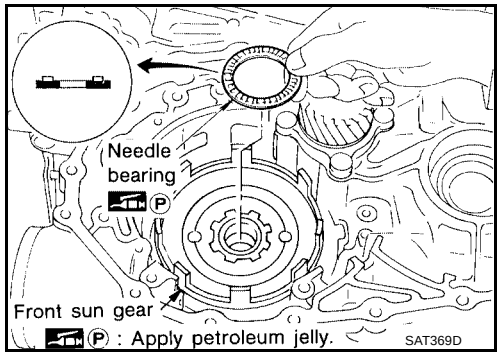
16. Install needle bearing on front sun gear.
    - **Apply petroleum jelly to needle bearing.**
    - **Pay attention to direction of needle bearing.**



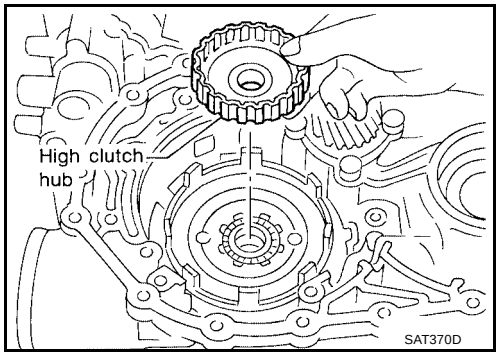
17. Install front sun gear on front planetary carrier.



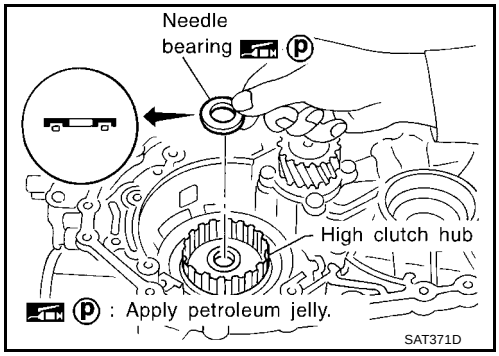
18. Install needle bearing on front sun gear.
    - **Apply petroleum jelly to needle bearing.**
    - **Pay attention to direction of needle bearing.**



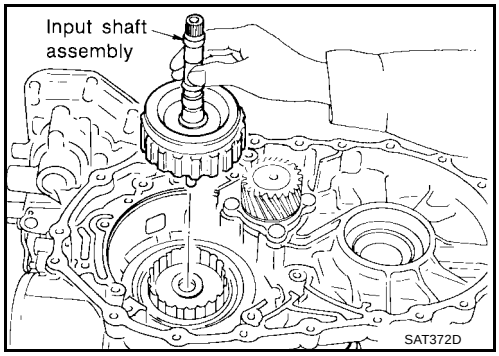
19. Install high clutch hub on front sun gear.



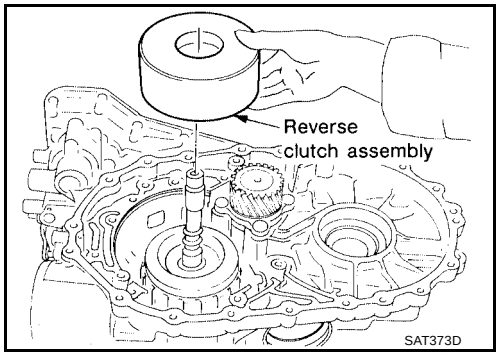
20. Install needle bearing on high clutch hub.
    - **Apply petroleum jelly to needle bearing.**
    - **Pay attention to direction of needle bearing.**



21. Remove paper rolled around input shaft.
22. Install input shaft assembly.
    - **Align teeth of high clutch drive plates before installing.**



23. Install reverse clutch assembly.
    - **Align teeth of reverse clutch drive plates before installing.**



Adjustment (2)

ECS0061A

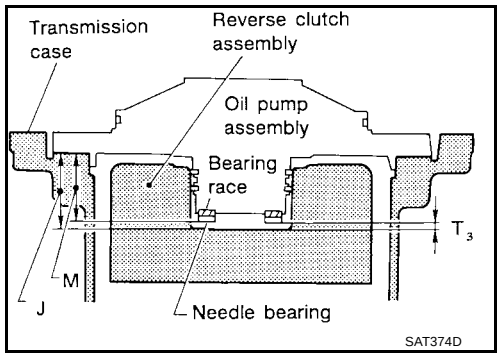
When any parts listed below are replaced, adjust total end play and reverse clutch end play.

Part name	Total end play	Reverse clutch end play
Transmission case	●	●
Overrun clutch hub	●	●
Rear internal gear	●	●
Rear planetary carrier	●	●

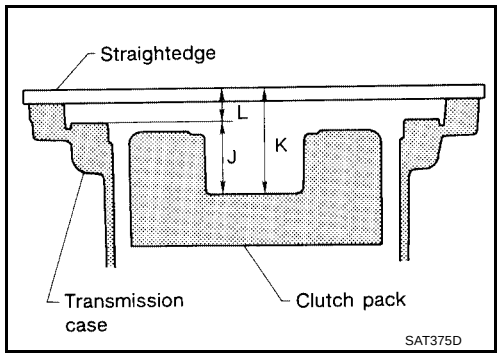
Part name	Total end play	Reverse clutch end play
Rear sun gear	●	●
Front planetary carrier	●	●
Front sun gear	●	●
High clutch hub	●	●
High clutch drum	●	●
Oil pump cover	●	●
Reverse clutch drum	—	●

TOTAL END PLAY

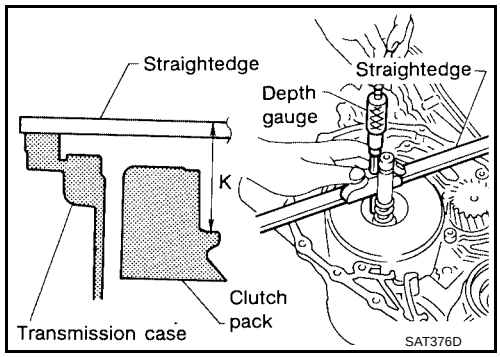
- Measure clearance between reverse clutch drum and needle bearing for oil pump cover.
- Select proper thickness of bearing race so that end play is within specifications.



1. Measure dimensions “K” and “L” and then calculate dimension “J”.



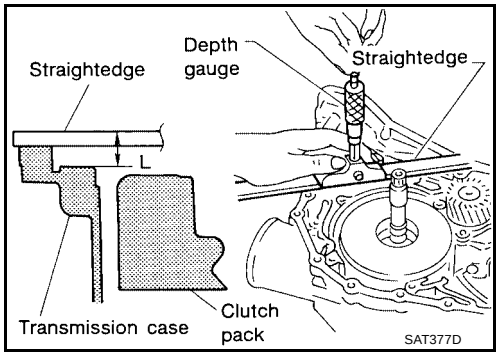
a. Measure dimension “K”.



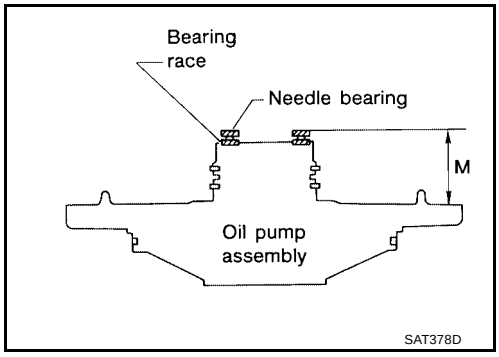
b. Measure dimension “L”.

c. Calculate dimension “J”.
“J”: Distance between oil pump fitting surface of transmission case and needle bearing mating surface of high clutch drum

J = K – L

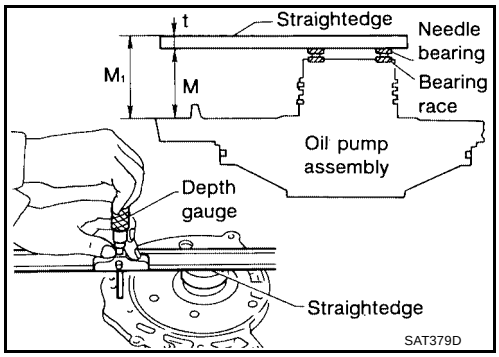


2. Measure dimension “M”.



a. Place bearing race and needle bearing on oil pump assembly.

b. Measure dimension “M”.
“M”: Distance between transmission case fitting surface and needle bearing on oil pump cover
“M_1 ”: Indication of gauge



c. Measure thickness of straightedge “t”.

$M = M_1 – t$

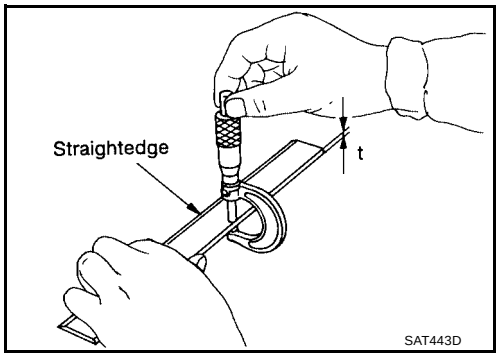
3. Adjust total end play “T_3 ”.

$T_3 = J – M$

Total end play “T_3 : 0.25 - 0.55 mm (0.0098 - 0.0217 in) ”

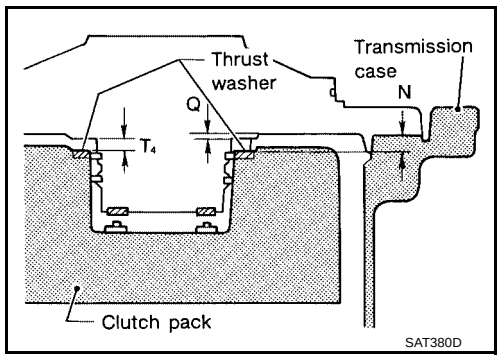
- Select proper thickness of bearing race so that total end play is within specifications.

Bearing races **: Refer to AT-393, "BEARING RACE FOR ADJUSTING TOTAL END PLAY"**

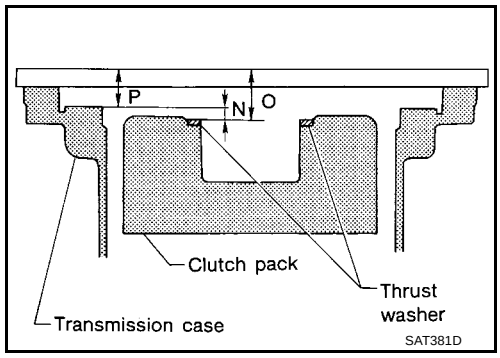


REVERSE CLUTCH END PLAY

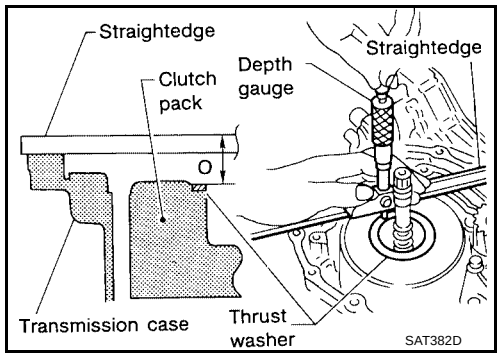
- Measure clearance between oil pump cover and thrust washer for reverse clutch drum.
- Select proper thickness of thrust washer so that end play is within specifications.



1. Measure dimensions “O” and “P” and then calculate dimension “N”.



a. Place thrust washer on reverse clutch drum.

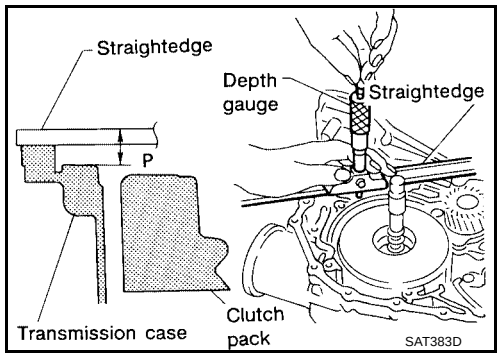


b. Measure dimension “O”.

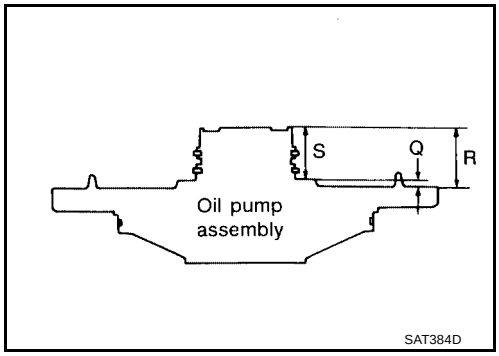
c. Measure dimension “P”.

d. Calculate dimension “N”.
“N”: Distance between oil pump fitting surface of transmission case and thrust washer on reverse clutch drum

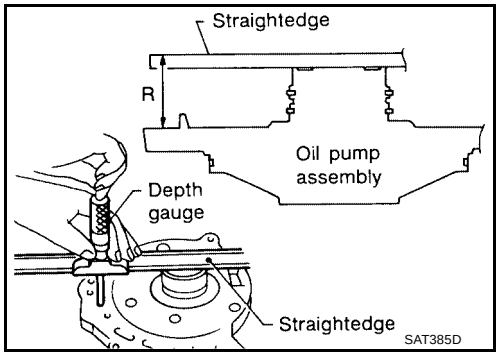
N = O – P



2. Measure dimensions “R” and “S” and then calculate dimension “Q”.



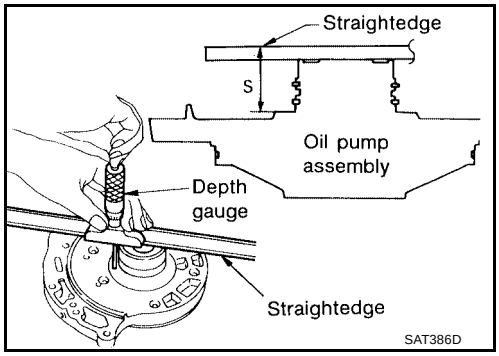
a. Measure dimension “R”.



b. Measure dimension “S”.

c. Calculate dimension “Q”.
“Q”: Distance between transmission case fitting surface and thrust washer mating surface

Q = R – S



3. Adjust reverse clutch end play “T_4 ”.

T_4 = N – Q

Reverse clutch end play	**: 0.65 - 1.00 mm (0.0256 - 0.0394 in)**

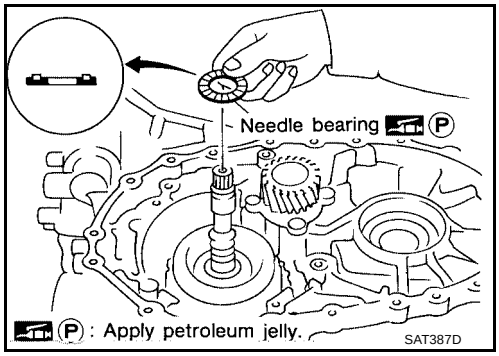
- Select proper thickness of thrust washer so that reverse clutch end play is within specifications.

Thrust washer	**: Refer to AT-393, "THRUST WASHERS FOR ADJUSTING REVERSE CLUTCH END PLAY"**

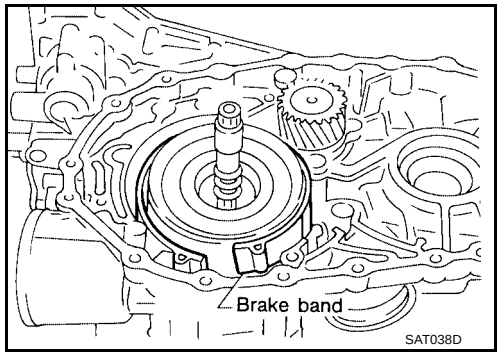
Assembly (3)

ECS0061B

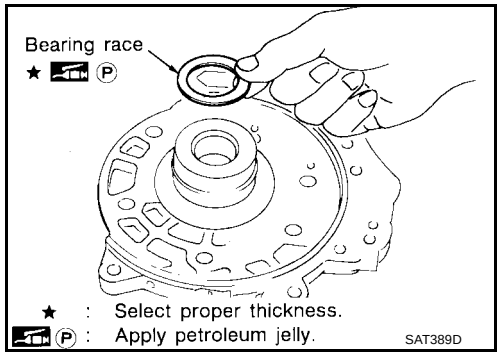
1. Remove reverse clutch assembly and install needle bearing on high clutch assembly.
   - **Pay attention to direction of needle bearing.**
2. Install reverse clutch assembly.



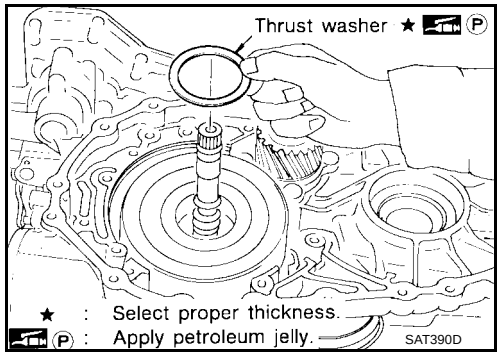
3. Install anchor end pin and lock nut on transmission case.
4. Place brake band on outside of reverse clutch drum. Tighten anchor end pin just enough so that brake band is evenly fitted on reverse clutch drum.



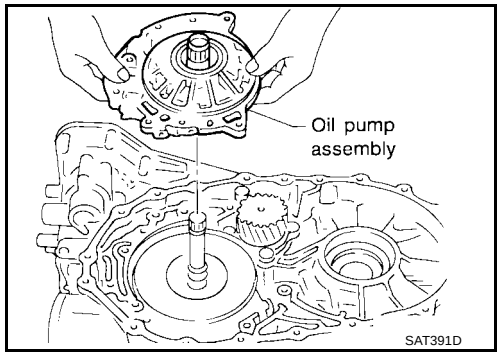
5. Place bearing race selected in total end play adjustment step on oil pump cover.
   - **Apply petroleum jelly to bearing race.**



6. Place thrust washer selected in reverse clutch end play step on reverse clutch drum.
   - **Apply petroleum jelly to thrust washer.**

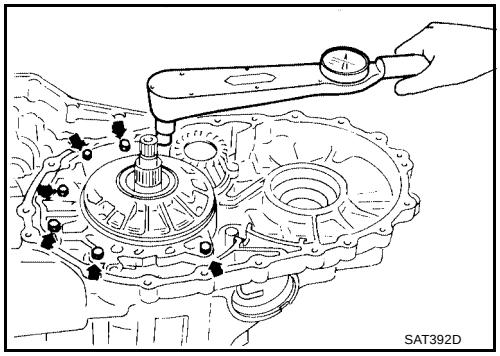


7. Install oil pump assembly on transmission case.

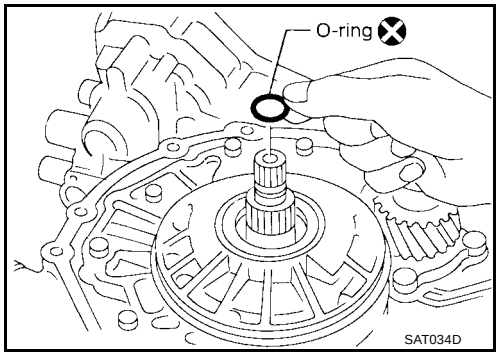


8. Tighten oil pump fixing bolts to specified torque.

: 18 - 21 N·m (1.8 - 2.1 kg-m, 13 - 15 ft-lb)



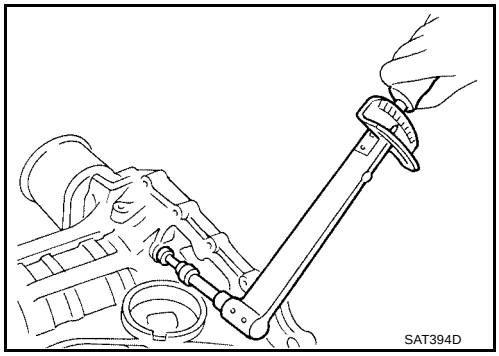
9. Install O-ring to input shaft.
   - **Apply ATF to O-ring.**



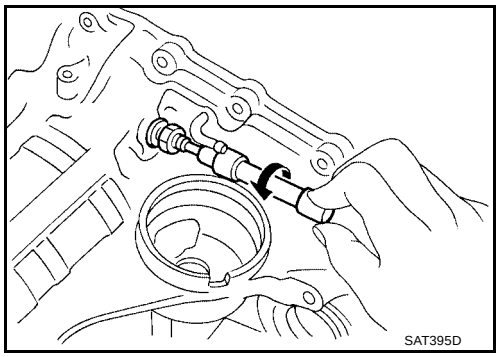
10. Adjust brake band.

a. Tighten anchor end pin to specified torque.

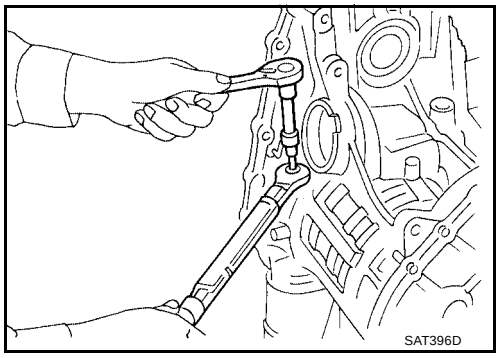
Anchor end pin	**: 3.9 - 5.9 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)**



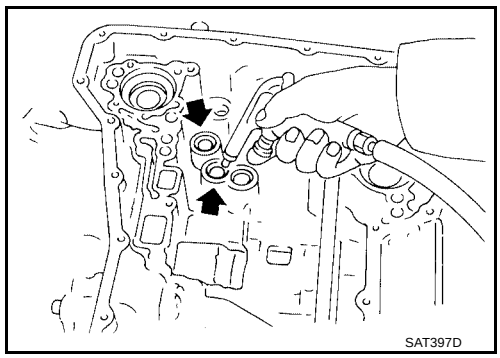
b. Back off anchor end pin two and a half turns.



c. While holding anchor end pin, tighten lock nut.



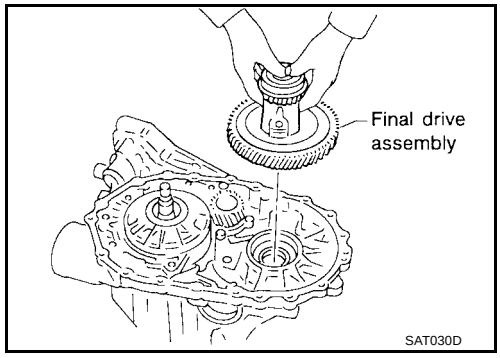
11. Apply compressed air to oil holes of transmission case and check operation of brake band.



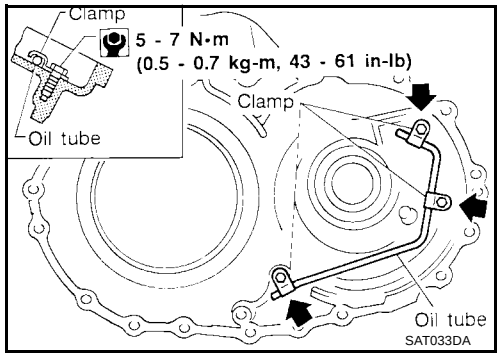
Assembly (4)

ECS0061C

1. Install final drive assembly on transmission case.

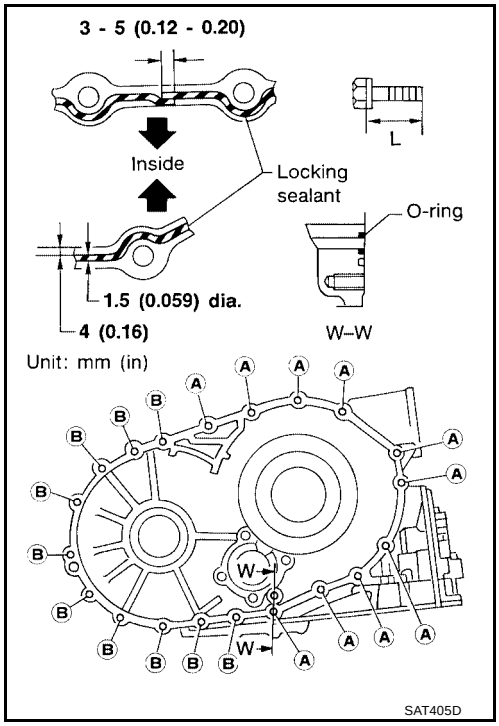


2. Install oil tube on converter housing.



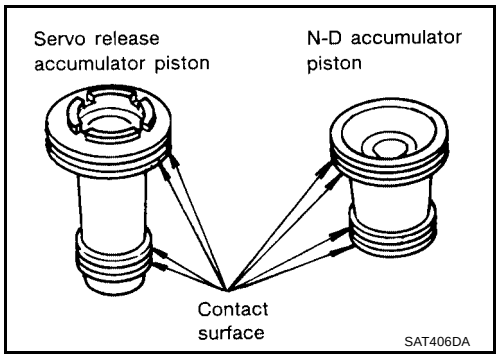
3. Install O-ring on differential oil port of transmission case.
4. Install converter housing on transmission case.
   - **Apply locking sealant to mating surface of converter housing.**

Bolt	Length mm (in)
A	32.8 (1.291)
B	40 (1.57)



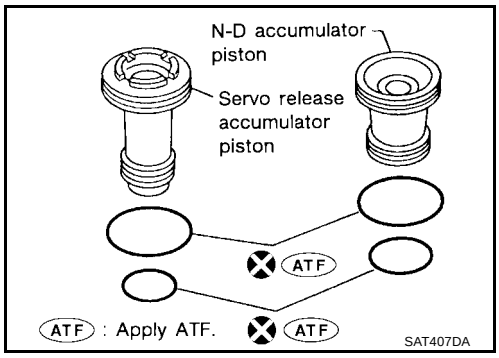
5. Install accumulator piston.

a. Check contact surface of accumulator piston for damage.



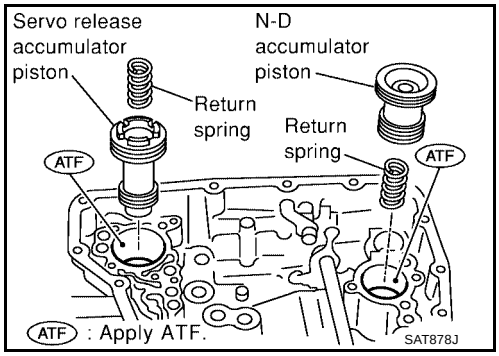
b. Install O-rings on accumulator piston.
   - Apply ATF to O-rings.

   Accumulator piston O-rings **: Refer to AT-393, "O-RING" .**

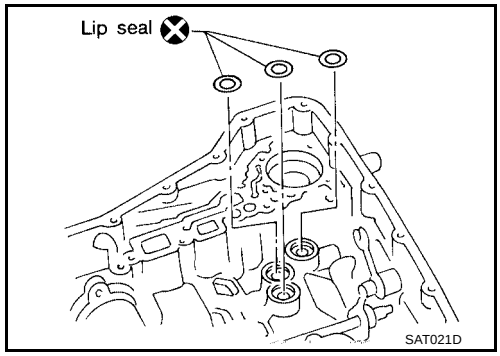


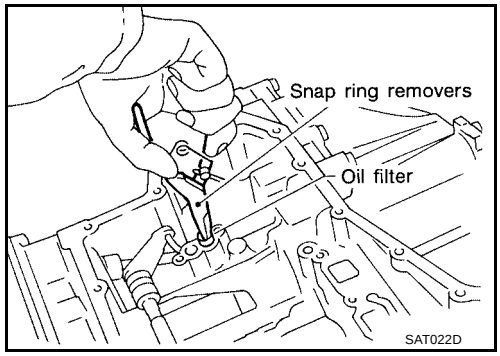
c. Install accumulator pistons and return springs on transmission case.
   - **Apply ATF to inner surface of transmission case.**

   Return springs **: Refer to AT-393, "RETURN SPRING" .**



6. Install lip seals for band servo oil holes on transmission case.



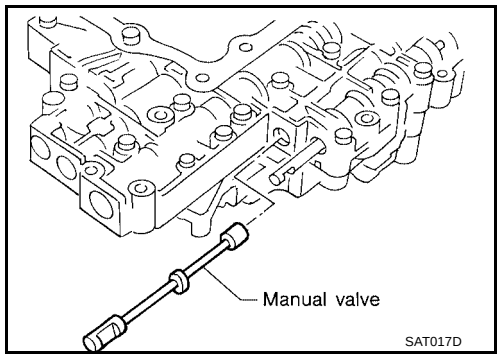


- **Apply petroleum jelly to lip seals.**

7. Install control valve assembly.

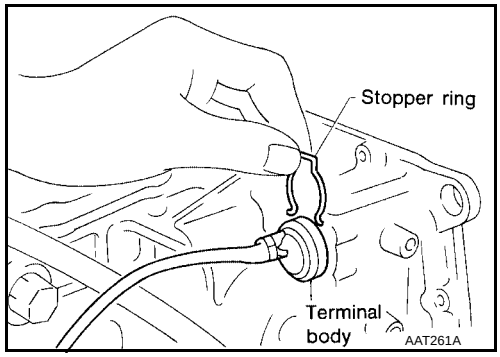
a. Insert manual valve into control valve assembly.

- **Apply ATF to manual valve.**



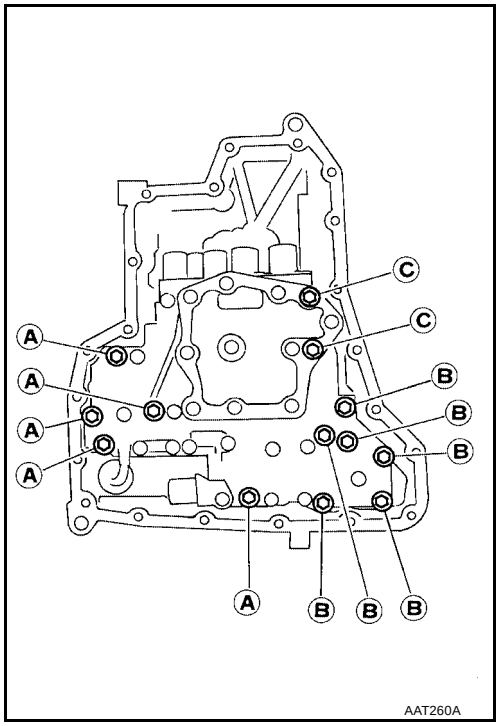
b. Pass solenoid harness through transmission case and install terminal body on transmission case by pushing it.

c. Install stopper ring to terminal body.



d. Tighten bolts **A** , **B** and **C** .

: **7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)**



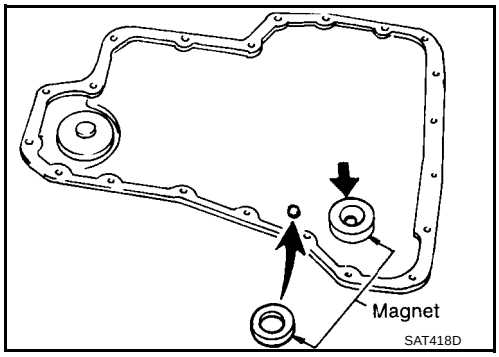
AAT260A

Bolt length, number and location

Bolt symbol	A	B	C
Bolt length "l"	40.0 mm (1.575 in)	33.0 mm (1.299 in)	43.5 mm (1.713 in)
Number of bolts	5	6	2

8. Install oil pan.

a. Attach magnet to oil pan.



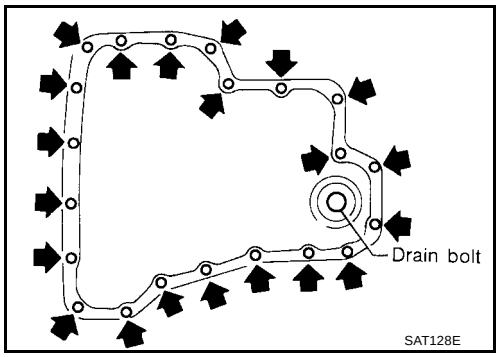
SAT418D

b. Install new oil pan gasket on transmission case.

c. Install oil pan on transmission case.

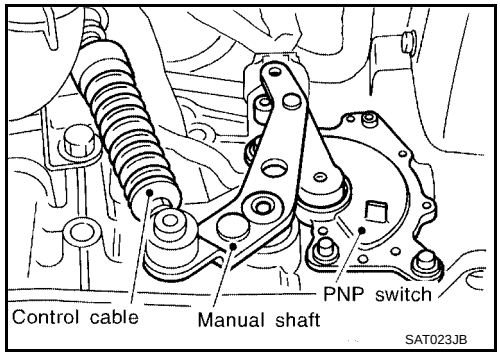
- **Always replace oil pan bolts as they are self-sealing bolts.**
- **Tighten the bolts in a criss-cross pattern to prevent dislocation of gasket.**

d. Tighten drain plug to specified torque.

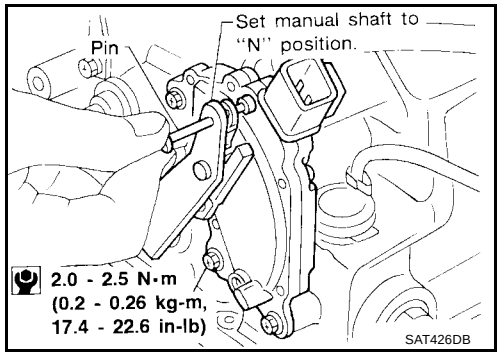


SAT128E

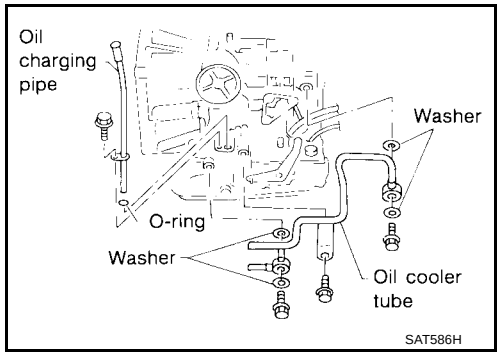
9. Install PNP switch.
a. Set manual shaft in “P” position.
b. Temporarily install PNP switch on manual shaft.
c. Move selector lever to “N” position.



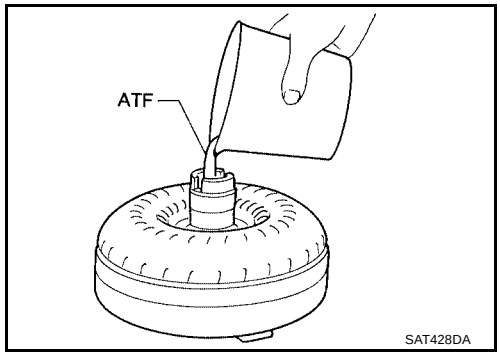
d. Use a 4 mm (0.157 in) pin for this adjustment.
   1. Insert the pin straight into the manual shaft adjustment hole.
   2. Rotate PNP switch until the pin can also be inserted straight into hole in PNP switch.
e. Tighten PNP switch fixing bolts.
f. Remove pin from adjustment hole after adjusting PNP switch.



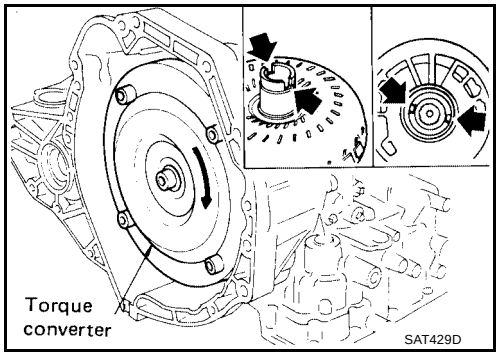
10. Install oil charging pipe and oil cooler tube to transmission case.



11. Install torque converter.
a. Pour ATF into torque converter.
   - **Approximately 1 liter (1-1/8 US qt, 7/8 Imp qt) of fluid is required for a new torque converter.**
   - **When reusing old torque converter, add the same amount of fluid as was drained.**

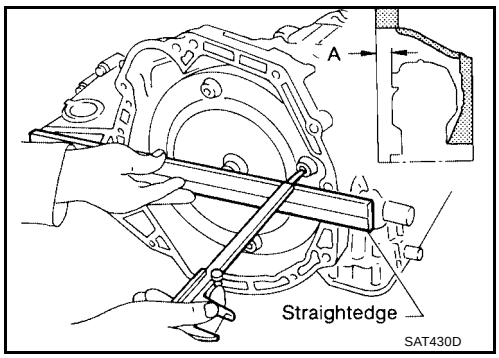


b. Install torque converter while aligning notches of torque converter with notches of oil pump.



c. Measure distance “A” to check that torque converter is in proper position.

Distance “A” : 21.1 mm (0.831 in)



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

ECS0061D

Engine		QG18DE
Automatic transaxle model		RE4F03B
Automatic transaxle assembly	Model code number	3AX60
Transaxle gear ratio	1st	2.861
	2nd	1.562
	3rd	1.000
	4th	0.698
	Reverse	2.230
	Final drive	3.827
Recommended fluid		Nissan Matic “D” (Continental U.S. and Alaska) or Genuine Nissan Automatic Transmission Fluid (Canada)*1
Fluid capacity		7.0l (7-3/8 US qt, 6-1/8 Imp qt)

*1: Refer to MA-13, "Fluids and Lubricants" .

Shift Schedule

ECS0061E

VEHICLE SPEED WHEN SHIFTING GEARS

QG18DE (Calif. CA Model)

Throttle position	Shift pattern	Vehicle speed km/h (MPH)						
		$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$	$1_2 \rightarrow 1_1$
Full throttle	Comfort	54 - 62 (34 - 39)	103 - 111 (64 - 69)	163 - 171 (101 - 106)	159 - 167 (99 - 104)	93 - 101 (58 - 63)	41 - 49 (25 - 30)	54 - 62 (34 - 39)
Half throttle	Comfort	32 - 40 (20 - 25)	60 - 68 (37 - 42)	124 - 132 (77 - 82)	70 - 78 (43 - 48)	35 - 43 (22 - 27)	25 - 33 (16 - 21)	54 - 62 (34 - 39)

QG18DE (Except Calif. CA Model)

Throttle position	Shift pattern	Vehicle speed km/h (MPH)						
		$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$	$1_2 \rightarrow 1_1$
Full throttle	Comfort	52 - 60 (32 - 37)	100 - 108 (62 - 67)	158 - 166 (98 - 103)	154 - 162 (96 - 101)	70 - 98 (56 - 61)	41 - 49 (25 - 30)	52 - 60 (32 - 37)
Half throttle	Comfort	31 - 39 (19 - 24)	58 - 66 (36 - 41)	119 - 127 (74 - 79)	68 - 76 (42 - 47)	34 - 42 (21 - 26)	24 - 32 (15 - 20)	52 - 60 (32 - 37)

VEHICLE SPEED WHEN PERFORMING LOCK-UP

QG18DE (Calif. CA Model)

Throttle opening	OD switch	Shift pattern	Vehicle speed km/h (MPH)	
			Lock-up ON	Lock-up OFF
2/8	ON (D_4)	Comfort	97 - 105 (60 - 65)	63 - 71 (39 - 44)
	OFF (D_3)	Comfort	86 - 94 (53 - 58)	83 - 91 (52 - 57)

QG18DE (Except Calif. CA Model)

Throttle opening	OD switch	Shift pattern	Vehicle speed km/h (MPH)	
			Lock-up ON	Lock-up OFF
2/8	ON (D_4)	Comfort	94 - 102 (58 - 63)	61 - 69 (38 - 43)
	OFF (D_3)	Comfort	86 - 94 (53 - 58)	83 - 91 (52 - 57)

Stall Revolution

ECS0061F

Engine model	Stall revolution rpm
QG18DE	2,350 - 2,800

Line Pressure

ECS0061G

Engine speed rpm	Line pressure kPa (kg/cm^2 , psi)			
	R position	D position	2 position	1 position
Idle	778 (7.9, 113)	500 (5.1, 73)	500 (5.1, 73)	500 (5.1, 73)
Stall	1,816 (18.5, 263)	1,167 (11.9, 169)	1,167 (11.9, 169)	1,167 (11.9, 169)

Control Valves

ECS0061H

CONTROL VALVE AND PLUG RETURN SPRINGS

Unit: mm (in)

	No.	Parts	Part No.*	Free length	Outer diameter
Upper body Refer to AT-307, "CONTROL VALVE UPPER BODY" .	35	3-2 timing valve spring	31736-01X00	23.29 (0.917)	6.65 (0.2618)
	19	Cooler check valve spring	31742-3AX05	28.04 (1.1039)	7.15 (0.2815)
	23	Pilot valve spring	31742-3AX03	38.98 (1.5346)	8.9 (0.350)
	15	1-2 accumulator valve spring	31742-3AX00	20.5 (0.807)	6.95 (0.2736)
	28	1-2 accumulator piston spring	31742-3AX09	55.66 (2.1913)	19.5 (0.7677)
	33	1st reducing valve spring	31742-80X05	27.0 (1.063)	7.0 (0.276)
	2	Overrun clutch reducing valve spring	31742-80X06	37.5 (1.476)	7.0 (0.276)
	7	Torque converter relief valve spring	31742-3AX04	33.3 (1.3110)	9.0 (0.354)
	10	Torque converter clutch control valve spring	31742-3AX02	53.01 (2.0870)	6.5 (0.256)
Lower body Refer to AT-311, "CONTROL VALVE LOWER BODY" .	34	Shuttle control valve spring	31762-41X04	51.0 (2.0079)	5.65 (0.2224)
	18	Pressure regulator valve spring	31742-80X13	45.0 (1.772)	15.0 (0.591)
	23	Overrun clutch control valve spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	27	Accumulator control valve spring	31742-80X02	22.0 (0.866)	6.5 (0.256)
	29	Shift valve A spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	2	Shift valve B spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	11	Pressure modifier valve spring	31742-41X15	30.5 (1.201)	9.8 (0.386)
	7	Pressure modifier valve spring	31742-80X16	32.0 (1.260)	6.9 (0.272)
	—	Oil cooler relief valve spring	31872-31X00	17.02 (0.6701)	8.0 (0.315)
	—	T/C pressure spring	31742-3AX11	9.0 (0.354)	7.3 (0.287)

*: Always check with the Parts Department for the latest parts information.

Clutch, Brake and Brake Band

ECS0061I

REVERSE CLUTCH

Number of drive plates		2	
Number of driven plates		2	
Drive plate thickness mm (in)	Standard	2.0 (0.079)	
	Allowable limit	1.8 (0.071)	
Clearance mm (in)	Standard	0.5 - 0.8 (0.020 - 0.031)	
	Allowable limit	1.2 (0.047)	
Thickness of retaining plates		Thickness mm (in)	Part number*
		4.4 (0.173)	31537-31X00
		4.6 (0.181)	31537-31X01
		4.8 (0.189)	31537-31X02
		5.0 (0.197)	31537-31X03
		5.2 (0.205)	31537-31X04

*: Always check with the Parts Department for the latest parts information.

HIGH CLUTCH

Number of drive plates		3	
Number of driven plates		5	
Drive plate thickness mm (in)	Standard	2.0 (0.079)	
	Allowable limit	1.8 (0.071)	
Clearance mm (in)	Standard	1.4 - 1.8 (0.055 - 0.071)	
	Allowable limit	2.4 (0.094)	
Thickness of retaining plates		Thickness mm (in)	Part number*
		4.8 (0.189) 5.0 (0.197) 5.2 (0.205) 5.4 (0.213) 5.6 (0.220) 5.8 (0.228) 6.0 (0.236)	31537-32X05 31537-32X06 31537-32X07 31537-32X08 31537-32X09 31537-32X10 31537-32X11

*: Always check with the Parts Department for the latest parts information.

FORWARD CLUTCH

Number of drive plates		5	
Number of driven plates		5	
Drive plate thickness mm (in)	Standard	1.8 (0.071)	
	Allowable limit	1.6 (0.063)	
Clearance mm (in)	Standard	0.45 - 0.85 (0.0177 - 0.0335)	
	Allowable limit	1.85 (0.0728)	
Thickness of retaining plate		Thickness mm (in)	Part number*
		3.6 (0.142) 3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181)	31537-31X60 31537-31X61 31537-31X62 31537-31X63 31537-31X64 31537-31X65

*: Always check with the Parts Department for the latest parts information.

OVERRUN CLUTCH

Number of drive plates		3	
Number of driven plates		4	
Drive plate thickness mm (in)	Standard	1.6 (0.063)	
	Allowable limit	1.4 (0.055)	
Clearance mm (in)	Standard	1.0 - 1.4 (0.039 - 0.055)	
	Allowable limit	2.0 (0.079)	
Thickness of retaining plate		Thickness mm (in)	Part number*
		3.6 (0.142) 3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173)	31567-31X79 31567-31X80 31567-31X81 31567-31X82 31567-31X83

*: Always check with the Parts Department for the latest parts information.

LOW & REVERSE BRAKE

Number of drive plates	5
Number of driven plates	4 + 1

Drive plate thickness mm (in)	Standard	2.0 (0.079)	
	Allowable limit	1.8 (0.071)	
Clearance mm (in)	Standard	1.4 - 1.8 (0.055 - 0.071)	
	Allowable limit	2.8 (0.110)	
Thickness of retaining plate		Thickness mm (in)	Part number*
		3.6 (0.142) 3.8 (0.150) 4.0 (0.157) 4.2 (0.165) 4.4 (0.173) 4.6 (0.181)	31667-31X16 31667-31X17 31667-31X18 31667-31X19 31667-31X20 31667-31X21

*: Always check with the Parts Department for the latest parts information.

BRAKE BAND

Anchor end pin tightening torque	3.5 - 5.9 N-m (0.35 - 0.6 kg-m, 31 - 52 in-lb)
Number of returning revolutions for anchor end pin	2.5±0.125
Lock nut tightening torque	31 - 36 N-m (3.2 - 3.7 kg-m, 23 - 27 ft-lb)

Clutch and Brake Return Springs

ECS0061J

Unit: mm (in)

Parts		Free length	Outer diameter	Part number*
Forward clutch (Overrun clutch)	Outer (16 pcs)	26.6 (1.047)	10.6 (0.417)	31505-31X02
	Inner (16 pcs)	26.3 (1.035)	7.7 (0.303)	31505-31X03
Reverse clutch (16 pcs)		18.6 (0.732)	8.0 (0.315)	31505-31X00
High clutch (12 pcs)		19.7 (0.776)	11.1 (0.437)	31505-31X01
Low reverse brake (20 pcs)		25.1 (0.988)	7.6 (0.299)	31505-31X04

*: Always check with the Parts Department for the latest parts information.

Oil Pump

ECS0061K

Oil pump side clearance mm (in)		0.02 - 0.04 (0.0008 - 0.0016)	
Thickness of inner gears and outer gears		Inner gear	
		Thickness mm (in)	Part number*
		9.99 - 10.00 (0.3933 - 0.3937) 9.98 - 9.99 (0.3929 - 0.3933) 9.97 - 9.98 (0.3925 - 0.3929)	31346-31X00 31346-31X01 31346-31X02
		Outer gear	
		Thickness mm (in)	Part number*
		9.99 - 10.00 (0.3933 - 0.3937) 9.98 - 9.99 (0.3929 - 0.3933) 9.97 - 9.98 (0.3925 - 0.3929)	31347-31X00 31347-31X01 31347-31X02
Clearance between oil pump housing and outer gear mm (in)	Standard	0.08 - 0.15 (0.0031 - 0.0059)	
	Allowable limit	0.15 (0.0059)	
Oil pump cover seal ring clearance mm (in)	Standard	0.1 - 0.25 (0.0039 - 0.0098)	
	Allowable limit	0.25 (0.0098)	

*: Always check with the Parts Department for the latest parts information.

Input Shaft

ECS0061L

Unit: mm (in)

Input shaft seal ring clearance	Standard	0.08 - 0.23 (0.0031 - 0.0091)
	Allowable limit	0.23 (0.0091)

Planetary Carrier

ECS0061M

Unit: mm (in)

Clearance between planetary carrier and pinion washer	Standard	0.15 - 0.70 (0.0059 - 0.0276)
	Allowable limit	0.80 (0.0315)

Final Drive

ECS0061N

DIFFERENTIAL SIDE GEAR CLEARANCE

Clearance between side gear and differential case with washer	0.1 - 0.2 mm (0.004 - 0.008 in)

DIFFERENTIAL SIDE GEAR THRUST WASHERS

Thickness mm (in)	Part number*
0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111
0.80 - 0.85 (0.0315 - 0.0335)	38424-D2112
0.85 - 0.90 (0.0335 - 0.0354)	38424-D2113
0.90 - 0.95 (0.0354 - 0.0374)	38424-D2114
0.95 - 1.00 (0.0374 - 0.0394)	38424-D2115

*: Always check with the Parts Department for the latest parts information.

BEARING PRELOAD

Differential side bearing preload “T”	0.04 - 0.09 mm (0.0016 - 0.0035 in)

TURNING TORQUE

Turning torque of final drive assembly	0.49 - 1.08 N-m (5.0 - 11.0 kg-cm, 4.3 - 9.5 in-lb)

DIFFERENTIAL SIDE BEARING ADJUSTING SHIMS

Thickness mm (in)	Part number*
0.40 (0.0157)	31499-21X07
0.44 (0.0173)	31499-21X08
0.48 (0.0189)	31499-21X09
0.52 (0.0205)	31499-21X10
0.56 (0.0220)	31499-21X11
0.60 (0.0236)	31499-21X12
0.64 (0.0252)	31499-21X13
0.68 (0.0268)	31499-21X14
0.72 (0.0283)	31499-21X15
0.76 (0.0299)	31499-21X16
0.80 (0.0315)	31499-21X17
0.84 (0.0331)	31499-21X18
0.88 (0.0346)	31499-21X19
0.92 (0.0362)	31499-21X20
1.44 (0.0567)	31499-21X21

*: Always check with the Parts Department for the latest parts information.

TABLE FOR SELECTING DIFFERENTIAL SIDE BEARING ADJUSTING SHIMS

Unit: mm (in)

Dial indicator deflection	Suitable shim(s)
0.31 - 0.35 (0.0122 - 0.0138)	0.40 (0.0157)
0.35 - 0.39 (0.0138 - 0.0154)	0.44 (0.0173)
0.39 - 0.43 (0.0154 - 0.0169)	0.48 (0.0189)
0.43 - 0.47 (0.0169 - 0.0185)	0.52 (0.0205)
0.47 - 0.51 (0.0185 - 0.0201)	0.56 (0.0220)
0.51 - 0.55 (0.0201 - 0.0217)	0.60 (0.0236)
0.55 - 0.59 (0.0217 - 0.0232)	0.64 (0.0252)
0.59 - 0.63 (0.0232 - 0.0248)	0.68 (0.0268)
0.63 - 0.67 (0.0248 - 0.0264)	0.72 (0.0283)
0.67 - 0.71 (0.0264 - 0.0280)	0.76 (0.0299)
0.71 - 0.75 (0.0280 - 0.0295)	0.80 (0.0315)
0.75 - 0.79 (0.0295 - 0.0311)	0.84 (0.0331)
0.79 - 0.83 (0.0311 - 0.0327)	0.88 (0.0346)
0.83 - 0.87 (0.0327 - 0.0343)	0.92 (0.0362)
0.87 - 0.91 (0.0343 - 0.0358)	0.48 (0.0189) + 0.48 (0.0189)
0.91 - 0.95 (0.0358 - 0.0374)	0.48 (0.0189) + 0.52 (0.0205)
0.95 - 0.99 (0.0374 - 0.0390)	0.52 (0.0205) + 0.52 (0.0205)
0.99 - 1.03 (0.0390 - 0.0406)	0.52 (0.0205) + 0.56 (0.0220)
1.03 - 1.07 (0.0406 - 0.0421)	0.56 (0.0220) + 0.56 (0.0220)
1.07 - 1.11 (0.0421 - 0.0437)	0.56 (0.0220) + 0.60 (0.0236)
1.11 - 1.15 (0.0437 - 0.0453)	0.60 (0.0236) + 0.60 (0.0236)
1.15 - 1.19 (0.0453 - 0.0469)	0.60 (0.0236) + 0.64 (0.0252)
1.19 - 1.23 (0.0469 - 0.0484)	0.64 (0.0252) + 0.64 (0.0252)
1.23 - 1.27 (0.0484 - 0.0500)	0.64 (0.0252) + 0.68 (0.0268)
1.27 - 1.31 (0.0500 - 0.0516)	0.68 (0.0268) + 0.68 (0.0268)
1.31 - 1.35 (0.0516 - 0.0531)	0.68 (0.0268) + 0.72 (0.0283)
1.35 - 1.39 (0.0531 - 0.0547)	1.44 (0.0567)
1.39 - 1.43 (0.0547 - 0.0563)	0.72 (0.0283) + 0.76 (0.0299)
1.43 - 1.47 (0.0563 - 0.0579)	0.76 (0.0299) + 0.76 (0.0299)
1.47 - 1.51 (0.0579 - 0.0594)	0.76 (0.0299) + 0.80 (0.0315)
1.51 - 1.55 (0.0594 - 0.0610)	0.80 (0.0315) + 0.80 (0.0315)
1.55 - 1.59 (0.0610 - 0.0626)	0.80 (0.0315) + 0.84 (0.0331)
1.59 - 1.63 (0.0626 - 0.0642)	0.84 (0.0331) + 0.84 (0.0331)
1.63 - 1.67 (0.0642 - 0.0657)	0.84 (0.0331) + 0.88 (0.0346)
1.67 - 1.71 (0.0657 - 0.0673)	0.88 (0.0346) + 0.88 (0.0346)
1.71 - 1.75 (0.0673 - 0.0689)	0.88 (0.0346) + 0.92 (0.0362)
1.75 - 1.79 (0.0689 - 0.0705)	0.92 (0.0362) + 0.92 (0.0362)
1.79 - 1.83 (0.0705 - 0.0720)	0.92 (0.0362) + 0.96 (0.0378)
1.83 - 1.87 (0.0720 - 0.0736)	0.96 (0.0378) + 0.96 (0.0378)
1.87 - 1.91 (0.0736 - 0.0752)	0.52 (0.0205) + 1.44 (0.0567)
1.91 - 1.95 (0.0752 - 0.0768)	0.56 (0.0220) + 1.44 (0.0567)

Reduction Pinion Gear

ECS0061O

BEARING PRELOAD

Reduction pinion gear bearing preload	0.05 mm (0.0020 in)

TURNING TORQUE

Turning torque of reduction pinion gear	0.1 - 0.69 N-m (1.1 - 7.0 kg-cm, 0.95 - 6.08 in-lb)

REDUCTION PINION GEAR BEARING ADJUSTING SHIMS

Thickness mm (in)	Part number*
1.74 (0.0685)	31438-31X16
1.78 (0.0701)	31438-31X17
1.82 (0.0717)	31438-31X18
1.86 (0.0732)	31438-31X19
1.90 (0.0748)	31438-31X20
1.92 (0.0756)	31439-31X60
1.94 (0.0764)	31438-31X21
1.96 (0.0772)	31439-31X61
1.98 (0.0780)	31438-31X22
2.00 (0.0787)	31439-31X62
2.02 (0.0795)	31438-31X23
2.04 (0.0803)	31439-31X63
2.06 (0.0811)	31438-31X24
2.08 (0.0819)	31439-31X64
2.10 (0.0827)	31438-31X60
2.12 (0.0835)	31439-31X65
2.14 (0.0843)	31438-31X61
2.16 (0.0850)	31439-31X66
2.18 (0.0858)	31438-31X62
2.20 (0.0866)	31439-31X67
2.22 (0.0874)	31438-31X63
2.24 (0.0882)	31439-31X68
2.26 (0.0890)	31438-31X64
2.28 (0.0898)	31439-31X69
2.30 (0.0906)	31438-31X65
2.34 (0.0921)	31438-31X66
2.38 (0.0937)	31438-31X67
2.42 (0.0953)	31438-31X68
2.46 (0.0969)	31438-31X69
2.50 (0.0984)	31438-31X70
2.54 (0.1000)	31438-31X71
2.58 (0.1016)	31438-31X72
2.62 (0.1031)	31438-31X73
2.66 (0.1047)	31438-31X74

*: Always check with the Parts Department for the latest parts information.

TABLE FOR SELECTING REDUCTION PINION GEAR BEARING ADJUSTING SHIM

Unit: mm (in)

Dimension "T"	Suitable shim(s)
1.77 - 1.81 (0.0697 - 0.0713)	1.74 (0.0685)
1.81 - 1.85 (0.0713 - 0.0728)	1.78 (0.0701)
1.85 - 1.89 (0.0728 - 0.0744)	1.82 (0.0717)
1.89 - 1.93 (0.0744 - 0.0760)	1.86 (0.0732)
1.93 - 1.96 (0.0760 - 0.0772)	1.90 (0.0748)
1.96 - 1.98 (0.0772 - 0.0780)	1.92 (0.0756)
1.98 - 2.00 (0.0780 - 0.0787)	1.94 (0.0764)
2.00 - 2.02 (0.0787 - 0.0795)	1.96 (0.0772)
2.02 - 2.04 (0.0795 - 0.0803)	1.98 (0.0780)
2.04 - 2.06 (0.0803 - 0.0811)	2.00 (0.0787)
2.06 - 2.08 (0.0811 - 0.0819)	2.02 (0.0795)
2.08 - 2.10 (0.0819 - 0.0827)	2.04 (0.0803)
2.10 - 2.12 (0.0827 - 0.0835)	2.06 (0.0811)
2.12 - 2.14 (0.0835 - 0.0843)	2.08 (0.0819)
2.14 - 2.16 (0.0843 - 0.0850)	2.10 (0.0827)
2.16 - 2.18 (0.0850 - 0.0858)	2.12 (0.0835)
2.18 - 2.20 (0.0858 - 0.0866)	2.14 (0.0843)
2.20 - 2.22 (0.0866 - 0.0874)	2.16 (0.0850)
2.22 - 2.24 (0.0874 - 0.0888)	2.18 (0.0858)
2.24 - 2.26 (0.0882 - 0.0890)	2.20 (0.0866)
2.26 - 2.28 (0.0890 - 0.0898)	2.22 (0.0874)
2.28 - 2.30 (0.0898 - 0.0906)	2.24 (0.0882)
2.30 - 2.32 (0.0906 - 0.0913)	2.26 (0.0890)
2.32 - 2.34 (0.0913 - 0.0921)	2.28 (0.0898)
2.34 - 2.37 (0.0921 - 0.0933)	2.30 (0.0906)
2.37 - 2.41 (0.0933 - 0.0949)	2.34 (0.0921)
2.41 - 2.45 (0.0949 - 0.0965)	2.38 (0.0937)
2.45 - 2.49 (0.0965 - 0.0980)	2.42 (0.0953)
2.49 - 2.53 (0.0980 - 0.0996)	2.46 (0.0969)
2.53 - 2.57 (0.0996 - 0.1012)	2.50 (0.0984)
2.57 - 2.61 (0.1012 - 0.1028)	2.54 (0.1000)
2.61 - 2.65 (0.1028 - 0.1043)	2.58 (0.1016)
2.65 - 2.69 (0.1043 - 0.1059)	2.62 (0.1031)
2.69 - 2.73 (0.1059 - 0.1075)	2.66 (0.1047)

Output Shaft

ECS0061P

SEAL RING CLEARANCE

Unit: mm (in)

Output shaft seal ring clearance	Standard	0.10 - 0.25 (0.0039 - 0.0098)
	Allowable limit	0.25 (0.0098)

END PLAY

Output shaft end play	0 - 0.5 mm (0 - 0.020 in)

OUTPUT SHAFT END PLAY ADJUSTING SHIMS

Thickness mm (in)	Part number*
0.56 (0.0220)	31438-31X46
0.96 (0.0378)	31438-31X47
1.36 (0.0535)	31438-31X48

*: Always check with the Parts Department for the latest parts information.

Bearing Retainer

ECS0061Q

SEAL RING CLEARANCE

Unit: mm (in)

Bearing retainer seal ring clearance	Standard	0.10 - 0.25 (0.0039 - 0.0098)
	Allowable limit	0.25 (0.0098)

Total End Play

ECS0061R

Total end play "T_3 "	0.25 - 0.55 mm (0.0098 - 0.0217 in)

BEARING RACE FOR ADJUSTING TOTAL END PLAY

Thickness mm (in)	Part number*
0.6 (0.024)	31435-31X01
0.8 (0.031)	31435-31X02
1.0 (0.039)	31435-31X03
1.2 (0.047)	31435-31X04
1.4 (0.055)	31435-31X05
1.6 (0.063)	31435-31X06
1.8 (0.071)	31435-31X07
2.0 (0.079)	31435-31X08

*: Always check with the Parts Department for the latest parts information.

Reverse Clutch End Play

ECS0061S

Reverse clutch end play "T_4 "	0.65 - 1.00 mm (0.0256 - 0.0394 in)

THRUST WASHERS FOR ADJUSTING REVERSE CLUTCH END PLAY

Thickness mm (in)	Part number*
0.65 (0.0256)	31508-31X10
0.80 (0.0315)	31508-31X11
0.95 (0.0374)	31508-31X12
1.10 (0.0433)	31508-31X13
1.25 (0.0492)	31508-31X14
1.40 (0.0551)	31508-31X15

*: Always check with the Parts Department for the latest parts information.

Accumulator

ECS0061T

O-RING

Unit: mm (in)

Accumulator	Diameter (Small)	Part number*	Diameter (Large)	Part number*
Servo release accumulator	26.9 (1.059)	31526-41X03	44.2 (1.740)	31526-41X02
N-D accumulator	34.6 (1.362)	31526-31X08	39.4 (1.551)	31672-21X00

*: Always check with the Parts Department for the latest parts information.

RETURN SPRING

Unit: mm (in)

Accumulator	Free length	Outer diameter	Part number*
Servo release accumulator spring	52.5 (2.067)	20.1 (0.791)	31605-80X00
N-D accumulator spring	45.0 (1.772)	27.6 (1.087)	31605-33X01

*: Always check with the Parts Department for the latest parts information.

Band Servo

ECS0061U

RETURN SPRING

Unit: mm (in)

Return spring	Free length	Outer diameter	Part number*
2nd servo return spring	32.5 (1.280)	25.9 (1.020)	31605-31X20
OD servo return spring	38.52 (1.5165)	22.0 (0.866)	31605-31X21

*: Always check with the Parts Department for the latest parts information.

Removal and Installation

ECS0061V

Unit: mm (in)

Distance between end of converter housing and torque converter	21.1 (0.831)

Shift Solenoid Valves

ECS0061W

Gear	Solenoid A	Solenoid B
1st	ON	ON
2nd	OFF	ON
3rd	OFF	OFF
4th	ON	OFF

Solenoid Valve

ECS0061X

Solenoid valve	Resistance (Approx.)	Terminal number
Shift solenoid A	20 - 30Ω	2
Shift solenoid B	5 - 20Ω	1
Ovr. clutch sol.	20 - 30Ω	3
Line pres. sol.	2.5 - 5Ω	4
T/conv. clutch sol.	5 - 20Ω	5

A/T Fluid Temperature Sensor

ECS0061Y

Monitor Item	Condition	Specification (Approx.)	
A/T fluid temperature sensor	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]	1.5V ↓ 0.5V	2.5 kΩ ↓ 0.3 kΩ

Revolution Sensor

ECS0061Z

Condition	Judgement standard
When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function. *1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	Approximately 150 Hz
When vehicle not moving.	Under 1.3V or over 4.5V

Dropping Resistor

ECS00620

Resistance	10 - 15Ω

TROUBLE DIAGNOSIS - INDEX

PFP:00000

Alphabetical & P No. Index for DTC

ECS00621

ALPHABETICAL INDEX FOR DTC

Items (CONSULT-II screen terms)	DTC	Reference page
	CONSULT-II GST*1	
A/T 1ST GR FNCTN	P0731	AT-508
A/T 2ND GR FNCTN	P0732	AT-513
A/T 3RD GR FNCTN	P0733	AT-518
A/T 4TH GR FNCTN	P0734	AT-523
A/T TCC S/V FNCTN	P0744	AT-535
ATF TEMP SEN/CIRC	P0710	AT-493
ENGINE SPEED SIG	P0725	AT-504
L/PRESS SOL/CIRC	P0745	AT-543
O/R CLTCH SOL/CIRC	P1760	AT-564
PNP SW/CIRC	P0705	AT-487
SFT SOL A/CIRC*2	P0750	AT-549
SFT SOL B/CIRC*2	P0755	AT-554
TCC SOLENOID/CIRC	P0740	AT-530
TP SEN/CIRC A/T*2	P1705	AT-559
VEH SPD SEN/CIR AT*3	P0720	AT-499
CAN COMM CIRCUIT	U1000	AT-586

*1: These numbers are prescribed by SAE J2012.
*2: When the fail-safe operation occurs, the MIL illuminates.
*3: The MIL illuminates when both the “Revolution sensor signal” and the “Vehicle speed sensor signal” meet the fail-safe condition at the same time.

P NO. INDEX FOR DTC

DTC CONSULT-II GST*1	Items (CONSULT-II screen terms)	Reference page
P0705	PNP SW/CIRC	AT-487
P0710	ATF TEMP SEN/CIRC	AT-493
P0720	VEH SPD SEN/CIR AT*3	AT-499
P0725	ENGINE SPEED SIG	AT-504
P0731	A/T 1ST GR FNCTN	AT-508
P0732	A/T 2ND GR FNCTN	AT-513
P0733	A/T 3RD GR FNCTN	AT-518
P0734	A/T 4TH GR FNCTN	AT-523
P0740	TCC SOLENOID/CIRC	AT-530
P0744	A/T TCC S/V FNCTN	AT-535
P0745	L/PRESS SOL/CIRC	AT-543
P0750	SFT SOL A/CIRC*2	AT-549
P0755	SFT SOL B/CIRC*2	AT-554
P1705	TP SEN/CIRC A/T*2	AT-559
P1760	O/R CLTCH SOL/CIRC	AT-564
U1000	CAN COMM CIRCUIT	AT-586

*1: These numbers are prescribed by SAE J2012.
*2: When the fail-safe operation occurs, the MIL illuminates.
*3: The MIL illuminates when both the “Revolution sensor signal” and the “Vehicle speed sensor signal” meet the fail-safe condition at the same time.

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

ECS00622

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precautions for On Board Diagnostic (OBD) System of A/T and Engine

ECS00623

The ECM has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

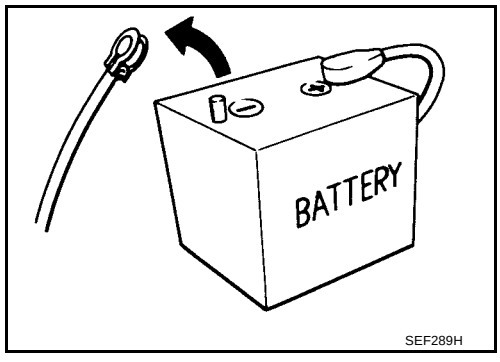
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the negative battery terminal before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MIL to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MIL to light up due to an open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Be sure to route and secure the harnesses properly after work. Interference of the harness with a bracket, etc. may cause the MIL to light up due to a short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MIL to light up due to a malfunction of the EGR system or fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the TCM or ECM before returning the vehicle to the customer.**

Precautions

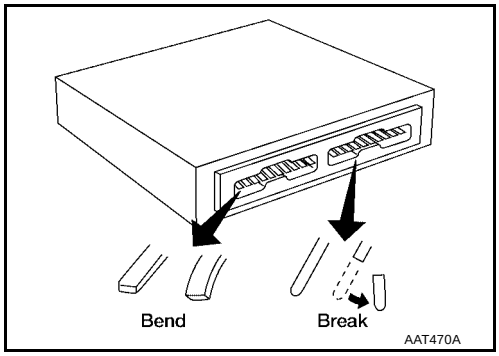
ECS00624

- **Before connecting or disconnecting the TCM harness connector, turn ignition switch OFF and disconnect negative battery terminal. Failure to do so may damage the TCM, because battery voltage is applied to TCM even if ignition switch is turned off.**

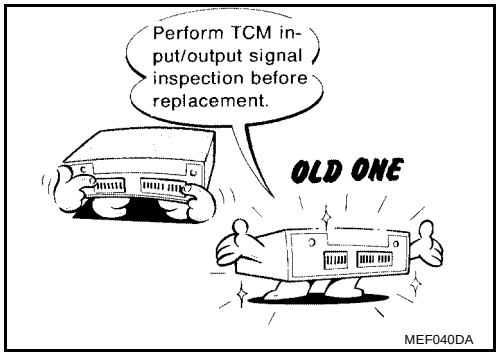


SEF289H

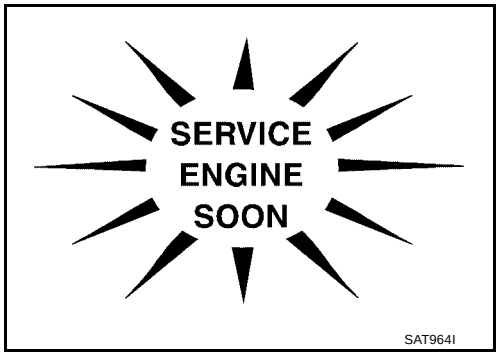
- **When connecting or disconnecting pin connectors into or from TCM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on TCM pin terminal, when connecting pin connectors.



- **Before replacing TCM, perform TCM input/output signal inspection and verify whether TCM functions properly or not. Refer to AT-419, "INPUT/OUTPUT SIGNAL OF TCM".**



- **After performing each TROUBLE DIAGNOSIS, perform "DTC (Diagnostic Trouble Code) CONFIRMATION PROCEDURE".**
  The DTC should not be displayed in the "DTC CONFIRMATION PROCEDURE" if the repair is completed.
- Before proceeding with disassembly, thoroughly clean the outside of the transaxle. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transaxle.



- Place disassembled parts in order for easier and proper assembly.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the transaxle is disassembled.
- It is very important to perform functional tests whenever they are indicated.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place disassembled valve body parts in order for easier and proper assembly. Care will also prevent springs and small parts from becoming scattered or lost.
- Properly installed valves, sleeves, plugs, etc. will slide along bores in valve body under their own weight.
- Before assembly, apply a coat of recommended ATF to all parts. Apply petroleum jelly to protect O-rings and seals, or hold bearings and washers in place during assembly. Do not use grease.
- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. Refer to AT-399, "ATF COOLER SERVICE" .
- After overhaul, refill the transaxle with new ATF.
- When the A/T drain plug is removed, only some of the fluid is drained. Old A/T fluid will remain in torque converter and ATF cooling system.
  Always follow the procedures when changing A/T fluid. Refer to MA-31, "Changing A/T Fluid" .

Service Notice or Precautions

ECS00625

FAIL-SAFE

The TCM has an electronic Fail-Safe (limp home mode). This allows the vehicle to be driven even if a major electrical input/output device circuit is damaged.
Under Fail-Safe, the vehicle always runs in third gear, even with a shift lever position of 1, 2 or D. The customer may complain of sluggish or poor acceleration.
When the ignition key is turned ON following Fail-Safe operation, O/D OFF indicator lamp blinks for about 8 seconds. [Or, refer to AT-439, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)"].
The blinking of the O/D OFF indicator lamp for about 8 seconds will appear only once and be cleared. The customer may resume normal driving conditions.
Always follow the “Work Flow”. Refer to AT-447, "Work Flow" .
The SELF-DIAGNOSIS results will be as follows:

- The first SELF-DIAGNOSIS will indicate damage to the vehicle speed sensor or the revolution sensor.
- During the next SELF-DIAGNOSIS, performed after checking the sensor, no damages will be indicated.

TORQUE CONVERTER SERVICE

The torque converter should be replaced under any of the following conditions:

- External leaks in the hub weld area.
- Converter hub is scored or damaged.
- Converter pilot is broken, damaged or fits poorly into crankshaft.
- Steel particles are found after flushing the cooler and cooler lines.
- Pump is damaged or steel particles are found in the converter.
- Vehicle has TCC shudder and/or no TCC apply. Replace only after all hydraulic and electrical diagnoses have been made. (Converter clutch material may be glazed.)
- Converter is contaminated with engine coolant containing antifreeze.
- Internal failure of stator roller clutch.
- Heavy clutch debris due to overheating (blue converter).
- Steel particles or clutch lining material found in fluid filter or on magnet when no internal parts in unit are worn or damaged — indicates that lining material came from converter.
  The torque converter should not be replaced if:
- The fluid has an odor, is discolored, and there is no evidence of metal or clutch facing particles.
- The threads in one or more of the converter bolt holes are damaged.
- Transaxle failure did not display evidence of damaged or worn internal parts, steel particles or clutch plate lining material in unit and inside the fluid filter.
- Vehicle has been exposed to high mileage (only). The exception may be where the torque converter clutch dampener plate lining has seen excess wear by vehicles operated in heavy and/or constant traffic, such as taxi, delivery or police use.

ATF COOLER SERVICE

If A/T fluid contains frictional material (clutches, bands, etc.), replace radiator and flush cooler line using cleaning solvent and compressed air after repair of A/T. Refer to CO-32, "RADIATOR" .

OBD-II SELF-DIAGNOSIS

- A/T self-diagnosis is performed by the TCM in combination with the ECM. The results can be read through the blinking pattern of the O/D OFF indicator or the malfunction indicator lamp (MIL). Refer to the table on AT-431 for the indicator used to display each self-diagnostic result.
- The self-diagnostic results indicated by the MIL are automatically stored in both the ECM and TCM memories.
  Always perform the procedure “HOW TO ERASE DTC” on AT-428 to complete the repair and avoid unnecessary blinking of the MIL.
- The following self-diagnostic items can be detected using ECM self-diagnostic results mode* only when the O/D OFF indicator lamp does not indicate any malfunctions.

– park/neutral position (PNP) switch
*: For details of OBD-II, refer to EC-696, "ON BOARD DIAGNOSTIC (OBD) SYSTEM" .

- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector.**

For description and how to disconnect, refer to GI-23, "How to Check Terminal" .

Wiring Diagrams and Trouble Diagnosis

ECS00626

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams"
- PG-3, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident"

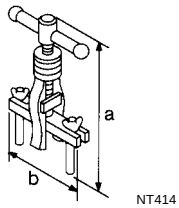
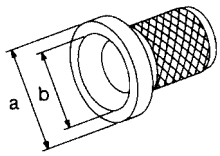
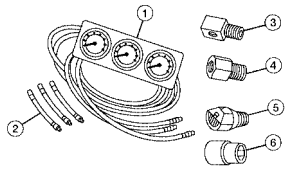
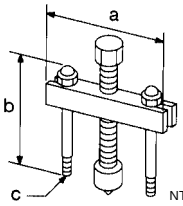
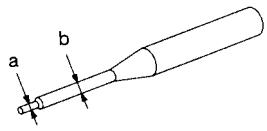
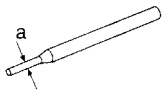
PREPARATION

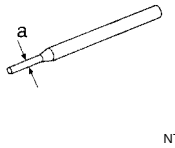
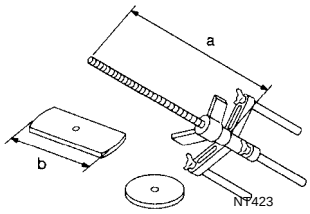
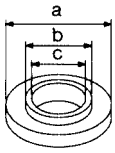
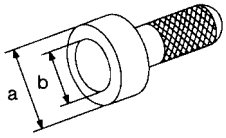
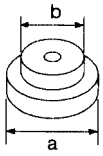
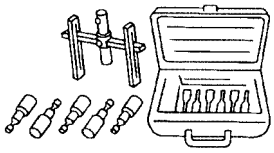
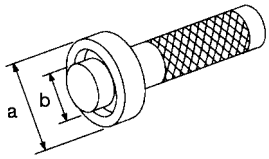
PFP:00002

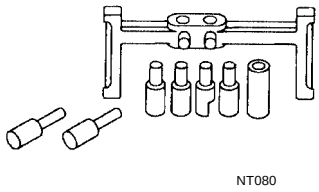
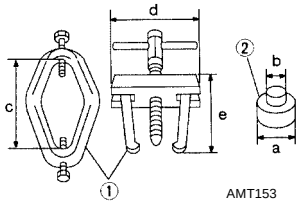
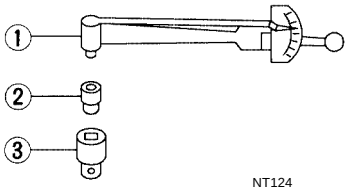
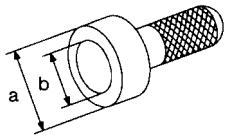
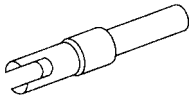
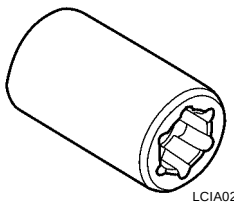
Special Service Tools

ECS00627

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

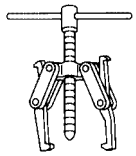
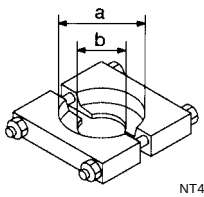
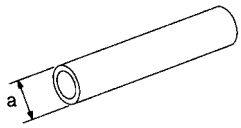
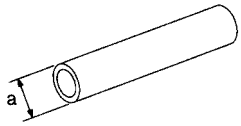
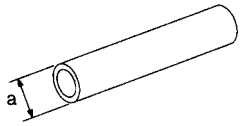
Tool number (Kent-Moore No.) Tool name	Description
KV381054S0 (J-34286) Puller  NT414	● Removing differential side oil seals ● Removing differential side bearing outer race ● Removing idler gear bearing outer race **a: 250 mm (9.84 in)** **b: 160 mm (6.30 in)**
ST33400001 (J-26082) Drift  NT086	● Installing differential side oil seal F04B and F04W (RH side) ● Installing oil seal on oil pump housing **a: 60 mm (2.36 in) dia.** **b: 47 mm (1.85 in) dia.**
(J-34301-C) Oil pressure gauge set 1 (J-34301-1) Oil pressure gauge 2 (J-34301-2) Hoses 3 (J-34298) Adapter 4 (J-34282-2) Adapter 5 (790-301-1230-A) 60° Adapter 6 (J-34301-15) Square socket  AAT896	● Measuring line pressure
ST27180001 (J-25726-A) Puller  NT424	● Removing idler gear **a: 100 mm (3.94 in)** **b: 110 mm (4.33 in)** **c: M8 x 1.25P**
ST23540000 (J-25689-A) Pin punch  NT442	● Removing and installing parking rod plate and manual plate pins **a: 2.3 mm (0.091 in) dia.** **b: 4 mm (0.16 in) dia.**
ST25710000 (J-25689-A) Pin punch  NT410	● Aligning groove of manual shaft and hole of transmission case **a: 2 mm (0.08 in) dia.**

Tool number (Kent-Moore No.) Tool name	Description
KV32101000 (J-25689-A) Pin punch  NT410	● Removing and installing manual shaft retaining pin ● Removing and installing pinion mate shaft lock pin **a: 4 mm (0.16 in) dia.**
KV31102400 (J-34285 and J-34285-87) Clutch spring compressor  NT423	● Removing and installing clutch return springs ● Installing low and reverse brake piston **a: 320 mm (12.60 in)** **b: 174 mm (6.85 in)**
KV40100630 (J-26092) Drift  NT107	● Installing reduction gear bearing inner race ● Installing idler gear bearing inner race **a: 67.5 mm (2.657 in) dia.** **b: 44 mm (1.73 in) dia.** **c: 38.5 mm (1.516 in) dia.**
ST30720000 (J-25405 and J-34331) Bearing installer  NT115	● Installing idler gear bearing outer race **a: 77 mm (3.03 in) dia.** **b: 55.5 mm (2.185 in) dia.**
ST35321000 (—) Drift  NT073	● Installing output shaft bearing **a: 49 mm (1.93 in) dia.** **b: 41 mm (1.61 in) dia.**
— (J-34291-A) Shim setting gauge set  NT101	● Selecting oil pump cover bearing race and oil pump thrust washer ● Selecting side gear thrust washer
ST33230000 (J25805-01) Drift  NT084	● Installing differential side bearing inner race (RH side) **a: 51 mm (2.01 in) dia.** **b: 28.5 mm (1.122 in) dia.**

Tool number (Kent-Moore No.) Tool name	Description
(J-34290) Shim selecting tool set  NT080	● Selecting differential side bearing adjusting shim
ST3306S001 (J-22888-D) Differential side bearing puller set 1 ST33051001 (J-22888-D) Puller 2 ST33061000 (J-8107-2) Adapter  AMT153	● Removing differential side bearing inner race **a: 38 mm (1.50 in) dia.** **b: 28.5 mm (1.122 in) dia.** **c: 130 mm (5.12 in)** **d: 135 mm (5.31 in)** **e: 100 mm (3.94 in)**
ST3127S000 (J-25765-A) Preload gauge 1 GG91030000 (J-25765-A) Torque wrench 2 HT62940000 (—) Socket adapter 3 HT62900000 (—) Socket adapter  NT124	● Checking differential side bearing preload
ST35271000 (J-26091) Drift  NT115	● Installing idler gear **a: 72 mm (2.83 in) dia.** **b: 63 mm (2.48 in) dia.**
— (J-39713) Preload adapter  NT087	● Selecting differential side bearing adjusting shim ● Checking differential side bearing preload
— J-45816 E20 TORX socket  LCIA0258E	● Removing flex plate bolts on vehicles equipped with QR25DE engines

Commercial Service Tools

ECS00628

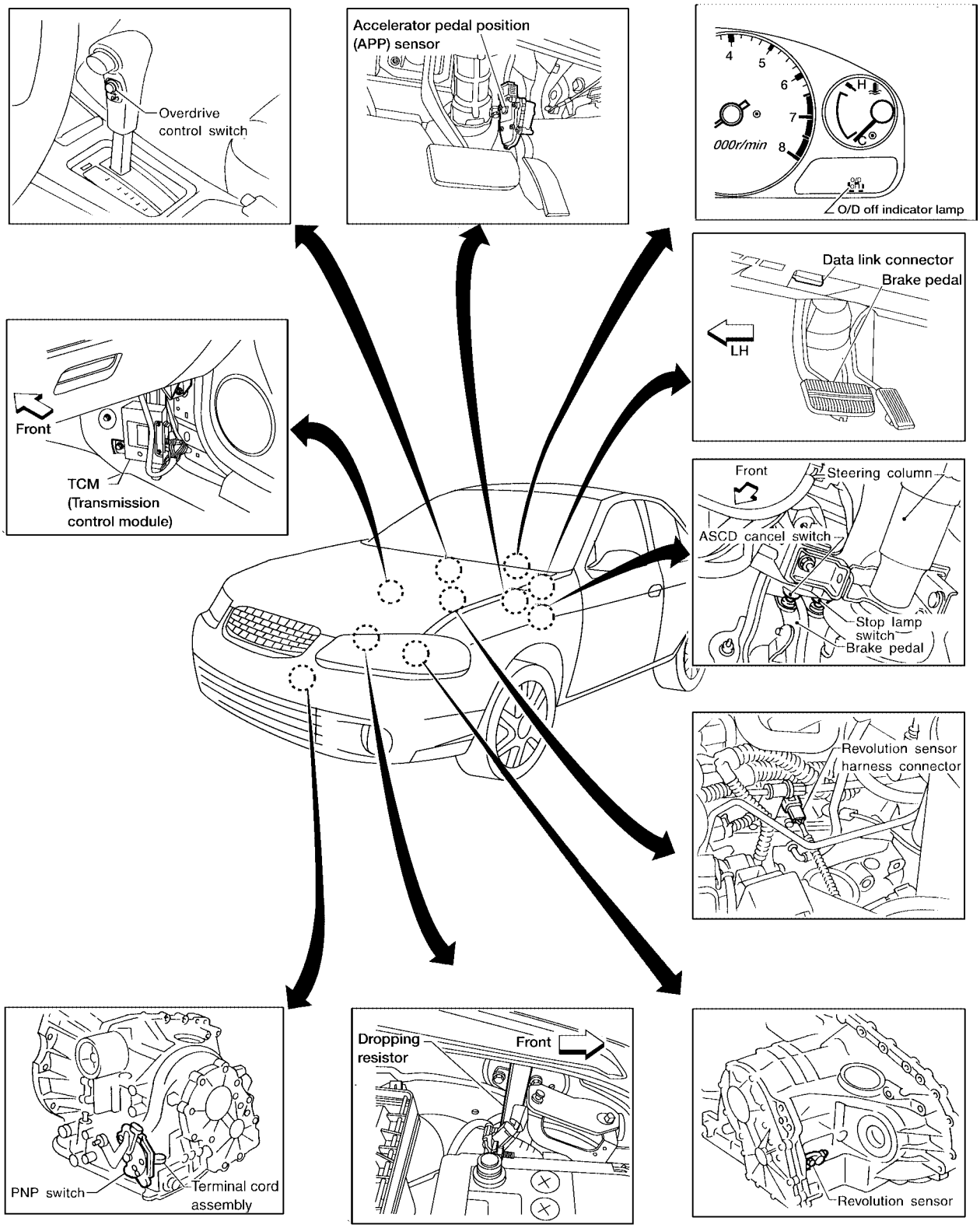
Tool name	Description
Puller  NT077	● Removing idler gear bearing inner race ● Removing and installing band servo piston snap ring
Puller  NT411	● Removing reduction gear bearing inner race **a: 60 mm (2.36 in) dia.** **b: 35 mm (1.38 in) dia.**
Drift  NT083	● Installing needle bearing on bearing retainer **a: 36 mm (1.42 in) dia.**
Drift  NT083	● Removing needle bearing from bearing retainer **a: 33.5 mm (1.319 in) dia.**
Drift  NT083	● Installing differential side bearing outer race (RH side) **a: 75 mm (2.95 in) dia.**

OVERALL SYSTEM

PFP:00000

A/T Electrical Parts Location

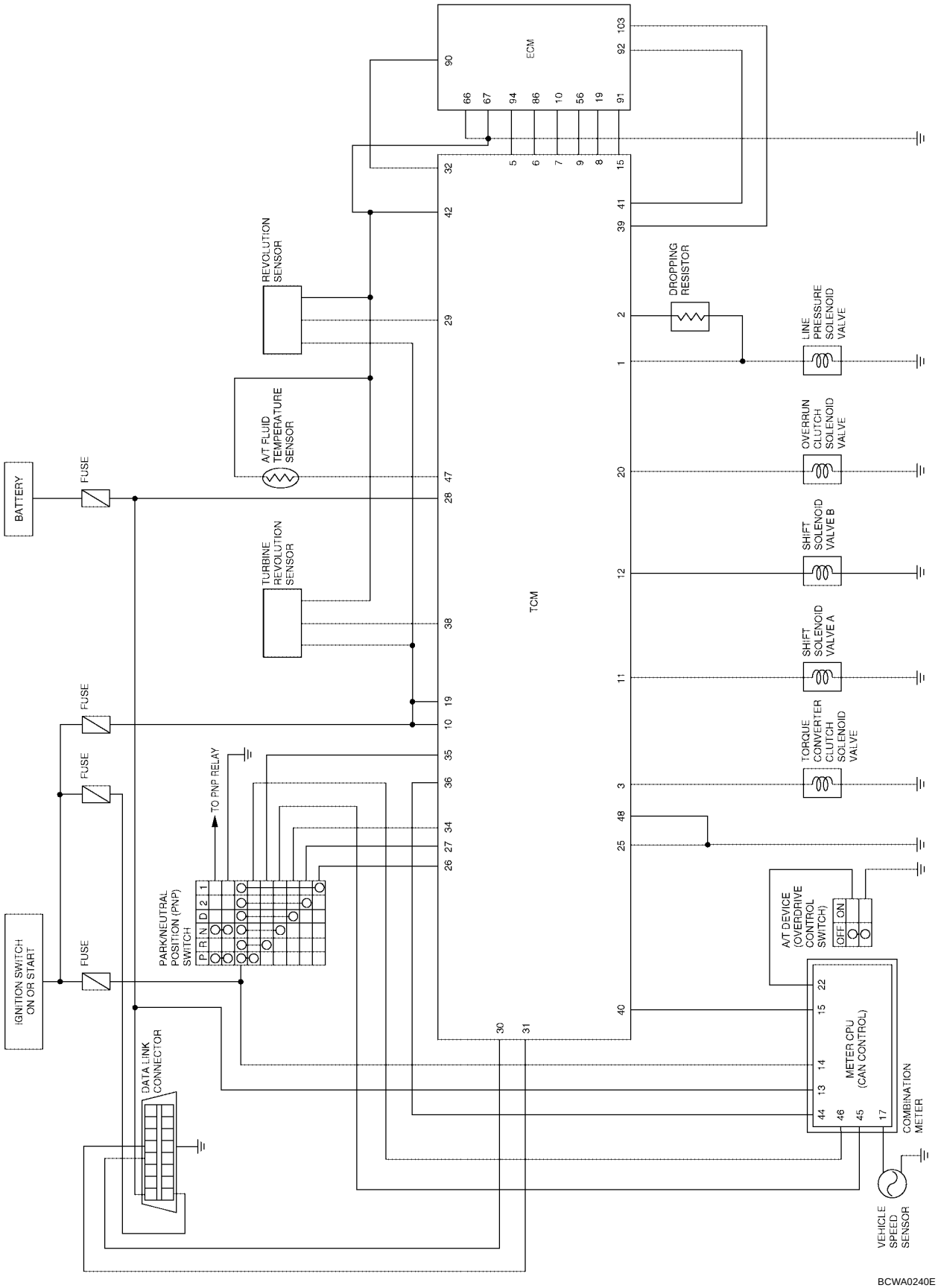
ECS00629



WCIA0131E

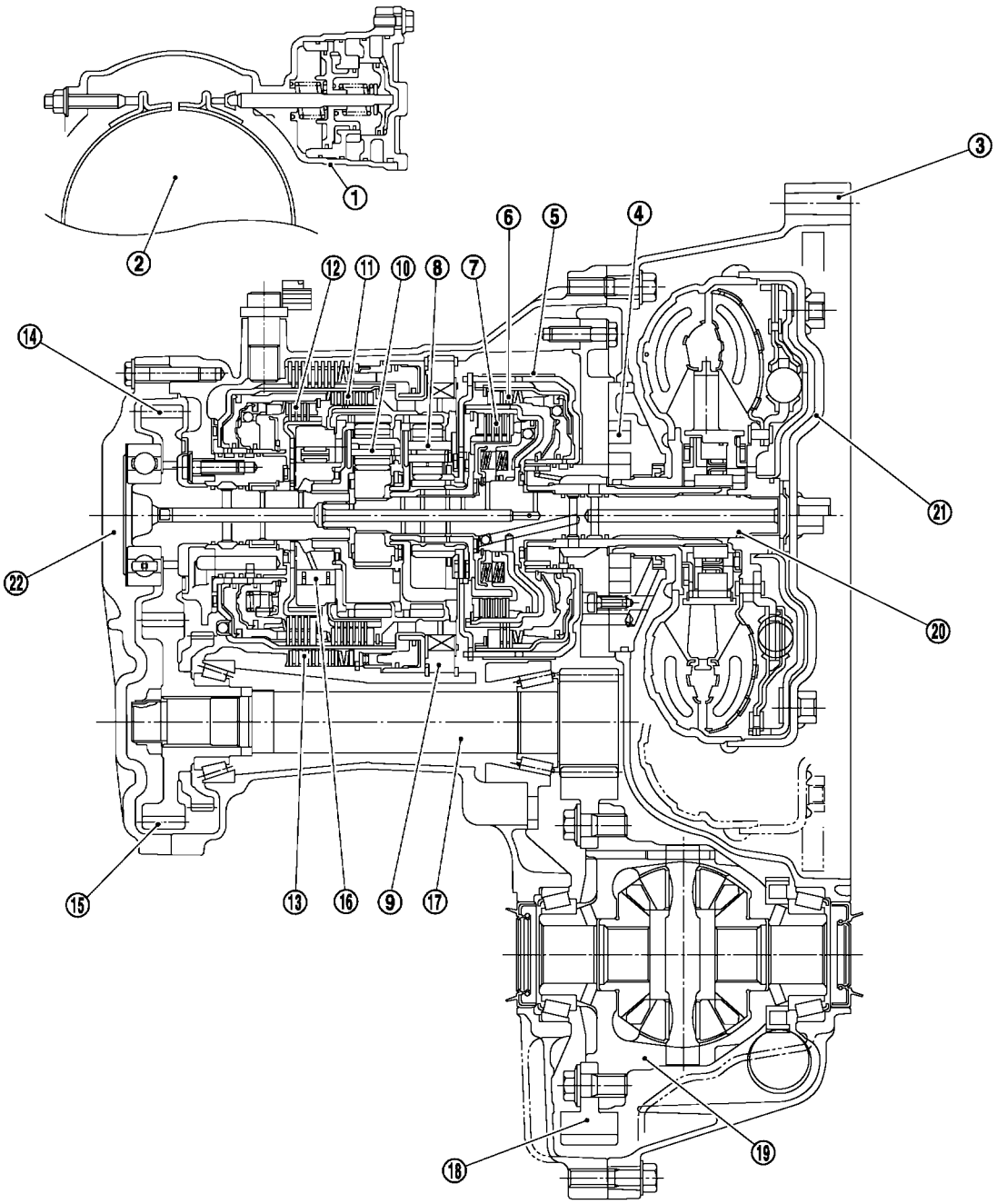
Circuit Diagram

ECS0062A



Cross-sectional View

ECS0062B

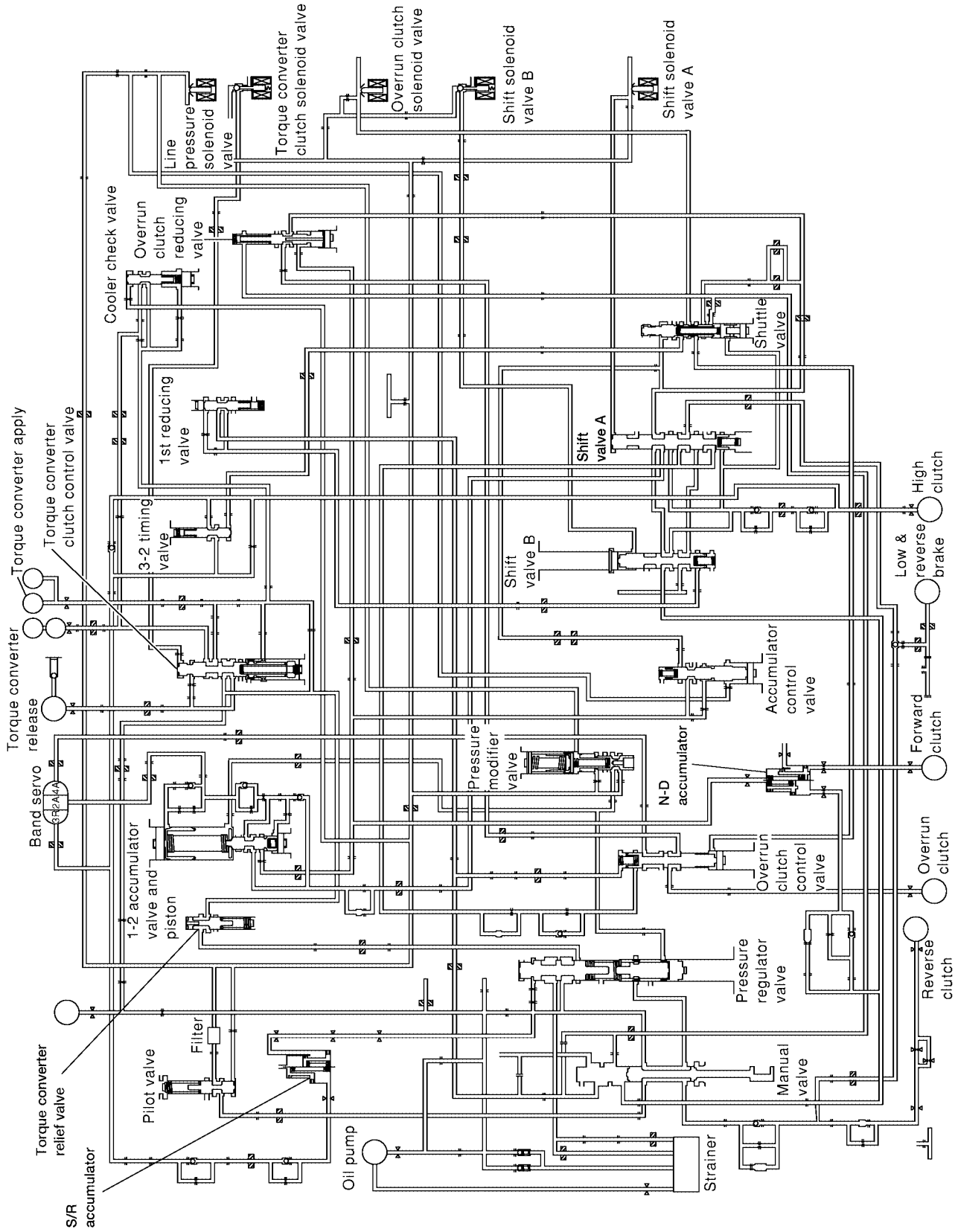


SAT488K

1. Band servo piston
2. Reverse clutch drum
3. Converter housing
4. Oil pump
5. Brake band
6. Reverse clutch
7. High clutch
8. Front planetary gear
9. Low one-way clutch
10. Rear planetary gear
11. Forward clutch
12. Overrun clutch
13. Low & reverse brake
14. Output gear
15. Idler gear
16. Forward one-way clutch
17. Pinion reduction gear
18. Final gear
19. Differential case
20. Input shaft
21. Torque converter
22. Side cover

Hydraulic Control Circuit

ECS0062C

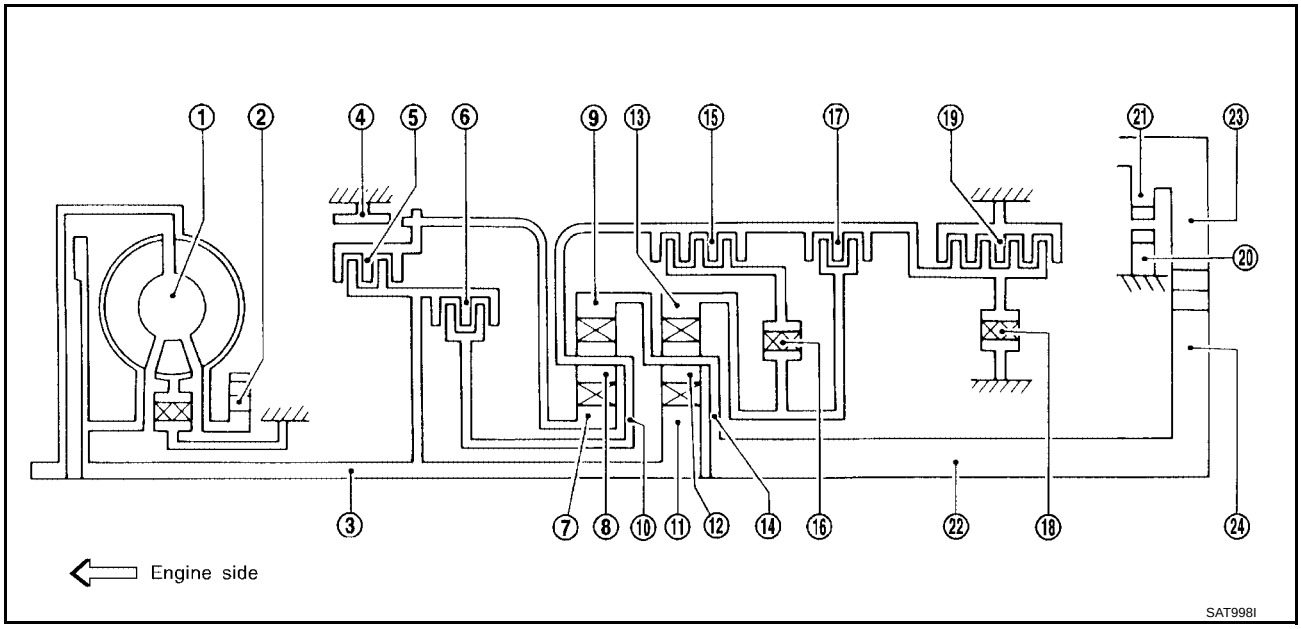


LCIA0040E

Shift Mechanism

ECS0062D

CONSTRUCTION



1. Torque converter	2. Oil pump	3. Input shaft
4. Brake band	5. Reverse clutch	6. High clutch
7. Front sun gear	8. Front pinion gear	9. Front internal gear
10. Front planetary carrier	11. Rear sun gear	12. Rear pinion gear
13. Rear internal gear	14. Rear planetary carrier	15. Forward clutch
16. Forward one-way clutch	17. Overrun clutch	18. Low one-way clutch
19. Low & reverse brake	20. Parking pawl	21. Parking gear
22. Output shaft	23. Idle gear	24. Output gear

FUNCTION OF CLUTCH AND BRAKE

Clutch and brake components	Abbr.	Function
Reverse clutch **5**	R/C	To transmit input power to front sun gear **7** .
High clutch **6**	H/C	To transmit input power to front planetary carrier **10** .
Forward clutch **15**	F/C	To connect front planetary carrier **10** with forward one-way clutch **16** .
Overrun clutch **17**	O/C	To connect front planetary carrier **10** with rear internal gear **13** .
Brake band **4**	B/B	To lock front sun gear **7** .
Forward one-way clutch **16**	F/O.C	When forward clutch **15** is engaged, to stop rear internal gear **13** from rotating in opposite direction against engine revolution.
Low one-way clutch **18**	L/O.C	To stop front planetary carrier **10** from rotating in opposite direction against engine revolution.
Low & reverse brake **19**	L & R/B	To lock front planetary carrier **10** .

CLUTCH AND BAND CHART

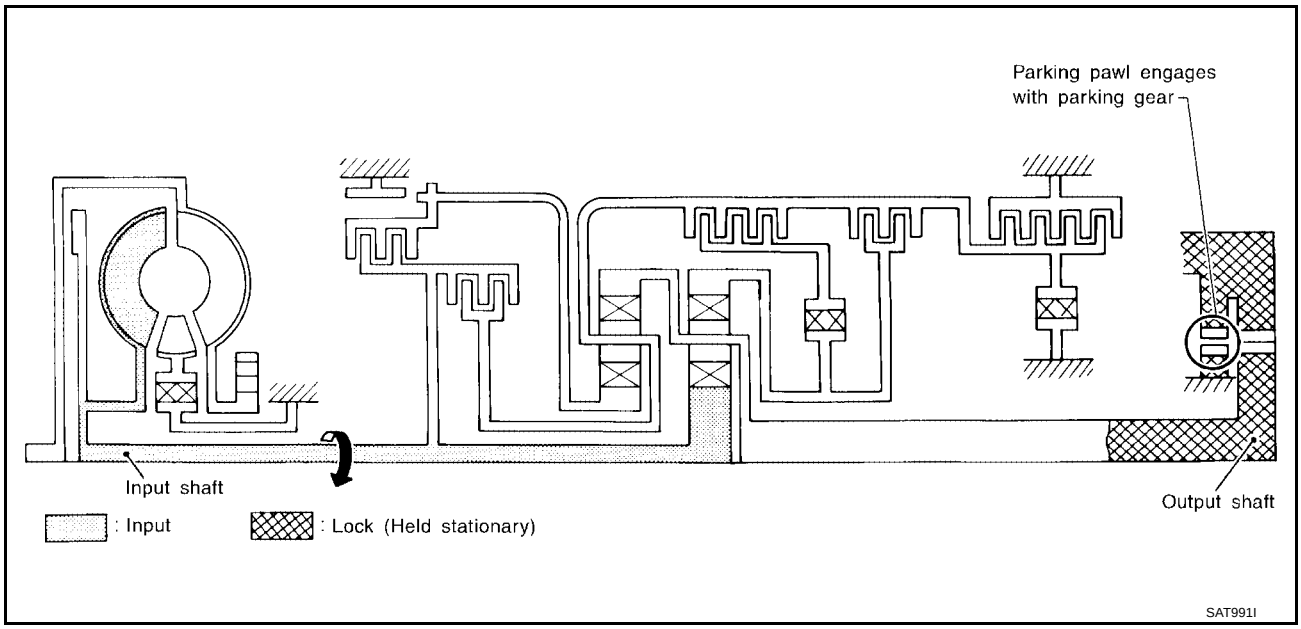
Shift position		Reverse clutch **5**	High clutch **6**	For-ward clutch **15**	Over-run clutch **17**	Band servo			For-ward one-way clutch **16**	Low one-way clutch **18**	Low & reverse brake **19**	Lock-up	Remarks
						2nd apply	3rd release	4th apply					
P													PARK POSITION
R		O									O		REVERSE POSITION
N													NEUTRAL POSITION
D*4	1st			O	*1 D				B	B			Automatic shift 1 ⇔ 2 ⇔ 3 ⇔ 4
	2nd			O	*1 A	O			B				
	3rd		O	O	*1 A	*2 C	C		B			*4 O	
	4th		O	C		*3 C	C	O	B			O	
2	1st			O	O				B	B			Automatic shift 1 ⇔ 2 ⇐ 3
	2nd			O	O	O			B				
	3rd			O	O				B				
1	1st			O	O				B		O		Locks (held stationary) in 1st speed 1 ⇐ 2 ⇐ 3
	2nd			O	O	O			B				
	3rd			O	O	*2 C			B				

*1: Operates when overdrive control switch is set in OFF position.
*2: Oil pressure is applied to both 2nd “apply” side and 3rd “release” side of band servo piston. However, brake band does not contract because oil pressure area on the “release” side is greater than that on the “apply” side.
*3: Oil pressure is applied to 4th “apply” side in condition *2 above, and brake band contracts.
*4: A/T will not shift to 4th when overdrive control switch is set in OFF position.
O: Operates
A: Operates when throttle opening is less than 3/16, activating engine brake.
B: Operates during “progressive” acceleration.
C: Operates but does not affect power transmission.
D: Operates when throttle opening is less than 3/16, but does not affect engine brake.

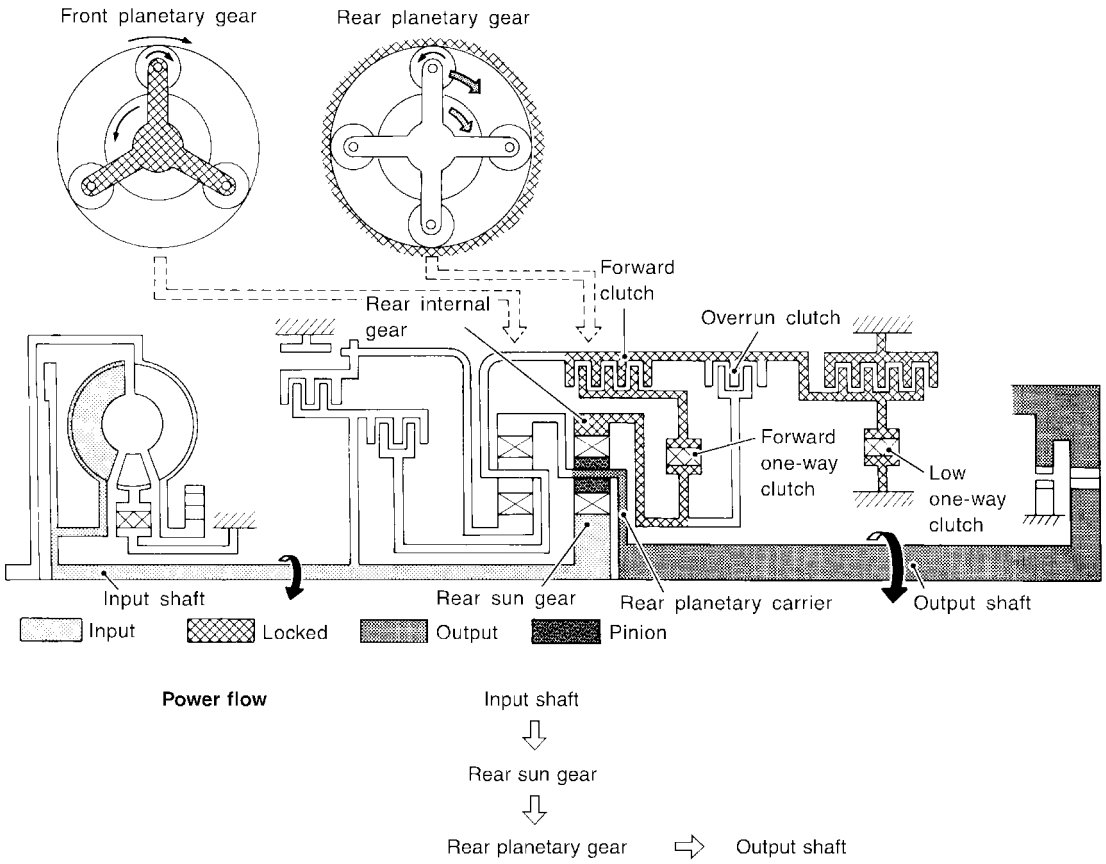
POWER TRANSMISSION

P and N Positions

- P position
  Similar to the N position, the clutches do not operate. The parking pawl engages with the parking gear to mechanically hold the output shaft so that the powertrain is locked.
- N position
  Power from the input shaft is not transmitted to the output shaft because the clutches do not operate.

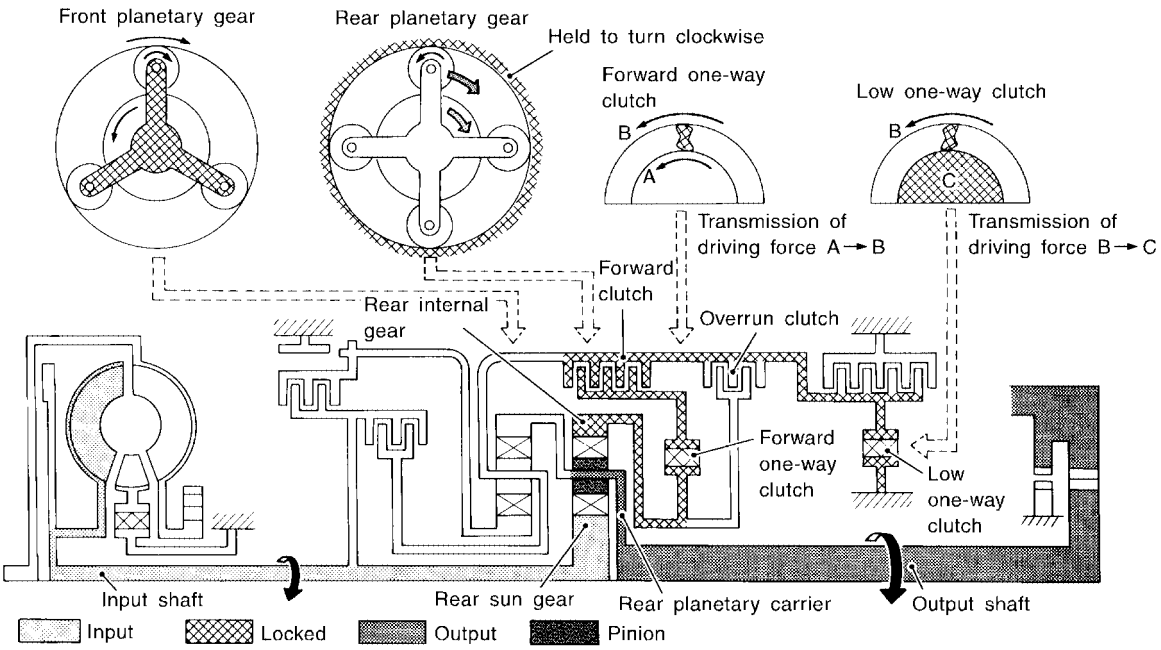


11 Position



● **Forward clutch** ● **Forward one-way clutch** ● **Overrun clutch** ● **Low and reverse brake**	As overrun clutch engages, rear internal gear is locked by the operation of low and reverse brake. This is different from that of D_1 and 2_1 .
Engine brake	Overrun clutch always engages, therefore engine brake can be obtained when decelerating.

D1 and 21 Positions



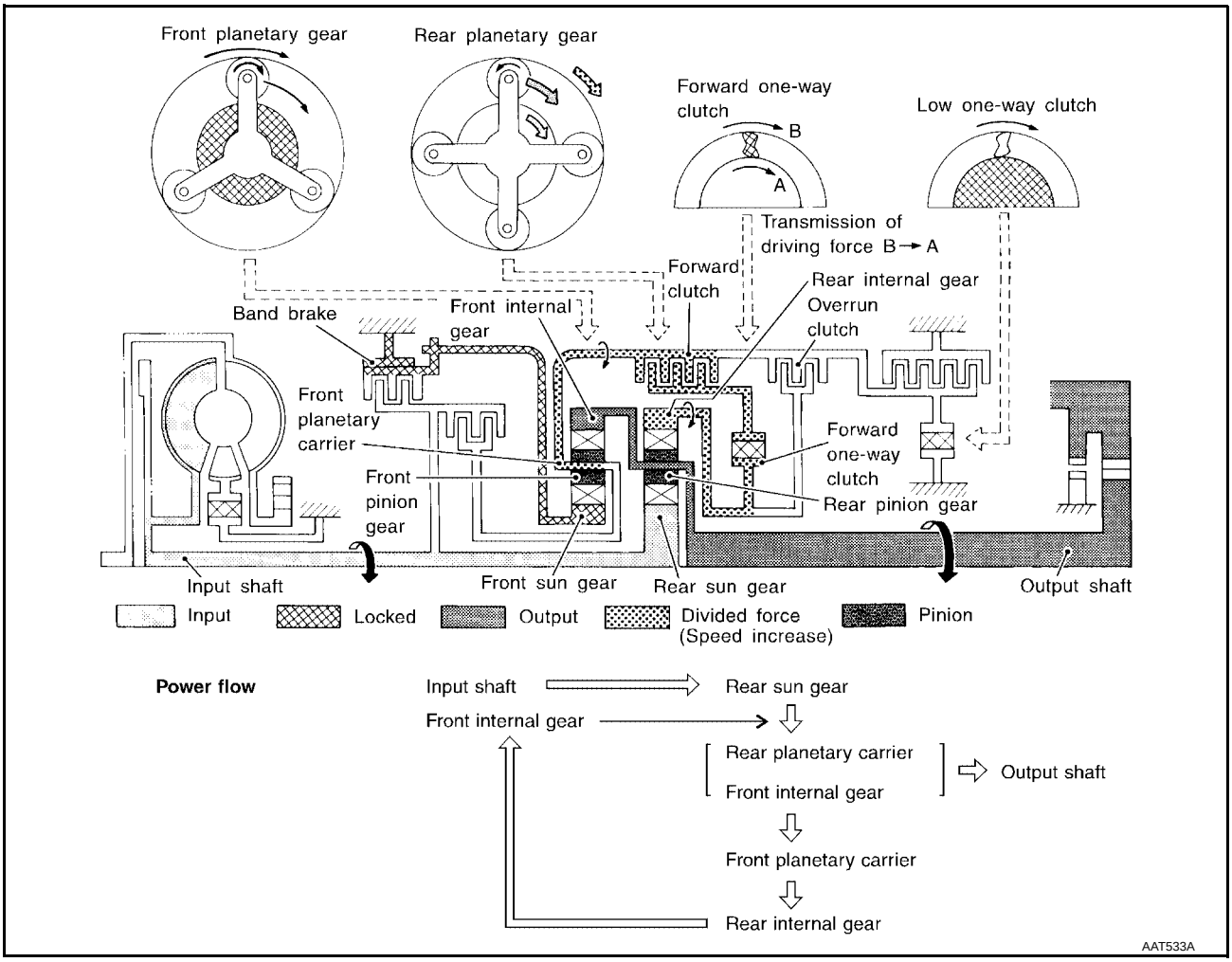
Power flow

Input shaft
⇩
Rear sun gear
⇩
Rear pinion gear
⇩
Rear planetary carrier → Output shaft

AAT532A

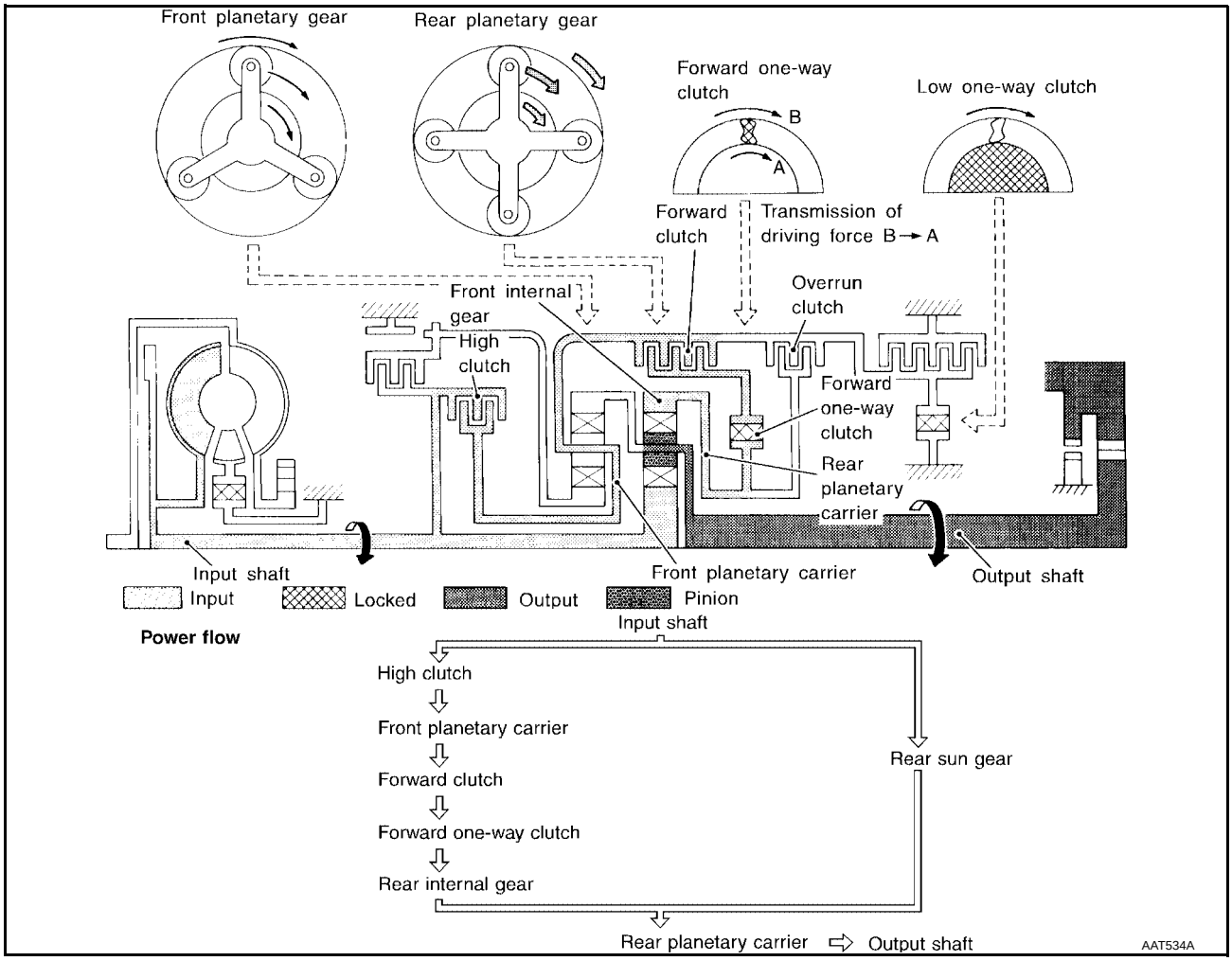
● **Forward one-way clutch** ● **Forward clutch** ● **Low one-way clutch**	Rear internal gear is locked to rotate counterclockwise because of the functioning of these three clutches.
Overrun clutch engagement conditions (Engine brake)	D1 : Overdrive control switch OFF and throttle opening is less than 3/16 21 : Always engaged At D1 and 21 positions, engine brake is not activated due to free turning of low one-way clutch.

D2 , 32 , 22 and 12 Positions



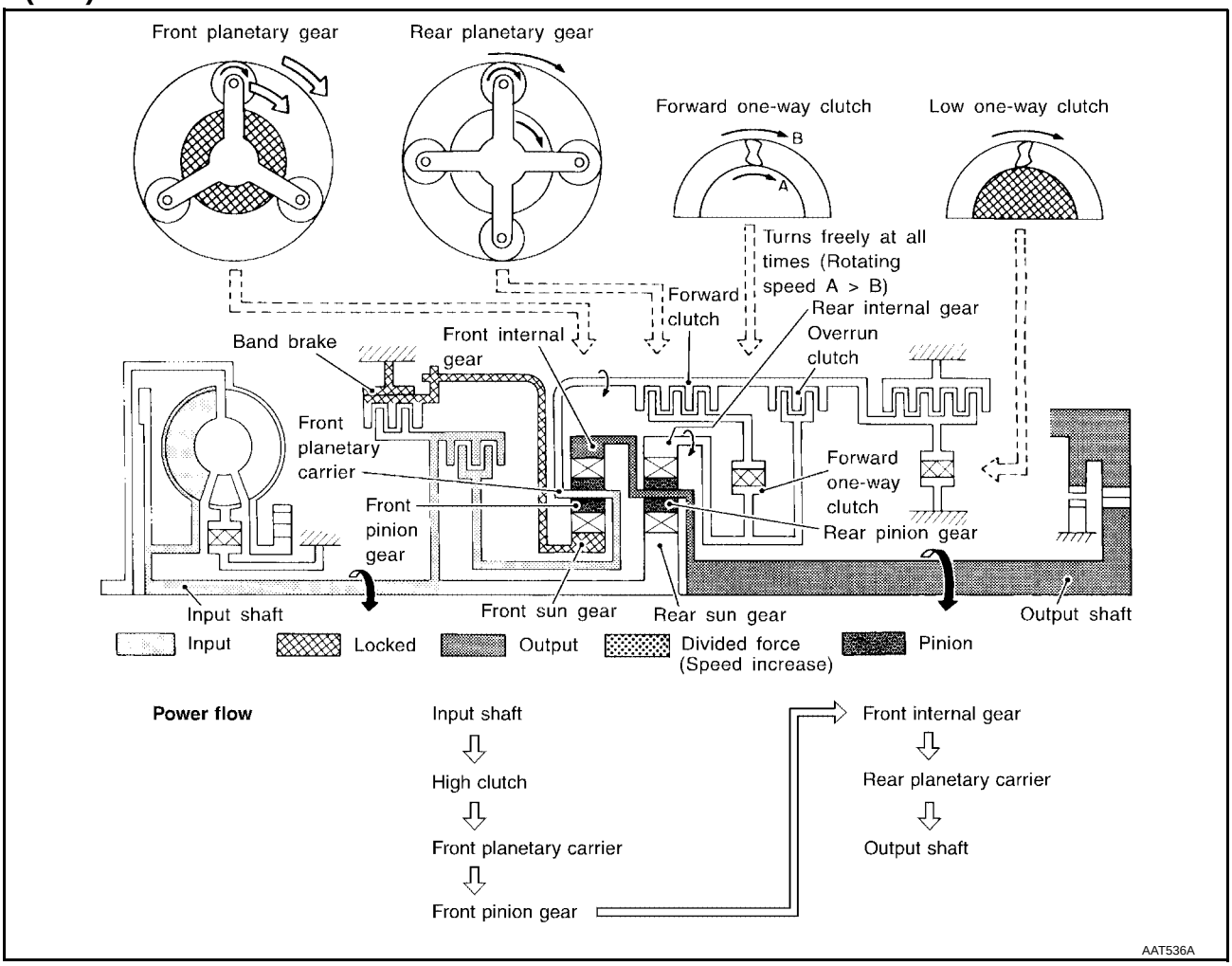
● **Forward clutch** ● **Forward one-way clutch** ● **Brake band**	Rear sun gear drives rear planetary carrier and combined front internal gear. Front internal gear now rotates around front sun gear accompanying front planetary carrier. As front planetary carrier transfers the power to rear internal gear through forward clutch and forward one-way clutch, this rotation of rear internal gear increases the speed of rear planetary carrier compared with that of the 1st speed.
Overrun clutch engagement conditions	D2 : Overdrive control switch OFF and throttle opening is less than 3/16 22 and 12 : Always engaged

D3 and 33 Positions



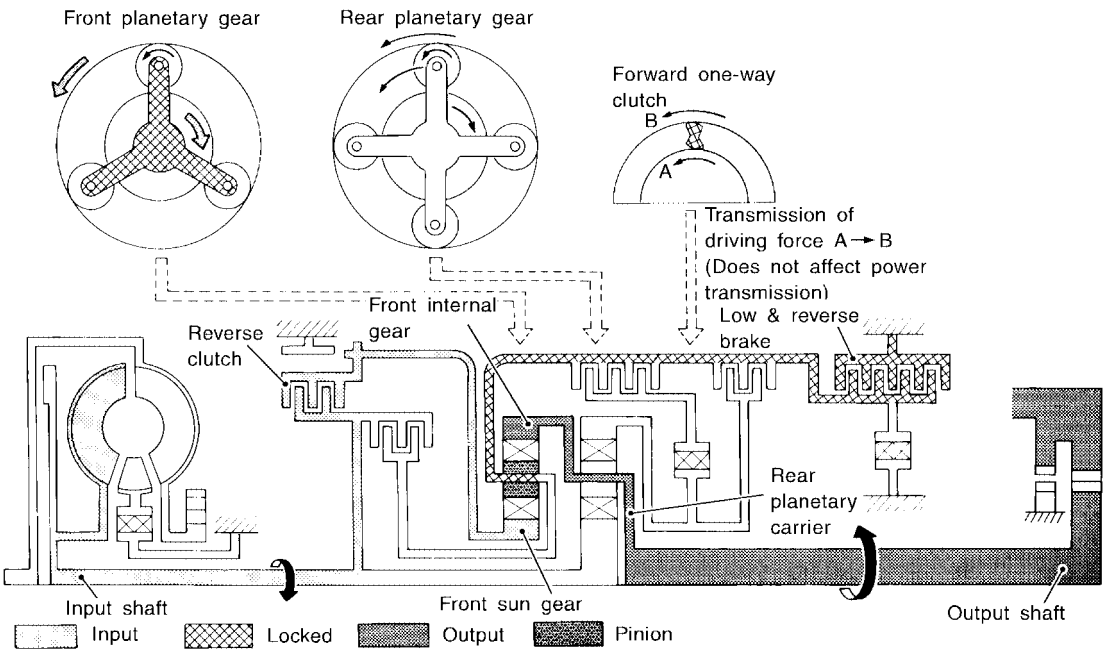
● **High clutch** ● **Forward clutch** ● **Forward one-way clutch**	Input power is transmitted to front planetary carrier through high clutch. And front planetary carrier is connected to rear internal gear by operation of forward clutch and forward one-way clutch. This rear internal gear rotation and another input (the rear sun gear) accompany rear planetary carrier to turn at the same speed.
Overrun clutch engagement conditions	D3 : Overdrive control switch OFF and throttle opening is less than 3/16

D4 (O/D) Position



● **High clutch** ● **Brake band** ● **Forward clutch** (Does not affect power transmission)	Input power is transmitted to front carrier through high clutch. This front carrier turns around the sun gear which is fixed by brake band and makes front internal gear (output) turn faster.
Engine brake	At D4 position, there is no one-way clutch in the power transmission line and engine brake can be obtained when decelerating.

R Position



Power flow

Input shaft
⇩
Reverse clutch
⇩
Front pinion gear ⇦ Front sun gear
⇩
Front internal gear ⇨ Output shaft

AAT535A

● **Reverse clutch** ● **Low and reverse brake**	Front planetary carrier is stationary because of the operation of low and reverse brake. Input power is transmitted to front sun gear through reverse clutch, which drives front internal gear in the opposite direction.
Engine brake	As there is no one-way clutch in the power transmission line, engine brake can be obtained when decelerating.

Control System

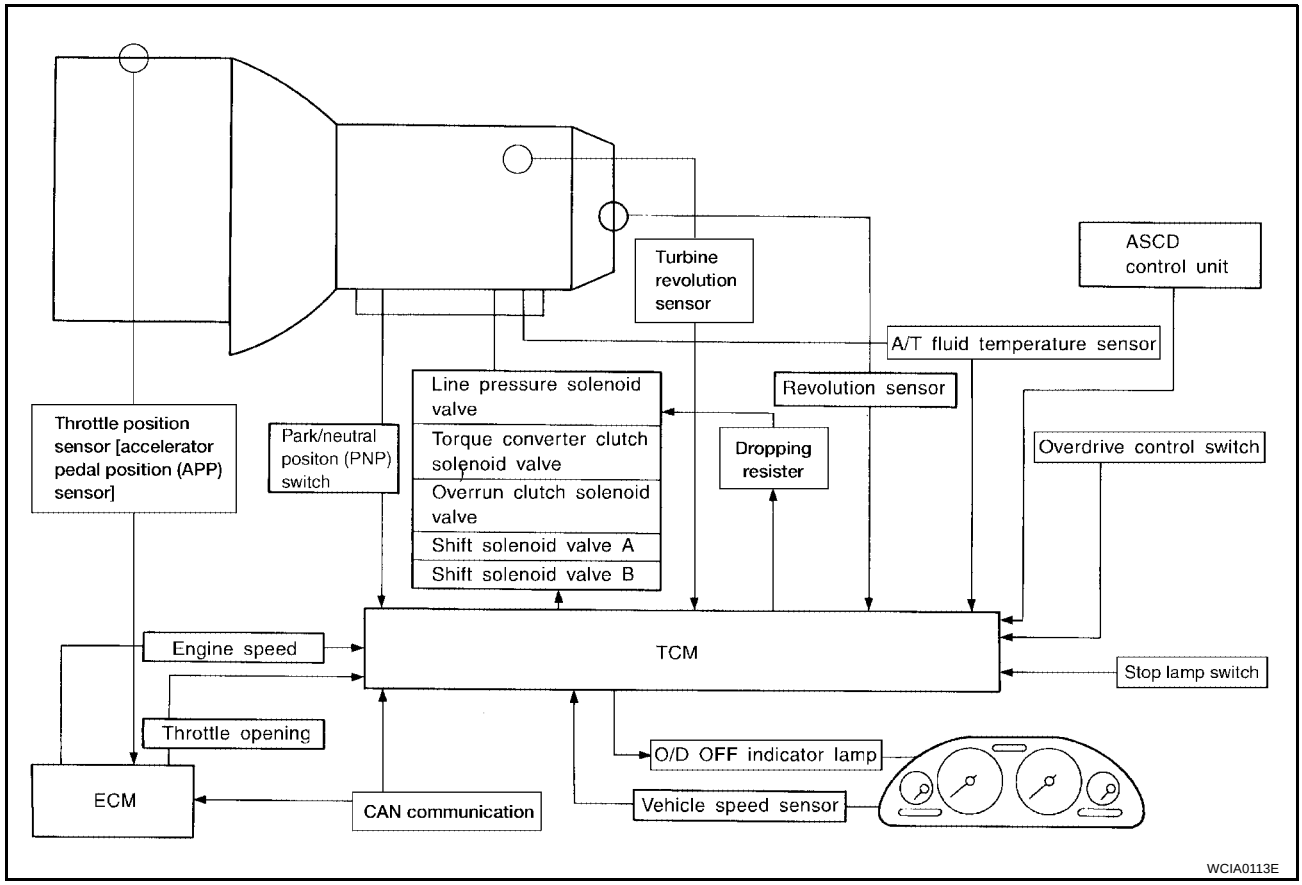
ECS0062E

OUTLINE

The automatic transaxle senses vehicle operating conditions through various sensors. It always controls the optimum shift position and reduces shifting and lock-up shocks.

SENSORS		TCM		ACTUATORS
Park/neutral position (PNP) switch Throttle position sensor [accelerator pedal position (APP) sensor] Engine speed signal A/T fluid temperature sensor Revolution sensor Vehicle speed sensor Overdrive control switch ASCD control unit Stop lamp switch Turbine revolution sensor	▶	Shift control Line pressure control Lock-up control Overrun clutch control Timing control Fail-safe control Self-diagnosis CONSULT-II communication line control	▶	Shift solenoid valve A Shift solenoid valve B Overrun clutch solenoid valve Torque converter clutch solenoid valve Line pressure solenoid valve O/D OFF indicator lamp

CONTROL SYSTEM



TCM FUNCTION

The function of the TCM is to:

- Receive input signals sent from various switches and sensors.
- Determine required line pressure, shifting point, lock-up operation, and engine brake operation.
- Send required output signals to the respective solenoids.

INPUT/OUTPUT SIGNAL OF TCM

	Sensors and solenoid valves	Function
Input	Park/neutral position (PNP) switch	Detects select lever position and sends a signal to TCM.
	Throttle position sensor [accelerator pedal position (APP) sensor]	Detects accelerator pedal position and requested throttle opening and sends a signal to TCM.
	Engine speed signal	Receives signal from ECM and controls lock-up control solenoid valve.
	A/T fluid temperature sensor	Detects transmission fluid temperature and sends a signal to TCM.
	Revolution sensor	Detects output shaft rpm and sends a signal to TCM.
	Vehicle speed sensor	Used as an auxiliary vehicle speed sensor. Sends a signal which is used if revolution sensor (installed on transmission) malfunctions.
	Overdrive control switch	Sends a signal to the TCM which prohibits a shift to D_4 (overdrive) position.
	ASCD control unit	Sends the cruise signal and D_4 (overdrive) cancellation signal from ASCD control unit to TCM.
	Stop lamp switch	Send the lock-up release signal to the TCM at time of D_4 (lock-up).
	CAN communication	Control units are connected to two communication lines (CAN H and CAN L) allowing a high rate of information transmission.
Output	Shift solenoid valve A/B	Selects shifting point suited to driving conditions in relation to a signal sent from TCM.
	Line pressure solenoid valve	Regulates line pressure suited to driving conditions in relation to a signal sent from TCM.
	Torque converter clutch solenoid valve	Regulates lock-up pressure suited to driving conditions in relation to a signal sent from TCM.
	Overrun clutch solenoid valve	Controls an “engine brake” effect suited to driving conditions in relation to a signal sent from TCM.
	O/D OFF indicator lamp	Shows TCM faults, when A/T control components malfunction.
	CAN communication	Control units are connected to two communication lines (CAN H and CAN L) allowing a high rate of information transmission.

CAN Communication

ECS006H8

SYSTEM DESCRIPTION

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only. For details, refer to LAN-4, "CAN Communication Unit" .

Control Mechanism

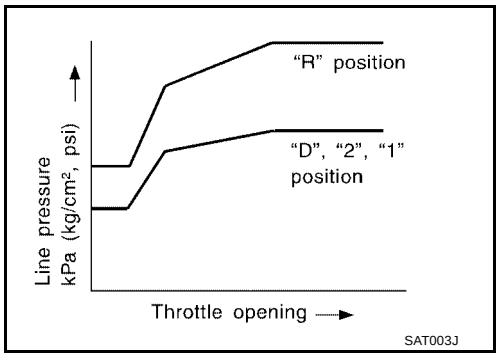
ECS0062F

LINE PRESSURE CONTROL

TCM has various line pressure control characteristics to meet the driving conditions.
An ON-OFF duty signal is sent to the line pressure solenoid valve based on TCM characteristics.
Hydraulic pressure on the clutch and brake is electronically controlled through the line pressure solenoid valve to accommodate engine torque. This results in smooth shift operation.

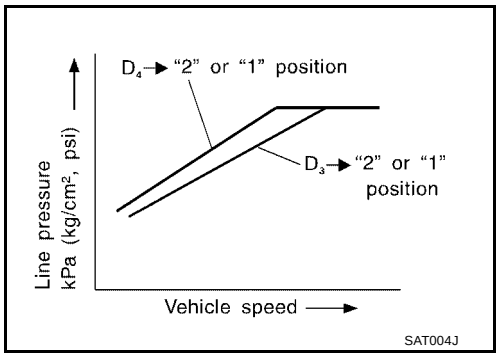
Normal Control

The line pressure to throttle opening characteristics is set for suitable clutch operation.



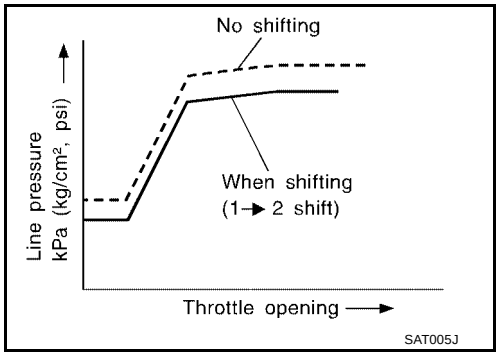
Back-up Control (Engine brake)

If the selector lever is shifted to 2 position while driving in D_4 (O/D) or D_3 , great driving force is applied to the clutch inside the transmission. Clutch operating pressure (line pressure) must be increased to deal with this driving force.



During Shift Change

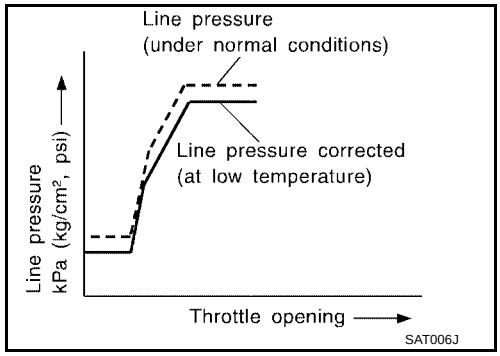
The line pressure is temporarily reduced corresponding to a change in engine torque when shifting gears (that is, when the shift solenoid valve is switched for clutch operation) to reduce shifting shock.



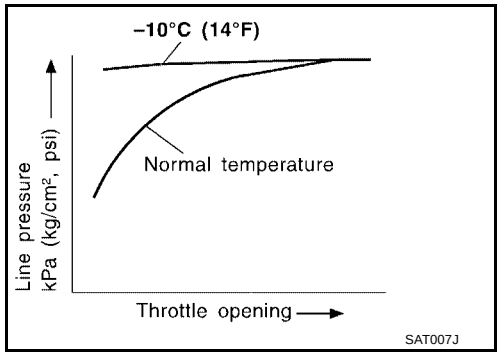
At Low Fluid Temperature

- Fluid viscosity and frictional characteristics of the clutch facing change with fluid temperature. Clutch engaging or band-contacting pressure is compensated for, according to fluid temperature, to stabilize shifting quality.

- The line pressure is reduced below 60°C (140°F) to prevent shifting shock due to low viscosity of automatic transmission fluid when temperature is low.



- Line pressure is increased to a maximum irrespective of the throttle opening when fluid temperature drops to −10°C (14°F). This pressure rise is adopted to prevent a delay in clutch and brake operation due to extreme drop of fluid viscosity at low temperature.

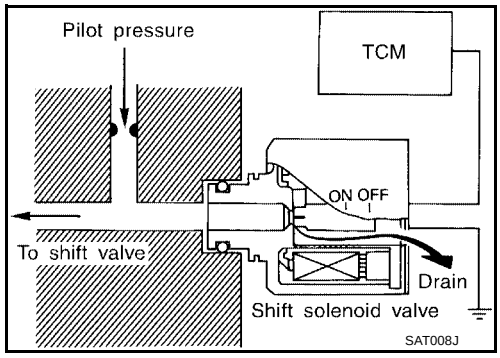


SHIFT CONTROL

The shift is regulated entirely by electronic control to accommodate vehicle speed and varying engine operations. This is accomplished by electrical signals transmitted by the revolution sensor and the ECM (throttle opening). This results in improved acceleration performance and fuel economy.

Control of Shift Solenoid Valves A and B

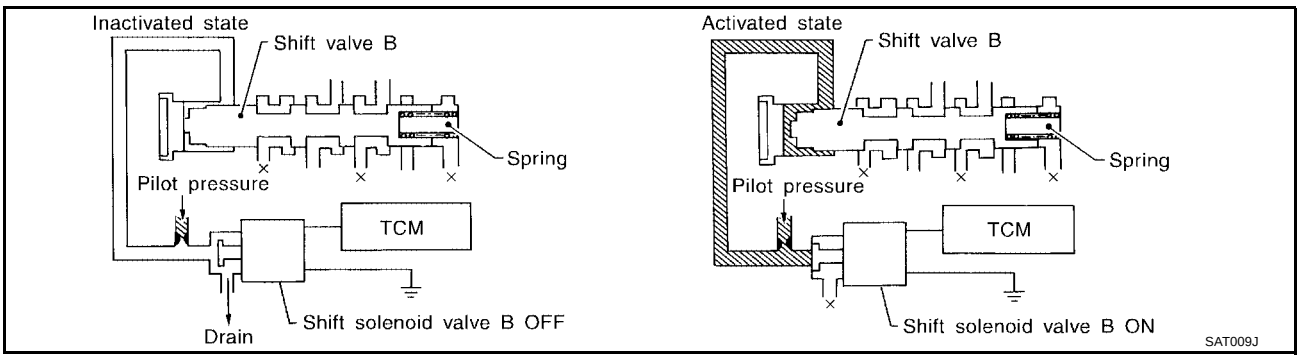
The TCM activates shift solenoid valves A and B according to signals from the ECM (throttle opening) and revolution sensor to select the optimum gear position on the basis of the shift schedule memorized in the TCM.
The shift solenoid valve performs simple ON-OFF operation. When set to ON, the drain circuit closes and pilot pressure is applied to the shift valve.



Relation between shift solenoid valves A and B and gear positions

Shift solenoid valve	Gear position				
	D_1 , 2_1 , 1_1	D_2 , 2_2 , 1_2	D_3	D_4 (O/D)	N-P
A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)	ON (Closed)
B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)

Control of Shift Valves A and B



Pilot pressure generated by the operation of shift solenoid valves A and B is applied to the end face of shift valves A and B.
The drawing above shows the operation of shift valve B. When the shift solenoid valve is ON, pilot pressure applied to the end face of the shift valve overcomes spring force, moving the valve upward.

LOCK-UP CONTROL

The torque converter clutch piston in the torque converter is locked to eliminate torque converter slip to increase power transmission efficiency. The solenoid valve is controlled by an ON-OFF duty signal sent from the TCM. The signal is converted to an oil pressure signal which controls the lock-up piston.

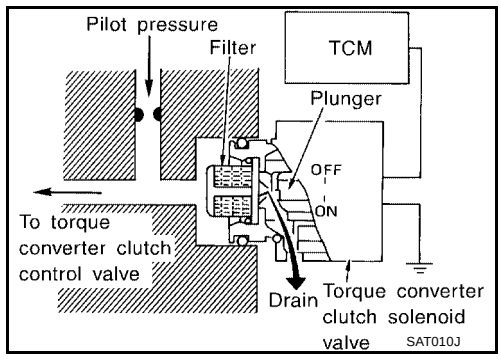
Conditions for Lock-up Operation

When vehicle is driven in 3rd and 4th gear position, vehicle speed and throttle opening are detected. If the detected values fall within the lock-up zone memorized in the TCM, lock-up occurs.

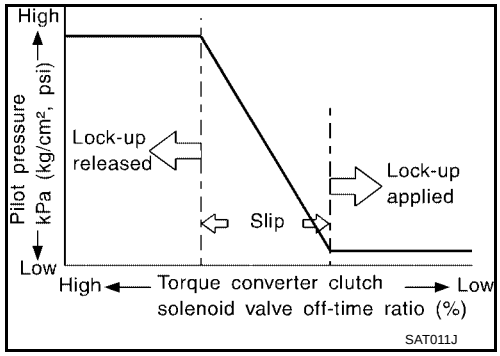
Overdrive control switch	ON	OFF
Selector lever	D position	
Gear position	D_4	D_3
Vehicle speed sensor	More than set value	
ECM (throttle opening)	Less than set opening	
A/T fluid temperature sensor	More than 40°C (104°F)	

Torque Converter Clutch Solenoid Valve Control

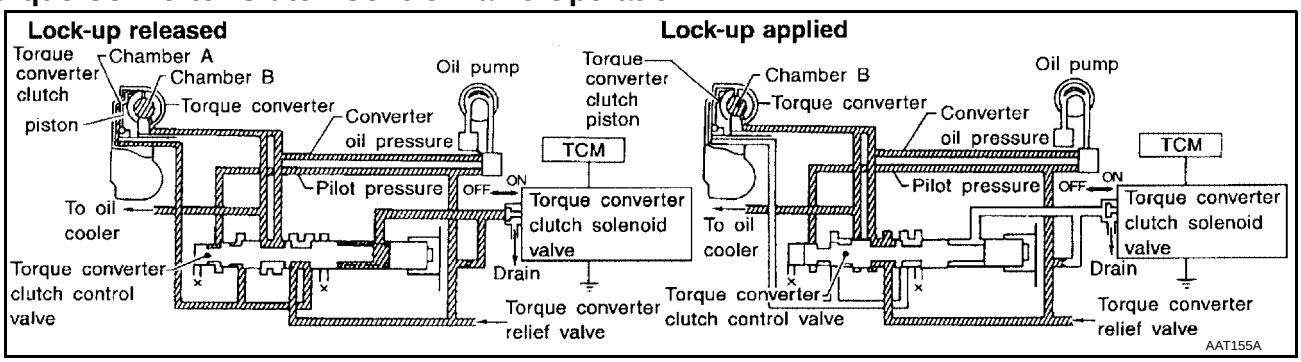
The torque converter clutch solenoid valve is controlled by the TCM. The plunger closes the drain circuit during the OFF period, and opens the circuit during the ON period. If the percentage of OFF-time increases in one cycle, the pilot pressure drain time is reduced and pilot pressure remains high.



The torque converter clutch piston is designed to slip to adjust the ratio of ON-OFF, thereby reducing lock-up shock.
OFF-time INCREASING
↓
Amount of drain DECREASING
↓
Pilot pressure HIGH
↓
Lock-up RELEASING



Torque Converter Clutch Control Valve Operation



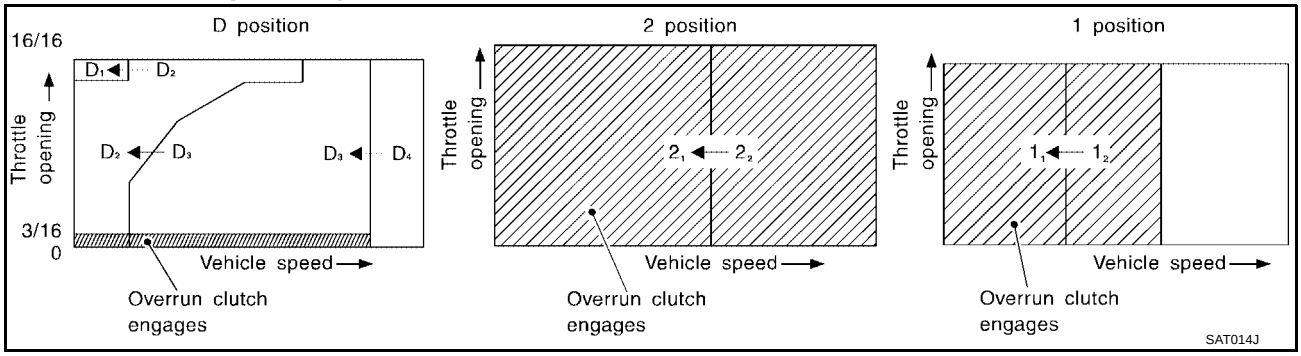
Lock-up released
The OFF-duration of the torque converter clutch solenoid valve is long, and pilot pressure is high. The pilot pressure pushes the end face of the torque converter clutch control valve in combination with spring force to move the valve to the left. As a result, converter pressure is applied to chamber A (torque converter clutch piston release side). Accordingly, the torque converter clutch piston remains unlocked.

Lock-up applied
When the OFF-duration of the torque converter clutch solenoid valve is short, pilot pressure drains and becomes low. Accordingly, the control valve moves to the right by the pilot pressure of the other circuit and converter pressure. As a result, converter pressure is applied to chamber B, keeping the torque converter clutch piston applied.
Also smooth lock-up is provided by transient application and release of the lock-up.

OVERRUN CLUTCH CONTROL (ENGINE BRAKE CONTROL)

Forward one-way clutch is used to reduce shifting shocks in downshifting operations. This clutch transmits engine torque to the wheels. However, drive force from the wheels is not transmitted to the engine because the one-way clutch rotates idle. This means the engine brake is not effective.
The overrun clutch operates when the engine brake is needed.

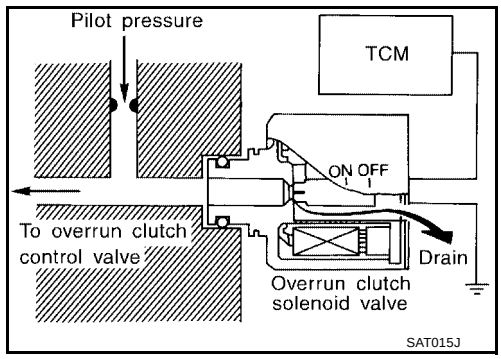
Overrun Clutch Operating Conditions



	Gear position	Throttle opening
D position	D1 , D2 , D3 gear position	Less than 3/16
2 position	21 , 22 gear position	
1 position	11 , 12 gear position	At any position

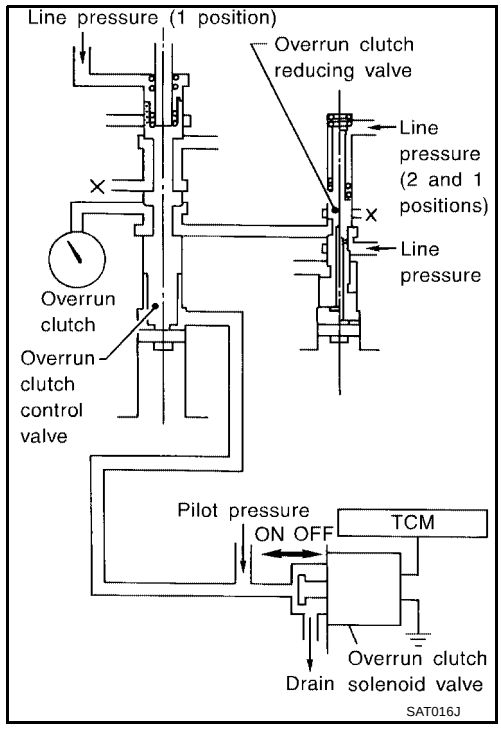
Overrun Clutch Solenoid Valve Control

The overrun clutch solenoid valve is operated by an ON-OFF signal transmitted by the TCM to provide overrun clutch control (engine brake control).
When this solenoid valve is ON, the pilot pressure drain port closes. When it is OFF, the drain port opens.
During the solenoid valve ON pilot pressure is applied to the end face of the overrun clutch control valve.



Overrun Clutch Control Valve Operation

When the solenoid valve is ON, pilot pressure is applied to the overrun clutch control valve. This pushes up the overrun clutch control valve. The line pressure is then shut off so that the clutch does not engage.
When the solenoid valve is OFF, pilot pressure is not generated. At this point, the overrun clutch control valve moves downward by spring force. As a result, overrun clutch operation pressure is provided by the overrun clutch reducing valve. This causes the overrun clutch to engage.
In the 1 position, the overrun clutch control valve remains pushed down so that the overrun clutch is engaged at all times.



Control Valve

ECS0062G

FUNCTION OF CONTROL VALVES

Valve name	Function
Pressure regulator valve, plug and sleeve plug	Regulates oil discharged from the oil pump to provide optimum line pressure for all driving conditions.
Pressure modifier valve and sleeve	Used as a signal supplementary valve to the pressure regulator valve. Regulates pressure-modifier pressure (signal pressure) which controls optimum line pressure for all driving conditions.
Pilot valve	Regulates line pressure to maintain a constant pilot pressure level which controls lock-up mechanism, overrun clutch, shift timing.
Accumulator control valve	Regulates accumulator back-pressure to pressure suited to driving conditions.
Manual valve	Directs line pressure to oil circuits corresponding to select positions. Hydraulic pressure drains when the shift lever is in Neutral.
Shift valve A	Simultaneously switches three oil circuits using output pressure of shift solenoid valve A to meet driving conditions (vehicle speed, throttle opening, etc.). Provides automatic downshifting and up-shifting (1st → 2nd → 3rd → 4th gears/4th → 3rd → 2nd → 1st gears) in combination with shift valve B.

Valve name	Function
Shift valve B	Simultaneously switches two oil circuits using output pressure of shift solenoid valve B in relation to driving conditions (vehicle speed, throttle opening, etc.). Provides automatic downshifting and up-shifting (1st → 2nd → 3rd → 4th gears/4th → 3rd → 2nd → 1st gears) in combination with shift valve A.
Overrun clutch control valve	Switches hydraulic circuits to prevent engagement of the overrun clutch simultaneously with application of the brake band in D_4 . (Interlocking occurs if the overrun clutch engages during D_4 .)
“1” reducing valve	Reduces low & reverse brake pressure to dampen engine-brake shock when down-shifting from the 1 position 1_2 to 1_1 .
Overrun clutch reducing valve	Reduces oil pressure directed to the overrun clutch and prevents engine-brake shock. In 1 and 2 positions, line pressure acts on the overrun clutch reducing valve to increase the pressure-regulating point, with resultant engine brake capability.
Torque converter relief valve	Prevents an excessive rise in torque converter pressure.
Torque converter clutch control valve, plug and sleeve	Activates or inactivates the lock-up function. Also provides smooth lock-up through transient application and release of the lock-up system.
1-2 accumulator valve and piston	Dampens the shock encountered when 2nd gear band servo contracts, and provides smooth shifting.
3-2 timing valve	Switches the pace that oil pressure is released depending on vehicle speed; maximizes the high clutch release timing, and allows for soft down shifting.
Shuttle valve	Determines if the overrun clutch solenoid valve should control the 3-2 timing valve or the overrun clutch control valve and switches between the two.
Cooler check valve	At low speeds and with a small load when little heat is generated, saves the volume of cooler flow, and stores the oil pressure for lock up.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

PFP:00000

Introduction

ECS0062H

The A/T system has two self-diagnostic systems.
The first is the emission-related on board diagnostic system (OBD-II) performed by the TCM (transmission control module) in combination with the ECM. The malfunction is indicated by the MIL (malfunction indicator lamp) and is stored as a DTC in the ECM memory but not the TCM memory.
The second is the TCM original self-diagnosis indicated by the O/D OFF indicator lamp. The malfunction is stored in the TCM memory. The detected items are overlapped with OBD-II self-diagnostic items. For details, refer to AT-426, "OBD-II Function for A/T System" .

OBD-II Function for A/T System

ECS0062I

The ECM provides emission-related on board diagnostic (OBD-II) functions for the A/T system. One function is to receive a signal from the TCM used with OBD-related parts of the A/T system. The signal is sent to the ECM when a malfunction occurs in the corresponding OBD-related part. The other function is to indicate a diagnostic result by means of the MIL (malfunction indicator lamp) on the instrument panel. Sensors, switches and solenoid valves are used as sensing elements.
The MIL automatically illuminates in One or Two Trip Detection Logic when a malfunction is sensed in relation to A/T system parts.

One or Two Trip Detection Logic of OBD-II

ECS0062J

ONE TRIP DETECTION LOGIC

If a malfunction is sensed during the first test drive, the MIL will illuminate and the malfunction will be stored in the ECM memory as a DTC. The TCM is not provided with such a memory function.

TWO TRIP DETECTION LOGIC

When a malfunction is sensed during the first test drive, it is stored in the ECM memory as a 1st trip DTC (diagnostic trouble code) or 1st trip freeze frame data. At this point, the MIL will not illuminate. — First Trip
If the same malfunction as that experienced during the first test drive is sensed during the second test drive, the MIL will illuminate. — Second Trip
A/T-related parts for which the MIL illuminates during the first or second test drive are listed below.

Items	MIL	
	One trip detection	Two trip detection
Shift solenoid valve A — DTC: P0750	X	
Shift solenoid valve B — DTC: P0755	X	
Throttle position sensor [accelerator pedal position (APP) sensor] — DTC: P1705	X	
Except above		X

The “trip” in the “One or Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation.

OBD-II Diagnostic Trouble Code (DTC)

ECS0062K

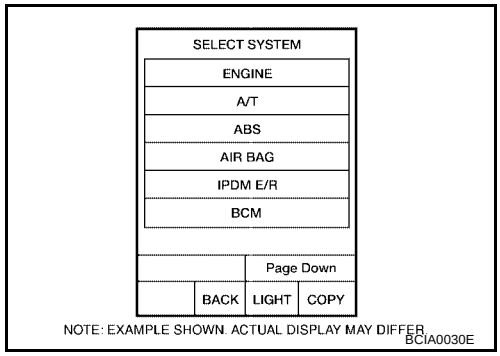
HOW TO READ DTC AND 1ST TRIP DTC

DTC and 1st trip DTC can be read by the following methods.

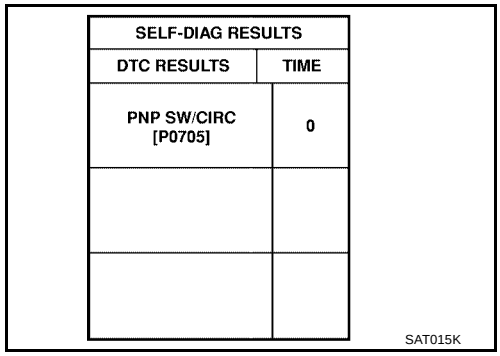
(With CONSULT-II or GST) GST) CONSULT-II or GST (Generic Scan Tool) Examples: P0705, P0710, P0720, P0725, etc.
These DTCs are prescribed by SAE J2012.
(CONSULT-II also displays the malfunctioning component or system.)

- **1st trip DTC No. is the same as DTC No.**
- **Output of the diagnostic trouble code indicates that the indicated circuit has a malfunction. However, in case of the Mode II and GST they do not indicate whether the malfunction is still occurring or occurred in the past and returned to normal.**
  CONSULT-II can identify them as shown below. Therefore, using CONSULT-II (if available) is recommended.

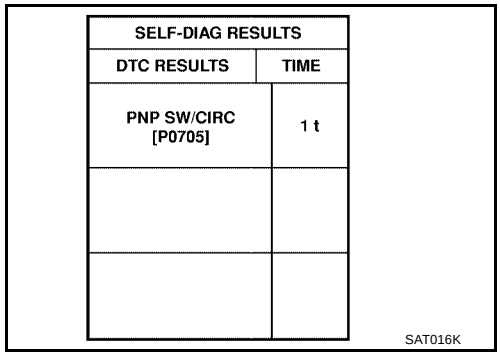
A sample of CONSULT-II display for DTC and 1st trip DTC is shown in the following page. DTC or 1st trip DTC of a malfunction is displayed in “SELF DIAGNOSIS” mode for “ENGINE” with CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.



If the DTC is being detected currently, the time data will be “0”.



If a 1st trip DTC is stored in the ECM, the time data will be “1t”.



Freeze Frame Data and 1st Trip Freeze Frame Data

The ECM has a memory function, which stores the driving condition such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed and vehicle speed at the moment the ECM detects a malfunction.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data, and the data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For detail, refer to EC-701, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .
Only one set of freeze frame data (either 1st trip freeze frame data of freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MIL on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172, P0174, P0175
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased.

HOW TO ERASE DTC

The diagnostic trouble code can be erased by CONSULT-II, GST or ECM DIAGNOSTIC TEST MODE as described in the following.

- **If the battery terminal is disconnected, the diagnostic trouble code will be lost within 24 hours.**
- **When you erase the DTC, using CONSULT-II or GST is easier and quicker than switching the mode selector on the ECM.**

The following emission-related diagnostic information is cleared from the ECM memory when erasing DTC related to OBD-II. For details, refer to EC-697, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS"
.

- **Diagnostic trouble codes (DTC)**
- **1st trip diagnostic trouble codes (1st trip DTC)**
- **Freeze frame data**
- **1st trip freeze frame data**
- **System readiness test (SRT) codes**
- **Test values**

HOW TO ERASE DTC (WITH CONSULT-II)

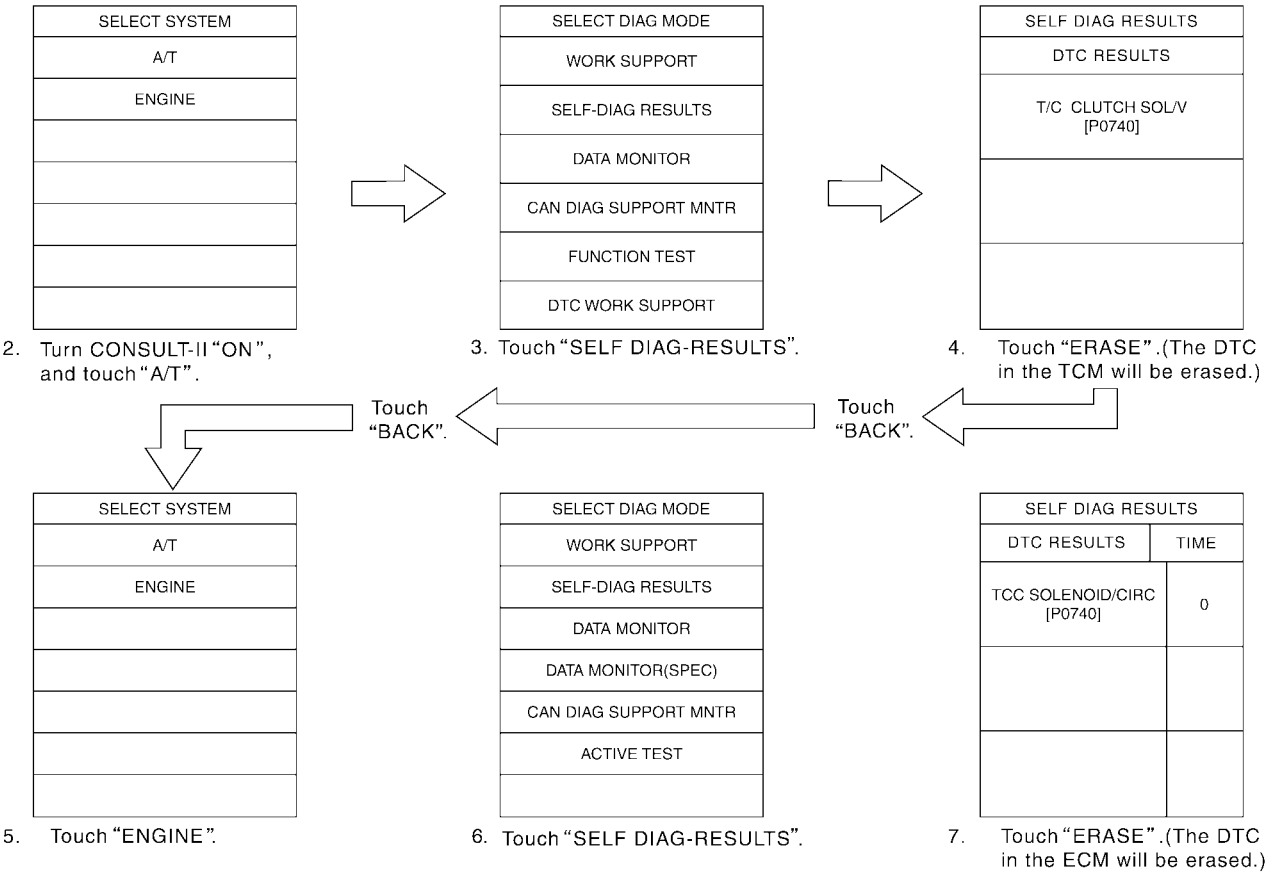
- **If a DTC is displayed for both ECM and TCM, it needs to be erased for both ECM and TCM.**

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Turn CONSULT-II “ON” and touch “A/T”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. (The DTC in the TCM will be erased.) Then touch “BACK” twice.
5. Touch “ENGINE”.
6. Touch “SELF DIAGNOSIS”.

7. Touch “ERASE”. (The DTC in the ECM will be erased.)

How to erase DTC (With CONSULT-II)

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.



HOW TO ERASE DTC (WITH GST)

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Perform TCM self-diagnostic procedure. Refer to AT-439, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" . (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with Generic Scan Tool (GST). For details, refer to EC-711, "How to Erase DTC" .

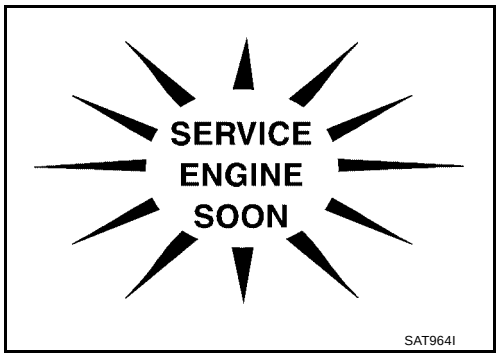
HOW TO ERASE DTC (NO TOOLS)

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Perform TCM self-diagnostic procedure. Refer to AT-439, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" . (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Perform OBD-II self-diagnostic procedure. Refer to AT-439, "OBD-II SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" . (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)

Malfunction Indicator Lamp (MIL)

ECS0062L

1. The malfunction indicator lamp will light up when the ignition switch is turned ON without the engine running. This is for checking the lamp.
   - If the malfunction indicator lamp does not light up, refer to DI-27, "WARNING LAMPS" .
     (Or see AT-430, "Malfunction Indicator Lamp (MIL)" .)
2. When the engine is started, the malfunction indicator lamp should go off.
   If the lamp remains on, the on board diagnostic system has detected an emission-related (OBD-II) malfunction. For details, refer to AT-426, "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" .



CONSULT-II

ECS0062M

After performing AT-431, "SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)" , place check marks for results on the AT-444, "DIAGNOSTIC WORKSHEET" . Reference pages are provided following the items.

NOTICE:

1. The CONSULT-II electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid).
   Check for time difference between actual shift timing and the CONSULT-II display. If the difference is noticeable, mechanical parts (except solenoids, sensors, etc.) may be malfunctioning. Check mechanical parts using applicable diagnostic procedures.
2. Shift schedule (which implies gear position) displayed on CONSULT-II and that indicated in Service Manual may differ slightly. This occurs because of the following reasons:

- Actual shift schedule has more or less tolerance or allowance,
- Shift schedule indicated in Service Manual refers to the point where shifts start, and
- Gear position displayed on CONSULT-II indicates the point where shifts are completed.

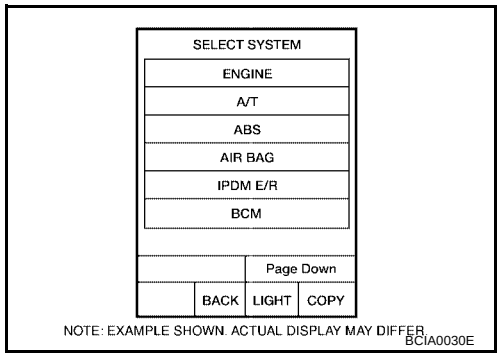
3. Shift solenoid valve “A” or “B” is displayed on CONSULT-II at the start of shifting. Gear position is displayed upon completion of shifting (which is computed by TCM).
4. Additional CONSULT-II information can be found in the Operation Manual supplied with the CONSULT-II unit.

FUNCTION

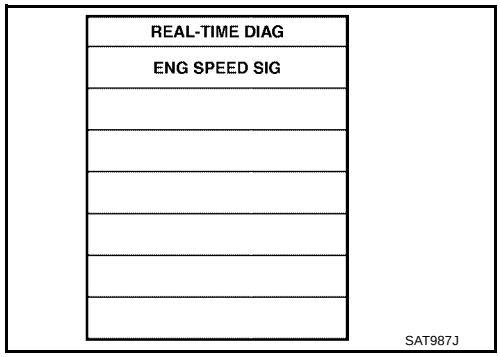
Diagnostic test mode	Function	Reference page
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on CONSULT-II.	—
Self-diagnostic results	Self-diagnostic results can be read and erased quickly.	AT-431
Data monitor	Input/Output data in the ECM can be read.	AT-433
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.	—
Function test	Performed by CONSULT-II instead of a technician to determine whether each system is "OK" or "NG".	—
DTC work support	Select the operating condition to confirm Diagnostic Trouble Codes.	AT-435
TCM part number	TCM part number can be read.	—

SELF-DIAGNOSTIC PROCEDURE (WITH CONSULT-II)

1. Turn on CONSULT-II and touch “ENGINE” for OBD-II detected items or touch “A/T” for TCM self-diagnosis.
If A/T is not displayed, check TCM power supply and ground circuit. Refer to AT-484, "TROUBLE DIAGNOSIS FOR POWER SUPPLY" . If result is NG, refer to PG-3, "POWER SUPPLY ROUTING" .



2. Touch “SELF DIAGNOSIS”.
Display shows malfunction experienced since the last erasing operation.
CONSULT-II performs “Real Time Diagnosis”.
Also, any malfunction detected while in this mode will be displayed at real time.



SELF-DIAGNOSTIC RESULT TEST MODE

Detected items (Screen terms for CONSULT-II, “SELF DIAGNOSIS” test mode)		Malfunction is detected when...	TCM self-diagnosis	OBD-II (DTC)
“A/T”	“ENGINE”		Available by O/D OFF indicator lamp or “A/T” on CONSULT-II	Available by malfunction indicator lamp*2, “ENGINE” on CONSULT-II or GST
Park/neutral position (PNP) switch circuit		● TCM does not receive the correct voltage signal (based on the gear position) from the switch.	—	P0705
—	PNP SW/CIRC			
Revolution sensor		● TCM does not receive the proper voltage signal from the sensor.	X	P0720
VHCL SPEED SEN·A/T	VEH SPD SEN/ CIR AT			
Vehicle speed sensor (Meter)		● TCM does not receive the proper voltage signal from the sensor.	X	—
VHCL SPEED SEN·MTR	—			
A/T 1st gear function		● A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	—	P0731*1
A/T 1ST GR FNCTN	A/T 1ST GR FNCTN			
A/T 2nd gear function		● A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	—	P0732*1
A/T 2ND GR FNCTN	A/T 2ND GR FNCTN			
A/T 3rd gear function		● A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	—	P0733*1
A/T 3RD GR FNCTN	A/T 3RD GR FNCTN			
A/T 4th gear function		● A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	—	P0734*1
A/T 4TH GR FNCTN	A/T 4TH GR FNCTN			
A/T TCC S/V function (lock-up)		● A/T cannot perform lock-up even if electrical circuit is good.	—	P0744*1
A/T TCC S/V FNCTN	A/T TCC S/V FNCTN			

Detected items (Screen terms for CONSULT-II, "SELF DIAGNOSIS" test mode)		Malfunction is detected when...	TCM self-diagnosis	OBD-II (DTC)
"A/T"	"ENGINE"		Available by O/D OFF indicator lamp or "A/T" on CONSULT-II	Available by malfunction indicator lamp*2, "ENGINE" on CONSULT-II or GST
Shift solenoid valve A		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0750
SHIFT SOLENOID/V A	SFT SOL A/CIRC			
Shift solenoid valve B		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0755
SHIFT SOLENOID/V B	SFT SOL B/CIRC			
Overrun clutch solenoid valve		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P1760
OVERRUN CLUTCH S/V	O/R CLUCH SOL/CIRC			
T/C clutch solenoid valve		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0740
T/C CLUTCH SOL/V	TCC SOLENOID/CIRC			
Line pressure solenoid valve		● TCM detects an improper voltage drop when it tries to operate the solenoid valve.	X	P0745
LINE PRESSURE S/V	L/PRESS SOL/CIRC			
Throttle position sensor [accelerator pedal position (APP) sensor] signal		● TCM receives an excessively low or high voltage from this sensor.	X	P1705
THROTTLE POSI SEN TP/SEN/CIRC A/T				
Engine speed signal		● TCM does not receive the proper voltage signal from the ECM.	X	P0725
ENGINE SPEED SIG				
A/T fluid temperature sensor		● TCM receives an excessively low or high voltage from the sensor.	X	P0710
BATT/FLUID TEMP SEN	ATF TEMP SEN/CIRC			
Engine control		● The ECM-A/T communication line is open or shorted.	X	U1000
A/T COMM LINE	—			
Turbine revolution sensor		● TCM does not receive the proper voltage signal from the sensor.	X	P0710
TURBINE REV				
TCM (RAM)		● TCM memory (RAM) is malfunctioning	—	—
CONTROL UNIT (RAM)	—			
TCM (ROM)		● TCM memory (ROM) is malfunctioning	—	—
CONTROL UNIT (ROM)	—			
TCM (EEP ROM)		● TCM memory (EEP ROM) is malfunctioning.	—	—
CONT UNIT(EEP ROM)	—			
Initial start		● This is not a malfunction message (Whenever shutting off a power supply to the TCM, this message appears on the screen.)	X	—
INITIAL START	—			
No failure (NO SELF DIAGNOSTIC FAILURE INDICATED FURTHER TESTING MAY BE REQUIRED**)		● No failure has been detected.	X	X

X: Applicable
–: Not applicable

*1: These malfunctions cannot be displayed by MIL SERVICE ENGINE SOON if another malfunction is assigned to MIL.

*2: Refer to EC-713, "Malfunction Indicator Lamp (MIL)" .

DATA MONITOR MODE (A/T)

Item	Display	Monitor item		Description	Remarks
		TCM Input signals	Main signals		
Vehicle speed sensor 1 (A/T) (Revolution sensor)	VHCL/S SE·A/T [km/h] or [mph]	X	—	● Vehicle speed computed from signal of revolution sensor is displayed.	When racing engine in N or P with vehicle stationary, CONSULT-II data may not indicate 0 km/h (0 mph).
Vehicle speed sensor 2 (Meter)	VHCL/S SE·MTR [km/h] or [mph]	X	—	● Vehicle speed computed from signal of vehicle speed sensor is displayed.	Vehicle speed display may not be accurate under approx. 10 km/h (6 mph). It may not indicate 0 km/h (0 mph) when vehicle is stationary.
Throttle position sensor [accelerator pedal position (APP) sensor]	THRTL POS SEN [V]	X	—	● Throttle position sensor signal voltage is displayed.	
A/T fluid temperature sensor	FLUID TEMP SE [V]	X	—	● A/T fluid temperature sensor signal voltage is displayed. ● Signal voltage lowers as fluid temperature rises.	
Battery voltage	BATTERY VOLT [V]	X	—	● Source voltage of TCM is displayed.	
Engine speed	ENGINE SPEED [rpm]	X	X	● Engine speed, computed from engine speed signal, is displayed.	Engine speed display may not be accurate under approx. 800 rpm. It may not indicate 0 rpm even when engine is not running.
Turbine revolution sensor	TURBINE REV	X	—	● Checks changing speed then performs oil pressure control and torque down control.	
Overdrive control switch	OVERDRIVE SW [ON/OFF]	X	—	● ON/OFF state computed from signal of overdrive control SW is displayed.	
PN position (PNP) switch	PN POSI SW [ON/OFF]	X	—	● ON/OFF state computed from signal of PN position SW is displayed.	
R position switch	R POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of R position SW is displayed.	
D position switch	D POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of D position SW is displayed.	
2 position switch	2 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 2 position SW, is displayed.	
1 position switch	1 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 1 position SW, is displayed.	
ASCD cruise signal	ASCD·CRUISE [ON/OFF]	X	—	● Status of ASCD cruise signal is displayed. ON ... Cruising state OFF ... Normal running state	● This is displayed even when no ASCD is mounted.

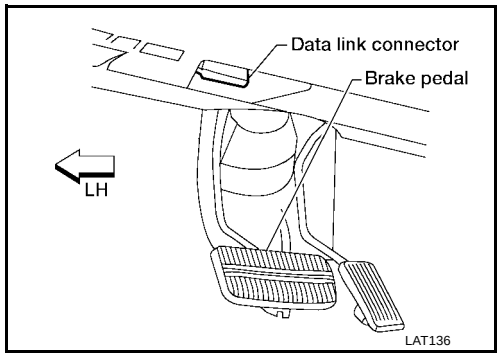
Item	Display	Monitor item		Description	Remarks
		TCM Input signals	Main signals		
ASCD OD cut signal	ASCD·OD CUT [ON/OFF]	X	—	● Status of ASCD OD release signal is displayed. ON ... OD released OFF ... OD not released	● This is displayed even when no ASCD is mounted.
Kickdown switch	KICKDOWN SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of kickdown SW, is displayed.	● This is displayed even when no kickdown switch is equipped.
Gear position	GEAR	—	X	● Gear position data used for computation by TCM, is displayed.	
Selector lever position	SLCT LVR POSI	—	X	● Selector lever position data, used for computation by TCM, is displayed.	● A specific value used for control is displayed if fail-safe is activated due to error.
Vehicle speed	VEHICLE SPEED [km/h] or [mph]	—	X	● Vehicle speed data, used for computation by TCM, is displayed.	
Throttle position sensor [accelerator pedal position (APP) sensor]	THROTTLE POSI [/8]	—	X	● Throttle position data, used for computation by TCM, is displayed.	● A specific value used for control is displayed if fail-safe is activated due to error.
Stop lamp switch	BRAKE SW [ON/OFF]	X	—	● ON/OFF status is displayed. ON ... Brake pedal is depressed. OFF ... Brake pedal is released.	
Line pressure duty	LINE PRES DTY [%]	—	X	● Control value of line pressure solenoid valve, computed by TCM from each input signal, is displayed.	
Torque converter clutch solenoid valve duty	TCC S/V DUTY [%]	—	X	● Control value of torque converter clutch solenoid valve, computed by TCM from each input signal, is displayed.	
Shift solenoid valve A	SHIFT S/V A [ON/OFF]	—	X	● Control value of shift solenoid valve A, computed by TCM from each input signal, is displayed.	Control value of solenoid is displayed even if solenoid circuit is disconnected. The OFF signal is displayed if solenoid circuit is shorted.
Shift solenoid valve B	SHIFT S/V B [ON/OFF]	—	X	● Control value of shift solenoid valve B, computed by TCM from each input signal, is displayed.	
Overrun clutch solenoid valve	OVERRUN/C S/V [ON/OFF]	—	X	● Control value of overrun clutch solenoid valve computed by TCM from each input signal is displayed.	
Self-diagnosis display lamp (O/D OFF indicator lamp)	SELF-D DP LMP [ON/OFF]	—	X	● Control status of O/D OFF indicator lamp is displayed.	

X: Applicable
—: Not applicable

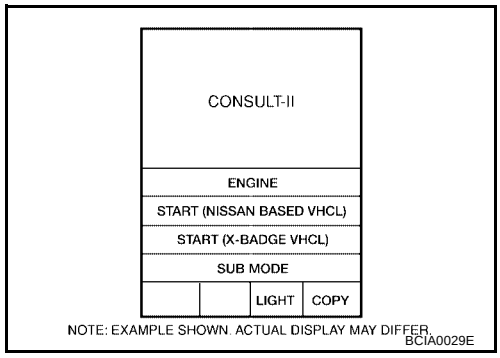
DTC WORK SUPPORT MODE WITH CONSULT-II

CONSULT-II Setting Procedure

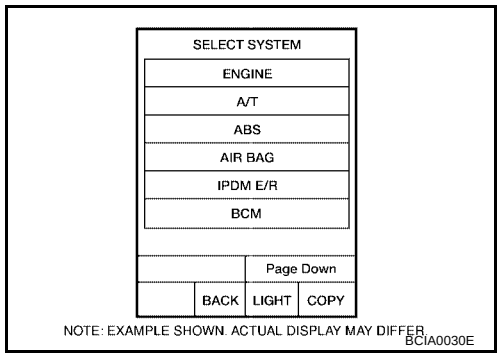
1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector, which is located in left side dash panel.



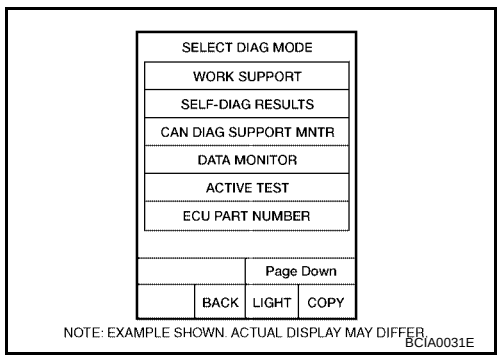
3. Turn ignition switch ON.
4. Touch “START (NISSAN BASED VHCL)”.



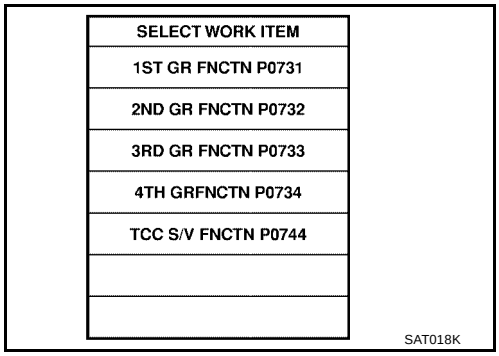
5. Touch “A/T”.



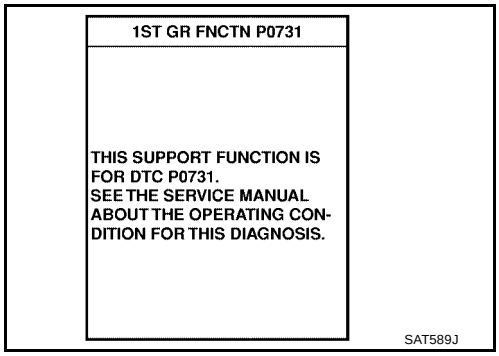
6. Touch “DTC WORK SUPPORT”.



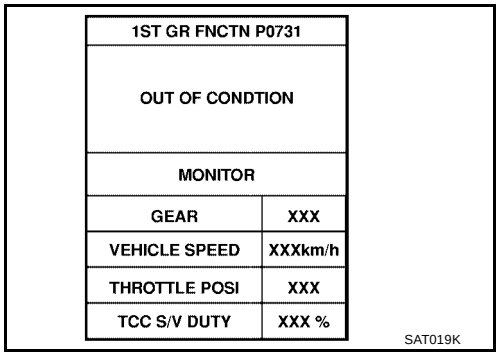
7. Touch select item menu (1ST, 2ND, etc.).



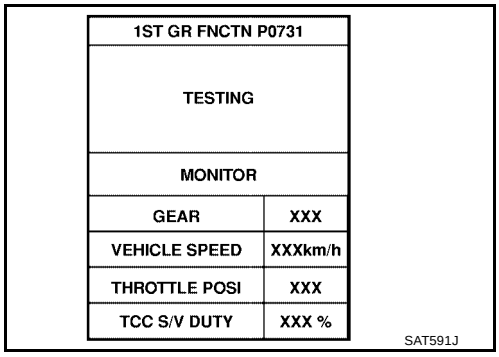
8. Touch “START”.



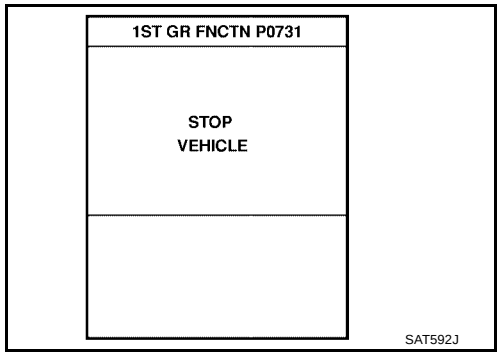
9. Perform driving test according to “DTC CONFIRMATION PROCEDURE” in “TROUBLE DIAGNOSIS FOR DTC”.

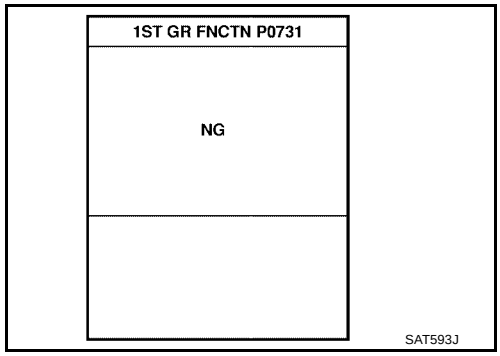


- **When testing conditions are satisfied, CONSULT-II screen changes from “OUT OF CONDITION” to “TESTING”.**

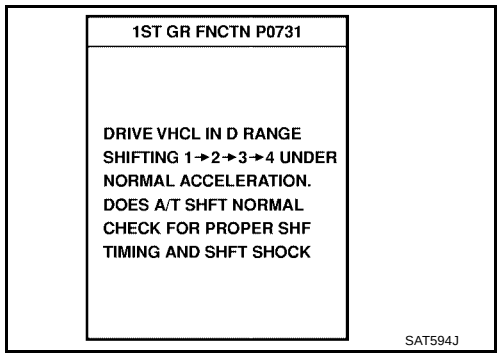


10. Stop vehicle. If “NG” appears on the screen, malfunction may exist. Go to “DIAGNOSTIC PROCEDURE”.

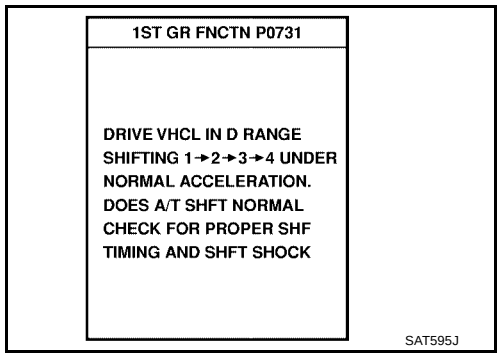




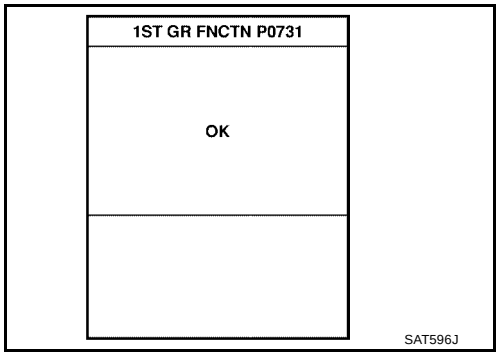
11. Perform test drive to check gear shift feeling in accordance with instructions displayed.

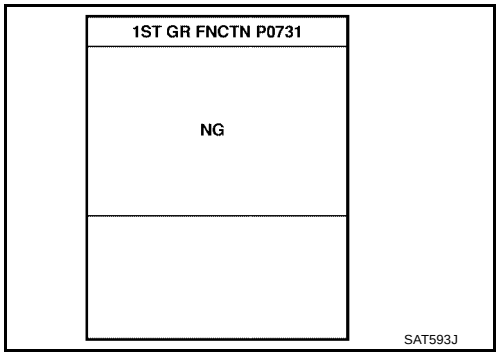


12. Touch “YES” or “NO”.



13. CONSULT-II procedure ended.





If “NG” appears on the screen, a malfunction may exist. Go to “DIAGNOSTIC PROCEDURE”.

DTC WORK SUPPORT MODE

DTC work support item	Description	Check item
1ST GR FNCTN P0731	Following items for “A/T 1st gear function (P0731)” can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit
2ND GR FNCTN P0732	Following items for “A/T 2nd gear function (P0732)” can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve B ● Each clutch ● Hydraulic control circuit
3RD GR FNCTN P0733	Following items for “A/T 3rd gear function (P0733)” can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Each clutch ● Hydraulic control circuit
4TH GR FNCTN P0734	Following items for “A/T 4th gear function (P0734)” can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Shift solenoid valve A ● Shift solenoid valve B ● Line pressure solenoid valve ● Each clutch ● Hydraulic control circuit
TCC S/V FNCTN P0744	Following items for “A/T TCC S/V function (lock-up) (P0744)” can be confirmed. ● Self-diagnosis status (whether the diagnosis is being conducted or not) ● Self-diagnosis result (OK or NG)	● Torque converter clutch solenoid valve ● Each clutch ● Hydraulic control circuit

Diagnostic Procedure Without CONSULT-II

ECS0062N

OBD-II SELF-DIAGNOSTIC PROCEDURE (WITH GST)

Refer to EC-803, "Generic Scan Tool (GST) Function" .

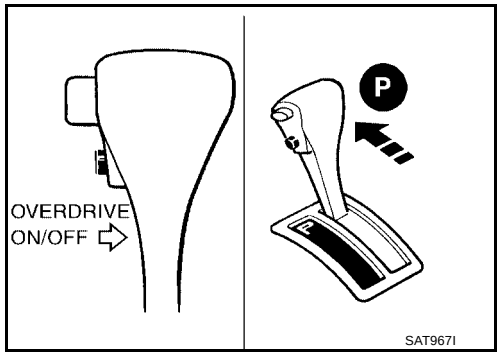
OBD-II SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)

Refer to EC-713, "Malfunction Indicator Lamp (MIL)" .

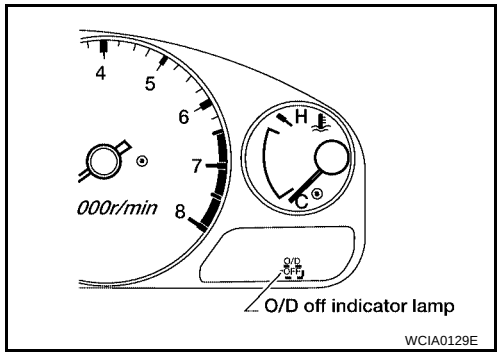
TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)

1. CHECK O/D OFF INDICATOR LAMP

1. Move selector lever to P position.
   Start engine and warm it up to normal engine operating temperature.
2. Turn ignition switch to OFF position.
3. Wait 5 seconds.
4. Turn ignition switch to ON position.
   (Do not start engine.)



5. Does O/D OFF indicator lamp come on for about 2 seconds?

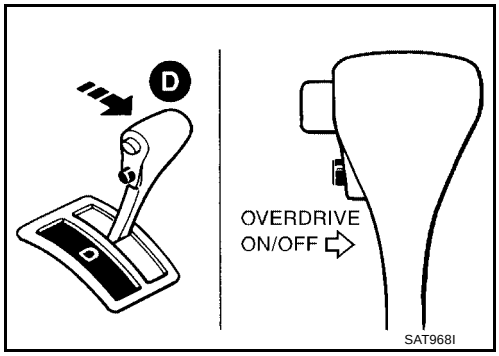


Yes or No

Yes >> GO TO 2.
No >> Stop procedure. Perform AT-597, "1. O/D OFF Indicator Lamp Does Not Come On" before proceeding.

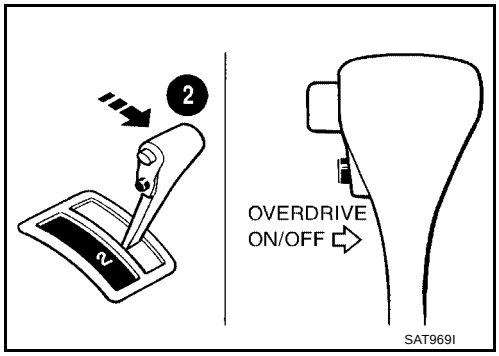
2. JUDGEMENT PROCEDURE STEP 1

1. Turn ignition switch to OFF position.
2. Turn ignition switch to ACC position.
3. Move selector lever from P to D position.
4. Turn ignition switch to ON position.
   (Do not start engine.)
5. Depress and hold overdrive control switch in OFF position (the O/D OFF indicator lamp will be ON) until directed to release the switch. (If O/D OFF indicator lamp does not come on, refer to “Steps 3 and 4” in AT-597, "1. O/D OFF Indicator Lamp Does Not Come On").
6. Turn ignition switch to OFF position.
7. Turn ignition switch to ON position (Do not start engine.)
8. Release the overdrive control switch (the O/D OFF indicator lamp will be OFF).
9. Wait 2 seconds.
10. Move selector lever to 2 position.
11. Depress and release overdrive control switch in ON position until next step is completed (the O/D OFF indicator lamp will be ON).



12. Depress and hold the overdrive control switch (the O/D OFF indicator lamp will be OFF) until directed to release the switch.

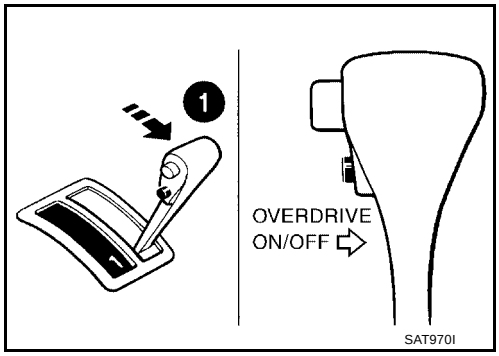
    >> GO TO 3.



3. JUDGEMENT PROCEDURE STEP 2

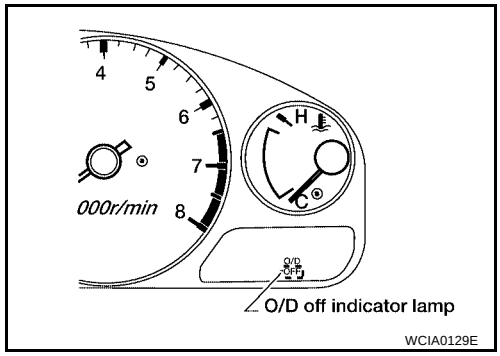
1. Move selector lever to 1 position.
2. Release the overdrive control switch.
3. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be ON).
4. Depress and release the overdrive control switch (the O/D OFF indicator lamp will be OFF).
5. Depress and hold the overdrive control switch (the O/D OFF indicator lamp will be ON) until directed to release the switch.
6. Depress accelerator pedal fully and release it.
7. Release the overdrive control switch (the O/D OFF indicator lamp will begin to flash ON and OFF).

    >> GO TO 4.



4. CHECK SELF-DIAGNOSTIC CODE

Check O/D OFF indicator lamp.
Refer to AT-441, "JUDGEMENT OF SELF-DIAGNOSIS CODE" .



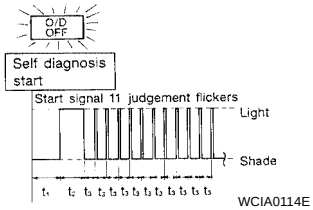
WCIA0129E

>> **DIAGNOSIS END**

JUDGEMENT OF SELF-DIAGNOSIS CODE

O/D OFF indicator lamp:

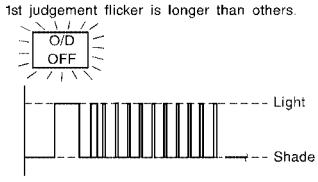
All judgement flickers are the same.



WCIA0114E

All circuits that can be confirmed by self-diagnosis are OK.

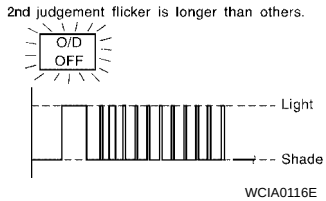
1st judgement flicker is longer than others.



WCIA0115E

Revolution sensor circuit is short-circuited or disconnected.
⇒ **Go to** **AT-499, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)"** **.**

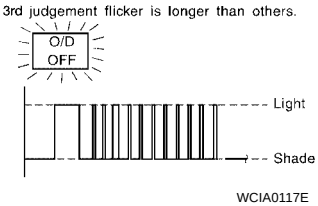
2nd judgement flicker is longer than others.



WCIA0116E

Vehicle speed sensor circuit is short-circuited or disconnected.
⇒ **Go to** **AT-576, "DTC VEHICLE SPEED SENSOR MTR"** **.**

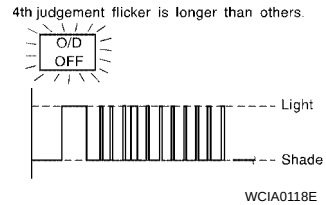
3rd judgement flicker is longer than others.



WCIA0117E

Throttle position sensor [accelerator pedal position (APP) sensor] circuit is short-circuited or disconnected.
⇒ **Go to** **AT-559, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]"** **.**

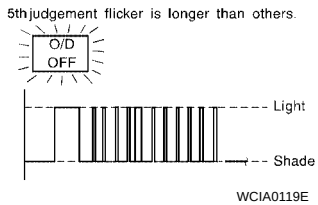
4th judgement flicker is longer than others.



WCIA0118E

Shift solenoid valve A circuit is short-circuited or disconnected.
⇒ **Go to** **AT-549, "DTC P0750 SHIFT SOLENOID VALVE A"** **.**

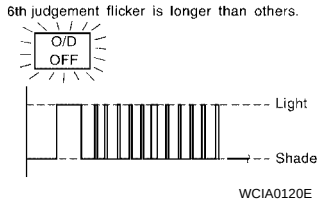
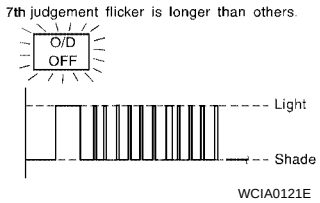
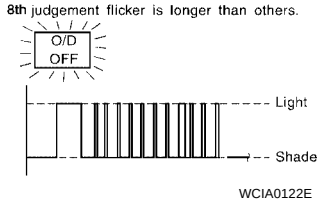
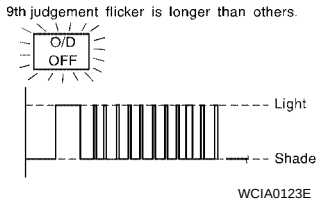
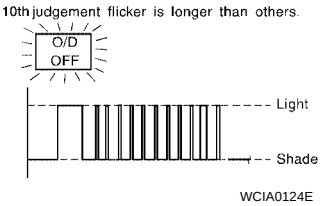
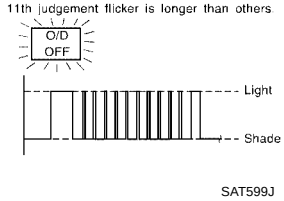
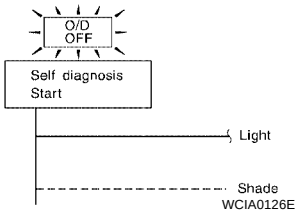
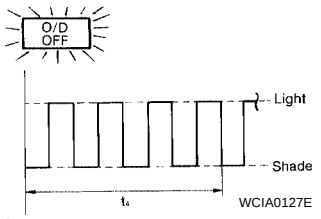
5th judgement flicker is longer than others.



WCIA0119E

Shift solenoid valve B circuit is short-circuited or disconnected.
⇒ **Go to** **AT-554, "DTC P0755 SHIFT SOLENOID VALVE B"** **.**

O/D OFF indicator lamp:

6th judgement flicker is longer than others.  Overrun clutch solenoid valve circuit is short-circuited or disconnected. ⇒ **Go to** AT-564, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" .	7th judgement flicker is longer than others.  Torque converter clutch solenoid valve circuit is short-circuited or disconnected. ⇒ **Go to** AT-530, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE" .
8th judgement flicker is longer than others.  A/T fluid temperature sensor is disconnected or TCM power source circuit is damaged. ⇒ **Go to** AT-493, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" .	9th judgement flicker is longer than others.  Engine speed signal circuit is short-circuited or disconnected. ⇒ **Go to** AT-504, "DTC P0725 ENGINE SPEED SIGNAL" .
10th judgement flicker is longer than others.  Line pressure solenoid valve circuit is short-circuited or disconnected. ⇒ **Go to** AT-543, "DTC P0745 LINE PRESSURE SOLENOID VALVE" .	11th judgement flicker is longer than others.  The ECM-A/T communication line is open or shorted. ⇒ **Go to** AT-586, "DTC U1000 CAN COMMUNICATION LINE" .
Lamp comes on.  Park/neutral position (PNP) switch, overdrive control switch or throttle position switch circuit is disconnected or TCM is damaged. ⇒ **Go to** AT-627, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}" .	Flickers as shown below.  Battery power is low. Battery has been disconnected for a long time. Battery is connected conversely. (When reconnecting TCM connectors. — This is not a problem.)

t_1 = 2.5 seconds t_2 = 2.0 seconds t_3 = 1.0 second t_4 = 1.0 second

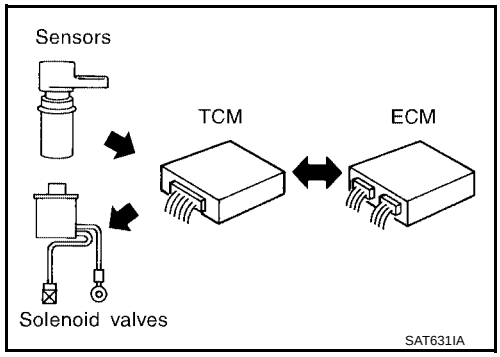
TROUBLE DIAGNOSIS - INTRODUCTION

PFP:00000

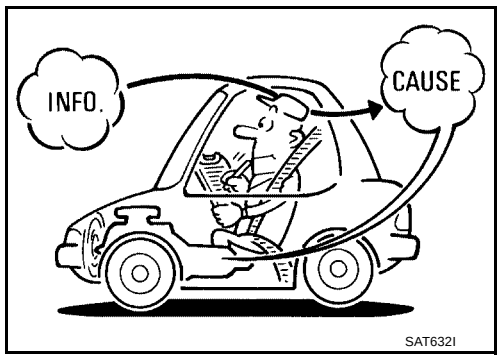
Introduction

ECS0062O

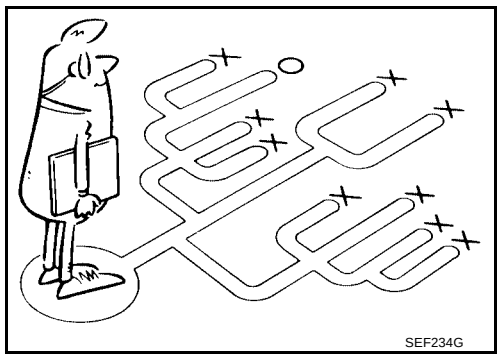
The TCM receives a signal from the vehicle speed sensor, ECM (throttle opening) or park/neutral position (PNP) switch and provides shift control or lock-up control via A/T solenoid valves.
The TCM also communicates with the ECM by means of a signal sent from sensing elements used with the OBD-related parts of the A/T system for malfunction-diagnostic purposes. The TCM is capable of diagnosing malfunctioning parts while the ECM can store malfunctions in its memory.
Input and output signals must always be correct and stable in the operation of the A/T system. The A/T system must be in good operating condition and be free of valve seizure, solenoid valve malfunction, etc.



It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.
A visual check only, may not find the cause of the problems. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the “Work Flow”. Refer to AT-447, "Work Flow"
.



Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A “DIAGNOSTIC WORKSHEET” like the example referenced at AT-444 should be used.
Start your diagnosis by looking for “conventional” problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.
Also check related Service bulletins for information.



DIAGNOSTIC WORKSHEET

Information from Customer

KEY POINTS
WHAT ..... Vehicle & A/T model
WHEN ..... Date, Frequencies
WHERE ..... Road conditions
HOW ..... Operating conditions, Symptoms

Customer name MR/MS	Model & Year	VIN
Trans. model	Engine	Mileage
Incident Date	Manuf. Date	In Service Date
Frequency	❑ Continuous ❑ Intermittent (times a day)	
Symptoms	❑ Vehicle does not move. (❑ Any position ❑ Particular position)	
	❑ No up-shift (❑ 1st → 2nd ❑ 2nd → 3rd ❑ 3rd → O/D)	
	❑ No down-shift (❑ O/D → 3rd ❑ 3rd → 2nd ❑ 2nd → 1st)	
	❑ Lockup malfunction	
	❑ Shift point too high or too low.	
	❑ Shift shock or slip (❑ N → D ❑ Lockup ❑ Any drive position)	
	❑ Noise or vibration	
	❑ No kickdown	
	❑ No pattern select	
	❑ Others ( )	
O/D OFF indicator lamp	Blinks for about 8 seconds.	
	❑ Continuously lit	❑ Not lit
Malfunction indicator lamp (MIL)	❑ Continuously lit	❑ Not lit

Diagnostic Worksheet

1.	❑ Read the Fail-safe and listen to customer complaints.			AT-399
2.	❑ CHECK A/T FLUID			AT-449
		❑ Leakage (Follow specified procedure) ❑ Fluid condition ❑ Fluid level		
3.	❑ Perform STALL TEST and PRESSURE TEST.			AT-449, AT-453
		❑ Stall test — Mark possible damaged components/others.		
			❑ Torque converter one-way clutch ❑ Reverse clutch ❑ Forward clutch ❑ Overrun clutch ❑ Forward one-way clutch	❑ Low & reverse brake ❑ Low one-way clutch ❑ Engine ❑ Line pressure is low ❑ Clutches and brakes except high clutch and brake band are OK
		❑ Pressure test — Suspected parts:		
4.	❑ Perform all ROAD TEST and mark required procedures.			AT-454
	4-1.	Check before engine is started.		AT-456
		❑ SELF-DIAGNOSTIC PROCEDURE - Mark detected items.		
			❑ Park/neutral position (PNP) switch, AT-487 . ❑ A/T fluid temperature sensor, AT-569 . ❑ Vehicle speed sensor·A/T (Revolution sensor), AT-499 . ❑ Engine speed signal, AT-504 . ❑ Turbine revolution sensor, AT-581 . ❑ Torque converter clutch solenoid valve, AT-530 . ❑ Line pressure solenoid valve, AT-543 . ❑ Shift solenoid valve A, AT-549 . ❑ Shift solenoid valve B, AT-554 . ❑ Throttle position sensor [accelerator pedal position (APP) sensor, AT-559 . ❑ Overrun clutch solenoid valve, AT-564 . ❑ Park/neutral position (PNP), overdrive control and throttle position sensor [accelerator pedal position (APP) sensor] circuit checks, AT-627 . ❑ A/T fluid temperature sensor and TCM power source, AT-484 . ❑ Vehicle speed sensor·MTR, AT-576 . ❑ A/T communication line, AT-586 . ❑ Control unit (RAM), Control unit (ROM), AT-589 . ❑ Control unit (EEP ROM), AT-591 . ❑ Battery ❑ Others	

4.	4-2.	Check at idle	AT-456
		❑ 1. O/D OFF Indicator Lamp Does Not Come On, AT-597 . ❑ 2. Engine Cannot Be Started In P and N Position, AT-598 . ❑ 3. In P Position, Vehicle Moves Forward or Backward When Pushed, AT-600 . ❑ 4. In N Position, Vehicle Moves, AT-600 . ❑ 5. Large Shock. N → R Position, AT-602 . ❑ 6. Vehicle Does Not Creep Backward In R Position, AT-604 . ❑ 7. Vehicle Does Not Creep Forward In D, 2 or 1 Position, AT-607 .	
	4-3.	Cruise test	AT-459 AT-462
		Part-1	
		❑ 8. Vehicle Cannot Be Started From D_1 , AT-609 . ❑ 9. A/T Does Not Shift: D_1 → D_2 or Does Not Kickdown: D_4 → D_2 , AT-612 . ❑ 10. A/T Does Not Shift: D_2 → D_3 , AT-614 . ❑ 11. A/T Does Not Shift: D_3 → D_4 , AT-617 . ❑ 12. A/T Does Not Perform Lock-up, AT-619 . ❑ 13. A/T Does Not Hold Lock-up Condition, AT-620 . ❑ 14. Lock-up Is Not Released, AT-621 . ❑ 15. Engine Speed Does Not Return To Idle (Light Braking D_4 → D_3), AT-622 .	
		Part-2	AT-465
		❑ 16. Vehicle Does Not Start From D_1 , AT-624 . ❑ 9. A/T Does Not Shift: D_1 → D_2 or Does Not Kickdown: D_4 → D_2 , AT-612 . ❑ 10. A/T Does Not Shift: D_2 → D_3 , AT-614 . ❑ 11. A/T Does Not Shift: D_3 → D_4 , AT-617 .	
		Part-3	AT-467
		❑ 17. A/T Does Not Shift: D_4 → D_3 When Overdrive Control Switch ON → OFF, AT-625 . ❑ 15. Engine Speed Does Not Return To Idle (Engine Brake In D_3), AT-622 . ❑ 18. A/T Does Not Shift: D_3 → 2_2 , When Selector Lever D → 2 Position, AT-625 . ❑ 15. Engine Speed Does Not Return To Idle (Engine Brake In 2_2), AT-622 . ❑ 19. A/T Does Not Shift: 2_2 → 1_1 , When Selector Lever 2 → 1 Position, AT-626 . ❑ 20. Vehicle Does Not Decelerate By Engine Brake, AT-627 . ❑ SELF-DIAGNOSTIC PROCEDURE — Mark detected items.	
		❑ Park/neutral position (PNP) switch, AT-487 . ❑ A/T fluid temperature sensor, AT-493 . ❑ Vehicle speed sensor·A/T (Revolution sensor), AT-499 . ❑ Engine speed signal, AT-504 . ❑ Turbine revolution sensor, AT-581 . ❑ Torque converter clutch solenoid valve, AT-530 . ❑ Line pressure solenoid valve, AT-543 . ❑ Shift solenoid valve A, AT-549 . ❑ Shift solenoid valve B, AT-554 . ❑ Throttle position sensor [accelerator pedal position (APP) sensor], AT-559 . ❑ Overrun clutch solenoid valve, AT-564 . ❑ Park/neutral position (PNP), overdrive control and throttle position sensor [accelerator pedal position (APP) sensor] circuit checks, AT-627 . ❑ A/T fluid temperature sensor and TCM power source, AT-484 . ❑ Vehicle speed sensor·MTR, AT-576 . ❑ A/T communication line, AT-586 . ❑ Control unit (RAM), Control unit (ROM), AT-589 . ❑ Control unit (EEP ROM), AT-591 . ❑ Battery ❑ Others	
5.	❑ For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts.		AT-639
6.	❑ Perform all ROAD TEST and re-mark required procedures.		AT-454
7.	❑ Perform DTC CONFIRMATION PROCEDURE for following MIL indicating items and check out NG items. Refer to EC-697, "Emission-related Diagnostic Information" .		EC-697
	❑ DTC (P0731) A/T 1st gear function, AT-508 . ❑ DTC (P0732) A/T 2nd gear function, AT-513 . ❑ DTC (P0733) A/T 3rd gear function, AT-518 . ❑ DTC (P0734) A/T 4th gear function, AT-523 . ❑ DTC (P0744) A/T TCC S/V function (lock-up), AT-535 .		

8.	❑ Perform the Diagnostic Procedures for all remaining items marked NG. Repair or replace the damaged parts. Refer to the Symptom Chart when you perform the procedures. (The chart also shows some other possible symptoms and the component inspection orders.)	AT-431 AT-438
9.	❑ Erase DTC from TCM and ECM memories.	AT-428

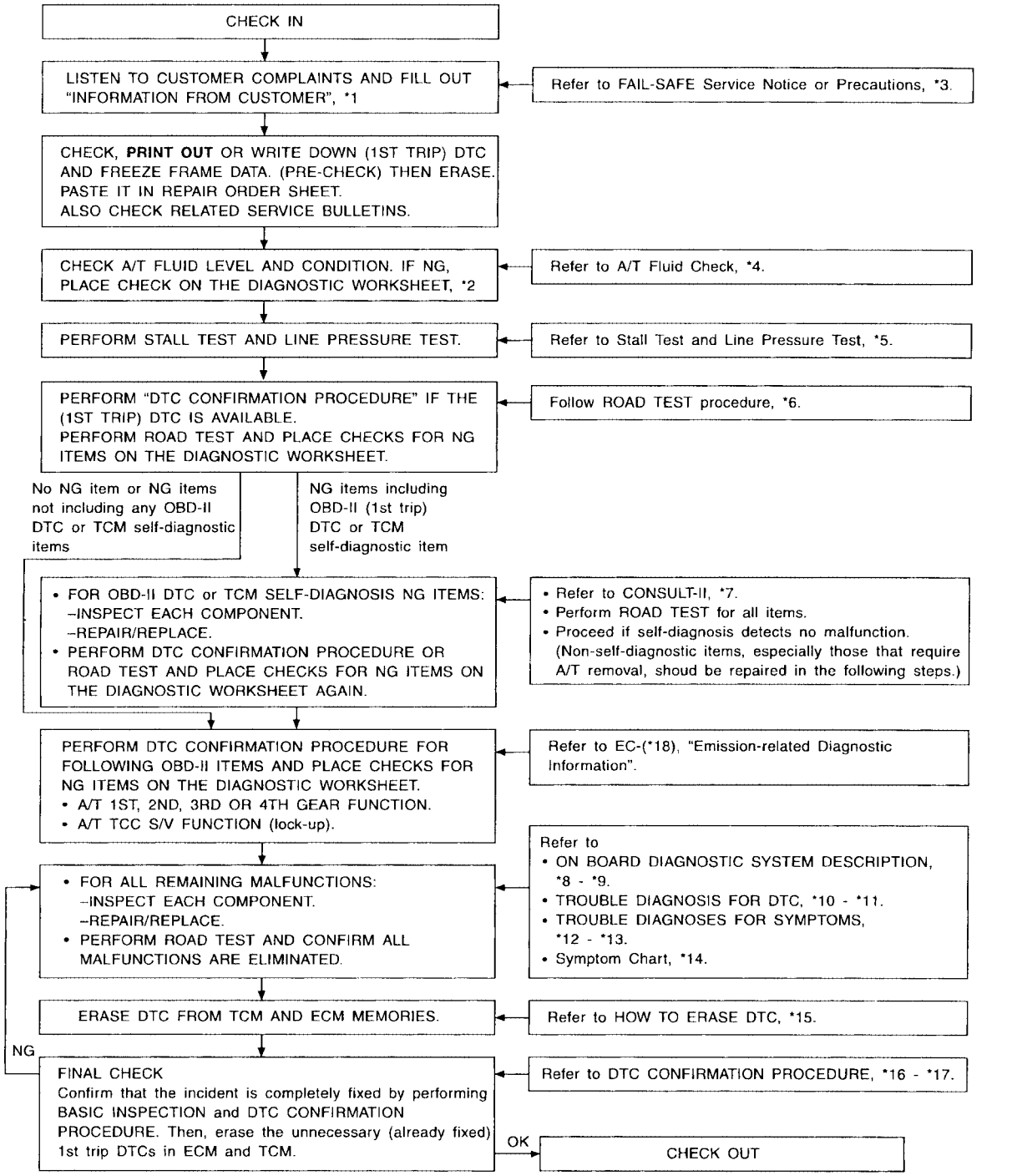
Work Flow

ECS0062P

HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

A good understanding of the malfunction conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.
Make good use of the two sheets provided, AT-444, "Information from Customer" and AT-445, "Diagnostic Worksheet" , to perform the best troubleshooting possible.

WORK FLOW CHART



SAT086JI

*1: AT-444 *2: AT-445 *3: AT-399
*4: AT-449 *5: AT-449, AT-453 *6: AT-454
*7: AT-430 *8: AT-426 *9: AT-443
*10: AT-487 *11: AT-593 *12: AT-593
*13: AT-632 *14: AT-470 *15: AT-428
*16: AT-487 *17: AT-589 *18: EC-697

TROUBLE DIAGNOSIS - BASIC INSPECTION

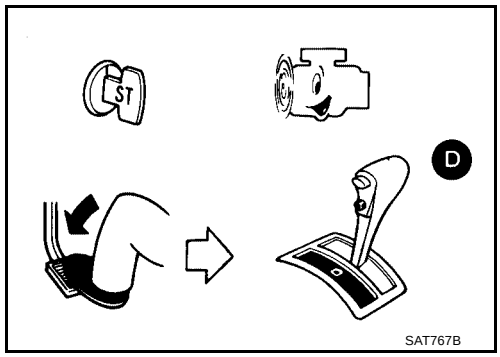
PFP:00000

A/T Fluid Check

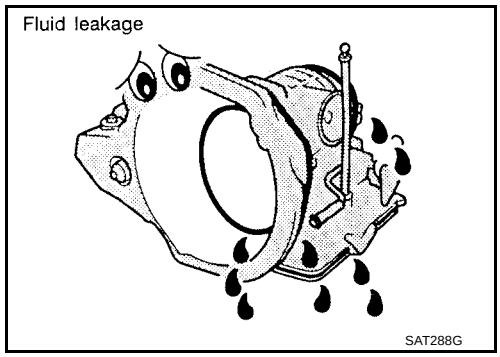
ECS0062Q

FLUID LEAKAGE CHECK

1. Clean area suspected of leaking. For example, mating surface of converter housing and transmission case.
2. Start engine, apply foot brake, place selector lever in D position and wait a few minutes.
3. Stop engine.

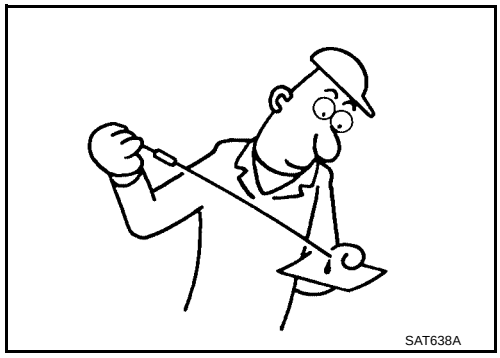


4. Check for fresh leakage.



FLUID CONDITION CHECK

Fluid color	Suspected problem
Dark or black with burned odor	Wear of frictional material
Milky pink	Water contamination — Road water entering through filler tube or breather
Varnished fluid, light to dark brown and tacky	Oxidation — Over or under filling, — Overheating



FLUID LEVEL CHECK

Refer to MA-31, "Checking A/T Fluid" .

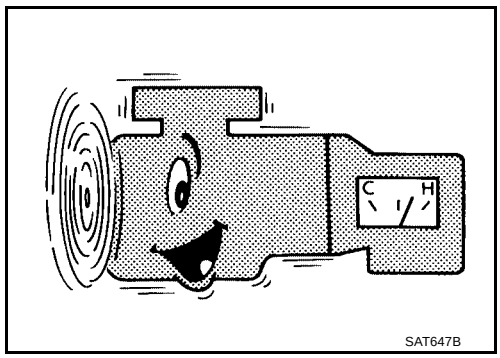
Stall Test

ECS0062R

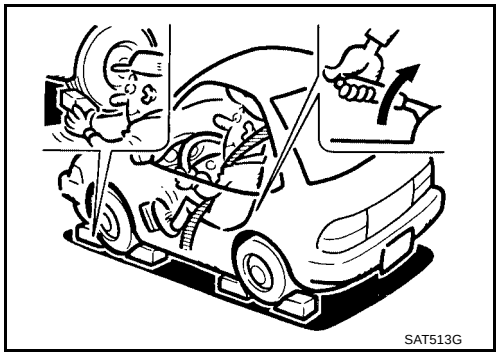
STALL TEST PROCEDURE

1. Check A/T fluid and engine oil levels. If necessary, add fluid and oil.
2. Drive vehicle for approx. 10 minutes or until fluid and oil reach operating temperature.

ATF operating temperature :50 - 80°C (122 - 176°F)

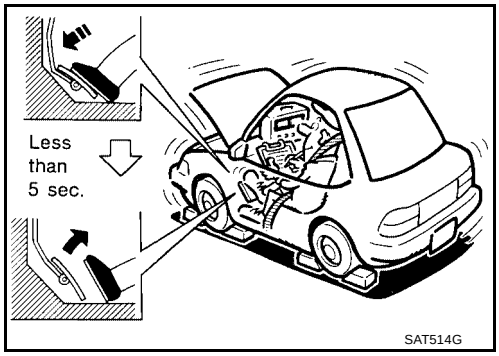


3. Set parking brake and block wheels.
4. Install a tachometer where it can be seen by driver during test.
   - **It is good practice to mark the point of specified engine rpm on indicator.**


SAT513G

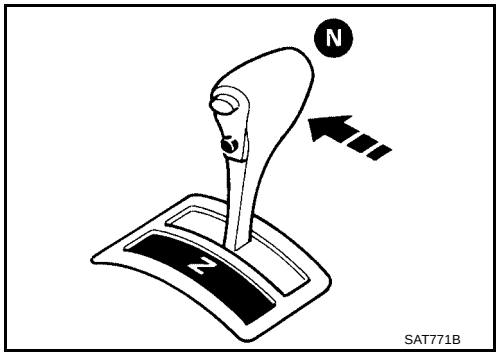
5. Start engine, apply foot brake, and place selector lever in D position.
6. Accelerate to wide open throttle gradually while applying foot brake.
7. Quickly note the engine stall revolution and immediately release throttle.
   - **During test, never hold throttle wide open for more than 5 seconds.**

   Stall revolution :2,350 - 2,800 rpm



SAT514G

8. Move selector lever to N position.
9. Cool off ATF.
   - **Run engine at idle for at least one minute.**
10. Repeat steps 5 through 9 with selector lever in 2, 1 and R positions.



SAT771B

JUDGEMENT OF STALL TEST

The test result and possible damaged components relating to each result are shown in the illustrations on next page.
In order to pinpoint the possible damaged components, follow the procedure shown in AT-448, "WORK FLOW CHART" .

NOTE:
Stall revolution is too high in D, 2 or 1 position:

- Slippage occurs in 1st gear but not in 2nd and 3rd gears. ..... Low one-way clutch slippage
- Slippage occurs in the following gears:
  1st through 3rd gears in D position and engine brake functions with overdrive control switch set to OFF.
  1st and 2nd gears in 2 position and engine brake functions with accelerator pedal released (fully closed throttle). ..... Forward clutch or forward one-way clutch slippage

Stall revolution is too high in R position:

- Engine brake does not function in 1 position. ..... Low & reverse brake slippage
- Engine brake functions in 1 position. ..... Reverse clutch slippage

Stall revolution within specifications:

- Vehicle does not achieve speed of more than 80 km/h (50 MPH). ..... One-way clutch seizure in torque converter housing

CAUTION:
Be careful since automatic fluid temperature increases abnormally.

- Slippage occurs in 3rd and 4th gears in D position. ..... High clutch slippage

- Slippage occurs in 2nd and 4th gear in D position. ..... Brake band slippage
- Engine brake does not function in 2nd and 3rd gears in D position, 2nd gear in 2 position, and 1st gear in 1 position with overdrive control switch set to OFF. ..... Overrun clutch slippage

Stall revolution less than specifications:

- Poor acceleration during starts. ..... One-way clutch seizure in torque converter

Selector lever position	Judgement		
D	H	O	L
2	H	O	L
1	H	O	L
R	O	H	L

O : Stall revolution is normal.
H : Stall revolution is higher than specified.
L : Stall revolution is lower than specified.

Damaged components

Forward clutch
Low one-way clutch
Low & reverse brake
Reverse clutch
Engine
Forward one-way clutch
Torque converter one-way clutch
Hydraulic circuit for line pressure control (Line pressure is low.)
Clutches and brakes except high clutch, brake band and overrun clutch are OK. (Condition of high clutch, brake band and overrun clutch cannot be confirmed by stall test.)

D	H	O
2	H	O
1	H	O
R	H	O
Selector lever position	Judgement	

SAT499K

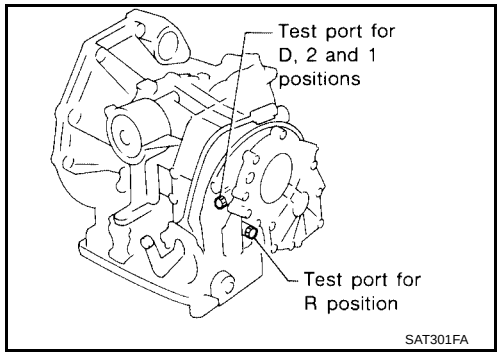
Line Pressure Test

ECS0062S

LINE PRESSURE TEST PORTS

Location of line pressure test ports are shown in the illustration.

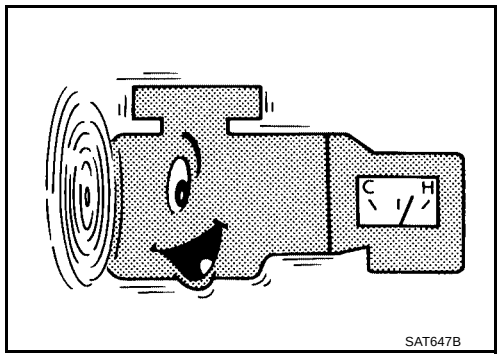
- **Always replace pressure plugs as they are self-sealing bolts.**



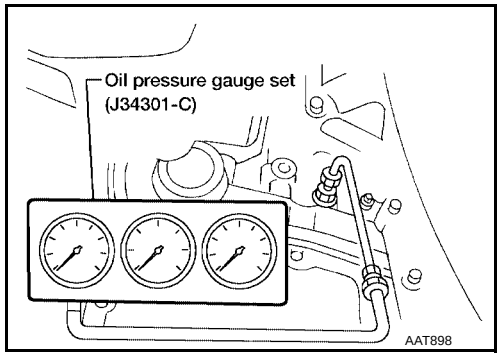
LINE PRESSURE TEST PROCEDURE

1. Check A/T fluid and engine oil levels. If necessary, add fluid and oil.
2. Drive vehicle for approx. 10 minutes or until fluid and oil reach operating temperature.

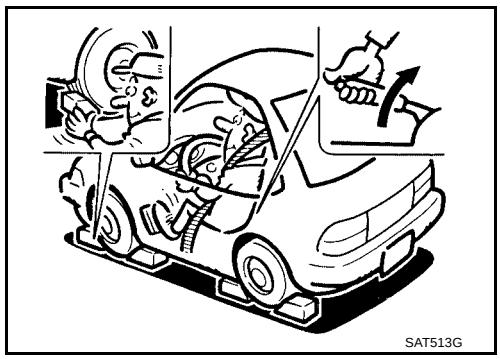
ATF operating temperature :50 - 80°C (122 - 176°F)



3. Install pressure gauge to corresponding line pressure port.

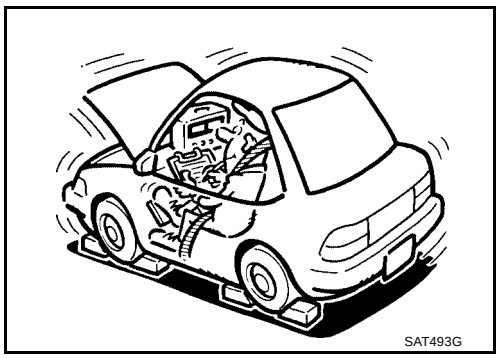


4. Set parking brake and block wheels.
   - **Continue to depress brake pedal fully while line pressure test is being performed at stall speed.**



5. Start engine and measure line pressure at idle and stall speed.
   - **When measuring line pressure at stall speed, follow the stall test procedure.**

AT-453, "Line Pressure Test" : Refer to SDS, AT-748, "Line Pressure"


SAT493G

JUDGEMENT OF LINE PRESSURE TEST

Judgement		Suspected parts
At idle	Line pressure is low in all positions.	● Oil pump wear ● Control piston damage ● Pressure regulator valve or plug sticking ● Spring for pressure regulator valve damaged ● Fluid pressure leakage between oil strainer and pressure regulator valve ● Clogged strainer
	Line pressure is low in particular position.	● Fluid pressure leakage between manual valve and particular clutch ● For example, line pressure is: – Low in R and 1 positions, but – Normal in D and 2 positions. Therefore, fluid leakage exists at or around low and reverse brake circuit. Refer to AT-410, "CLUTCH AND BAND CHART" .
	Line pressure is high.	● A/T fluid temperature sensor damaged ● Line pressure solenoid valve sticking ● Short circuit of line pressure solenoid valve circuit ● Pressure modifier valve sticking ● Pressure regulator valve or plug sticking ● Open in dropping resistor circuit
At stall speed	Line pressure is low.	● Line pressure solenoid valve sticking ● Short circuit of line pressure solenoid valve circuit ● Pressure regulator valve or plug sticking ● Pressure modifier valve sticking ● Pilot valve sticking

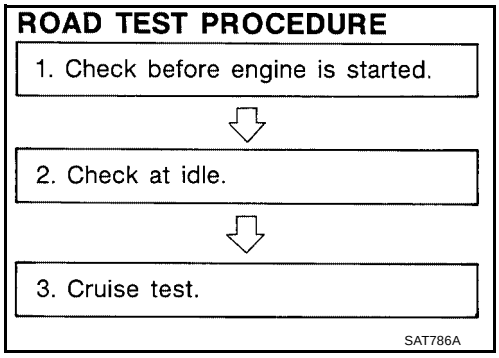
Road Test

ECS0062T

DESCRIPTION

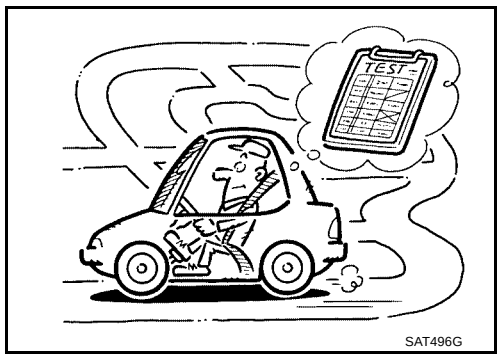
- The purpose of the test is to determine overall performance of A/T and analyze causes of problems.
- The road test consists of the following three parts:

1. Check before engine is started
2. Check at idle
3. Cruise test



SAT786A

- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items until specified symptom is found. Troubleshoot items which check out No Good after road test. Refer to AT-426, "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" and AT-593, "TROUBLE DIAGNOSIS FOR SYMPTOMS" .



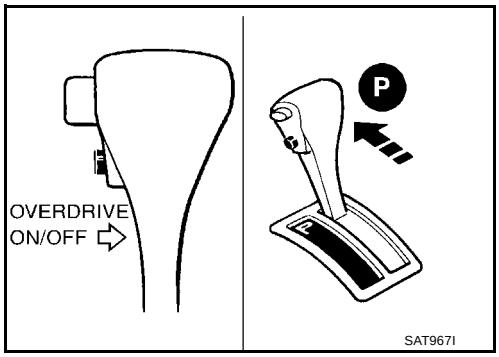
1. CHECK BEFORE ENGINE IS STARTED

1. CHECK O/D OFF INDICATOR LAMP

1. Park vehicle on flat surface.
2. Move selector lever to P position.
3. Turn ignition switch to OFF position. Wait at least 5 seconds.
4. Turn ignition switch to ON position. (Do not start engine.)
5. Does O/D OFF indicator lamp come on for about 2 seconds?

Yes or No

Yes >> GO TO 2.
No >> Stop ROAD TEST. Go to AT-597, "1. O/D OFF Indicator Lamp Does Not Come On" .

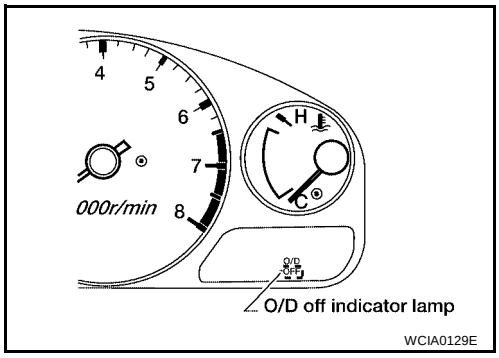


2. CHECK O/D OFF INDICATOR LAMP

Does O/D OFF indicator lamp flicker for about 8 seconds?

Yes or No

Yes >> TCM is in fail-safe mode. Perform self-diagnosis and check NG items on the DIAGNOSTIC WORKSHEET, AT-445 . Refer to AT-439, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .
No >> 1. Turn ignition switch to OFF position.
2. Perform self-diagnosis and note NG items. Refer to AT-439, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .
3. Go to AT-456, "2. CHECK AT IDLE" .



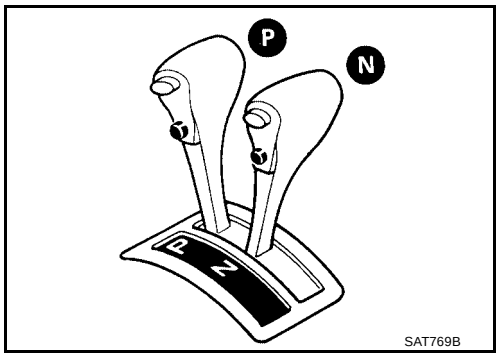
2. CHECK AT IDLE

1. CHECK ENGINE START

1. Park vehicle on flat surface.
2. Move selector lever to P position.
3. Turn ignition switch to OFF position.
4. Turn ignition switch to START position.
5. Is engine started?

Yes or No

Yes >> Stop ROAD TEST.
No >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-598, "2. Engine Cannot Be Started In P and N Position" .



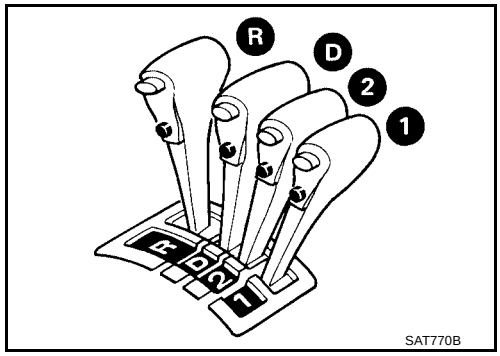
2. CHECK ENGINE START

1. Turn ignition switch to ACC position.
2. Move selector lever to D, 1, 2 or R position.
3. Turn ignition switch to START position.
4. Is engine started?

Yes or No

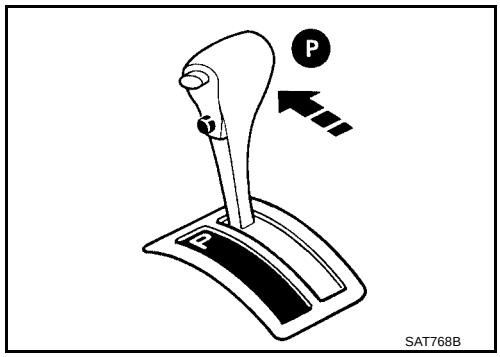
Yes >> Stop ROAD TEST. Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-598, "2. Engine Cannot Be Started In P and N Position" .

No >> GO TO 3.



3. CHECK VEHICLE MOVE

1. Move selector lever to P position.
2. Turn ignition switch to OFF position.
3. Release parking brake.

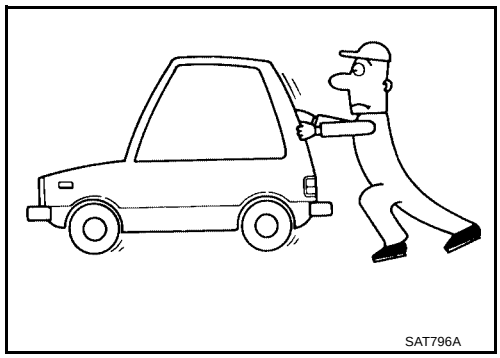


4. Push vehicle forward or backward.
5. Does vehicle move when it is pushed forward or backward?
6. Apply parking brake.

Yes or No

Yes >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-600, "3. In P Position, Vehicle Moves Forward or Backward When Pushed" . Continue ROAD TEST.

No >> GO TO 4.



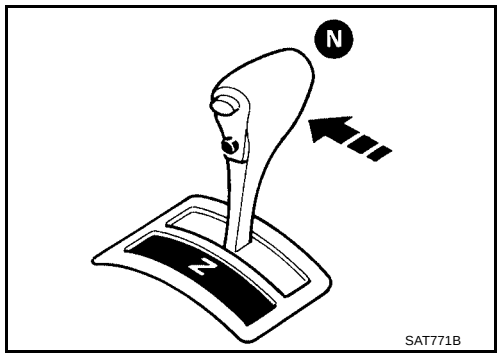
4. CHECK VEHICLE MOVE

1. Start engine.
2. Move selector lever to N position.
3. Release parking brake.
4. Does vehicle move forward or backward?

Yes or No

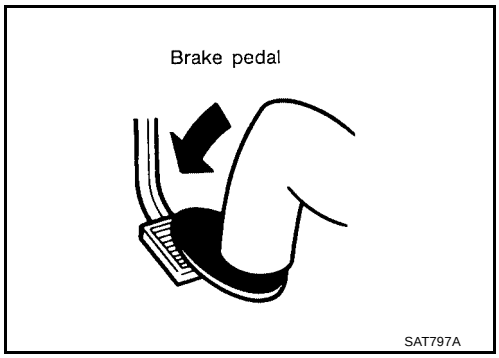
Yes >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-600, "4. In N Position, Vehicle Moves" . Continue ROAD TEST.

No >> GO TO 5.



5. CHECK SHIFT LOCK

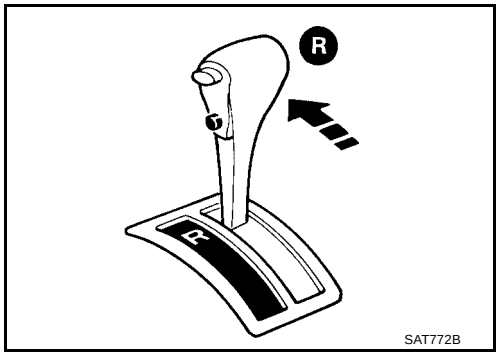
1. Apply foot brake.



2. Move selector lever to R position.
3. Is there large shock when changing from N to R position?

Yes or No

Yes >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-602, "5. Large Shock N → R Position" . Continue ROAD TEST.
No >> GO TO 6.

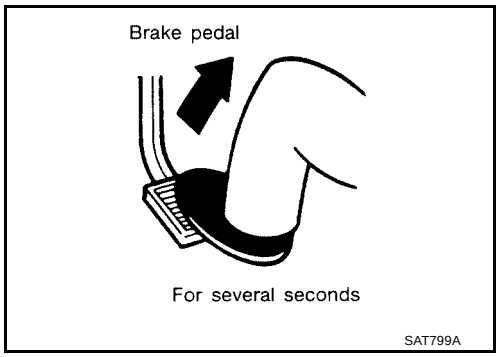


6. CHECK VEHICLE MOVE

1. Release foot brake for several seconds.
2. Does vehicle creep backward when foot brake is released?

Yes or No

Yes >> GO TO 7.
No >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-604, "6. Vehicle Does Not Creep Backward In R Position" . Continue ROAD TEST.

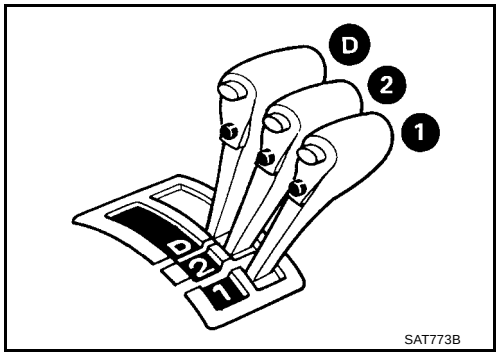


7. CHECK VEHICLE MOVE

1. Move selector lever to D, 2 and 1 positions and check if vehicle creeps forward.
2. Does vehicle creep forward in all three positions?

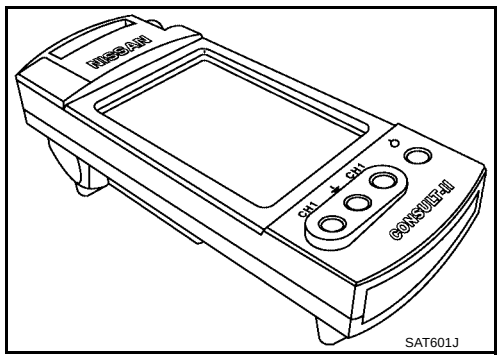
Yes or No

Yes >> Go to AT-459, "3. CRUISE TEST" .
No >> Mark the box on the DIAGNOSTIC WORKSHEET. Go to AT-607, "7. Vehicle Does Not Creep Forward in D, 2 or 1 Position" . Continue ROAD TEST.



3. CRUISE TEST

- Check all items listed in Parts 1 through 3.



With CONSULT-II

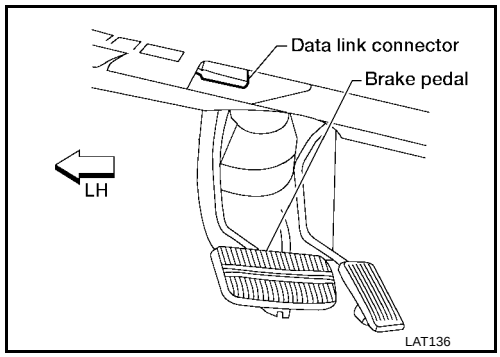
- Using CONSULT-II, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per Shift Schedule. Refer to AT-747, "Shift Schedule"

CONSULT-II Setting Procedure

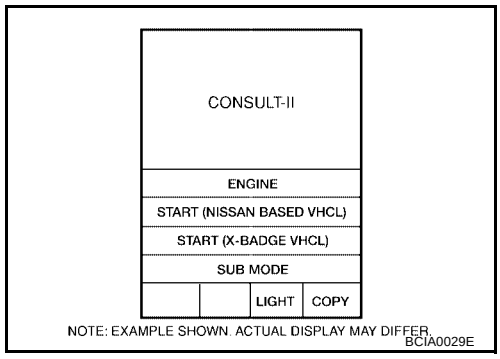
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carries out CAN communication.

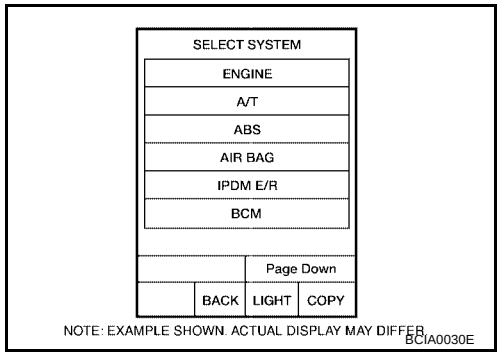
1. With the ignition switch OFF, connect CONSULT-II and CONSULT-II CONVERTER to the data link connector, then turn ignition switch ON.



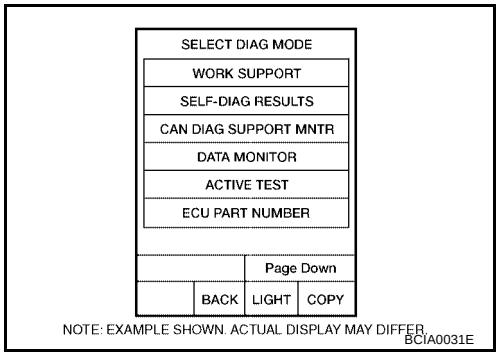
2. Touch “START (NISSAN BASED VHCL)”.



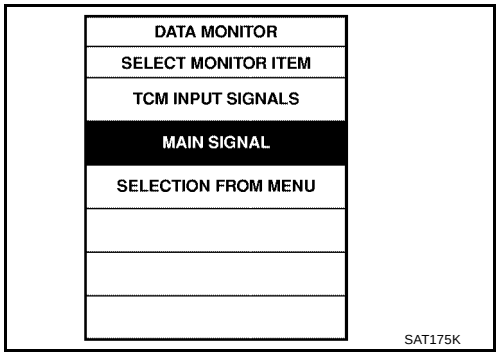
3. Touch “A/T”.



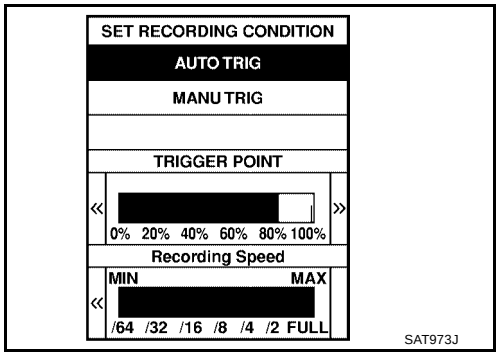
4. Touch “DATA MONITOR”.



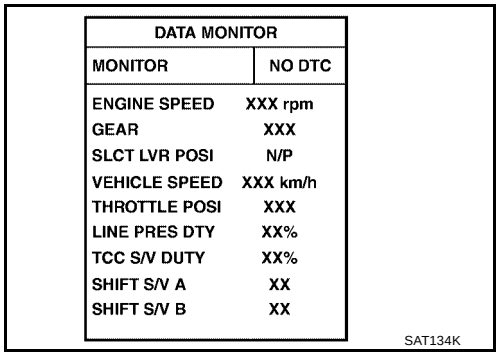
5. Touch “MAIN SIGNAL” or “TCM INPUT SIGNALS”.
6. See “NUMERICAL DISPLAY”, “BARCHART DISPLAY” or “LINE GRAPH DISPLAY”.



7. Touch “SETTING” to set recording condition (“AUTO TRIG” or “MANU TRIG”) and touch “BACK”.
8. Touch “START”.



9. When performing cruise test, touch “RECORD”.



10. After finishing cruise test part 1, touch “STOP”.

DATA MONITOR		
Recording Data	X%	DTC DETECTED
ENGINE SPEED	XXX rpm	
GEAR	XXX	
SLCT LVR POSI	N/P	
VEHICLE SPEED	XXX km/h	
THROTTLE POSI	XXX	
LINE PRES DTY	XX%	
TCC S/V DUTY	XX%	
SHIFT S/V A	XX	
SHIFT S/V B	XX	

SAT135K

11. Touch “STORE” and touch “BACK”.

REAL-TIME DIAG
ENG SPEED SIG

SAT987J

12. Touch “DISPLAY”.
13. Touch “PRINT”.
14. Check the monitor data printed out.
15. Continue cruise test part 2 and 3.

Trigger	VHCL S/SEN A/T	VHCL S/SEN MTR	THRTL POSI SEN
	km/h	km/h	V

SAT975J

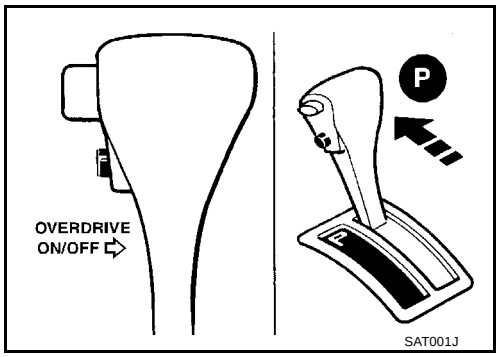
Cruise Test — Part 1

1. CHECK STARTING GEAR (D_1) POSITION

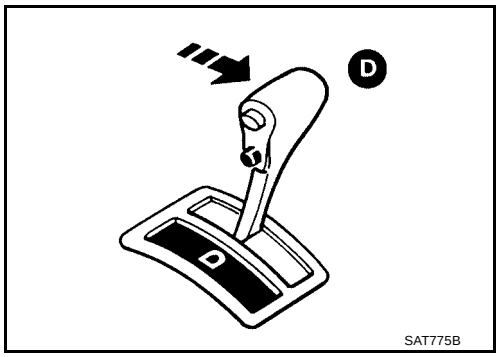
1. Drive vehicle for approx. 10 minutes to warm engine oil and ATF up to operating temperature.

ATF operating temperature	**:50 - 80°C (122 - 176°F)**

2. Park vehicle on flat surface.
3. Set overdrive control switch to ON position.
4. Move selector lever to P position.
5. Start engine.



6. Move selector lever to D position.

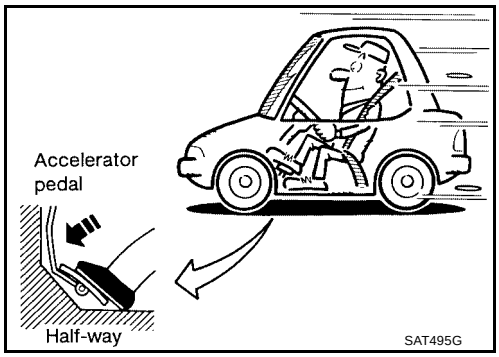


7. Accelerate vehicle by constantly depressing accelerator pedal half-way.
8. Does vehicle start from D_1 ?

Read gear position.

Yes or No

Yes >> GO TO 2.
No >> Go to AT-609, "8. Vehicle Cannot Be Started From D_1" . Continue ROAD TEST.

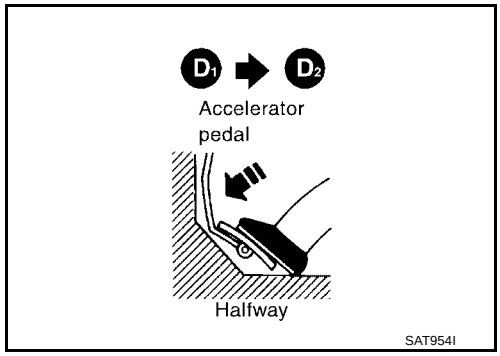


2. CHECK SHIFT UP (D_1 TO D_2)

Does A/T shift from D_1 to D_2 at the specified speed?

Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_1 to D_2 **:Refer to AT-747, "Shift Schedule" .**



Yes or No

Yes >> GO TO 3.

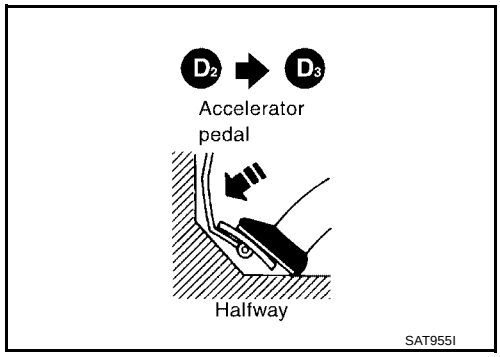
No >> Go to AT-612, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ or Does Not Kickdown: $D_4 \rightarrow D_2$" . Continue ROAD TEST.

3. CHECK SHIFT UP (D_2 TO D_3)

Does A/T shift from D_2 to D_3 at the specified speed?

Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_2 to D_3 **:Refer to AT-747, "Shift Schedule" .**



Yes or No

Yes >> GO TO 4.

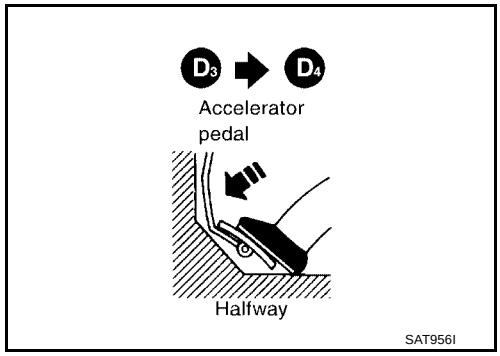
No >> Go to AT-614, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" . Continue ROAD TEST.

4. CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_3 to D_4 **:Refer to AT-747, "Shift Schedule" .**



Yes or No

Yes >> GO TO 5.

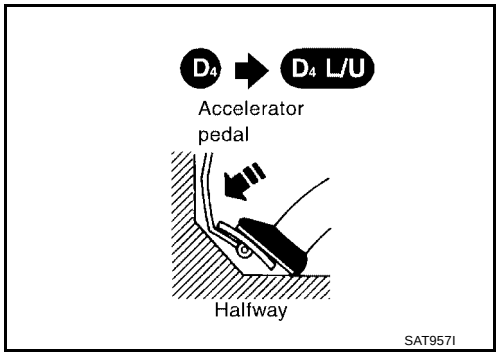
No >> Go to AT-617, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$" . Continue ROAD TEST.

5. CHECK LOCK-UP (D4 TO D4 L/U)

Does A/T perform lock-up at the specified speed?

Read vehicle speed, throttle opening when lock-up duty becomes 94%.

Specified speed when lock-up occurs :Refer to AT-747, "Shift Schedule" .



Yes or No

Yes >> GO TO 6.
No >> Go to AT-619, "12. A/T Does Not Perform Lock-up" . Continue ROAD TEST.

6. CHECK HOLD LOCK-UP

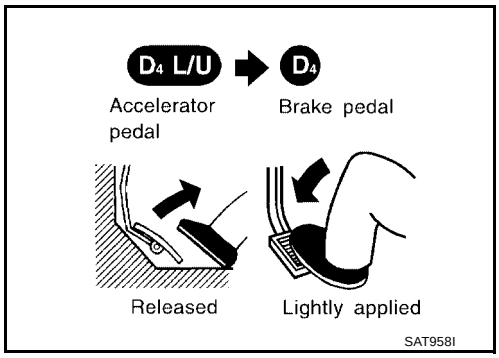
Does A/T hold lock-up condition for more than 30 seconds?

Yes or No

Yes >> GO TO 7.
No >> Go to AT-620, "13. A/T Does Not Hold Lock-up Condition" .

7. CHECK SHIFT DOWN (D4 L/U TO D4)

1. Release accelerator pedal.
2. Is lock-up released when accelerator pedal is released?



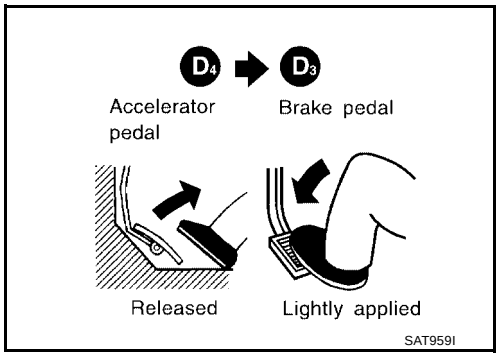
Yes or No

Yes >> GO TO 8.
No >> Go to AT-621, "14. Lock-up Is Not Released" . Continue ROAD TEST.

8. CHECK SHIFT DOWN (D4 TO D3)

1. Decelerate vehicle by applying foot brake lightly.
2. Does engine speed return to idle smoothly when A/T is shifted from D4 to D3 ?

Read gear position and engine speed.



Yes or No

Yes >> 1. Stop vehicle.
2. Go to AT-465, "Cruise Test — Part 2" .
No >> Go to AT-622, "15. Engine Speed Does Not Return To Idle (Light Braking D4 → D3)" . Continue ROAD TEST.

Cruise Test — Part 2

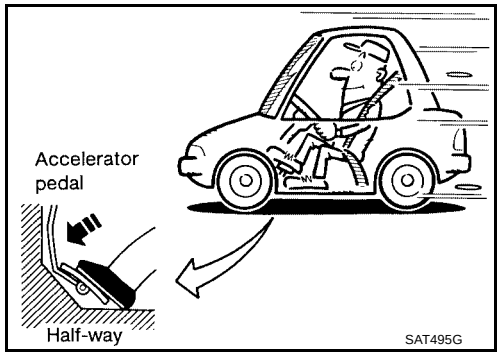
1. CHECK STARTING GEAR (D_1) POSITION

1. Confirm overdrive control switch is in ON position.
2. Confirm selector lever is in D position.
3. Accelerate vehicle by half throttle again.
4. Does vehicle start from D_1 ?

Read gear position.

Yes or No

Yes >> GO TO 2.
No >> Go to AT-624, "16. Vehicle Does Not Start From D_1" . Continue ROAD TEST.



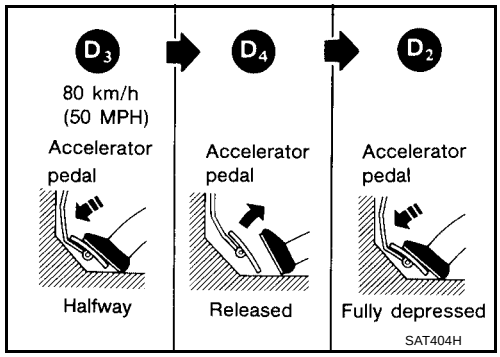
2. CHECK SHIFT UP AND SHIFT DOWN (D_3 TO D_4 TO D_2)

1. Accelerate vehicle to 80 km/h (50 MPH) as shown in illustration.
2. Release accelerator pedal and then quickly depress it fully.
3. Does A/T shift from D_4 to D_2 as soon as accelerator pedal is depressed fully?

Read gear position and throttle opening.

Yes or No

Yes >> GO TO 3.
No >> Go to AT-612, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ or Does Not Kickdown: $D_4 \rightarrow D_2$" . Continue ROAD TEST.



3. CHECK SHIFT UP (D_2 TO D_3)

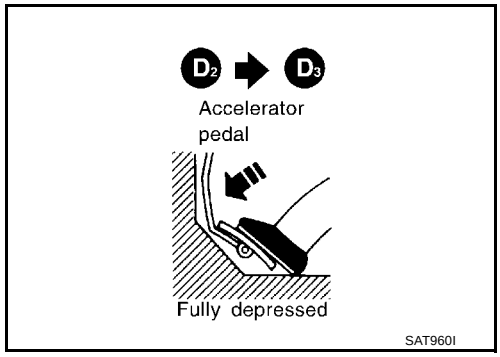
Does A/T shift from D_2 to D_3 at the specified speed?

Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D_2 to D_3 **:Refer to AT-747, "Shift Schedule" .**

Yes or No

Yes >> GO TO 4.
No >> Go to AT-614, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" . Continue ROAD TEST.



4. CHECK SHIFT UP (D_3 TO D_4) AND ENGINE BRAKE

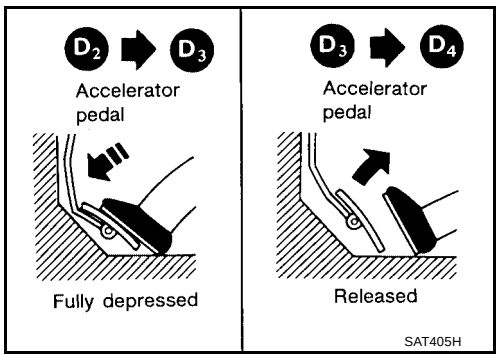
Release accelerator pedal after shifting from D_2 to D_3.
Does A/T shift from D_3 to D_4 and does vehicle decelerate by engine brake?

Read gear position, throttle opening and vehicle speed.

Yes or No

Yes >> 1. Stop vehicle.
2. Go to AT-467, "Cruise Test — Part 3".

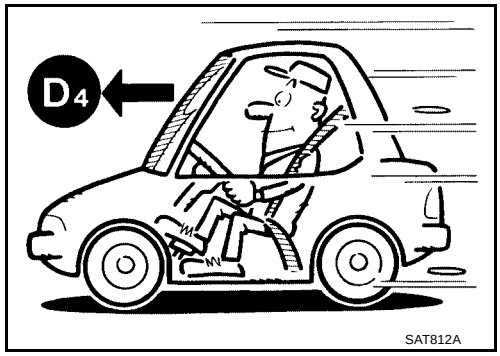
No >> Go to AT-617, "11. A/T Does Not Shift: $D_3 \rightarrow D_4$". Continue ROAD TEST.



Cruise Test — Part 3

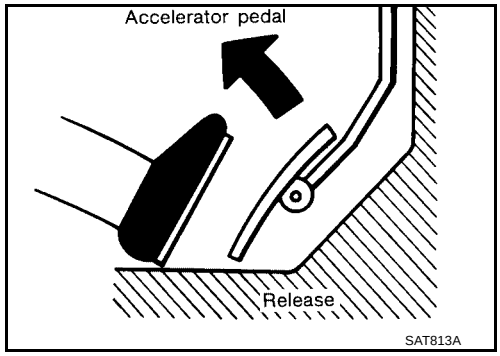
1. VEHICLE SPEED (D_4) POSITION

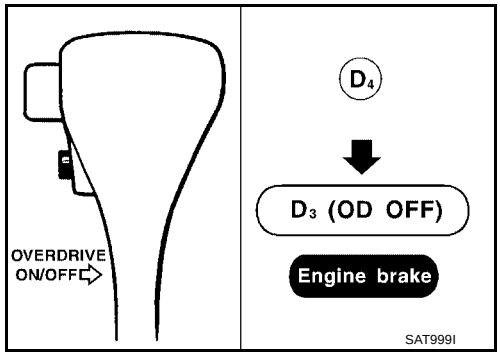
1. Confirm overdrive control switch is in ON position.
2. Confirm selector lever is in D position.
3. Accelerate vehicle using half-throttle to D_4.



4. Release accelerator pedal.
5. Set overdrive control switch to OFF position while driving in D_4.
6. Does A/T shift from D_4 to D_3 (O/D OFF)?

Read gear position and vehicle speed.





Yes or No

Yes >> GO TO 2.

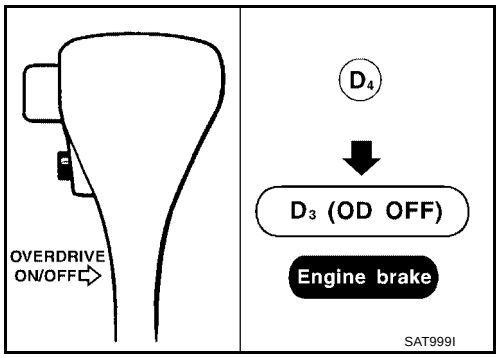
No >> Go to AT-625, "17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch ON → OFF". Continue ROAD TEST.

2. CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

Yes or No

Yes >> GO TO 3.
No >> Go to AT-622, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" . Continue ROAD TEST.



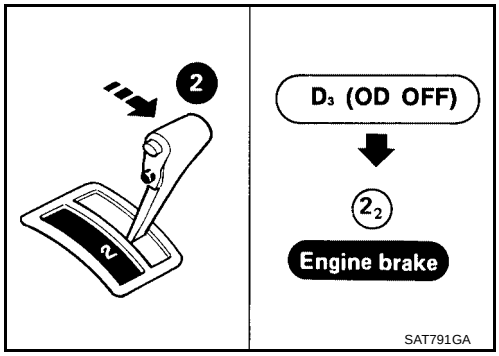
3. CHECK SHIFT DOWN (D_3 TO D_2)

1. Move selector lever from D to 2 position while driving in D_3 (O/D OFF).
2. Does A/T shift from D_3 (O/D OFF) to 2_2 ?

Read gear position.

Yes or No

Yes >> GO TO 4.
No >> Go to AT-625, "18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever D → 2 Position" . Continue ROAD TEST.

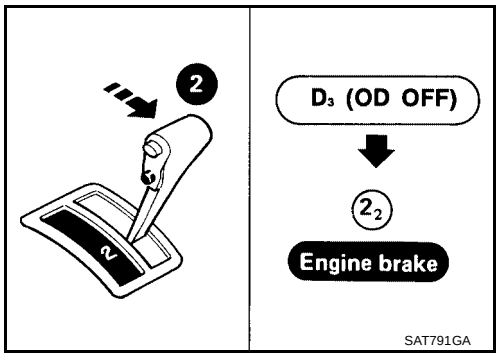


4. CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

Yes or No

Yes >> GO TO 5.
No >> Go to AT-622, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)" . Continue ROAD TEST.



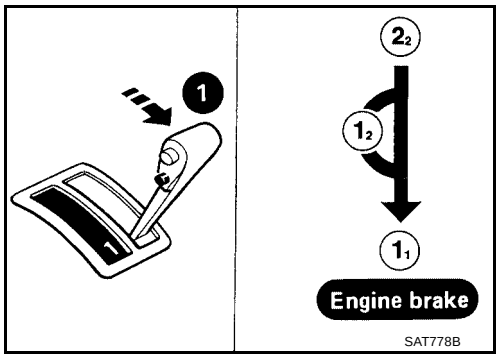
5. CHECK SHIFT DOWN (2_2 TO 1_1)

1. Move selector lever from 2 to 1 position while driving in 2_2 .
2. Does A/T shift from 2_2 to 1_1 position?

Read gear position.

Yes or No

Yes >> GO TO 6.
No >> Go to AT-626, "19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever 2 → 1 Position" . Continue ROAD TEST.



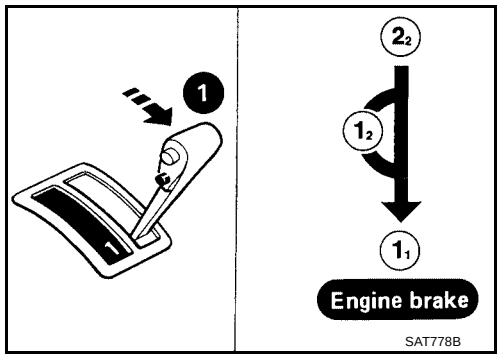
6. CHECK ENGINE BRAKE

Does vehicle decelerate by engine brake?

Yes or No

Yes >> 1. Stop vehicle.
2. Perform self-diagnosis. Refer to AT-439, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .

No >> Go to AT-627, "20. Vehicle Does Not Decelerate By Engine Brake" . Continue ROAD TEST.



TROUBLE DIAGNOSIS - GENERAL DESCRIPTION

PFP:00000

Symptom Chart

ECS0062U

Numbers are arranged in order of inspection.
Perform inspections starting with number one and work up.

Items	Symptom	Condition	Diagnostic Item	Reference Page
No Lock-up Engagement/ TCC Inoperative	Torque converter is not locked up.	ON vehicle	1. Throttle position sensor {accelerator pedal position (APP) sensor]	AT-559
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-499, AT-576
			3. Engine speed signal	AT-504
			4. A/T fluid temperature sensor	AT-569
			5. Line pressure test	AT-453
			6. Torque converter clutch solenoid valve	AT-530
			7. Control valve assembly	AT-639
		OFF vehicle	8. Torque converter	AT-652
	Torque converter clutch piston slip.	ON vehicle	1. Fluid level	AT-449
			2. Throttle position sensor {accelerator pedal position (APP) sensor]	AT-559
			3. Line pressure test	AT-453
			4. Torque converter clutch solenoid valve	AT-530
			5. Line pressure solenoid valve	AT-543
			6. Control valve assembly	AT-639
		OFF vehicle	7. Torque converter	AT-652
	Lock-up point is extremely high or low.	ON vehicle	1. Throttle position sensor {accelerator pedal position (APP) sensor]	AT-559
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-499, AT-576
			3. Torque converter clutch solenoid valve	AT-530
			4. Control valve assembly	AT-639
Shift Shock	Sharp shock in shifting from N to D position.	ON vehicle	1. Engine idling rpm	EC-726
			2. Throttle position sensor {accelerator pedal position (APP) sensor]	AT-559
			3. Line pressure test	AT-453
			4. A/T fluid temperature sensor	AT-569
			5. Engine speed signal	AT-504
			6. Line pressure solenoid valve	AT-543
			7. Control valve assembly	AT-639
			8. Accumulator N-D	AT-652
		OFF vehicle	9. Forward clutch	AT-697

Items	Symptom	Condition	Diagnostic Item	Reference Page
Shift Shock	Too sharp a shock in change from D_1 to D_2.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			2. Line pressure test	AT-453
			3. Accumulator servo release	AT-652
			4. Control valve assembly	AT-639
			5. A/T fluid temperature sensor	AT-569
		OFF vehicle	6. Brake band	AT-652
	Too sharp a shock in change from D_2 to D_3.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			2. Line pressure test	AT-453
			3. Control valve assembly	AT-639
			4. A/T fluid temperature sensor	AT-493
		OFF vehicle	5. High clutch	AT-692
			6. Brake band	AT-652
	Too sharp a shock in change from D_3 to D_4.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			2. Line pressure test	AT-453
			3. Control valve assembly	AT-639
			4. A/T fluid temperature sensor	AT-493
		OFF vehicle	5. Brake band	AT-652
			6. Overrun clutch	AT-697
			7. Forward one-way clutch	AT-652
	Gear change shock felt during deceleration by releasing accelerator pedal.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			2. Line pressure test	AT-453
			3. Overrun clutch solenoid valve	AT-564
			4. Control valve assembly	AT-639
	Large shock changing from 1_2 to 1_1 in 1 position.	ON vehicle	1. Control valve assembly	AT-639
		ON vehicle	2. Low & reverse brake	AT-703
Improper Shift Timing	Too high a gear change point from D_1 to D_2, from D_2 to D_3, from D_3 to D_4.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-499, AT-576
			3. Shift solenoid valve A	AT-549
			4. Shift solenoid valve B	AT-554
	Gear change directly from D_1 to D_3 occurs.	ON vehicle	1. Fluid level	AT-449
			2. Accumulator servo release	AT-652
		OFF vehicle	3. Brake band	AT-652
	Too high a change point from D_4 to D_3, from D_3 to D_2, from D_2 to D_1.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-499, AT-576

Items	Symptom	Condition	Diagnostic Item	Reference Page
Improper Shift Timing	Kickdown does not operate when depressing pedal in D4 within kickdown vehicle speed.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			2. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-499, AT-576
			3. Shift solenoid valve A	AT-549
			4. Shift solenoid valve B	AT-554
	Kickdown operates or engine overruns when depressing pedal in D4 beyond kickdown vehicle speed limit.	ON vehicle	1. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-499, AT-576
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			3. Shift solenoid valve A	AT-549
			4. Shift solenoid valve B	AT-554
	Gear change from 22 to 23 in 2 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-641
			2. Control cable adjustment	AT-642
	Gear change from 11 to 12 in 1 position.	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-641
			2. Control cable adjustment	AT-642
No Down Shift	Failure to change gear from D4 to D3 .	ON vehicle	1. Fluid level	AT-449
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			3. Overrun clutch solenoid valve	AT-564
			4. Shift solenoid valve A	AT-549
			5. Line pressure solenoid valve	AT-543
			6. Control valve assembly	AT-639
		OFF vehicle	7. Brake band	AT-652
			8. Overrun clutch	AT-697
	Failure to change gear from D3 to D2 or from D4 to D2 .	ON vehicle	1. Fluid level	AT-449
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			3. Shift solenoid valve A	AT-549
			4. Shift solenoid valve B	AT-554
			5. Control valve assembly	AT-639
		OFF vehicle	6. High clutch	AT-692
			7. Brake band	AT-652
	Failure to change gear from D2 to D1 or from D3 to D1 .	ON vehicle	1. Fluid level	AT-449
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			3. Shift solenoid valve A	AT-549
			4. Shift solenoid valve B	AT-554
			5. Control valve assembly	AT-639
		OFF vehicle	6. Low one-way clutch	AT-652
			7. High clutch	AT-692
			8. Brake band	AT-652

Items	Symptom	Condition	Diagnostic Item	Reference Page
No Down Shift	Failure to change from D_3 to 2_2 when changing lever into 2 position. AT-625	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			2. Shift solenoid valve B	AT-554
			3. Control valve assembly	AT-639
			4. Control cable adjustment	AT-642
		OFF vehicle	5. Brake band	AT-652
	Does not change from 1_2 to 1_1 in 1 position.	ON vehicle	1. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-499, AT-576
			2. Shift solenoid valve A	AT-549
			3. Control valve assembly	AT-639
		OFF vehicle	4. Overrun clutch	AT-697
			5. Brake band	AT-652
			6. Low & reverse brake	AT-703
No Up Shift	Failure to change gear from D_1 to D_2 .	ON vehicle	1. Control cable adjustment	AT-642
			2. Shift solenoid valve A	AT-549
			3. Control valve assembly	AT-639
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-499, AT-576
			5. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
		OFF vehicle	6. Brake band	AT-652
	Failure to change gear from D_2 to D_3 .	ON vehicle	1. Control cable adjustment	AT-642
			2. Shift solenoid valve B	AT-554
			3. Control valve assembly	AT-639
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-499, AT-576
			5. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
		OFF vehicle	6. High clutch	AT-692
			7. Brake band	AT-652
No Up Shift	Failure to change gear from D_3 to D_4 .	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-641
			2. Overdrive control switch	AT-627
			3. Shift solenoid valve A	AT-549
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-499, AT-576
			5. Throttle position sensor [accelerator pedal position (APP) sensor	AT-641
			6. A/T fluid temperature sensor	AT-569
		OFF vehicle	7. Brake band	AT-652

Items	Symptom	Condition	Diagnostic Item	Reference Page
No Up Shift	A/T does not shift to D4 when driving with overdrive control switch ON.	ON vehicle	1. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			2. Park/neutral position (PNP) switch adjustment	AT-641
			3. Overdrive control switch	AT-627
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-499, AT-576
			5. Shift solenoid valve A	AT-549
			6. Overrun clutch solenoid valve	AT-564
			7. Control valve assembly	AT-639
			8. A/T fluid temperature sensor	AT-569
			9. Line pressure solenoid valve	AT-543
		OFF vehicle	10. Brake band	AT-652
			11. Overrun clutch	AT-697
Slips/Will Not Engage	Vehicle will not run in R position (but runs in D, 2 and 1 positions). Clutch slips. Very poor acceleration. AT-604	ON vehicle	1. Control cable adjustment	AT-642
			2. Line pressure test	AT-453
			3. Stall test	AT-449
			4. Line pressure solenoid valve	AT-543
			5. Control valve assembly	AT-639
		OFF vehicle	6. Reverse clutch	AT-689
			7. High clutch	AT-692
			8. Forward clutch	AT-697
			9. Overrun clutch	AT-697
			10. Low & reverse brake	AT-703
	Vehicle will not run in D and 2 positions (but runs in 1 and R positions).	ON vehicle	1. Control cable adjustment	AT-642
		OFF vehicle	2. Low one-way clutch	AT-652
Slips/Will Not Engage	Vehicle will not run in D, 1, 2 positions (but runs in R position). Clutch slips. Very poor acceleration. AT-607	ON vehicle	1. Fluid level	AT-449
			2. Stall test	AT-449
			3. Line pressure test	AT-453
			4. Line pressure solenoid valve	AT-543
			5. Control valve assembly	AT-639
			6. Accumulator N-D	AT-652
		OFF vehicle	7. Reverse clutch	AT-689
			8. High clutch	AT-692
			9. Forward clutch	AT-697
			10. Forward one-way clutch	AT-652
			11. Low one-way clutch	AT-652

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Clutches or brakes slip somewhat in starting.	ON vehicle	1. Fluid level	AT-449
			2. Control cable adjustment	AT-642
			3. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			4. Line pressure test	AT-453
			5. Line pressure solenoid valve	AT-543
			6. Control valve assembly	AT-639
			7. Accumulator N-D	AT-652
			8. Shift solenoid valve A	AT-549
			9. Shift solenoid valve B	AT-554
			10. Overrun clutch solenoid valve	AT-564
			11. Torque converter clutch solenoid valve	AT-530
		OFF vehicle	12. Forward clutch	AT-697
			13. Reverse clutch	AT-689
			14. Low & reverse brake	AT-703
			15. Oil pump	AT-670
			16. Torque converter	AT-652
	No creep at all. AT-604, AT-607	ON vehicle	1. Fluid level	AT-449
			2. Line pressure test	AT-453
			3. Control valve assembly	AT-639
		OFF vehicle	4. Forward clutch	AT-697
			5. Oil pump	AT-670
			6. Torque converter	AT-652
	Almost no shock or clutches slipping in change from D_1 to D_2.	ON vehicle	1. Fluid level	AT-449
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			3. Line pressure test	AT-453
			4. Accumulator servo release	AT-652
			5. Control valve assembly	AT-639
		OFF vehicle	6. Brake band	AT-652

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Almost no shock or slipping in change from D_2 to D_3 .	ON vehicle	1. Fluid level	AT-449
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			3. Line pressure test	AT-453
			4. Control valve assembly	AT-639
		OFF vehicle	5. High clutch	AT-692
			6. Forward clutch	AT-697
	Almost no shock or slipping in change from D_3 to D_4 .	ON vehicle	1. Fluid level	AT-449
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			3. Line pressure test	AT-453
			4. Control valve assembly	AT-639
		OFF vehicle	5. Brake band	AT-652
	Races extremely fast or slips in changing from D_4 to D_3 when depressing pedal.	ON vehicle	1. Fluid level	AT-449
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			3. Line pressure test	AT-453
			4. Line pressure solenoid valve	AT-543
			5. Shift solenoid valve B	AT-549
			6. Control valve assembly	AT-639
		OFF vehicle	7. Brake band	AT-652
			8. Forward clutch	AT-697
	Races extremely fast or slips in changing from D_4 to D_2 when depressing pedal.	ON vehicle	1. Fluid level	AT-449
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			3. Line pressure test	AT-453
			4. Line pressure solenoid valve	AT-543
			5. Shift solenoid valve A	AT-549
			6. Shift solenoid valve B	AT-549
			7. Control valve assembly	AT-639
		OFF vehicle	8. Brake band	AT-652
			9. High clutch	AT-692
			10. Forward clutch	AT-697
	Races extremely fast or slips in changing from D_3 to D_2 when depressing pedal.	ON vehicle	1. Fluid level	AT-449
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			3. Line pressure test	AT-453
			4. Line pressure solenoid valve	AT-543
			5. Control valve assembly	AT-639
			6. Shift solenoid valve B	AT-549
		OFF vehicle	7. Brake band	AT-652
			8. High clutch	AT-692

Items	Symptom	Condition	Diagnostic Item	Reference Page
Slips/Will Not Engage	Races extremely fast or slips in changing from D_4 or D_3 to D_1 when depressing pedal.	ON vehicle	1. Fluid level	AT-449
			2. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			3. Line pressure test	AT-453
			4. Line pressure solenoid valve	AT-543
			5. Shift solenoid valve A	AT-549
			6. Shift solenoid valve B	AT-549
			7. Control valve assembly	AT-639
		OFF vehicle	8. Forward clutch	AT-697
			9. Forward one-way clutch	AT-652
			10. Low one-way clutch	AT-652
	Vehicle will not run in any position.	ON vehicle	1. Fluid level	AT-449
			2. Control cable adjustment	AT-642
			3. Line pressure test	AT-453
			4. Line pressure solenoid valve	AT-543
		OFF vehicle	5. Oil pump	AT-670
			6. High clutch	AT-692
			7. Brake band	AT-652
			8. Low & reverse brake	AT-703
			9. Torque converter	AT-652
			10. Parking components	AT-667
NOT USED	Engine cannot be started in P and N positions. AT-598	ON vehicle	1. Ignition switch and starter	PG-3, SC-9
			2. Control cable adjustment	AT-642
			3. Park/neutral position (PNP) switch adjustment	AT-641
	Engine starts in positions other than P and N. AT-598	ON vehicle	1. Control cable adjustment	AT-642
			2. Park/neutral position (PNP) switch adjustment	AT-641
	Transaxle noise in P and N positions.	ON vehicle	1. Fluid level	AT-449
			2. Line pressure test	AT-453
			3. Throttle position sensor [accelerator pedal position (APP) sensor] (Adjustment)	EC-748
			4. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-499, AT-576
		OFF vehicle	5. Oil pump	AT-670
			6. Torque converter	AT-652
	Vehicle moves when changing into P position or parking gear does not disengage when shifted out of P position. AT-600	ON vehicle	1. Control cable adjustment	AT-642
		OFF vehicle	2. Parking components	AT-667

Items	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	Vehicle runs in N position. AT-600	ON vehicle	1. Control cable adjustment	AT-642
		OFF vehicle	2. Forward clutch	AT-697
			3. Reverse clutch	AT-689
			4. Overrun clutch	AT-697
	Vehicle braked when shifting into R position.	ON vehicle	1. Fluid level	AT-449
			2. Line pressure test	AT-453
			3. Line pressure solenoid valve	AT-543
			4. Control valve assembly	AT-639
		OFF vehicle	5. High clutch	AT-692
			6. Brake band	AT-652
			7. Forward clutch	AT-697
			8. Overrun clutch	AT-697
	Excessive creep.	ON vehicle	1. Engine idling rpm	EC-726
	Engine stops when shifting lever into R, D, 2 and 1.	ON vehicle	1. Engine idling rpm	EC-726
			2. Fluid level	AT-449
			3. Torque converter clutch solenoid valve	AT-530
			4. Control valve assembly	AT-639
		OFF vehicle	5. Torque converter	AT-652
	Vehicle braked by gear change from D_1 to D_2.	ON vehicle	1. Fluid level	AT-449
		OFF vehicle	2. Reverse clutch	AT-689
			3. Low & reverse brake	AT-703
			4. High clutch	AT-692
			5. Low one-way clutch	AT-652
	Vehicle braked by gear change from D_2 to D_3.	ON vehicle	1. Fluid level	AT-449
		OFF vehicle	2. Brake band	AT-652
	Vehicle braked by gear change from D_3 to D_4.	ON vehicle	1. Fluid level	AT-449
		OFF vehicle	2. Overrun clutch	AT-697
			3. Forward one-way clutch	AT-652
			4. Reverse clutch	AT-689

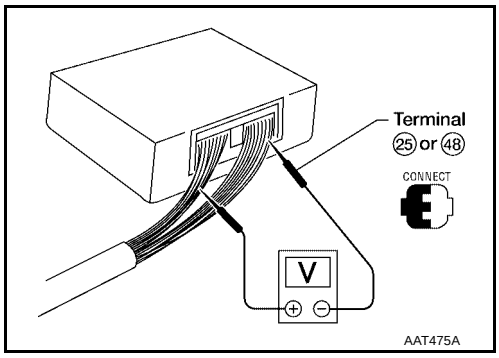
Items	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	Maximum speed not attained. Acceleration poor.	ON vehicle	1. Fluid level	AT-449
			2. Park/neutral position (PNP) switch adjustment	AT-641
			3. Overdrive control switch	AT-627
			4. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			5. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-499, AT-576
			6. Shift solenoid valve A	AT-549
			7. Shift solenoid valve B	AT-554
			8. Control valve assembly	AT-639
		OFF vehicle	9. Reverse clutch	AT-689
			10. High clutch	AT-692
			11. Brake band	AT-652
			12. Low & reverse brake	AT-703
			13. Oil pump	AT-670
			14. Torque converter	AT-652
	Transaxle noise in D, 2, 1 and R positions.	ON vehicle	1. Fluid level	AT-449
		ON vehicle	2. Torque converter	AT-652
	Engine brake does not operate in “1” position. AT-627	ON vehicle	1. Park/neutral position (PNP) switch adjustment	AT-641
			2. Control cable adjustment	AT-642
			3. Vehicle speed sensor·A/T (Revolution sensor) and vehicle speed sensor·MTR	AT-499, AT-576
			4. Control valve assembly	AT-639
			5. Overrun clutch solenoid valve	AT-564
		OFF vehicle	6. Overrun clutch	AT-697
			7. Low & reverse brake	AT-703
	Transaxle overheats.	ON vehicle	1. Fluid level	AT-449
			2. Engine idling rpm	EC-726
			3. Throttle position sensor [accelerator pedal position (APP) sensor]	AT-559
			4. Line pressure test	AT-453
			5. Line pressure solenoid valve	AT-543
			6. Control valve assembly	AT-639
		OFF vehicle	7. Oil pump	AT-670
			8. Reverse clutch	AT-689
			9. High clutch	AT-692
			10. Brake band	AT-652
			11. Forward clutch	AT-697
			12. Overrun clutch	AT-697
			13. Low & reverse brake	AT-703
			14. Torque converter	AT-652

Items	Symptom	Condition	Diagnostic Item	Reference Page
NOT USED	ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	ON vehicle	1. Fluid level	AT-449
		OFF vehicle	2. Reverse clutch	AT-689
			3. High clutch	AT-692
			4. Brake band	AT-652
			5. Forward clutch	AT-697
			6. Overrun clutch	AT-697
			7. Low & reverse brake	AT-703
	Offensive smell at fluid charging pipe.	ON vehicle	1. Fluid level	AT-449
		OFF vehicle	2. Torque converter	AT-652
			3. Oil pump	AT-670
			4. Reverse clutch	AT-689
			5. High clutch	AT-692
			6. Brake band	AT-652
			7. Forward clutch	AT-697
			8. Overrun clutch	AT-697
			9. Low & reverse brake	AT-703

TCM Terminals and Reference Value

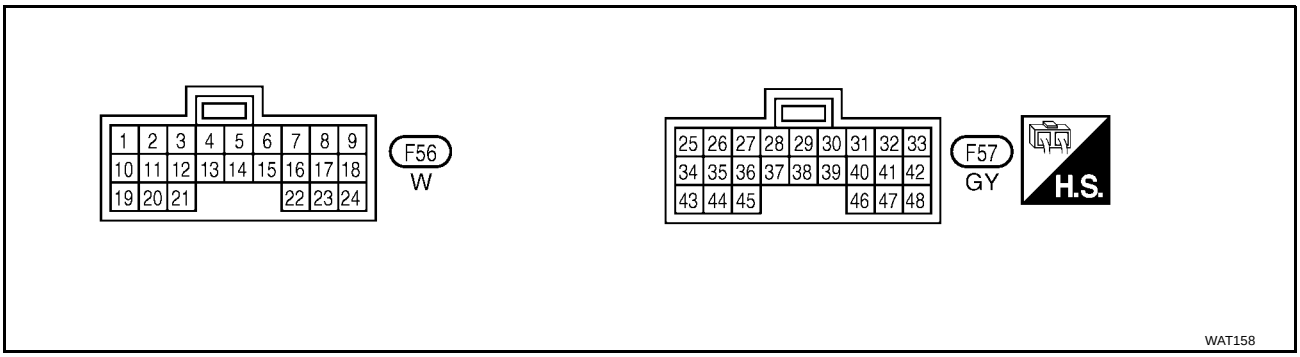
ECS0062V

PREPARATION



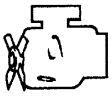
- Measure voltage between each terminal and terminal 25 or 48 by following “TCM INSPECTION TABLE”.

TCM HARNESS CONNECTOR TERMINAL LAYOUT



TCM INSPECTION TABLE

(Data are reference values.)

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
1	R/W	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 3.0V
				When depressing accelerator pedal fully after warming up engine.	0V
2	P/B	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	4 - 14V
				When depressing accelerator pedal fully after warming up engine.	0V
3	Y/G	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V
				When A/T does not perform lock-up.	0V
5*	L	CAN-H	—	—	—
6*	Y	CAN-L	—	—	—
10	BR/R	Power source		When turning ignition switch to ON.	Battery voltage
				When turning ignition switch to OFF.	0V
11	L/W	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in D_1 or D_4.)	Battery voltage
				When shift solenoid valve A does not operate. (When driving in D_2 or D_3.)	0V
12	L/Y	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in D_1 or D_2.)	Battery voltage
				When shift solenoid valve B does not operate. (When driving in D_3 or D_4.)	0V
19	BR/R	Power source		With ignition switch ON.	Battery voltage
				With ignition switch OFF.	0V
20	L/B	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage
				When overrun clutch solenoid valve does not operate.	0V
25	B	Ground	—	—	—
26	BR/Y	PNP switch 1 position		When setting selector lever to 1 position.	Battery voltage
				When setting selector lever to other positions.	0V
27	B/R	PNP switch 2 position		When setting selector lever to 2 position.	Battery voltage
				When setting selector lever to other positions.	0V
28	R/B	Power source (Memory back-up)		With ignition switch OFF.	Battery voltage
				With ignition switch ON.	Battery voltage

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
29	W	Revolution sensor		When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function.*1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	450 Hz
				When vehicle is parked.	Under 1.3V or over 4.5V
30**	G/B	Data link connector (RX)		—	—
31**	GY/L	Data link connector (TX)		—	—
32	R	Sensor power		Ignition switch ON.	4.5 - 5.5V
				Ignition switch OFF.	0V
34	W/G	PNP switch D position		When setting selector lever to D position.	Battery voltage
				When setting selector lever to other positions.	0V
35	G/Y	PNP switch R position		When setting selector lever to R position.	Battery voltage
				When setting selector lever to other positions.	0V
36	LG	PNP switch P or N position		When setting selector lever to P or N position.	Battery voltage
				When setting selector lever to other positions.	0V
38	G	Turbine revolution sensor		When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function.*1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	240 Hz
				When vehicle is parked.	Under 1.3V or over 4.5V
39	L/OR	Engine speed signal		Refer to EC-782, "ECM INSPECTION TABLE" .	
40	PU/R	Vehicle speed sensor		When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Voltage varies between less than 1V and more than 4.5V

Terminal No.	Wire color	Item	Condition		Judgement standard (Approx.)
41	GY	Throttle position sensor [accelerator pedal position (APP) sensor]		When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: 0.5V Fully-open throttle: 4V
42	B/W	Sensor ground	—	—	—
47	BR	A/T fluid temperature sensor		When ATF temperature is 20°C (68°F).	1.5V
				When ATF temperature is 80°C (176°F).	0.5V
48	B	Ground	—	—	—

*: These terminals are connected to the ECM.
**: These terminals are connected to the Data link connector.

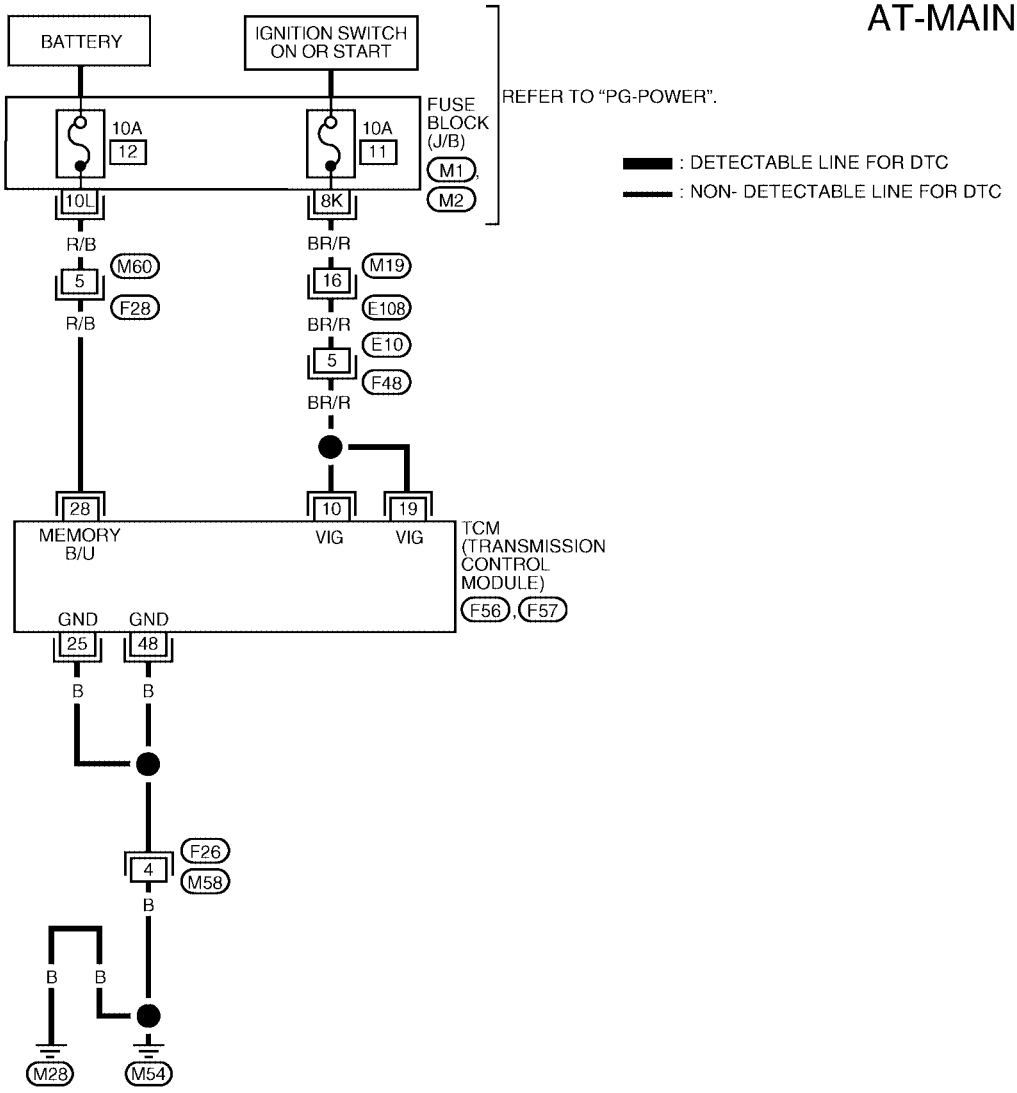
TROUBLE DIAGNOSIS FOR POWER SUPPLY

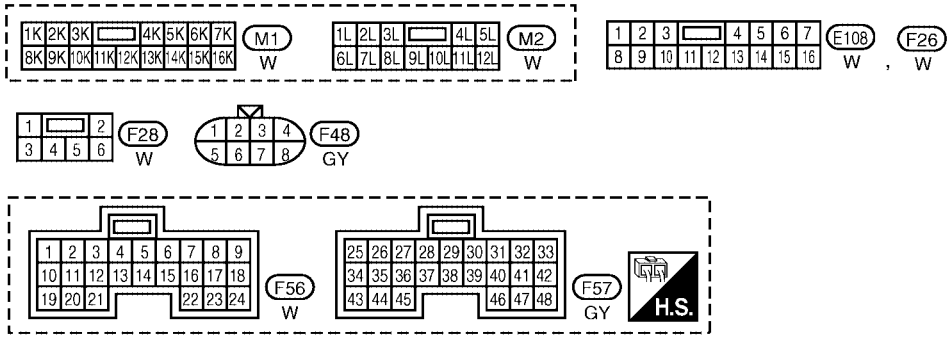
PFP:00000

Wiring Diagram — AT — MAIN

ECS0062X

AT-MAIN-01





BCWA0234E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)

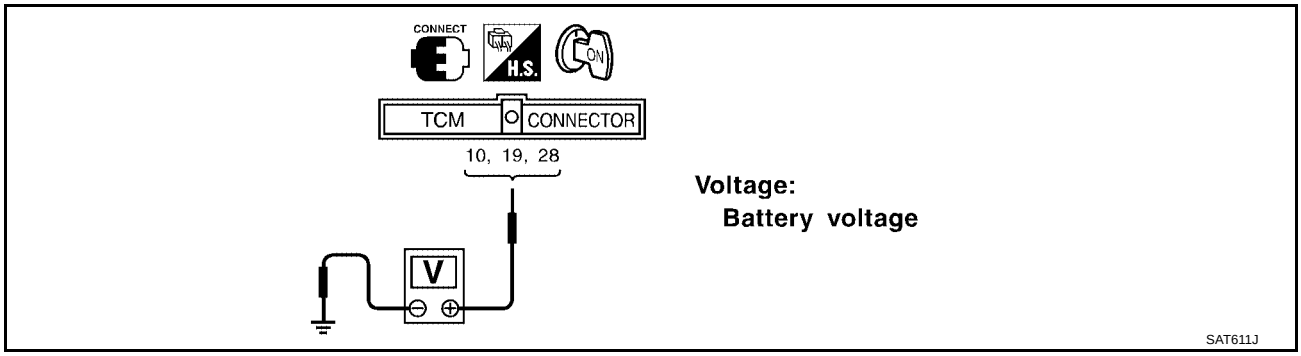
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	BR/R	POWER SOURCE	IGNITION ON	BATTERY VOLTAGE
			IGNITION OFF	APPROX. 0V
19	BR/R	POWER SOURCE	IGNITION ON	BATTERY VOLTAGE
			IGNITION OFF	APPROX. 0V
25	B	GROUND	—	—
28	R/B	POWER SOURCE (MEMORY BACKUP)	IGNITION ON	BATTERY VOLTAGE
			IGNITION OFF	BATTERY VOLTAGE
48	B	GROUND	—	—

Diagnostic Procedure

ECS0062Y

1. CHECK TCM POWER SOURCE STEP 1

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM terminals 10 (BR/R), 19 (BR/R), 28 (R/B) and ground.

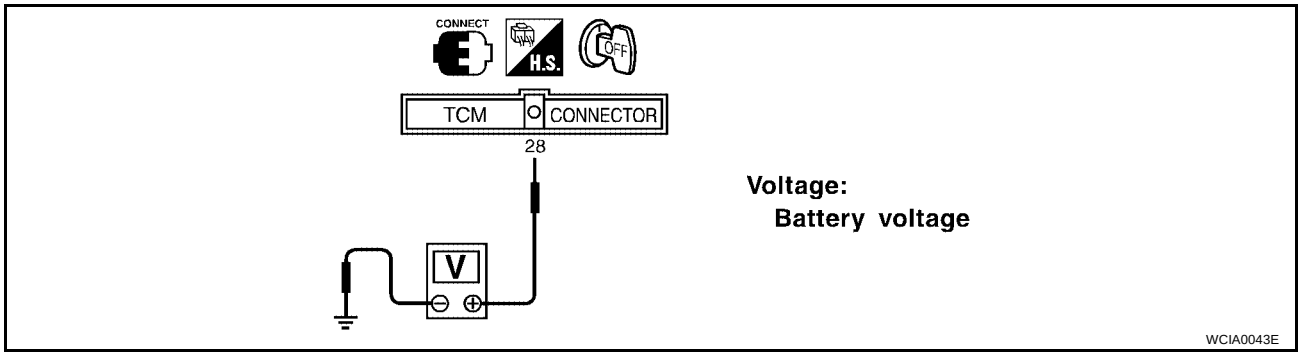


OK or NG

OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK TCM POWER SOURCE STEP 2

1. Turn ignition switch to OFF position.
2. Check voltage between TCM terminal 28 (R/B) and ground.



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short or open between ignition switch and TCM terminals 10, 19 and 28 (Main harness)
- Fuse
- Ignition switch
  Refer to PG-3, "POWER SUPPLY ROUTING" .

OK or NG

OK >> GO TO 4.
NG >> Repair or replace damaged parts.

4. CHECK TCM GROUND CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between TCM terminals 25, 48 and ground. Refer to AT-484, "Wiring Diagram — AT — MAIN" .

Continuity should exist.

OK or NG

OK >> **INSPECTION END**
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

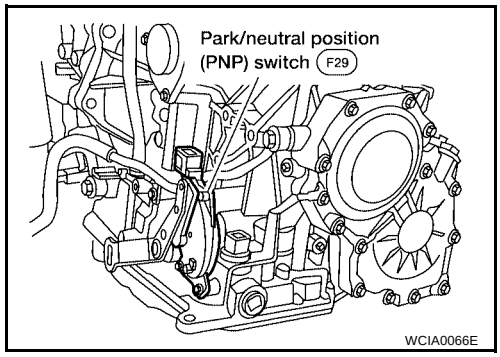
DTC P0705 PARK/NEUTRAL POSITION SWITCH

PFP:32006

Description

ECS0062Z

- The park/neutral position (PNP) switch includes a transmission range switch.
- The transmission range switch detects the selector lever position and sends a signal to the TCM.



On Board Diagnosis Logic

ECS00630

Diagnostic trouble code PNP SW/CIRC with CONSULT-II or P0705 without CONSULT-II is detected when TCM does not receive the correct voltage signal from the switch based on the gear position.

Possible Cause

ECS00631

Check the following items.

- Harness or connectors
  (The park/neutral position (PNP) switch circuit is open or shorted.)
- Park/neutral position (PNP) switch

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS00632

CAUTION:

Always drive vehicle at a safe speed.

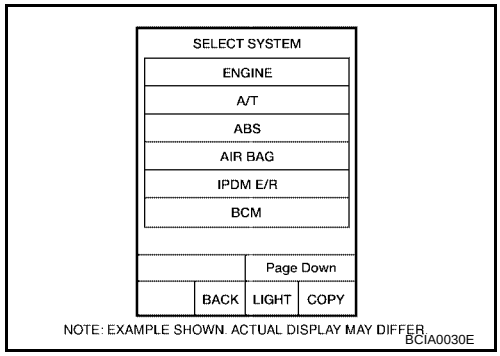
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

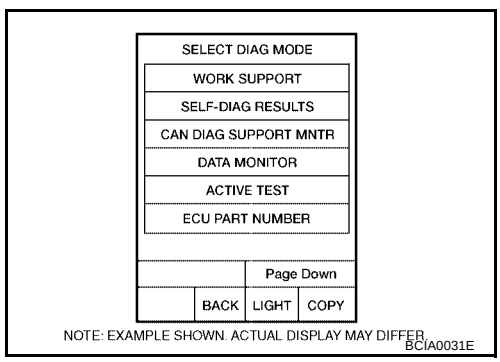
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON.



2. Select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.



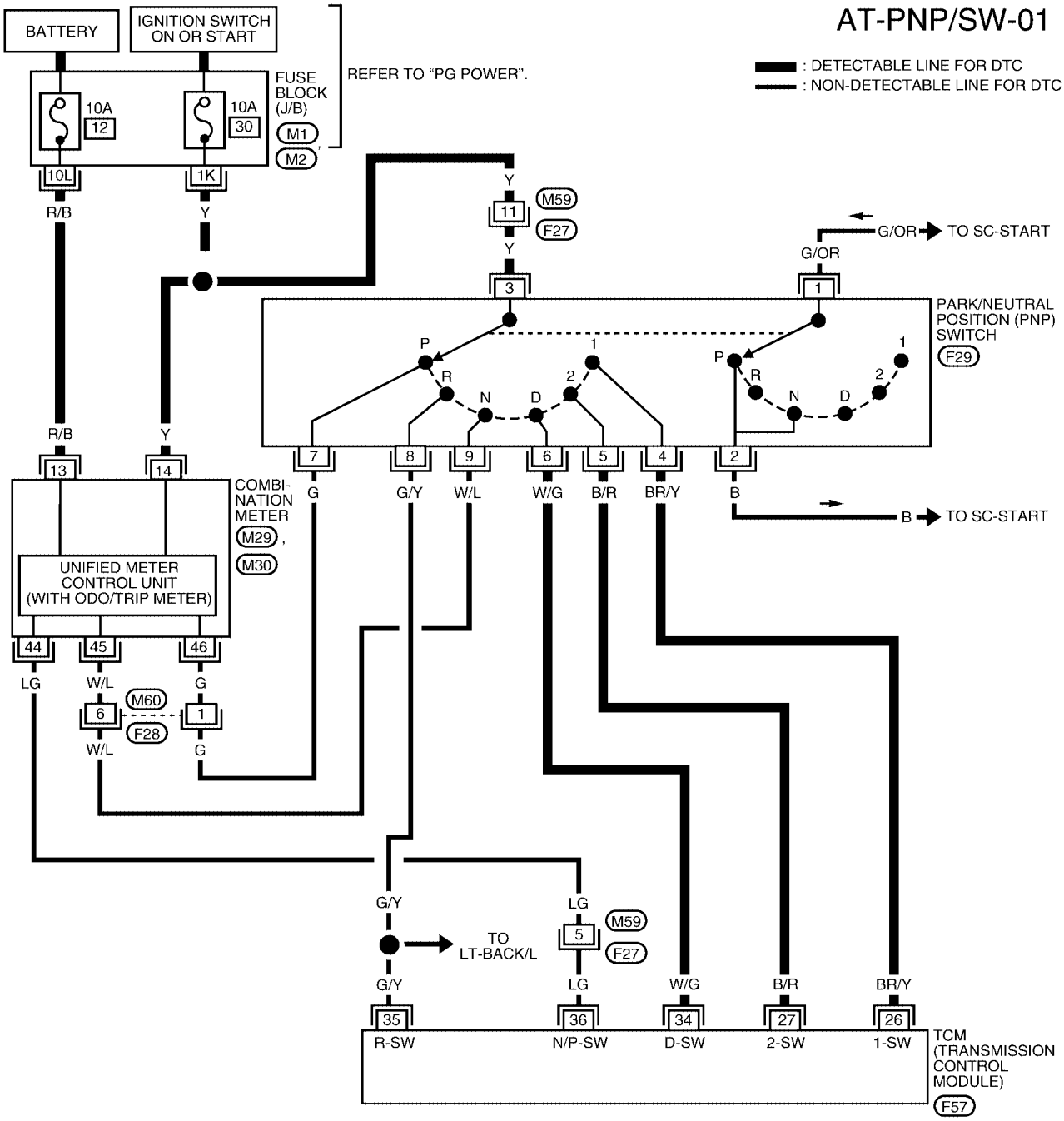
3. Start engine and maintain the following conditions for at least 5 consecutive seconds.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.3V
   Selector lever: D position (O/D ON or OFF)

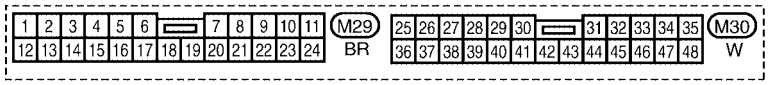
WITH GST

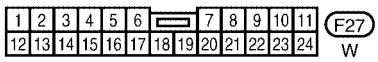
Follow the procedure “With CONSULT-II”.

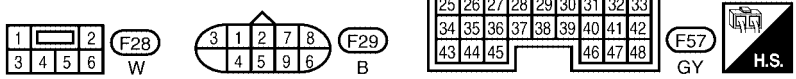
Wiring Diagram — AT — PNP/SW

ECS00633









WCWA0129E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
26	BR/Y	PNP SWITCH 1 POSITION	IGNITION ON AND SELECTOR LEVER IN 1 POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
27	BR	PNP SWITCH 2 POSITION	IGNITION ON AND SELECTOR LEVER IN 2 POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
34	W/G	PNP SWITCH D POSITION	IGNITION ON AND SELECTOR LEVER IN D POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
35	G/Y	PNP SWITCH R POSITION	IGNITION ON AND SELECTOR LEVER IN R POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
36	LG	PNP SWITCH P OR N POSITION	IGNITION ON AND SELECTOR LEVER IN P OR N POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V

Diagnostic Procedure

ECS00634

1. INSPECTION START

Do you have CONSULT-II?

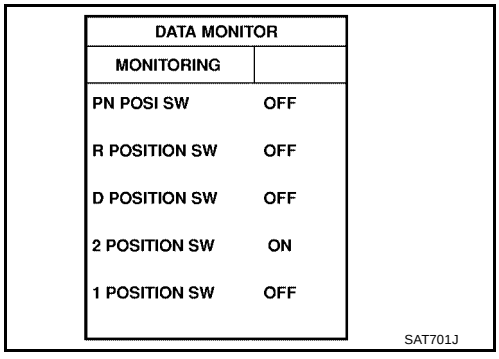
Yes or No

Yes >> GO TO 2.
No >> GO TO 6.

2. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT (WITH CONSULT-II)

With CONSULT-II

1. Turn ignition switch to ON position. (Do not start engine.)
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out P, R, N, D, 2 and 1 position switches moving selector lever to each position.
   Check that the signal of the selector lever position is indicated properly.



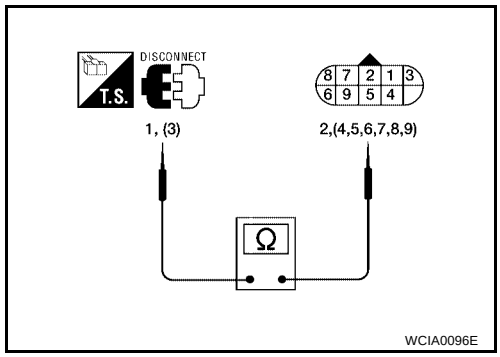
OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING ITEM

Check the following item:

- Park/neutral position (PNP) switch
  Check continuity between park/neutral position (PNP) switch F29 terminals 1 (G/OR) and 2 (B) and between terminals 3 (Y) and 4 (BR/Y), 5 (B/R), 6 (W/G), 7 (G), 8 (G/Y) and 9 (W/L) while moving manual shaft through each position.



Lever position	Terminal No.	
P	3 - 7	1 - 2
R	3 - 8	
N	3 - 9	1 - 2
D	3 - 6	
2	3 - 5	
1	3 - 4	

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. CHECK MANUAL CONTROL CABLE ADJUSTMENT

Check PNP switch again with manual control cable disconnected from manual shaft of A/T assembly. Refer to test group 1.

OK or NG

OK >> Adjust manual control cable. Refer to AT-642, "Control Cable Adjustment" .
NG >> Repair or replace PNP switch.

5. DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short or open between ignition switch and park/neutral position (PNP) switch (Main harness)
- Harness for short or open between park/neutral position (PNP) switch and TCM (Main harness)
- Fuse
- Ignition switch
  Refer to PG-3, "POWER SUPPLY ROUTING" .

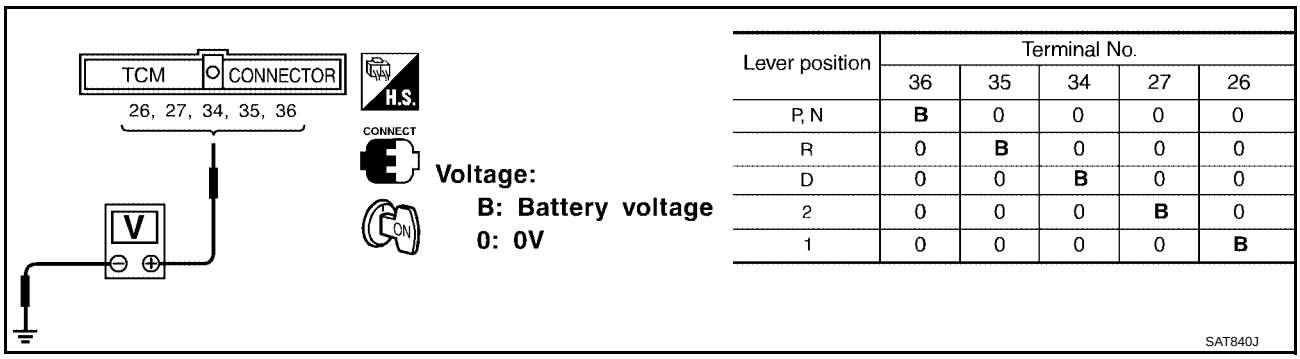
OK or NG

OK >> GO TO 7.
NG >> Repair or replace damaged parts.

6. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT (WITHOUT CONSULT-II)

Without CONSULT-II

1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between TCM terminals 26 (BR/Y), 27 (B/R), 34 (W/G), 35 (G/Y), 36 (LG) and ground while moving selector lever through each position.



Lever position	Terminal No.				
	36	35	34	27	26
P, N	**B**	0	0	0	0
R	0	**B**	0	0	0
D	0	0	**B**	0	0
2	0	0	0	**B**	0
1	0	0	0	0	**B**

OK or NG

OK >> GO TO 7.
NG >> GO TO 5.

7. CHECK DTC

Perform AT-487, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 8.

8. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

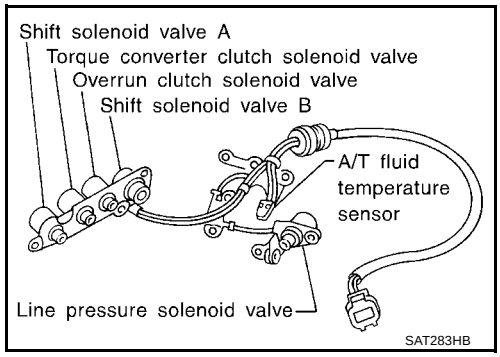
DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT

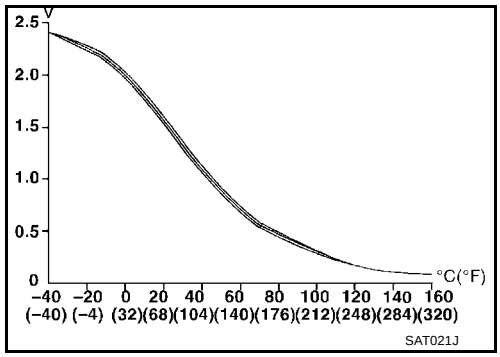
PFP:31940

Description

ECS00635

The A/T fluid temperature sensor detects the A/T fluid temperature and sends a signal to the TCM.





CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approximately)	
A/T fluid temperature sensor	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]	1.5V ↓ 0.5V	2.5 kΩ ↓ 0.3 kΩ

On Board Diagnosis Logic

ECS00636

Diagnostic trouble code ATF TEMP SEN/CIRC with CONSULT-II or P0710 without CONSULT-II is detected when TCM receives an excessively low or high voltage from the sensor.

Possible Cause

ECS00637

Check the following items.

- Harness or connectors
  (The sensor circuit is open or shorted.)
- A/T fluid temperature sensor

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS00638

CAUTION:

Always drive vehicle at a safe speed.

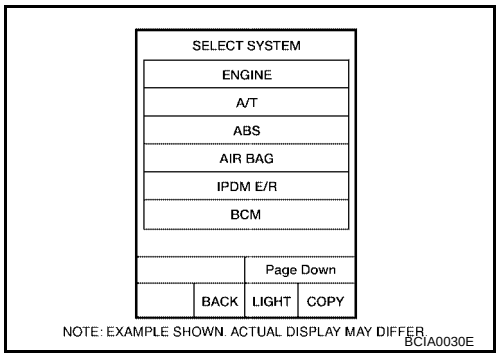
NOTE:

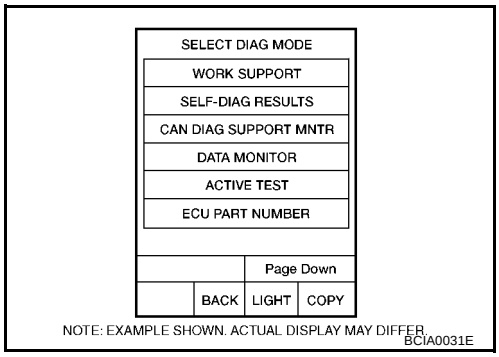
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.





2. Start engine and maintain the following conditions for at least 10 minutes (Total). (It is not necessary to maintain continuously.)
   CMPS·RPM (REF): 450 rpm or more
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (O/D ON)

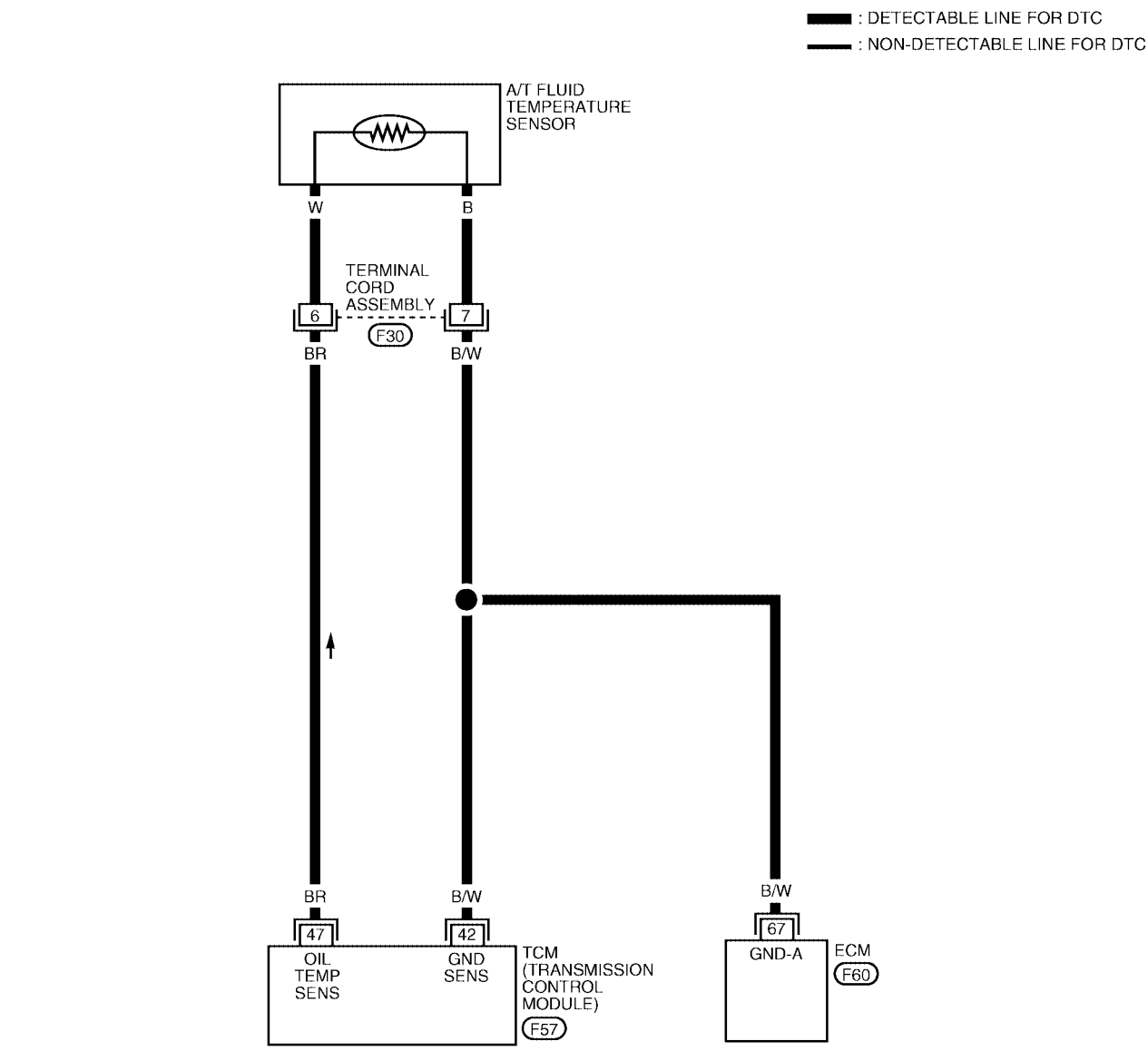
WITH GST

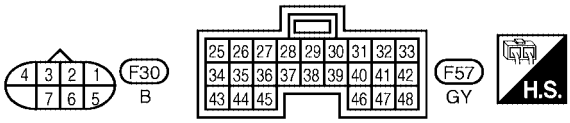
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — FTS

ECS00639

AT-FTS-01





REFER TO THE FOLLOWING.
F60 - ELECTRICAL UNITS

BCWA0249E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
42	B/W	SENSOR GROUND	—	—
47	BR	A/T FLUID TEMPERATURE SENSOR	IGNITION ON AND ATF TEMPERATURE IS 20°C (68°F)	APPROX. 1.5V
			IGNITION ON AND ATF TEMPERATURE IS 80°C (176°F)	APPROX. 0.5V

Diagnostic Procedure

ECS0063A

1. INSPECTION START

Do you have CONSULT-II?

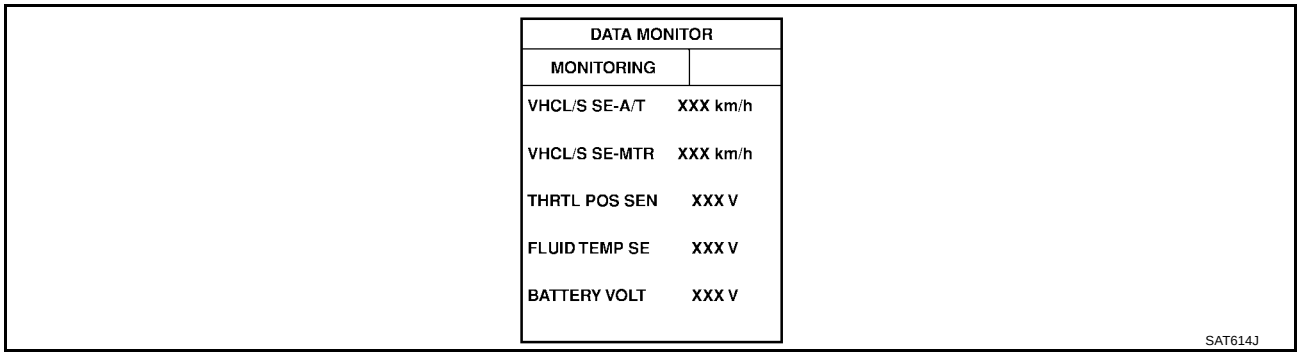
Yes or No

Yes >> GO TO 2.
No >> GO TO 6.

2. CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITH CONSULT-II)

With CONSULT-II

1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “FLUID TEMP SE”.



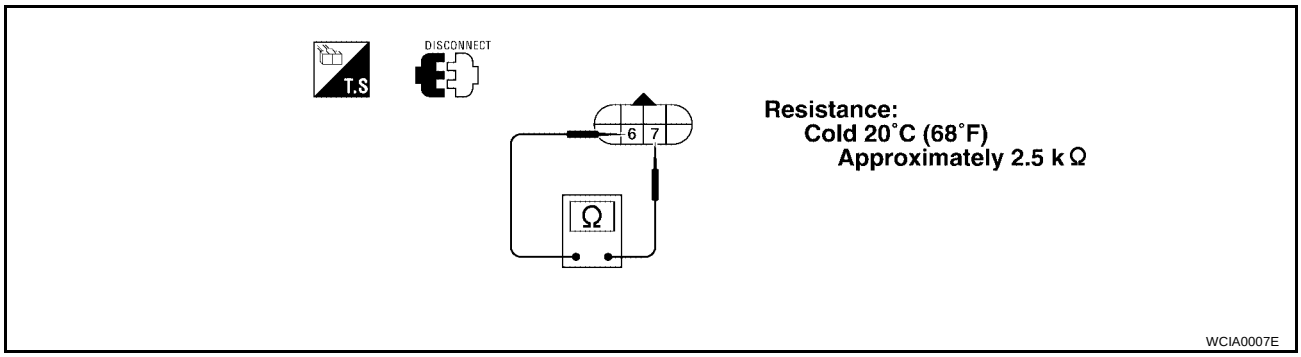
Voltage :Cold [20°C (68°F)] → Hot [80°C (176°F)]
:Approximately 1.5V → 0.5V

OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly F30 terminals 6 and 7 (component side) when A/T is cold.



4. Reinstall any part removed.

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short to ground or short to power or open between TCM, ECM and terminal cord assembly (Main harness)
- Ground circuit for ECM
  Refer to AT-484, "TROUBLE DIAGNOSIS FOR POWER SUPPLY" .

OK or NG

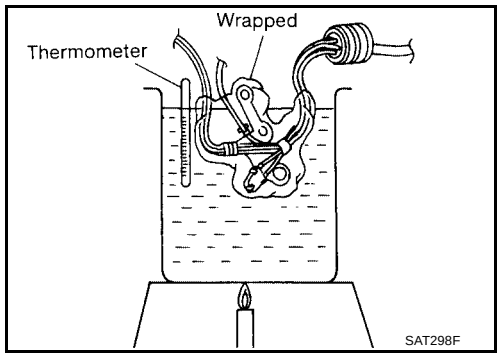
OK >> GO TO 7.
NG >> Repair or replace damaged parts.

5. DETECT MALFUNCTIONING ITEM

1. Remove oil pan.
2. Check the following items:

– A/T fluid temperature sensor
  Check resistance between two terminals while changing temperature as shown in figure.

Temperature	Resistance (Approx.)
20°C (68°F)	2.5kΩ
80°C (176°F)	0.3kΩ



– Harness of terminal cord assembly for short or open

OK or NG

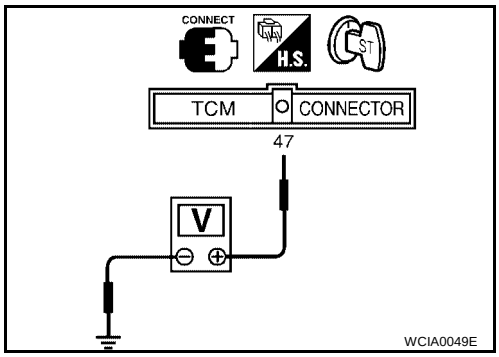
OK >> GO TO 7.
NG >> Repair or replace damaged parts.

6. CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II)

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM connector F57 terminal 47 (BR) and ground while warming up A/T.

Voltage :Cold [20°C (68°F)] → Hot [80°C (176°F)]
:Approximately 1.5V → 0.5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

7. CHECK DTC

Perform AT-493, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 8.

8. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

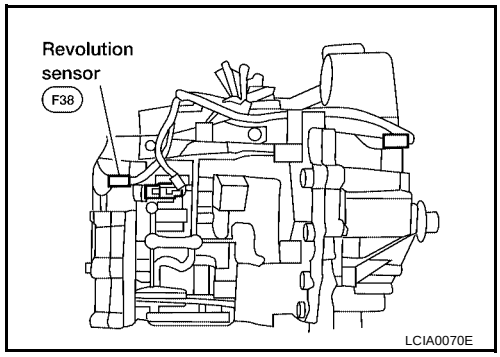
DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)

PFP:32702

Description

ECS0063B

The revolution sensor detects the revolution of the idler gear parking pawl lock gear and emits a pulse signal. The pulse signal is sent to the TCM which converts it into vehicle speed.



On Board Diagnosis Logic

ECS0063C

Diagnostic trouble code VEH SPD SEN/CIR AT with CONSULT-II or P0720 without CONSULT-II is detected when TCM does not receive the proper voltage signal from the sensor.

Possible Cause

ECS0063D

Check the following items.

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Revolution sensor

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0063E

CAUTION:

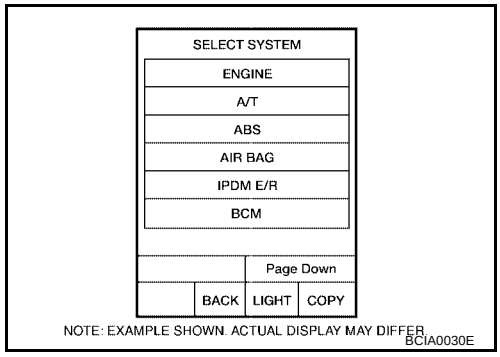
- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

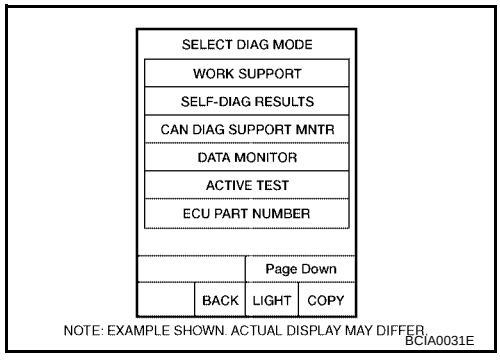
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

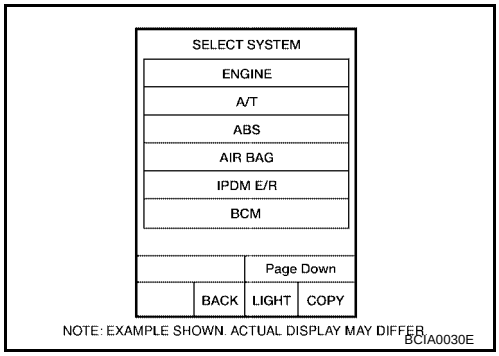
WITH CONSULT-II

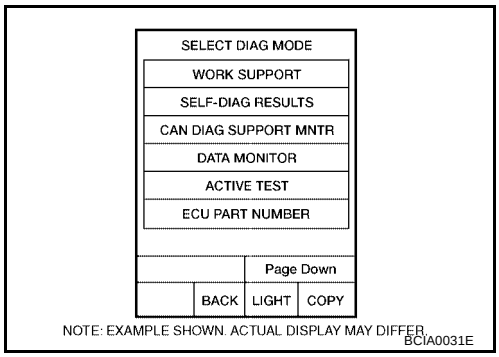
1. Turn ignition switch ON and select “DATA MONITOR” mode for “A/T” with CONSULT-II.





2. Drive vehicle and check for an increase of “VHCL/S SE·MTR” value.
   If the check result is NG, go to AT-502, "Diagnostic Procedure" .
   If the check result is OK, go to following step.
3. Select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.





4. Start engine and maintain the following conditions for at least 5 consecutive seconds.
   VHCL SPEED SE: 30 km/h (19 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (O/D ON)
   Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.
   If the check result is NG, go to AT-502, "Diagnostic Procedure" .
   If the check result is OK, go to following step.
5. Maintain the following conditions for at least 5 consecutive seconds.
   CMPS·RPM (REF): 3,500 rpm or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (O/D ON)
   Driving location: Driving the vehicle uphill (increased engine load) will help maintain the driving conditions required for this test.

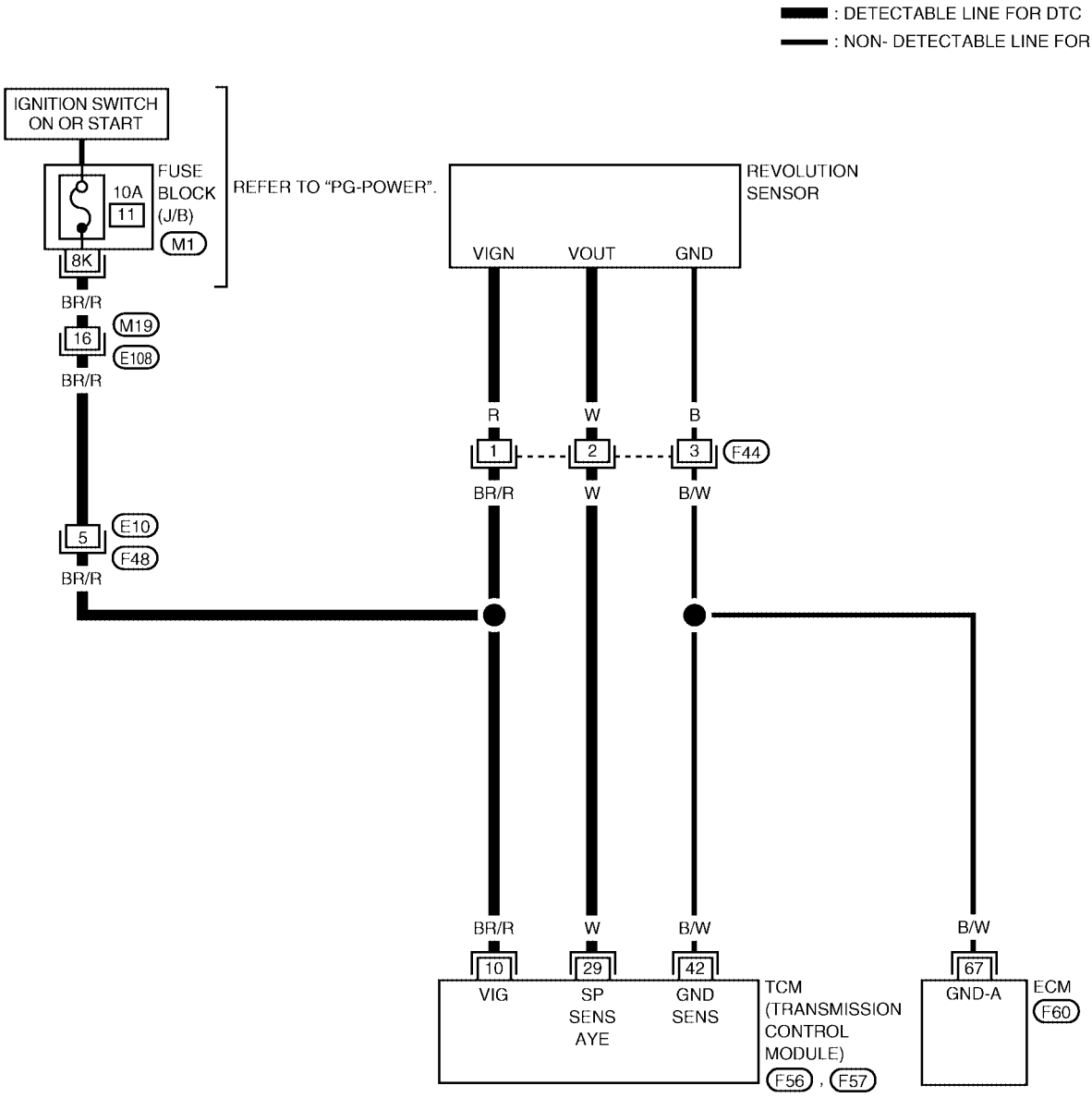
WITH GST

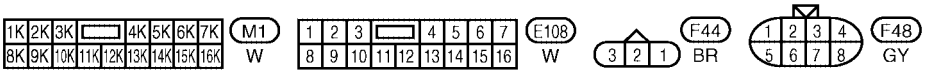
Follow the procedure “With CONSULT-II”.

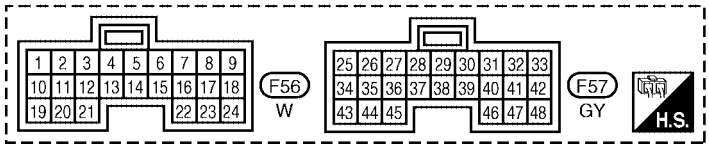
Wiring Diagram — AT — VSSA/T

ECS0063F

AT-VSSA/T-01







REFER TO THE FOLLOWING.
F60 - ELECTRICAL UNITS

BCWA0241E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	BR/R	POWER SOURCE	IGNITION OFF	APPROX. 0V
			IGNITION ON	BATTERY VOLTAGE
29	W	REVOLUTION SENSOR	VEHICLE MOVING AT 20 KM/H (12 MPH). USE THE CONSULT-II PULSE FREQUENCY MEASURING FUNCTION. A CIRCUIT TESTER CANNOT BE USED TO TEST THIS ITEM. CAUTION: CONNECT THE DIAGNOSIS DATA LINK CABLE TO THE VEHICLE DIAGNOSIS CONNECTOR.	450 HZ
			VEHICLE NOT MOVING.	LESS THAN 1.3V OR GREATER THAN 4.5V
42	B/W	SENSOR GROUND	—	—

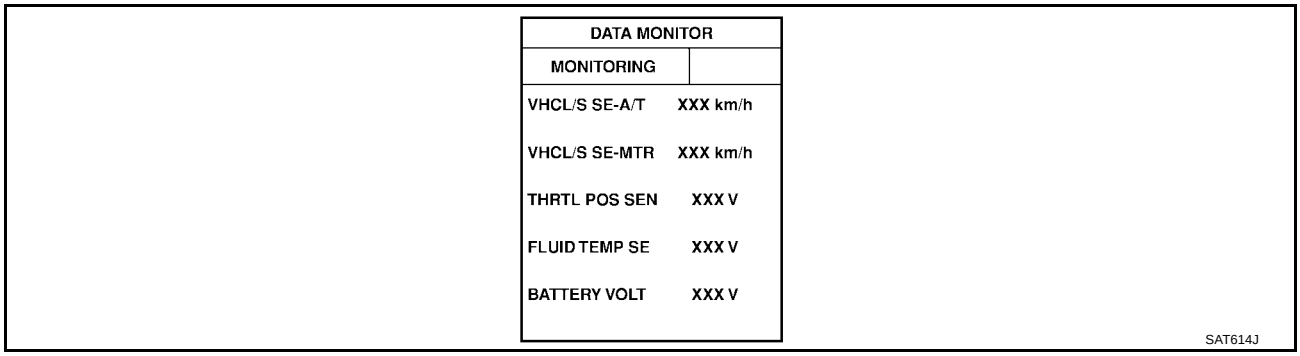
Diagnostic Procedure

ECS0063G

1. CHECK INPUT SIGNAL (WITH CONSULT-II)

With CONSULT-II

1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “VHCL/S SE·A/T” while driving.
   Check the value changes according to driving speed.



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK REVOLUTION SENSOR (WITH CONSULT-II)

With CONSULT-II

1. Start engine.

Condition	Judgement standard (Approx.)
When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function. *1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	450 Hz
When vehicle parks.	Under 1.3V or over 4.5V

MTBL0594

- Harness for short or open between TCM, ECM and revolution sensor
- Harness for short or open between ignition switch and revolution sensor

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK DTC

Perform AT-499, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

DTC P0725 ENGINE SPEED SIGNAL

PFP:24825

Description

ECS0063H

The engine speed signal is sent from the ECM to the TCM.

On Board Diagnosis Logic

ECS0063I

Diagnostic trouble code ENGINE SPEED SIG with CONSULT-II or P0725 without CONSULT-II is detected when TCM does not receive the proper voltage signal from ECM.

Possible Cause

ECS0063J

Check harness or connectors. (The sensor circuit is open or shorted.)

Diagnostic Trouble Code (DTC) Confirmation Procedure

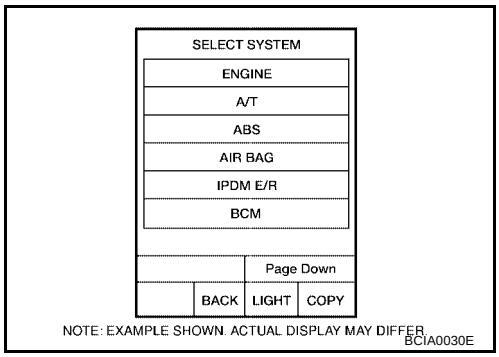
ECS0063K

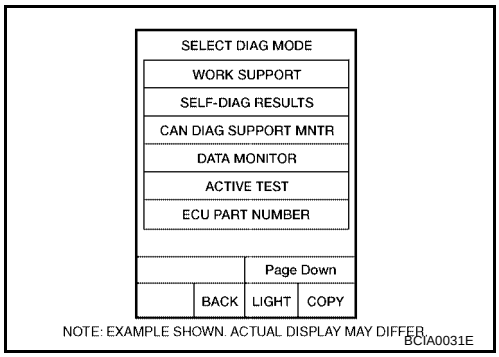
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.





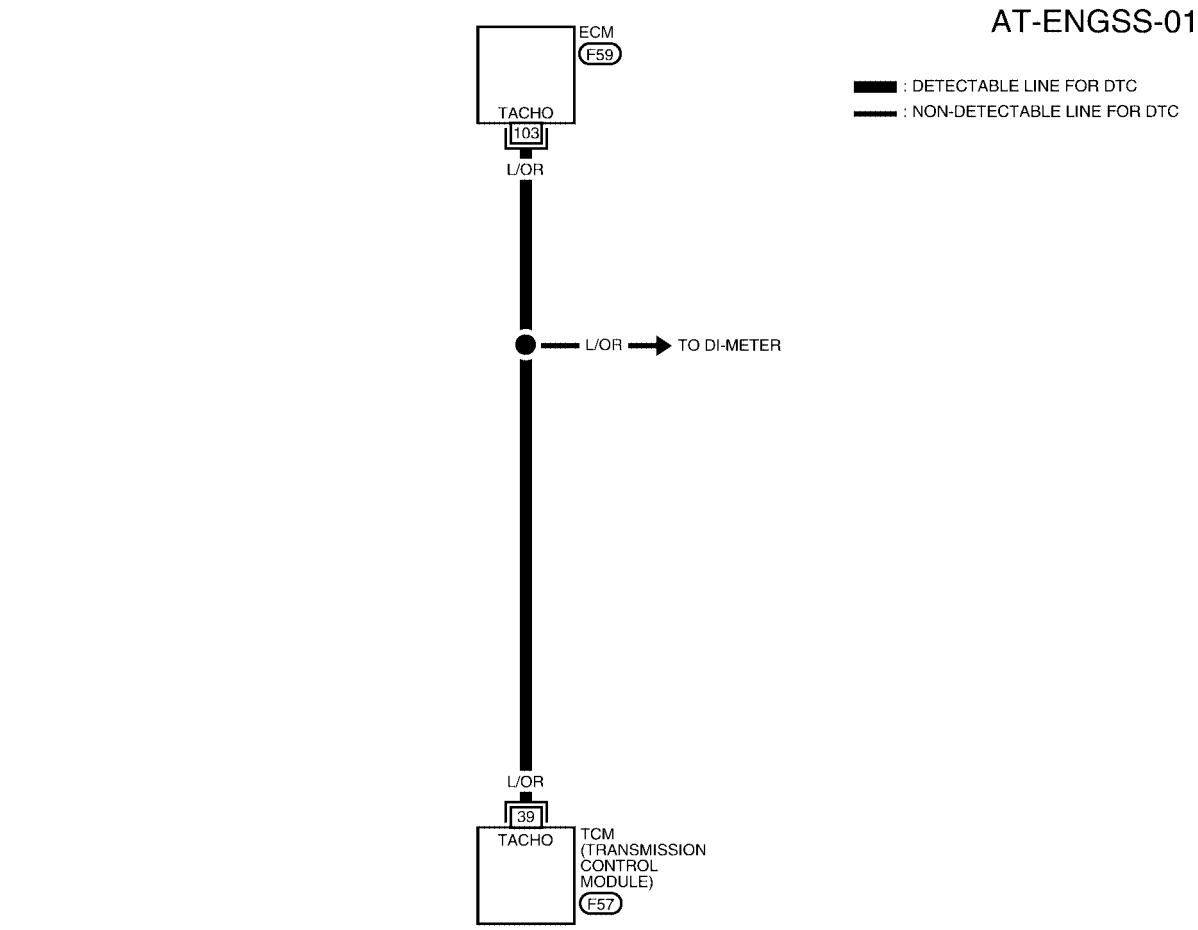
2. Start engine and maintain the following conditions for at least 10 consecutive seconds.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: More than 1.2V
   Selector lever: D position (O/D ON)

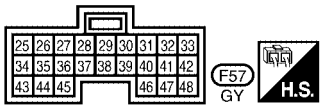
WITH GST

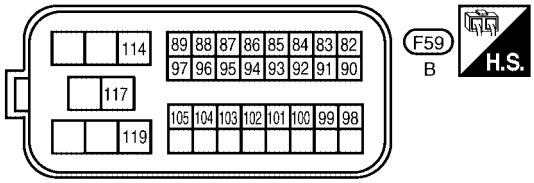
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — ENGSS

ECS0063L







WCWA0132E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
39	L/OR	ENGINE SPEED SIGNAL	WITH ENGINE RUNNING AT IDLE SPEED	APPROX. 0.6V
			WITH ENGINE RUNNING AT 3,000 RPM	APPROX. 2.2V

Diagnostic Procedure

ECS0063M

1. CHECK DTC WITH ECM

- Check P code with CONSULT-II “ENGINE”.
  Turn ignition switch ON and select “SELF-DIAGNOSTIC RESULTS” mode for “ENGINE” with CONSULT-II.
  Refer to EC-713, "Malfunction Indicator Lamp (MIL)" .

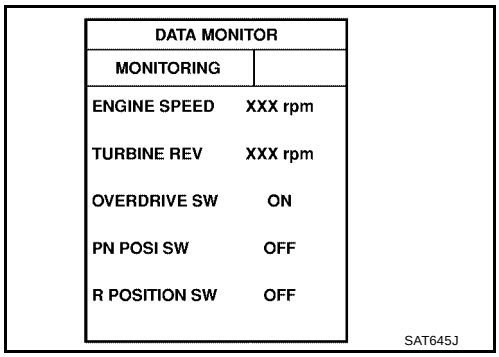
OK or NG

OK (with CONSULT-II)>>GO TO 2.
OK (without CONSULT-II)>>GO TO 4.
NG >> Check ignition signal circuit for engine control. Refer to EC-1312, "IGNITION SIGNAL" .

2. CHECK INPUT SIGNAL (WITH CONSULT-II)

With CONSULT-II

1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “ENGINE SPEED”.
   Check engine speed changes according to throttle position.



OK or NG

OK >> GO TO 6.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short or open between TCM and ECM
- Resistor and ignition coil
  Refer to EC-1312, "IGNITION SIGNAL" .

OK or NG

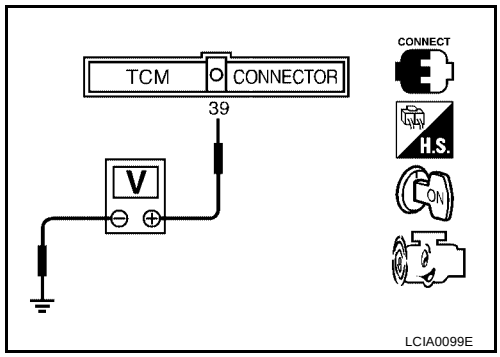
OK >> GO TO 6.
NG >> Repair or replace damaged parts.

4. CHECK INPUT SIGNAL (WITHOUT CONSULT-II)

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM connector F57 terminal 39 (L/OR) and ground.

Voltage :0.6 (Idle speed) - 2.2V (3,000 rpm)



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short or open between TCM and ECM
- Resistor and ignition coil
  Refer to EC-1312, "IGNITION SIGNAL" .

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

6. CHECK DTC

Perform AT-504, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

7. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

DTC P0731 A/T 1ST GEAR FUNCTION

PFP:31940

Description

ECS0063N

- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into first gear position as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

On Board Diagnosis Logic

ECS0063O

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is higher than the position (1st) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when either shift solenoid valve A is stuck open or shift solenoid valve B is stuck open.
Gear positions supposed by TCM are as follows.
In case of gear position with no malfunctions: **1** , 2, 3 and 4 positions
In case of gear position with shift solenoid valve A stuck open: **2*** , 2, 3 and 3 positions
In case of gear position with shift solenoid valve B stuck open: **4*** , 3, 3 and 4 positions to each gear position above
*: P0731 is detected.
Diagnostic trouble code A/T 1ST GR FNCTN with CONSULT-II or P0731 without CONSULT-II is detected when A/T cannot be shifted to the 1st gear position even if electrical circuit is good.

Possible Cause

ECS0063P

Check the following items.

- Shift solenoid valve A
- Shift solenoid valve B
- Each clutch
- Hydraulic control circuit

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0063Q

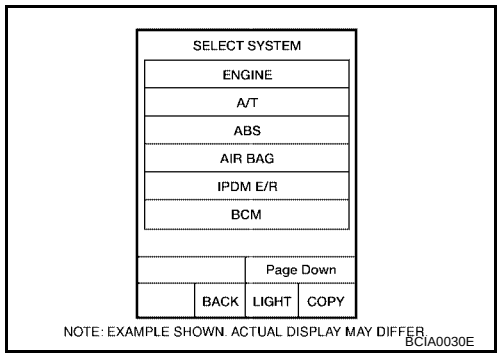
CAUTION:

- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

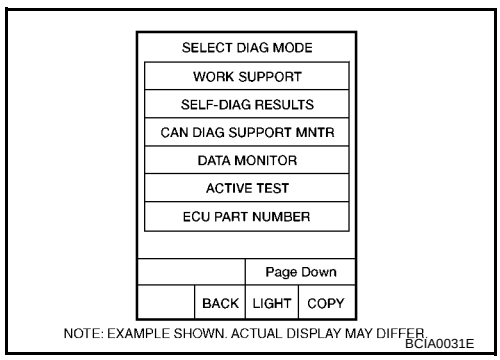
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always drive vehicle on a level road to improve the accuracy of test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

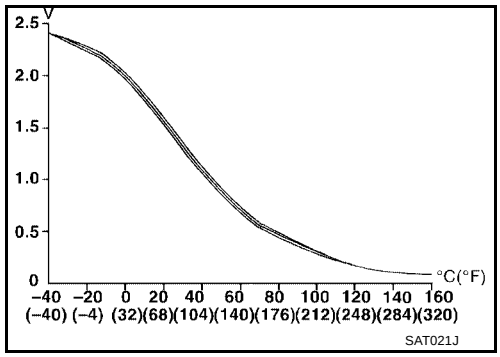
1. Start engine and select “DATA MONITOR” mode for “A/T” with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3. Select “1ST GR FNCTN P0731” of “DTC WORK SUPPORT” mode for “A/T” with CONSULT-II and touch “START”.



4. Accelerate vehicle to 20 to 25 km/h (12 to 16 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (O/D ON)
   - **Check that “GEAR” shows “2” after releasing pedal.**
5. Depress accelerator pedal to WOT (more than 7.0/8 of “THROTTLE POSI”) quickly from a speed of 20 to 25 km/h (12 to 16 MPH) until “TESTING” changes to “STOP VEHICLE” or “COMPLETED”. (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to AT-511, "Diagnostic Procedure" .
   If “STOP VEHICLE” appears on CONSULT-II screen, go to the following step.
   - **Check that “GEAR” shows “1” when depressing accelerator pedal to WOT.**
   - **If “TESTING” does not appear on CONSULT-II for a long time, select “SELF-DIAG RESULTS” for “ENGINE”. In case a 1st trip DTC other than P0731 is shown, refer to applicable “TROUBLE DIAGNOSIS FOR DTC”.**
6. Stop vehicle.
7. Follow the instruction displayed. (Check for normal shifting referring to the table below.)



Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists.	1 → 2 → 3 → 4
Malfunction for P0731 exists.	2 → 2 → 3 → 3
	4 → 3 → 3 → 4



8. Make sure that “OK” is displayed. (If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”.)
   Refer to AT-511, "Diagnostic Procedure" .
   Refer to AT-747, "Shift Schedule" .

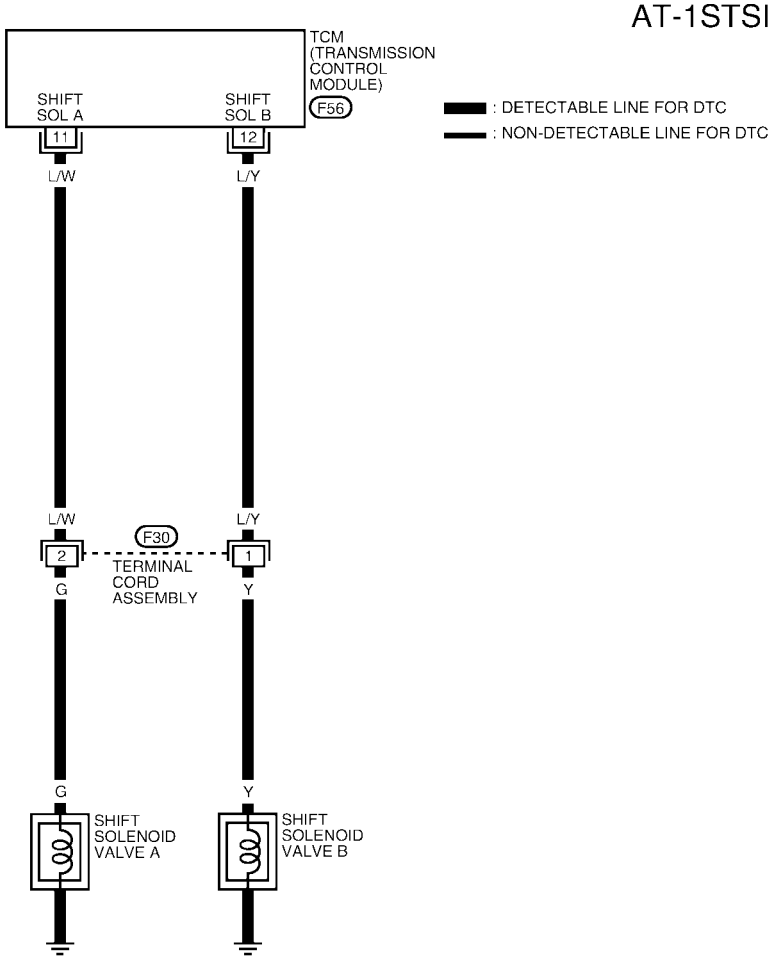
WITH GST

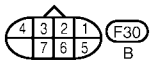
Follow the procedure “With CONSULT-II”.

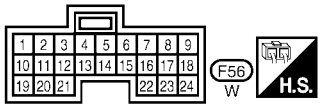
Wiring Diagram — AT — 1ST

ECS0063R

AT-1STSIG-01







WCWA0021E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)

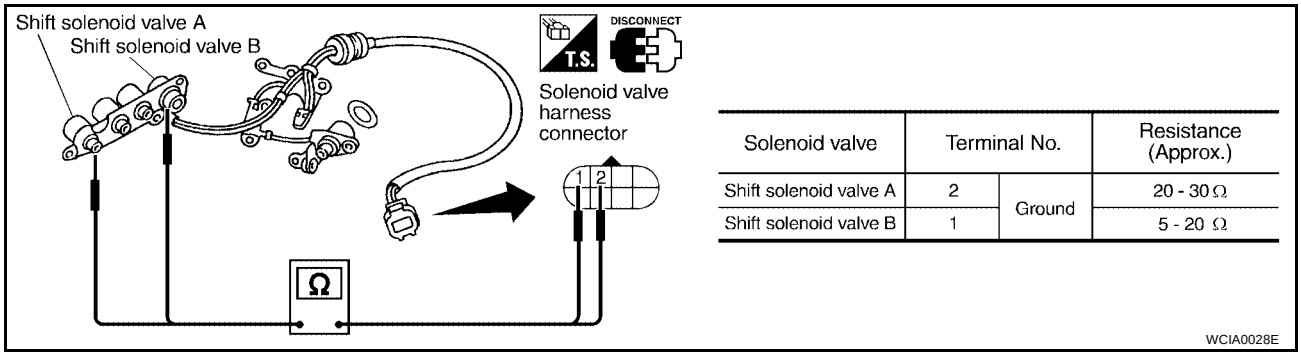
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A IS OPERATING (DRIVING IN D1 OR D4)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A IS NOT OPERATING (DRIVING IN D2 OR D3)	APPROX. 0V
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B IS OPERATING (DRIVING IN D1 OR D2)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE B IS NOT OPERATING (DRIVING IN D3 OR D4)	APPROX. 0V

Diagnostic Procedure

ECS0063S

1. CHECK VALVE RESISTANCE

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
- Shift solenoid valve A
- Shift solenoid valve B
2. Check resistance between terminal cord assembly F30 terminals 1 and 2, and ground.



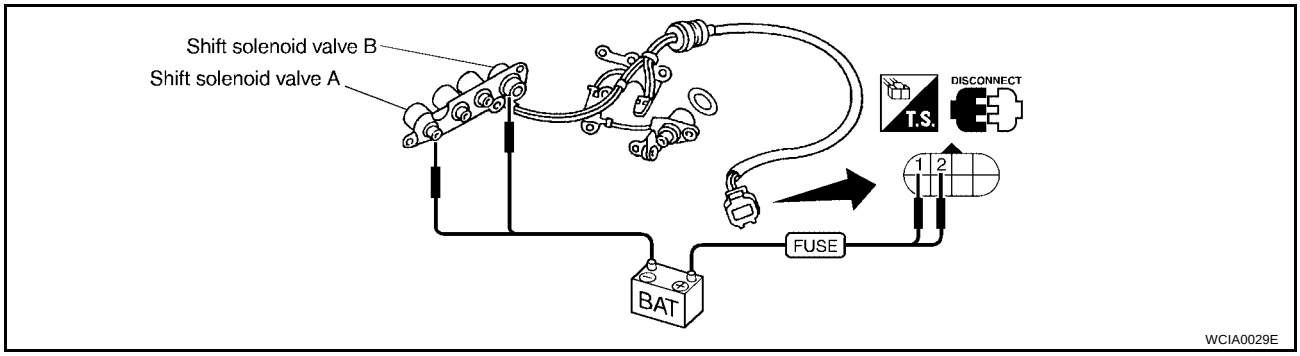
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 30 Ω
Shift solenoid valve B	1		5 - 20 Ω

OK or NG

OK >> GO TO 2.
NG >> Repair or replace damaged parts.

2. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
- Shift solenoid valve A
- Shift solenoid valve B
2. Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.

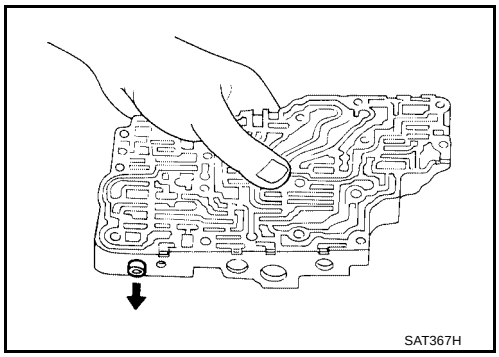


OK or NG

OK >> GO TO 3.
NG >> Repair or replace shift solenoid valve assembly.

3. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-674, "DISASSEMBLY" .
2. Check to ensure that:
- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



OK or NG

OK >> GO TO 4.
NG >> Repair control valve assembly.

4. CHECK DTC

Perform AT-508, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> Check transaxle internal components (clutch, brake, etc.).

DTC P0732 A/T 2ND GEAR FUNCTION

PFP:31940

Description

ECS0063T

- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into second gear position as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

On Board Diagnosis Logic

ECS0063U

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is higher than the position (2nd) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when shift solenoid valve B is stuck open.
Gear positions supposed by TCM are as follows.
In case of gear position with no malfunctions: 1, **2** , 3 and 4 positions
In case of gear position with shift solenoid valve B stuck open: 4, **3*** , 3 and 4 positions to each gear position above
*: P0732 is detected.
Diagnostic trouble code A/T 2ND GR FNCTN with CONSULT-II or P0732 without CONSULT-II is detected when A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.

Possible Cause

ECS0063V

Check the following items.

- Shift solenoid valve B
- Each clutch
- Hydraulic control circuit

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0063W

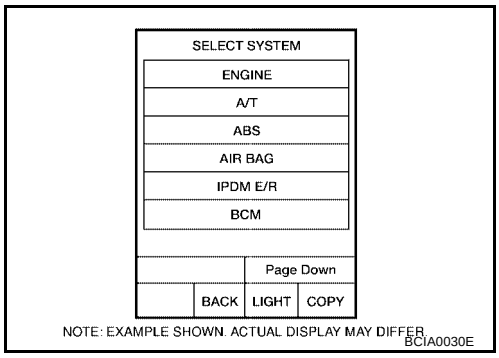
CAUTION:

- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

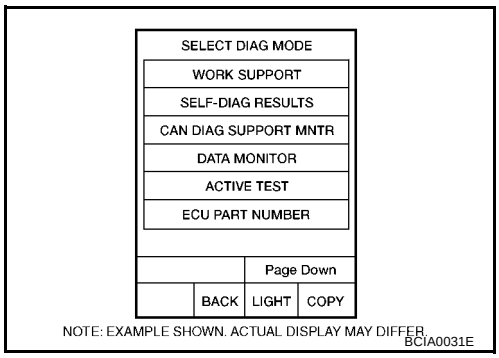
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always drive vehicle on a level road to improve the accuracy of test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

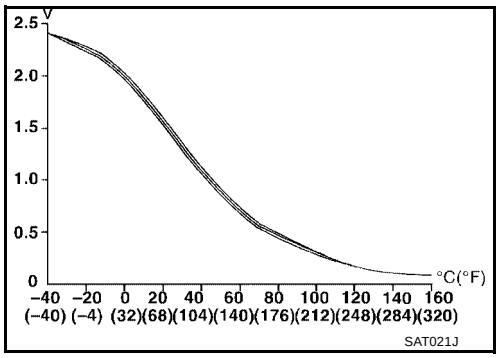
WITH CONSULT-II

1. Start engine and select “DATA MONITOR” mode for “A/T” with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3. Select “2ND GR FNCTN P0732” of “DTC WORK SUPPORT” mode for “A/T” with CONSULT-II and touch “START”.



4. Accelerate vehicle to 63 to 68 km/h (39 to 42 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8
   Selector lever: D position (O/D ON)
   - **Check that “GEAR” shows “3” or “4” after releasing pedal.**
5. Depress accelerator pedal to WOT (more than 7.0/8 of “THROTTLE POSI”) quickly from a speed of 63 to 68 km/h (39 to 42 MPH) until “TESTING” changes to “STOP VEHICLE” or “COMPLETE”. (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to AT-516, "Diagnostic Procedure" .
   If “STOP VEHICLE” appears on CONSULT-II screen, go to following step.
   - **Check that “GEAR” shows “2” when depressing accelerator pedal to WOT.**
   - **If “TESTING” does not appear on CONSULT-II for a long time, select “SELF-DIAG RESULTS” for “ENGINE”. In case a 1st trip DTC other than P0732 is shown, refer to applicable “TROUBLE DIAGNOSIS FOR DTC”.**
6. Stop vehicle.
7. Follow the instruction displayed. (Check for normal shifting referring to the table below.)





Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists	1 → 2 → 3 → 4
Malfunction for P0732 exists.	4 → 3 → 3 → 4

8. Make sure that “OK” is displayed. (If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”.)
   Refer to AT-516, "Diagnostic Procedure" .
   Refer to AT-747, "Shift Schedule" .

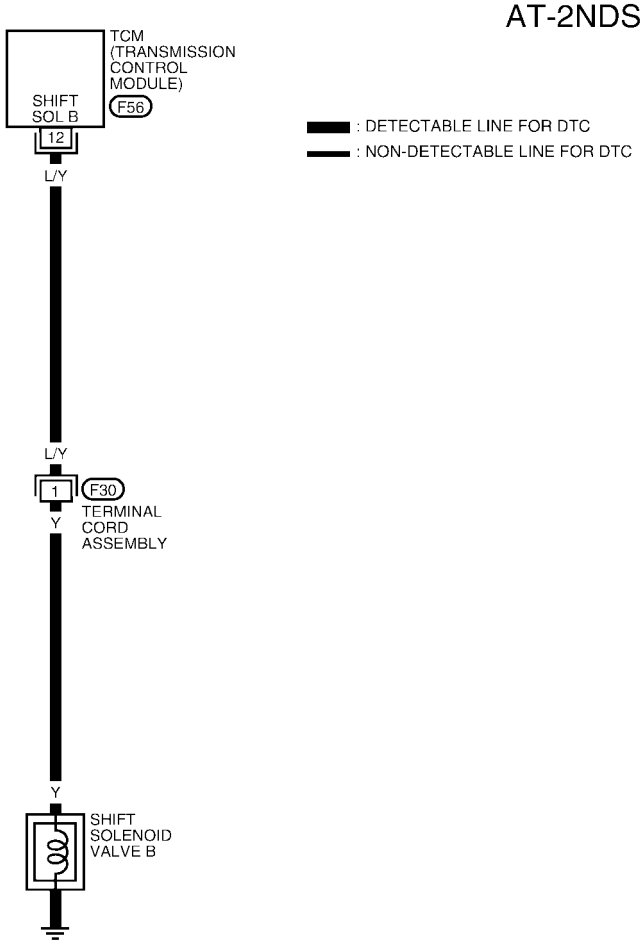
WITH GST

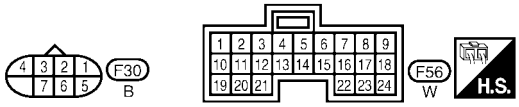
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 2ND

ECS0063X

AT-2NDSIG-01





WCWA0022E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)

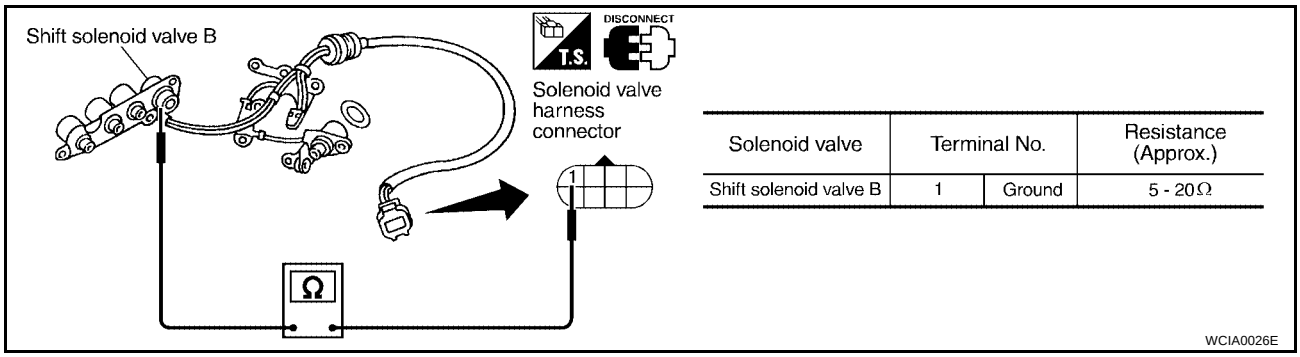
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B IS OPERATING (DRIVING IN D1 OR D2)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE B IS NOT OPERATING (DRIVING IN D3 OR D4)	APPROX. 0V

Diagnostic Procedure

ECS0063Y

1. CHECK VALVE RESISTANCE

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
- Shift solenoid valve B
2. Check resistance between terminal cord assembly F30 terminal 1 and ground.



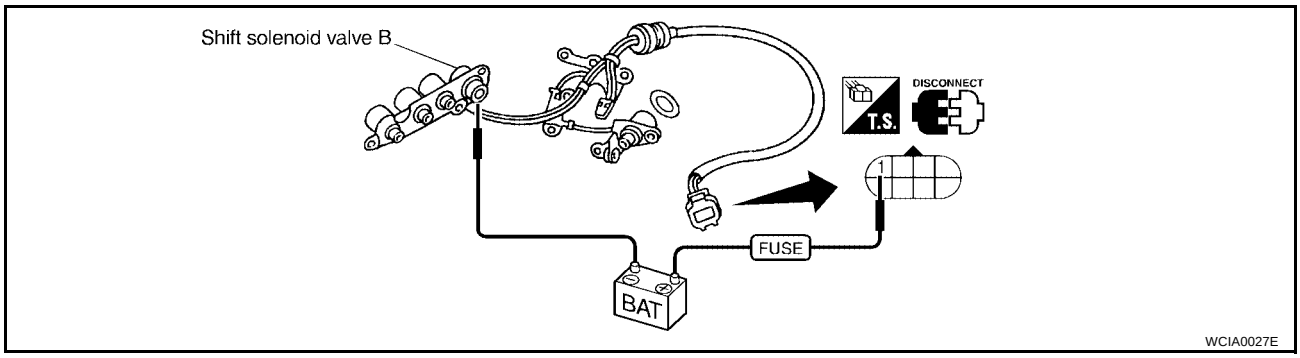
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve B	1	Ground	5 - 20Ω

OK or NG

OK >> GO TO 2.
NG >> Repair or replace shift solenoid valve assembly.

2. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
- Shift solenoid valve B
2. Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.



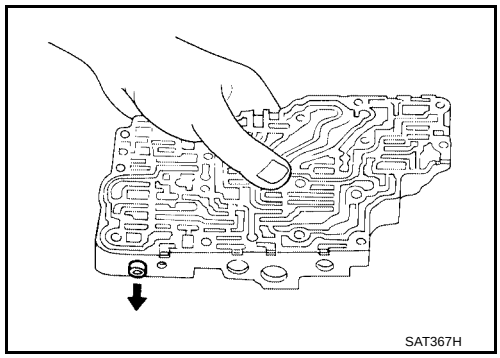
OK or NG

OK >> GO TO 3.
NG >> Repair or replace shift solenoid valve assembly.

3. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-674, "DISASSEMBLY" .
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



OK or NG

OK >> GO TO 4.
NG >> Repair control valve assembly.

4. CHECK DTC

Perform AT-513, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> Check transaxle internal components (clutch, brake, etc.).

DTC P0733 A/T 3RD GEAR FUNCTION

PFP:31940

Description

ECS0063Z

- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into third gear position as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning servo piston or brake band, etc.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

On Board Diagnosis Logic

ECS00640

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is higher than the position (3rd) supposed by TCM, the slip ratio will be more than normal. In case the ratio exceeds the specified value, TCM judges this diagnosis malfunction.
This malfunction will be caused when shift solenoid valve A is stuck closed.
Gear positions supposed by TCM are as follows.
In case of gear position with no malfunctions: 1, 2, **3** and 4 positions
In case of gear position with shift solenoid valve A stuck closed: 1, 1, **4*** and 4 positions to each gear position above
*: P0733 is detected.
Diagnostic trouble code A/T 3RD GR FNCTN with CONSULT-II or P0733 without CONSULT-II is detected when A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.

Possible Cause

ECS00641

Check the following items.

- Shift solenoid valve A
- Each clutch
- Hydraulic control circuit

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS00642

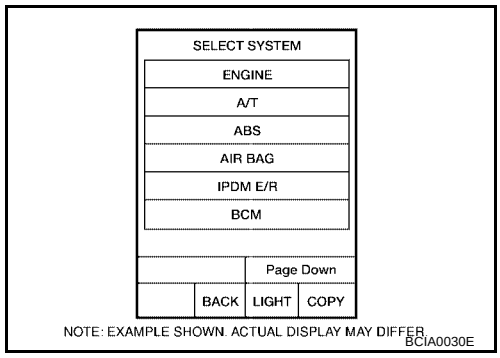
CAUTION:

- **Always drive vehicle at a safe speed.**
- **Be careful not to rev engine into the red zone on the tachometer.**

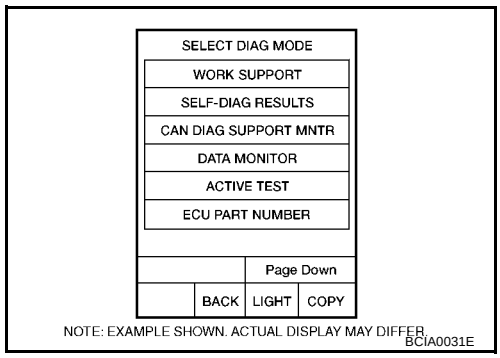
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always drive vehicle on a level road to improve the accuracy of test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

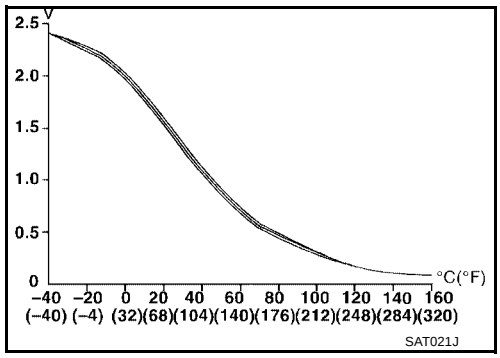
WITH CONSULT-II

1. Start engine and select “DATA MONITOR” mode for “A/T” with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3. Select “3RD GR FNCTN P0733” of “DTC WORK SUPPORT” mode for “A/T” with CONSULT-II and touch “START”.



4. Accelerate vehicle to 80 to 95 km/h (50 to 59 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 1.0/8 (at all times during step 4)
   Selector lever: D position (OD “ON”)
   - **Check that “GEAR” shows “4” after releasing pedal.**
5. Depress accelerator pedal steadily with 3.5/8 - 4.5/8 of “THROTTLE POSI” from a speed of 80 to 95 km/h (50 to 59 MPH) until “TESTING” changes to “STOP VEHICLE” or “COMPLETED”. (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to AT-521, "Diagnostic Procedure" .
   If “STOP VEHICLE” appears on CONSULT-II screen, go to following step.
   - **Check that “GEAR” shows “3” when depressing accelerator pedal with 3.5/8 - 4.5/8 of “THROTTLE POSI”.**
   - **If “TESTING” does not appear on CONSULT-II for a long time, select “SELF-DIAG RESULTS” for “ENGINE”. In case a 1st trip DTC other than P0733 is shown, refer to applicable “TROUBLE DIAGNOSIS FOR DTC”.**
6. Stop vehicle.
7. Follow the instruction displayed. (Check for normal shifting referring to the table below.)





Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists.	1 → 2 → 3 → 4
Malfunction for P0733 exists.	1 → 1 → 4 → 4

8. Make sure that “OK” is displayed. (If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”.)
   Refer to AT-521, "Diagnostic Procedure" .
   Refer to AT-747, "Shift Schedule" .

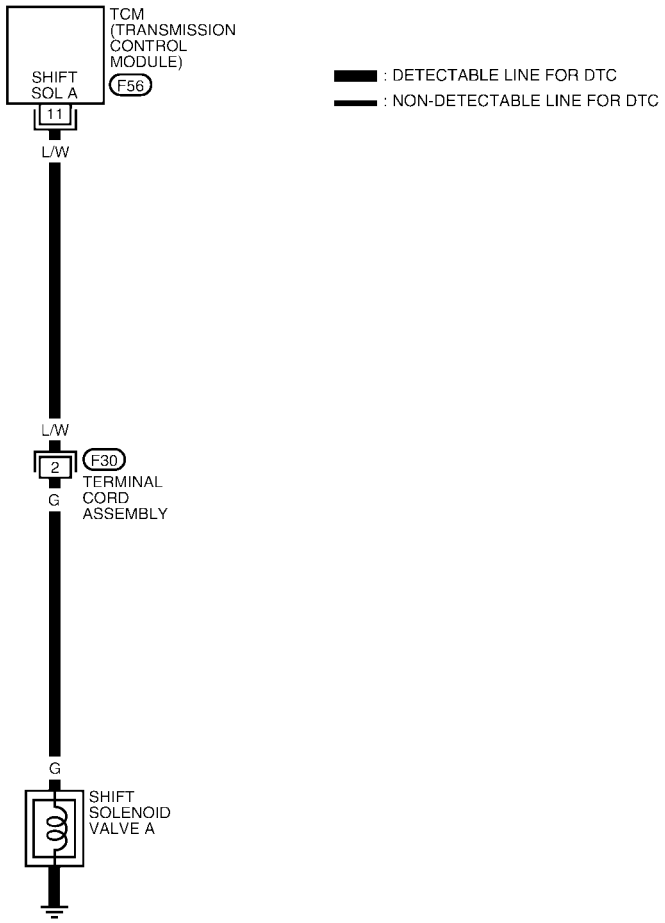
WITH GST

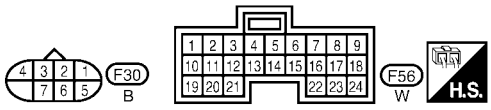
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 3RD

ECS00643

AT-3RDSIG-01





WCWA0023E

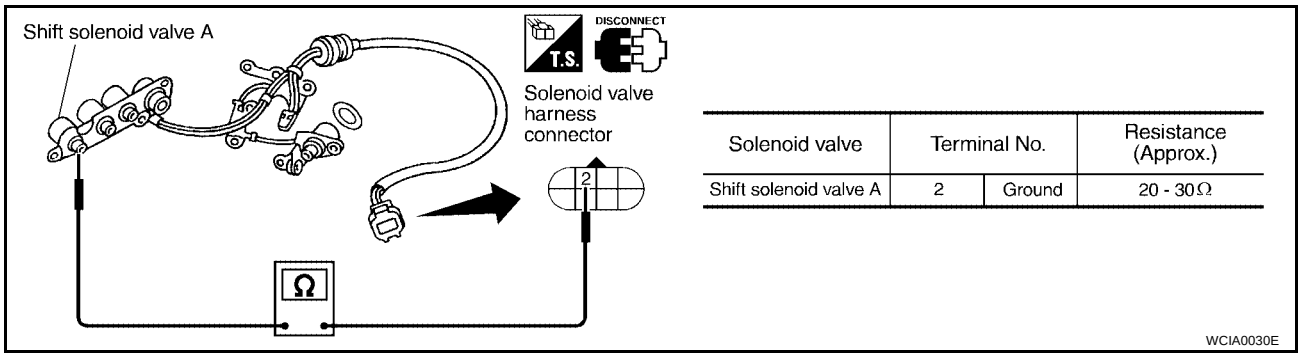
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A IS OPERATING (DRIVING IN D1 OR D4)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A IS NOT OPERATING (DRIVING IN D2 OR D3)	APPROX. 0V

Diagnostic Procedure

ECS00644

1. CHECK VALVE RESISTANCE

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
- Shift solenoid valve A
2. Check resistance between terminal cord assembly F30 terminal 2 and ground.



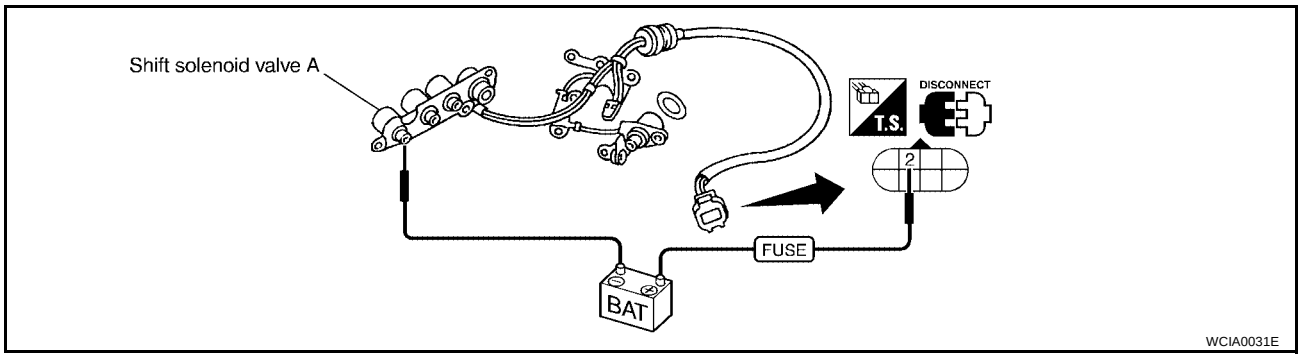
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 30Ω

OK or NG

OK >> GO TO 2.
NG >> Repair or replace shift solenoid valve assembly.

2. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
- Shift solenoid valve A
2. Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.



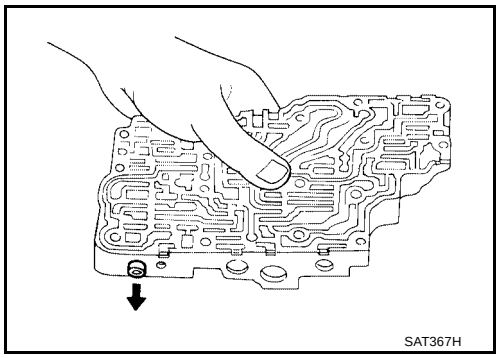
OK or NG

OK >> GO TO 3.
NG >> Repair or replace shift solenoid valve assembly.

3. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-674, "DISASSEMBLY" .
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



OK or NG

OK >> GO TO 4.
NG >> Repair control valve assembly.

4. CHECK DTC

Perform AT-518, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> Check transaxle internal components (clutch, brake, etc.).

DTC P0734 A/T 4TH GEAR FUNCTION

PFP:31940

Description

ECS00645

- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into fourth gear position as instructed by the TCM, or if the line pressure is low. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning oil pump or torque converter clutch, etc.

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Torque converter clutch solenoid valve duty	Lock-up OFF ↓ Lock-up ON	Approximately 4% ↓ Approximately 94%
Line pressure solenoid valve duty	Small throttle opening (Low line pressure) ↓ Large throttle opening (High line pressure)	Approximately 24% ↓ Approximately 95%

On Board Diagnosis Logic

ECS00646

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is much lower than the position (4th) supposed by TCM, the slip ratio will be much less than normal. In case the ratio does not reach the specified value, TCM judges this diagnosis malfunction. This malfunction will be caused when shift solenoid valve B is stuck closed.
Gear positions supposed by TCM are as follows.
In case of gear position with no malfunctions: 1, 2, 3 and **4** positions
In case of gear position with shift solenoid valve B stuck closed: 1, 2, 2 and **1*** positions to each gear position above
*: P0734 is detected.
Diagnostic trouble code A/T 4TH GR FNCTN with CONSULT-II or P0734 without CONSULT-II is detected when A/T cannot be shifted to the 4th gear position even if electrical circuit is good.

Possible Cause

ECS00647

Check the following items.

- Shift solenoid valve A
- Shift solenoid valve B
- Line pressure solenoid valve
- Each clutch
- Hydraulic control circuit

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS00648

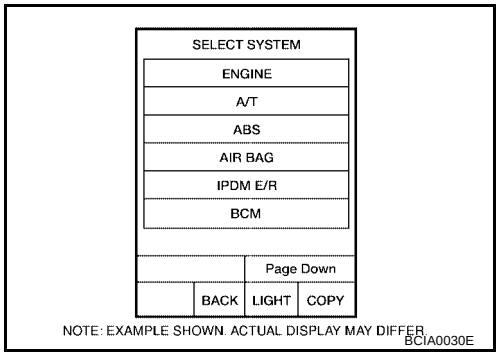
CAUTION:

- **Always drive vehicle at a safe speed.**
- **If conducting this “DTC CONFIRMATION PROCEDURE” again, always turn ignition switch OFF and wait at least 10 seconds before continuing.**
- **Be careful not to rev engine into the red zone on the tachometer.**

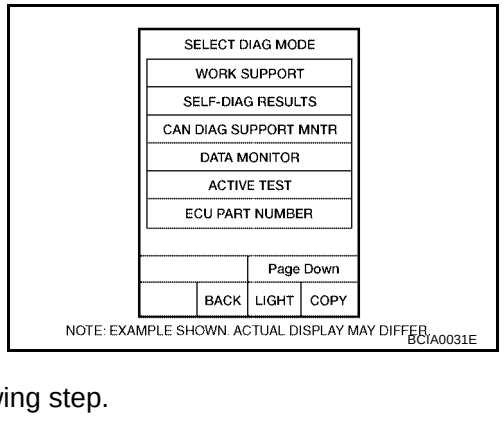
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Always drive vehicle on a level road to improve the accuracy of test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

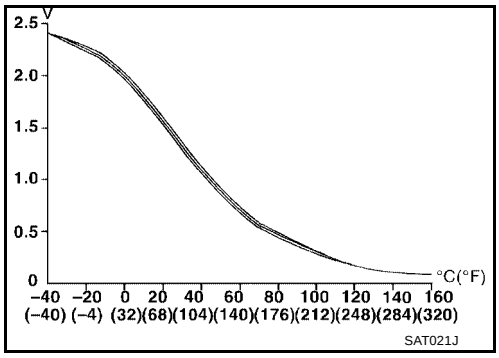
WITH CONSULT-II

1. Start engine and select “DATA MONITOR” mode for “A/T” with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive the vehicle to decrease the voltage (warm up the fluid) or stop engine to increase the voltage (cool down the fluid).
3. Select “4TH GR FNCTN P0734” of “DTC WORK SUPPORT” mode for “A/T” with CONSULT-II and touch “START”.



4. Accelerate vehicle to 60 to 70 km/h (37 to 43 MPH) under the following condition and release the accelerator pedal completely.
   THROTTLE POSI: Less than 5.5/8 (at all times during step 4)
   Selector lever: D position (O/D ON)
   - **Check that “GEAR” shows “3” after releasing pedal.**
5. Depress accelerator pedal steadily with 1.0/8 - 2.0/8 of “THROTTLE POSI” from a speed of 60 to 70 km/h (37 to 43 MPH) until “TESTING” has turned to “STOP VEHICLE” or “COMPLETED”. (It will take approximately 3 seconds.)
   If the check result NG appears on CONSULT-II screen, go to AT-526, "Diagnostic Procedure" .
   If “STOP VEHICLE” appears on CONSULT-II screen, go to following step.
   - **Check that “GEAR” shows “4” when depressing accelerator pedal with 1.0/8 - 2.0/8 of “THROTTLE POSI”.**
   - **If “TESTING” does not appear on CONSULT-II for a long time, select “SELF-DIAG RESULTS” for “ENGINE”. In case a 1st trip DTC other than P0734 is shown, refer to applicable “TROUBLE DIAGNOSIS FOR DTC”.**
6. Stop vehicle.
7. Follow the instruction displayed. (Check for normal shifting referring to the table below.)





Vehicle condition	Gear on actual transmission shift pattern when screen is changed to 1 → 2 → 3 → 4
No malfunction exists	1 → 2 → 3 → 4
Malfunction for P0734 exists.	1 → 2 → 2 → 1

8. Make sure that “OK” is displayed. (If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”.)
   Refer to AT-526, "Diagnostic Procedure" .
   Refer to AT-747, "Shift Schedule" .

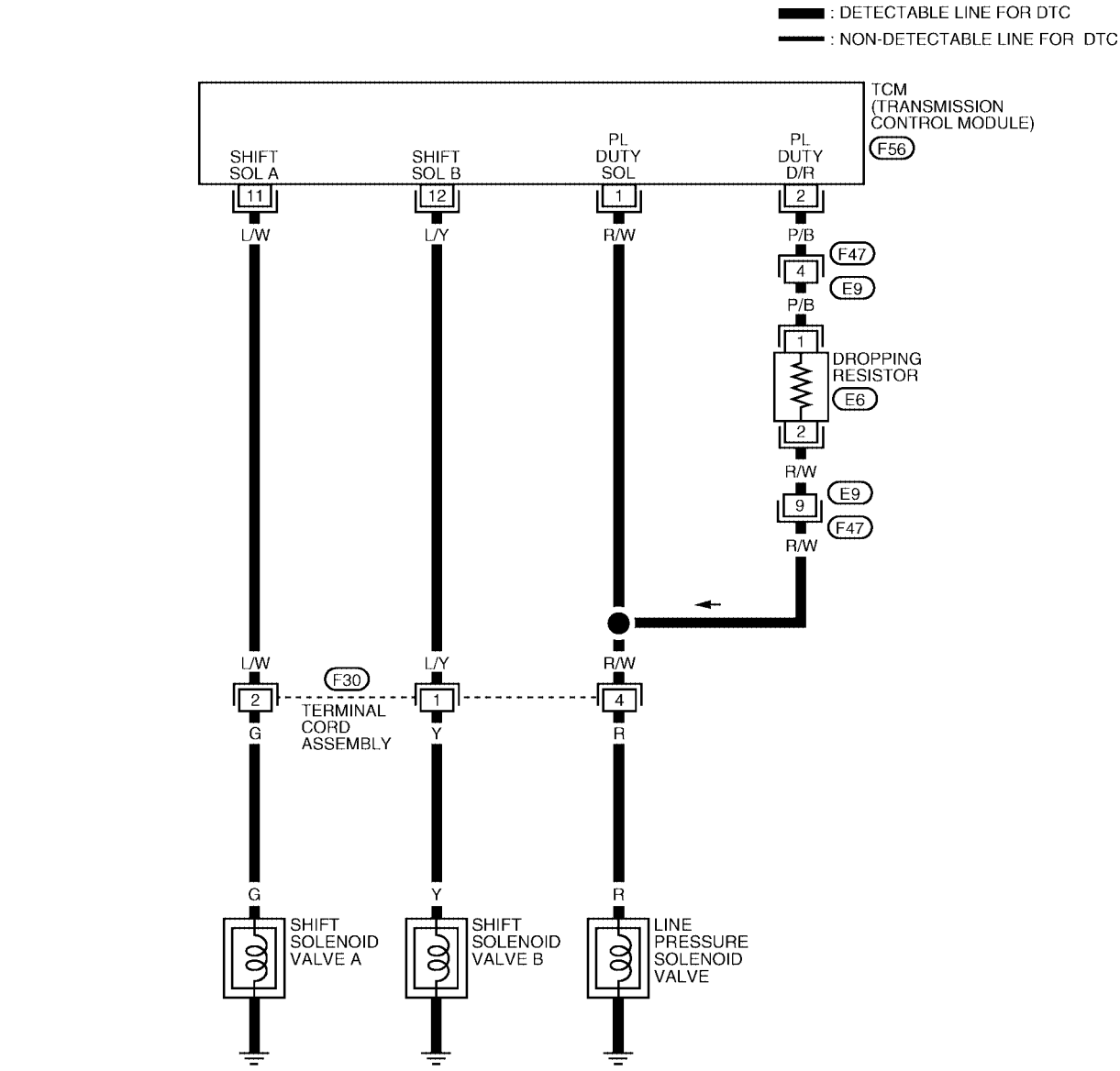
WITH GST

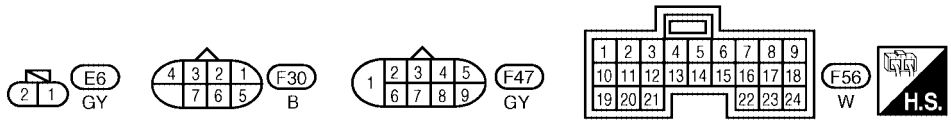
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — 4TH

ECS00649

AT-4THSIG-01





BCWA0242E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	R/W	LINE PRESSURE SOLENOID VALVE	WHEN ACCELERATOR PEDAL IS RELEASED WHILE DRIVING	APPROX. 1.5 - 3.0V
			WHEN ACCELERATOR PEDAL IS DEPRESSED WHILE DRIVING	APPROX. 0V
2	P/B	LINE PRESSURE SOLENOID VALVE (DROPPING RESISTOR)	WHEN ACCELERATOR PEDAL IS RELEASED WHILE DRIVING	APPROX. 4 - 14V
			WHEN ACCELERATOR PEDAL IS DEPRESSED WHILE DRIVING	APPROX. 0V
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A IS OPERATING (DRIVING IN D_1 OR D_4)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A IS NOT OPERATING (DRIVING IN D_2 OR D_3)	APPROX. 0V
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B IS OPERATING (DRIVING IN D_1 OR D_2)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE BE IS NOT OPERATING (DRIVING IN D_3 OR D_4)	APPROX. 0V

Diagnostic Procedure

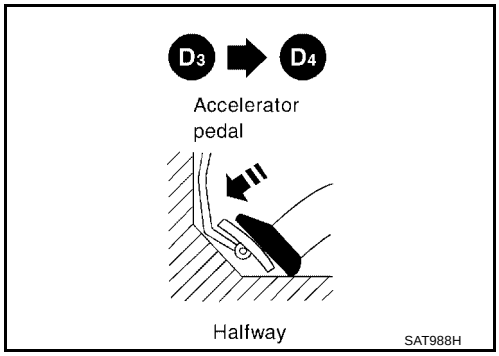
ECS0064A

1. CHECK SHIFT UP (D_3 TO D_4)

During AT-462, "Cruise Test — Part 1" , does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes >> GO TO 11.
No >> GO TO 2.



2. CHECK LINE PRESSURE

Perform line pressure test.

Engine Speed RPM	Line Pressure kPa (kg/cm^2 , psi)	
	D, 2 and 1 Position	R Position
Idle	500 (5.1, 73)	778 (7.9, 113)
Stall	1,223 (12.6, 179)	1,918 (19.6, 278)

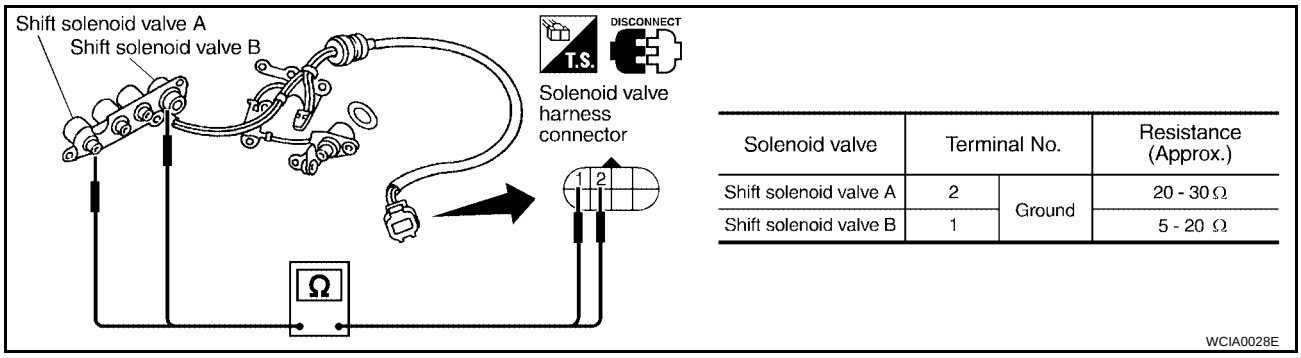
Refer to AT-453, "Line Pressure Test" .

OK or NG

OK >> GO TO 3.
NG >> GO TO 7.

3. CHECK VALVE RESISTANCE

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
- Shift solenoid valve A
- Shift solenoid valve B
2. Check resistance between terminal cord assembly connector F30 terminals 1 and 2 and ground.



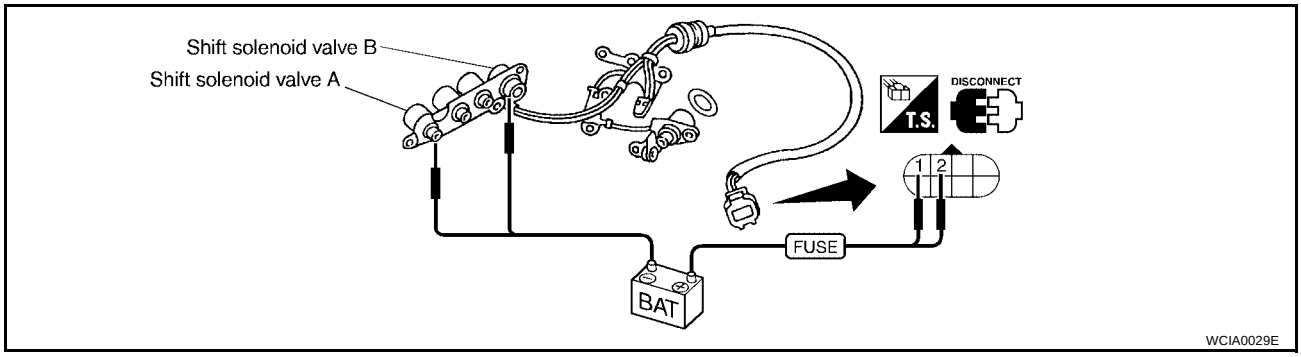
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	2	Ground	20 - 30 Ω
Shift solenoid valve B	1		5 - 20 Ω

OK or NG

OK >> GO TO 5.
NG >> Replace solenoid valve assembly.

4. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
- Shift solenoid valve A
- Shift solenoid valve B
2. Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.



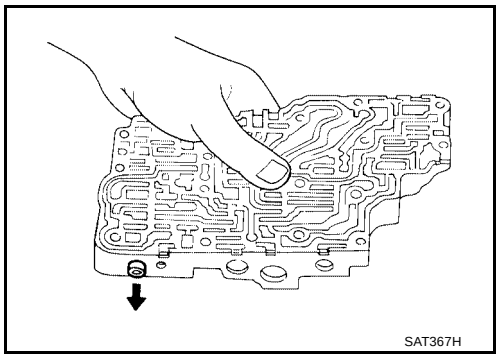
OK or NG

OK >> GO TO 5.
NG >> Replace solenoid valve assembly.

5. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-674, "DISASSEMBLY" .
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



OK or NG

OK >> GO TO 6.
NG >> Repair control valve.

6. CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

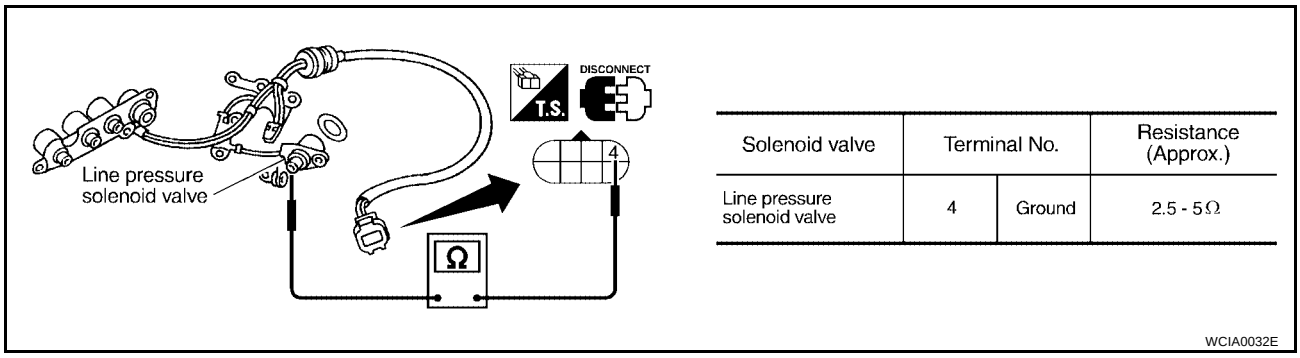
Yes >> GO TO 11.
No >> Check transaxle internal components (clutch, brake, etc.).

7. CHECK VALVE RESISTANCE

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .

- Line pressure solenoid valves

2. Check resistance between the terminal cord assembly connector F30 terminal 4 and ground.



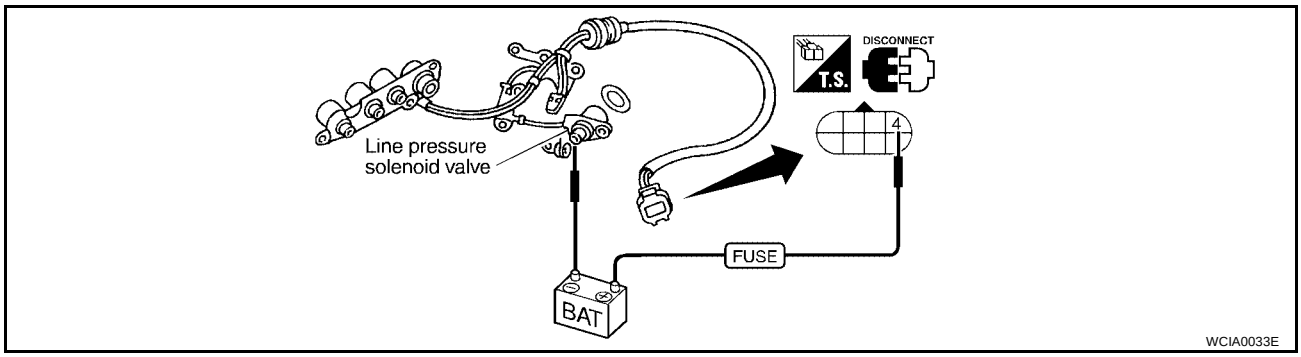
Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	4	Ground	2.5 - 5Ω

OK or NG

OK >> GO TO 9.
NG >> Replace solenoid valve assembly.

8. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
- Line pressure solenoid valves
2. Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.

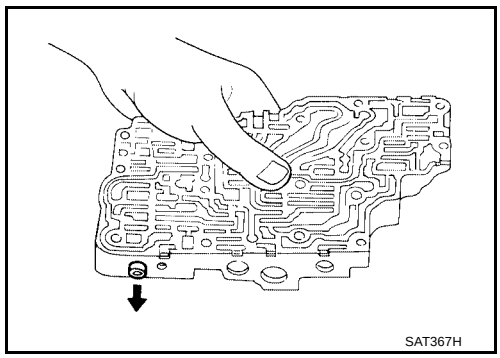


OK or NG

OK >> GO TO 9.
NG >> Replace solenoid valve assembly.

9. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-674, "DISASSEMBLY" .
2. Check line pressure circuit valves for sticking.
- Pressure regulator valve
- Pilot valve
- Pressure modifier valve



OK or NG

OK >> GO TO 10.
NG >> Repair control valve.

10. CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes >> GO TO 11.
No >> Check transaxle internal components (clutch, brake, etc.).

11. CHECK DTC

Perform AT-523, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> Perform “Cruise test — Part 1” again and return to the start point of this test group.

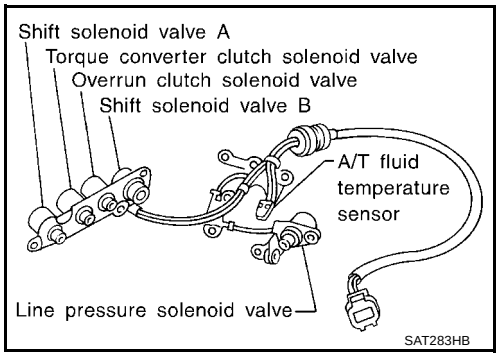
DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE

PFP:31940

Description

ECS0064B

The torque converter clutch solenoid valve is activated, with the gear in D4 , by the TCM in response to signals sent from the vehicle speed and the ECM (throttle opening). Lock-up piston operation will then be controlled.
Lock-up operation, however, is prohibited when A/T fluid temperature is too low.
When the accelerator pedal is depressed (less than 2/8) in lock-up condition, the engine speed should not change abruptly. If there is a big jump in engine speed, there is no lock-up.



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Torque converter clutch solenoid valve duty	Lock-up OFF ↓ Lock-up ON	Approximately 4% ↓ Approximately 94%

On Board Diagnosis Logic

ECS0064C

Diagnostic trouble code TCC SOLENOID/CIRC with CONSULT-II or P0740 without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve.

Possible Cause

ECS0064D

Check the following items.

- Torque converter clutch solenoid valve
- Harness or connectors
  (The solenoid circuit is open or shorted.)

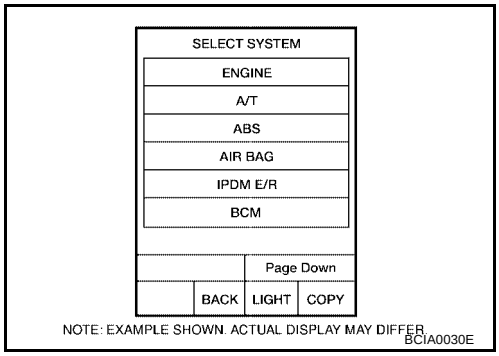
Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0064E

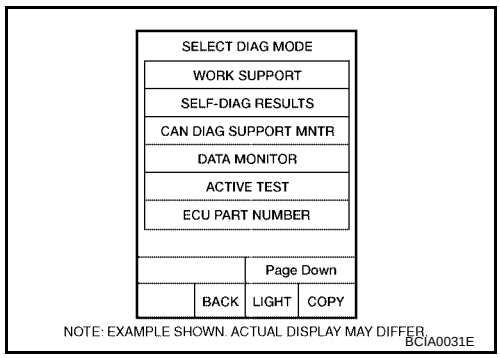
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON.



2. Select “DATA MONITOR” mode for “ENGINE” with CONSULT-II and wait at least 1 second.



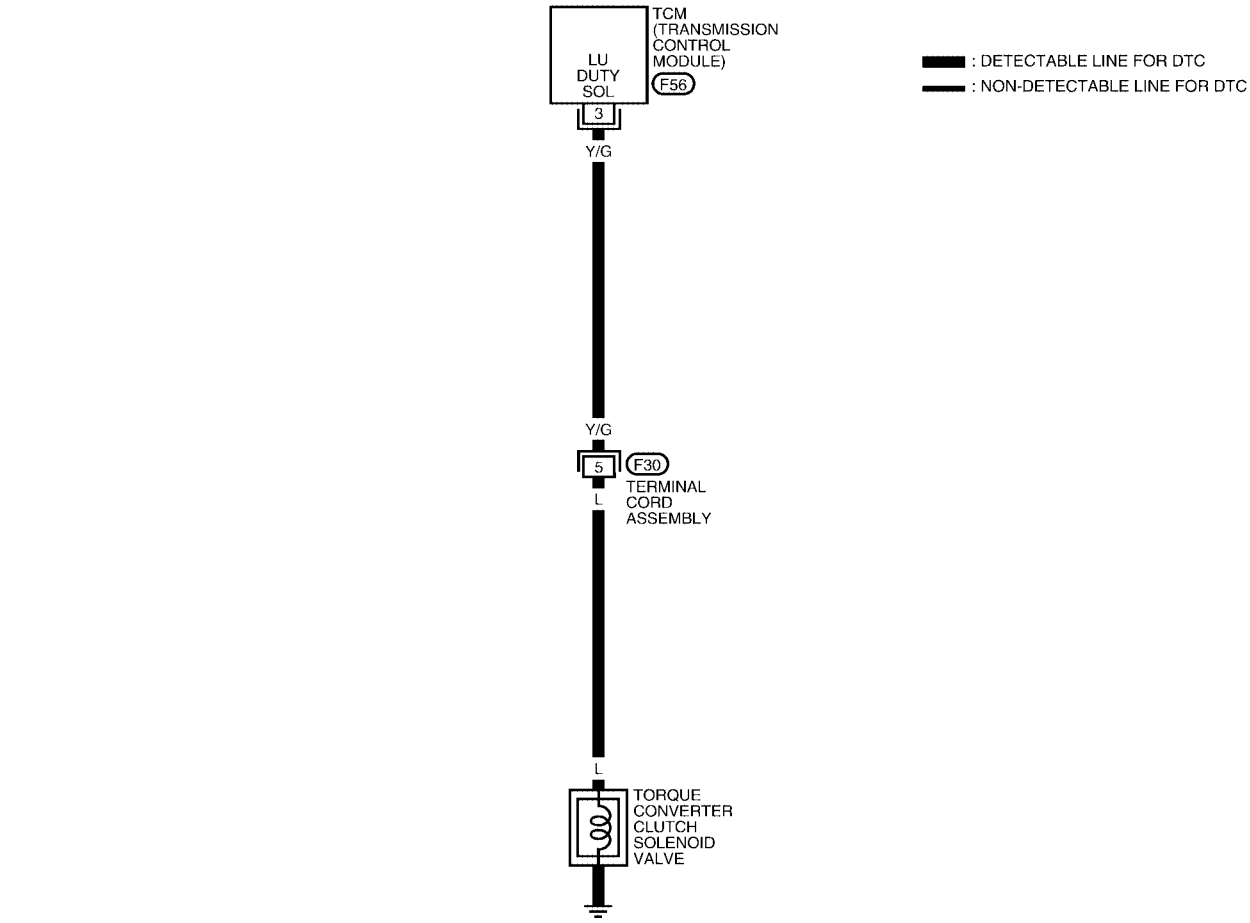
WITH GST

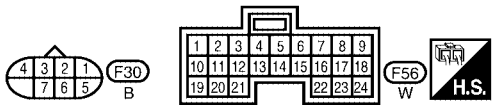
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — TCV

ECS0064F

AT-TCV-01





WCWA0133E

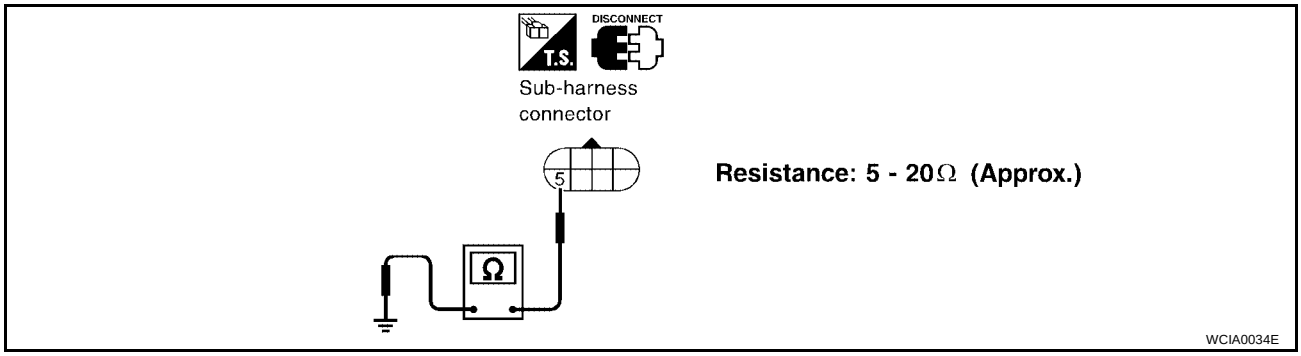
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
3	Y/G	TORQUE CONVERTER CLUTCH SOLENOID VALVE	WITH TORQUE CONVERTER LOCK-UP	APPROX. 8 - 15V
			WITHOUT TORQUE CONVERTER LOCK-UP	APPROX. 0V

Diagnostic Procedure

ECS0064G

1. CHECK VALVE RESISTANCE

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly connector F30 terminal 5 and ground.



OK or NG

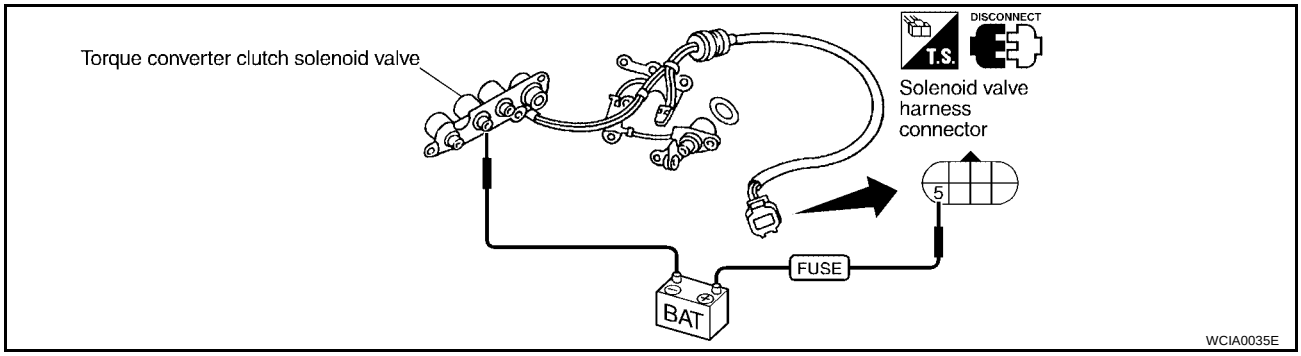
OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK VALVE OPERATION

1. Remove oil pan.
2. Check the following items:

– Torque converter clutch solenoid valve

• Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.



– Harness of terminal cord assembly for short or open

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal cord assembly harness connector F30 terminal 5 and TCM harness connector F56 terminal 3. Refer to AT-532, "Wiring Diagram — AT — TCV" .

Continuity should exist.

4. Reinstall any part removed.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK DTC

Perform AT-530, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 5.

5. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

DTC P0744 A/T TCC S/V FUNCTION (LOCK-UP)

PFP:31940

Description

ECS0064H

- This is an OBD-II self-diagnostic item and not available in TCM self-diagnosis.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into fourth gear position or the torque converter clutch does not lock up as instructed by the TCM. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning oil pump or torque converter clutch, etc.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Torque converter clutch solenoid valve duty	Lock-up OFF ↓ Lock-up ON	Approximately 4% ↓ Approximately 94%

On Board Diagnosis Logic

ECS0064I

This diagnosis monitors actual gear position by checking the torque converter slip ratio calculated by TCM as follows:
Torque converter slip ratio = A x C/B
A: Output shaft revolution signal from revolution sensor
B: Engine speed signal from ECM
C: Gear ratio determined as gear position which TCM supposes
If the actual gear position is much lower than the position (4th) supposed by TCM, the slip ratio will be much less than normal. In case the ratio does not reach the specified value, TCM judges this diagnosis malfunction. This malfunction will be caused when shift solenoid valve B is stuck closed.
Gear positions supposed by TCM are as follows.
In case of gear position with no malfunctions: 1, 2, 3 and 4 positions
In case of gear position with shift solenoid valve B stuck closed: 1, 2, 2 and 1* positions to each gear position above
*: P0744 is detected.
Diagnostic trouble code A/T TCC S/V FNCTN with CONSULT-II or P0744 without CONSULT-II is detected when A/T cannot perform lock-up even if electrical circuit is good.

Possible Cause

ECS0064J

Check the following items.

- Line pressure solenoid valve
- Torque converter clutch solenoid valve
- Each clutch
- Hydraulic control circuit

Diagnostic Trouble Code (DTC) Confirmation Procedure

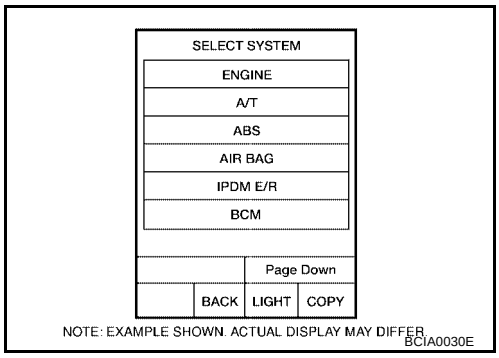
ECS0064K

CAUTION:
Always drive vehicle at a safe speed.

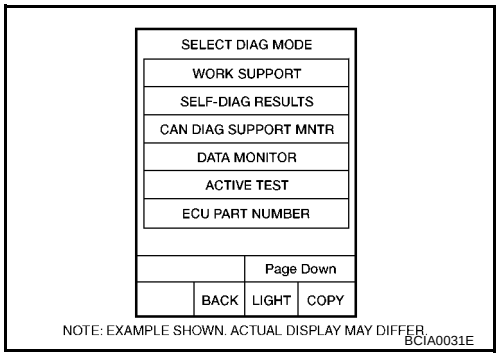
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

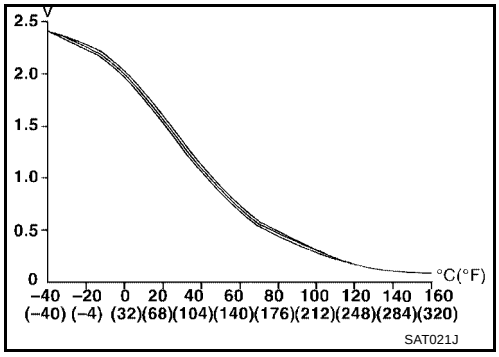
1. Start engine and select “DATA MONITOR” mode for “A/T” with CONSULT-II.
2. Make sure that output voltage of A/T fluid temperature sensor is within the range below.
   FLUID TEMP SEN: 0.4 - 1.5V
   If out of range, drive vehicle to decrease voltage (warm up the fluid) or stop engine to increase voltage (cool down the fluid).
3. Select “TCC S/V FNCTN P0744” of “DTC WORK SUPPORT” mode for “A/T” with CONSULT-II and touch “START”.



4. Accelerate vehicle to more than 70 km/h (43 MPH) and maintain the following condition continuously until “TESTING” has turned to “COMPLETE”. (It will take approximately 30 seconds after “TESTING” shows.)
   THROTTLE POSI: 1.0/8 - 2.0/8 (at all times during step 4)
   Selector lever: D position (O/D ON)
   TCC S/V DUTY: More than 94%
   VHCL/S SE·A/T: Constant speed of more than 70 km/h (43 MPH)
   - **Check that “GEAR” shows “4”.**
   - **For shift schedule, refer to AT-747, "Shift Schedule" .**
   - **If “TESTING” does not appear on CONSULT-II for a long time, select “SELF-DIAG RESULTS”. In case a 1st trip DTC other than P0744 is shown, refer to applicable “TROUBLE DIAGNOSIS FOR DTC”.**



5. Make sure that “OK” is displayed. (If “NG” is displayed, refer to “DIAGNOSTIC PROCEDURE”.)
   Refer to AT-538, "Diagnostic Procedure" .
   Refer to AT-747, "Shift Schedule" .



WITH GST

Follow the procedure “With CONSULT-II”.

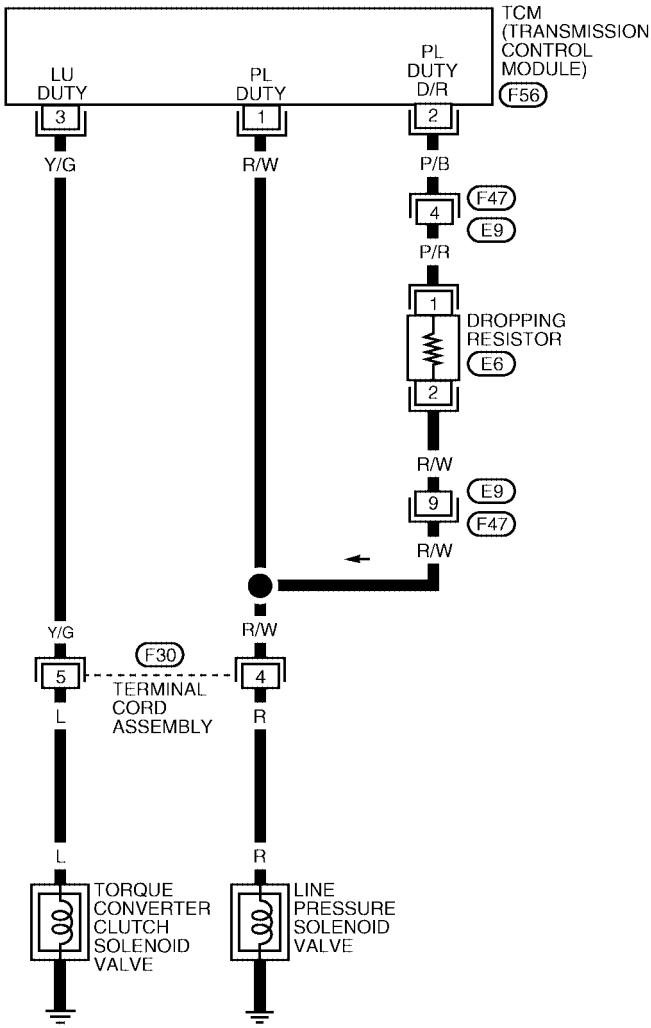
Wiring Diagram — AT — TCCSIG

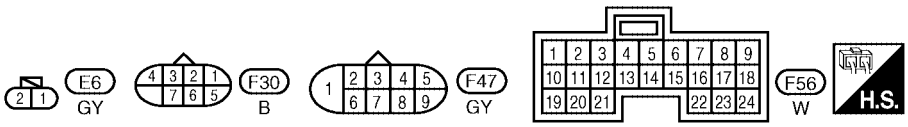
ECS0064L

AT-TCCSIG-01

: DETECTABLE LINE FOR DTC

: NON- DETECTABLE LINE FOR DTC





BCWA0243E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	R/W	LINE PRESSURE SOLENOID VALVE	WHEN ACCELERATOR PEDAL IS RELEASED WHILE DRIVING	APPROX. 1.5 - 3.0V
			WHEN ACCELERATOR PEDAL IS DEPRESSED WHILE DRIVING	APPROX. 0V
2	P/B	LINE PRESSURE SOLENOID VALVE (DROPPING RESISTOR)	WHEN ACCELERATOR PEDAL IS RELEASED WHILE DRIVING	APPROX. 4 - 14V
			WHEN ACCELERATOR PEDAL IS DEPRESSED WHILE DRIVING	APPROX. 0V
3	Y/G	TORQUE CONVERTER CLUTCH SOLENOID VALVE	WITH TORQUE CONVERTER LOCK-UP	APPROX. 8 - 15V
			WITHOUT TORQUE CONVERTER LOCK-UP	APPROX. 0V

Diagnostic Procedure

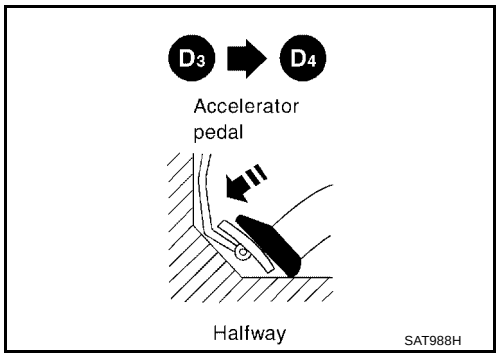
ECS0064M

1. CHECK SHIFT UP (D_3 TO D_4)

During AT-462, "Cruise Test — Part 1" , does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes >> GO TO 11.
No >> GO TO 2.



2. CHECK LINE PRESSURE

Perform line pressure test.

Engine Speed RPM	Line Pressure kPa (kg/cm^2 , psi)	
	D, 2 and 1 Position	R Position
Idle	500 (5.1, 73)	778 (7.9, 113)
Stall	1,223 (12.6, 179)	1,918 (19.6, 278)

Refer to AT-453, "Line Pressure Test" .

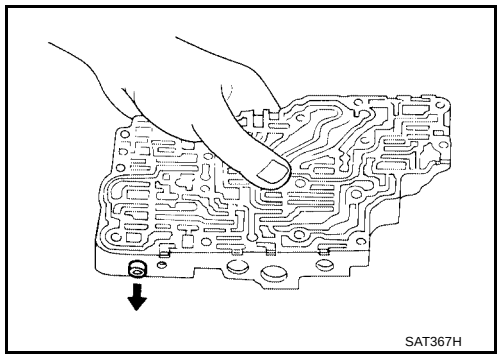
OK or NG

OK >> GO TO 3.
NG >> GO TO 6.

3. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-674, "DISASSEMBLY" .
2. Check to ensure that:

- Valve, sleeve and plug slide along valve bore under their own weight.
- Valve, sleeve and plug are free from burrs, dents and scratches.
- Control valve springs are free from damage, deformation and fatigue.
- Hydraulic line is free from obstacles.



OK or NG

OK >> GO TO 4.
NG >> Repair control valve.

4. CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes >> GO TO 5.
No >> Check transaxle internal components (clutch, brake, etc.).

5. CHECK DTC

Perform AT-535, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

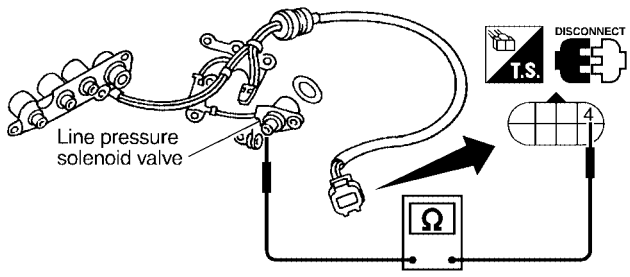
OK >> **INSPECTION END**
NG >> GO TO 11. Check for proper lock-up.

6. CHECK VALVE RESISTANCE

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .

- Line pressure solenoid valve

2. Check resistance to the terminal and ground.



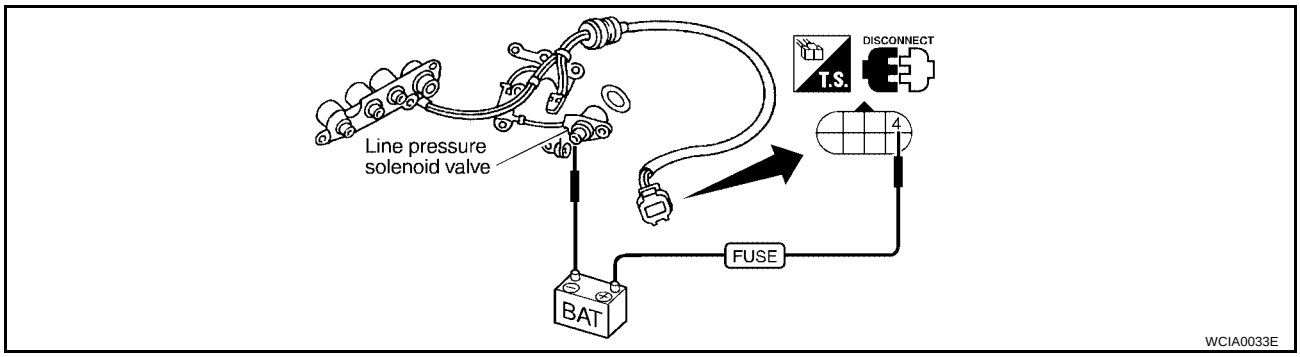
Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	4	Ground	2.5 - 5Ω

OK or NG

OK >> GO TO 8.
NG >> Replace solenoid valve assembly.

7. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
- Line pressure solenoid valve
2. Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.

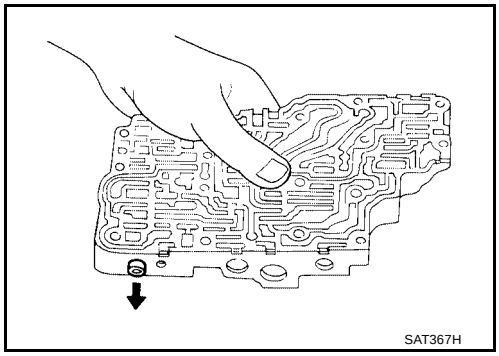


OK or NG

OK >> GO TO 8.
NG >> Replace solenoid valve assembly.

8. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-674, "DISASSEMBLY" .
2. Check line pressure circuit valves for sticking.
- Pressure regulator valve
- Pilot valve
- Pressure modifier valve



OK or NG

OK >> GO TO 9.
NG >> Repair control valve.

9. CHECK SHIFT UP (D_3 TO D_4)

Does A/T shift from D_3 to D_4 at the specified speed?

Yes or No

Yes >> GO TO 10.
No >> Check transaxle internal components (clutch, brake, etc.).

10. CHECK DTC

Perform AT-535, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11. Check for proper lock-up.

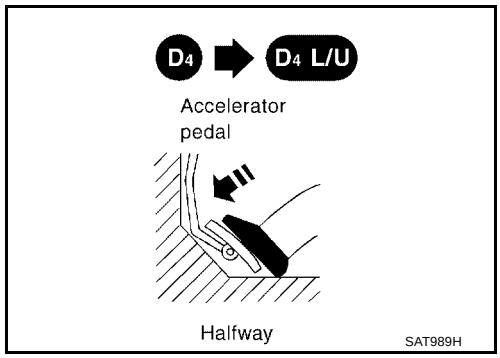
11. CHECK LOCK-UP

During AT-462, "Cruise Test — Part 1" , does A/T perform lock-up at the specified speed?

Yes or No

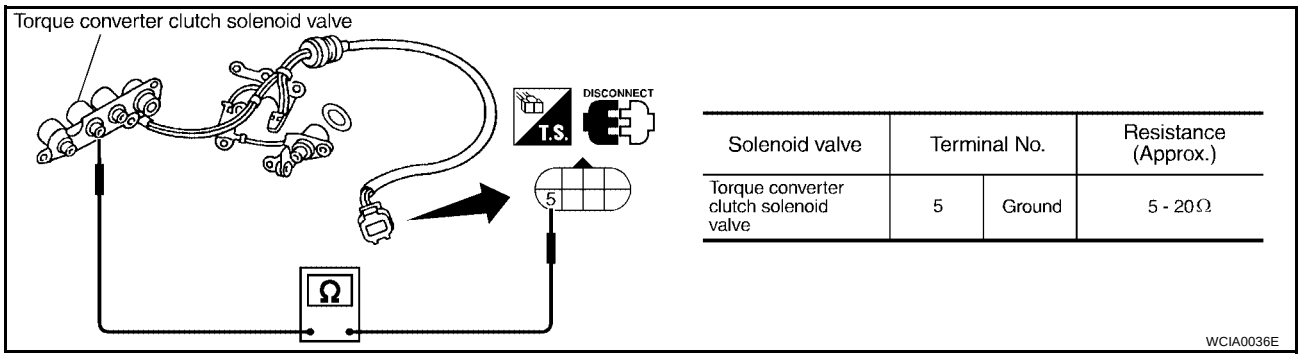
Yes >> Perform “Cruise test — Part 1” again and return to the start point of this test group.

No >> GO TO 12.



12. CHECK VALVE RESISTANCE

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
- Torque converter clutch solenoid valve
2. Check resistance between terminal cord assembly connector F30 terminal 5 and ground.



Solenoid valve	Terminal No.		Resistance (Approx.)
Torque converter clutch solenoid valve	5	Ground	5 - 20Ω

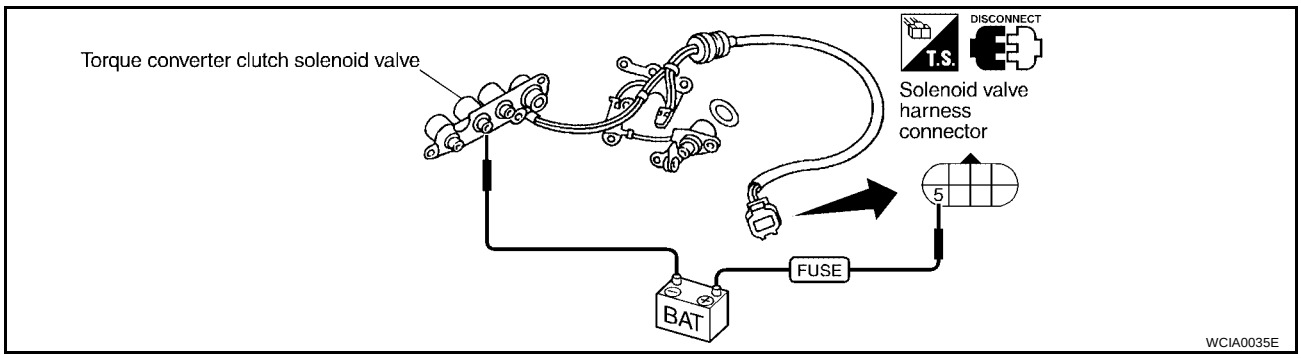
OK or NG

OK >> GO TO 14.

NG >> Replace solenoid valve assembly.

13. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
- Torque converter clutch solenoid valve
2. Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.



OK or NG

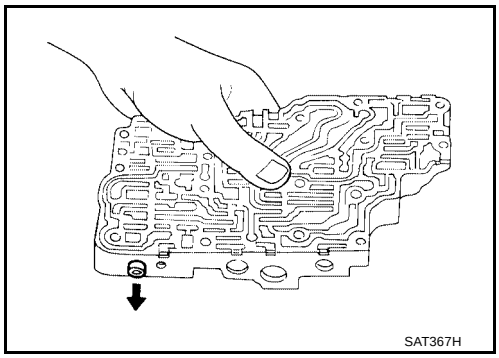
OK >> GO TO 14.

NG >> Replace solenoid valve assembly.

14. CHECK CONTROL VALVE

1. Disassemble control valve assembly. Refer to AT-674, "DISASSEMBLY" .
2. Check control valves for sticking.

- Torque converter clutch control valve
- Torque converter clutch relief valve



OK or NG

OK >> GO TO 15.
NG >> Repair control valve.

15. CHECK LOCK-UP

Does A/T perform lock-up at the specified speed?

Yes or No

Yes >> GO TO 16.
No >> Check transaxle internal components (clutch, brake, etc.).

16. CHECK DTC

Perform AT-535, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> Perform “Cruise test — Part 1” again and return to the start point of this test group.

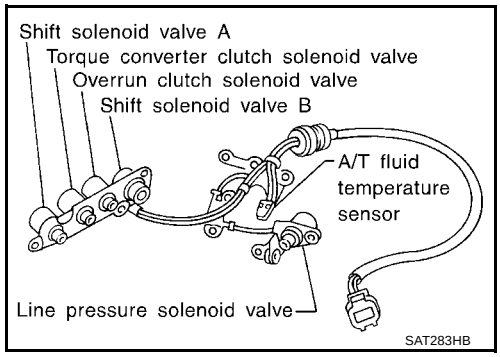
DTC P0745 LINE PRESSURE SOLENOID VALVE

PFP:31940

Description

ECS0064N

The line pressure solenoid valve regulates the oil pump discharge pressure to suit the driving condition in response to a signal sent from the TCM.



CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Line pressure solenoid valve duty	Small throttle opening (Low line pressure) ↓ Large throttle opening (High line pressure)	Approximately 24% ↓ Approximately 95%

On Board Diagnosis Logic

ECS0064O

Diagnostic trouble code L/PRESS SOL/CIRC with CONSULT-II or P0745 without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve.

Possible Cause

ECS0064P

Check the following items.

- Harness or connectors
  (The solenoid circuit is open or shorted.)
- Line pressure solenoid valve

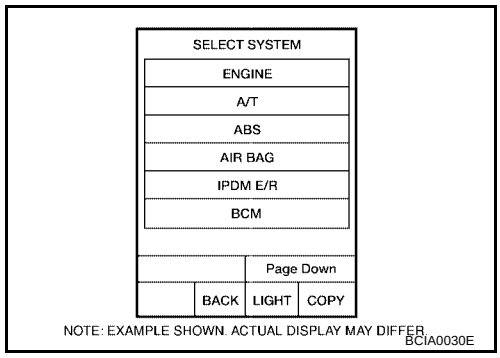
Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0064Q

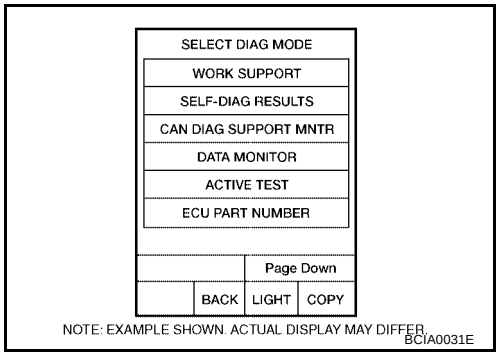
NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.



2. Depress accelerator pedal completely and wait at least 5 seconds.



WITH GST

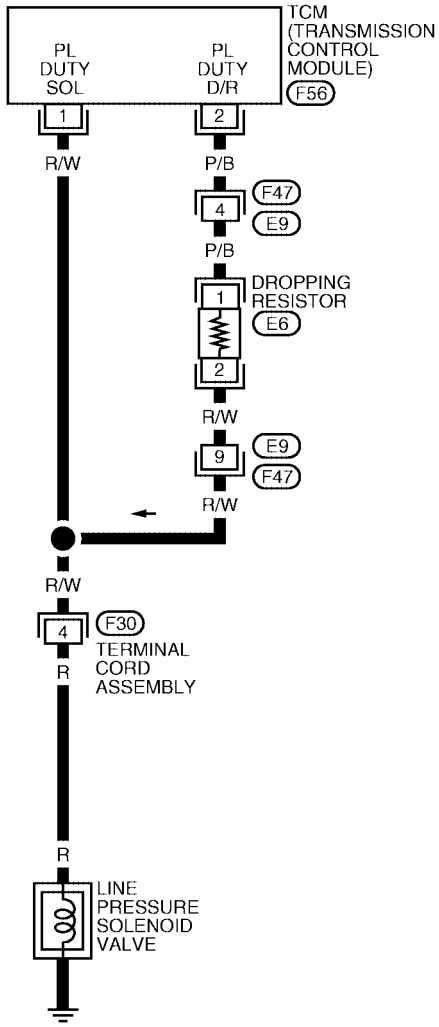
Follow the procedure “With CONSULT-II”.

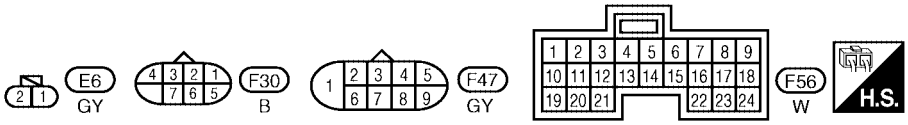
Wiring Diagram — AT — LPSV

ECS0064R

AT-LPSV-01

: DETECTABLE LINE FOR DTC
: NON- DETECTABLE LINE FOR DTC





BCWA0244E

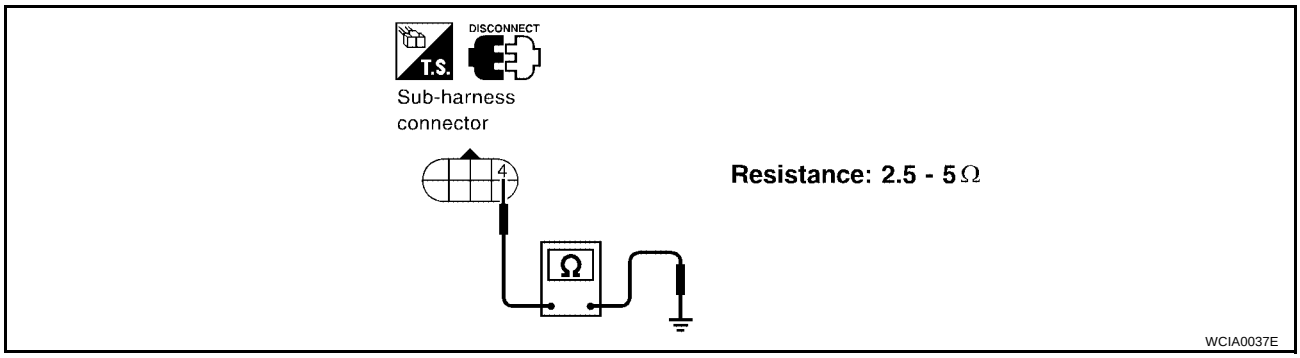
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	R/W	LINE PRESSURE SOLENOID VALVE	WHEN ACCELERATOR PEDAL IS RELEASED WHILE DRIVING	APPROX. 1.5 - 3.0V
			WHEN ACCELERATOR PEDAL IS DEPRESSED WHILE DRIVING	APPROX. 0V
2	P/B	LINE PRESSURE SOLENOID VALVE (DROPPING RESISTOR)	WHEN ACCELERATOR PEDAL IS RELEASED WHILE DRIVING	APPROX. 4 - 14V
			WHEN ACCELERATOR PEDAL IS DEPRESSED WHILE DRIVING	APPROX. 0V

Diagnostic Procedure

ECS0064S

1. CHECK VALVE RESISTANCE

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly connector F30 terminal 4 and ground.



OK or NG

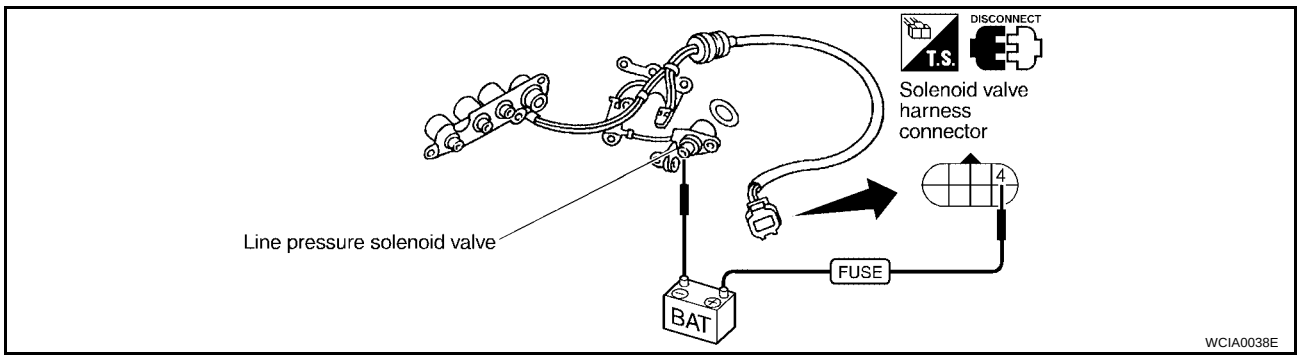
OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

– Line pressure solenoid valve

• Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.



– Harness of terminal cord assembly for short or open

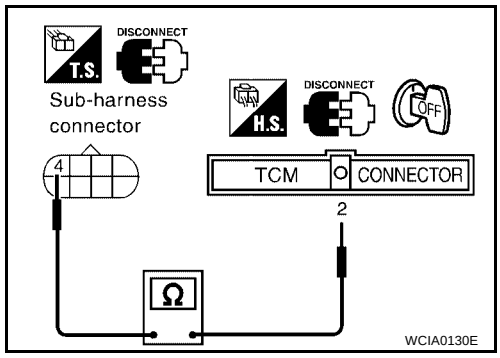
OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK POWER SOURCE AND DROPPING RESISTOR CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check resistance between terminal cord assembly harness connector F30 terminal 4 and TCM harness connector F56 terminal 2.

Resistance : Approximately 12Ω



OK or NG

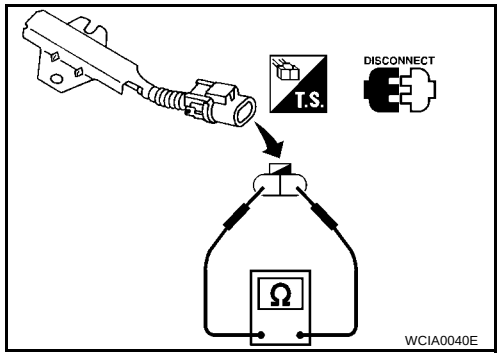
OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING ITEM

Check the following items:

- Dropping resistor
- Check resistance between two terminals.

Resistance : Approximately 12Ω



- Harness for short or open between TCM terminal 2 and terminal cord assembly (Main harness)

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

5. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Check continuity between terminal cord assembly connector F30 terminal 4 and TCM harness connector F56 terminal 1. Refer to AT-545, "Wiring Diagram — AT — LPSV" .

Continuity should exist.

3. Reinstall any part removed.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK DTC

Perform AT-543, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

7. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

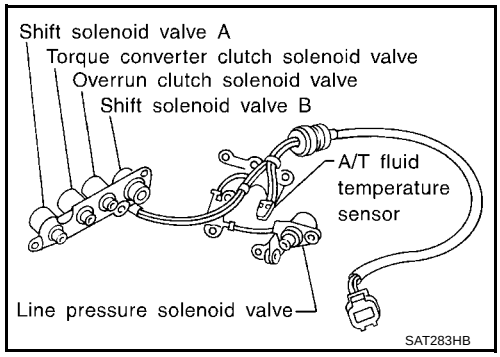
DTC P0750 SHIFT SOLENOID VALVE A

PFP:31940

Description

ECS0064T

Shift solenoid valves A and B are turned ON or OFF by the TCM in response to signals sent from the park/neutral position (PNP) switch, vehicle speed and ECM (throttle opening). Gears will then be shifted to the optimum position.



Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

On Board Diagnosis Logic

ECS0064U

Diagnostic trouble code SFT SOL A/CIRC with CONSULT-II or P0750 without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve.

Possible Cause

ECS0064V

Check the following items.

- Harness or connectors
  (The solenoid circuit is open or shorted.)
- Shift solenoid valve A

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0064W

CAUTION:

Always drive vehicle at a safe speed.

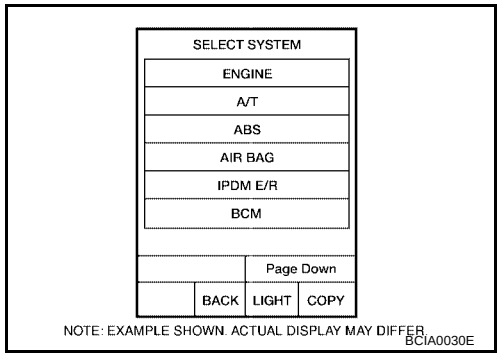
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

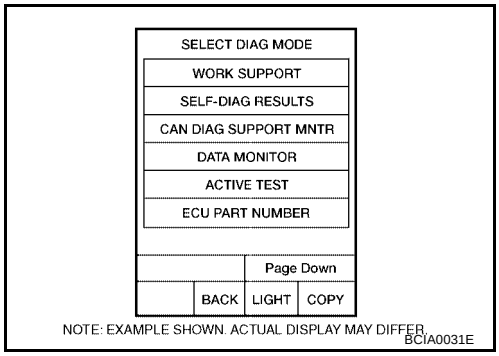
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.



2. Start engine.
3. Drive vehicle in D position and allow the transmission to shift 1 → 2 (“GEAR”).



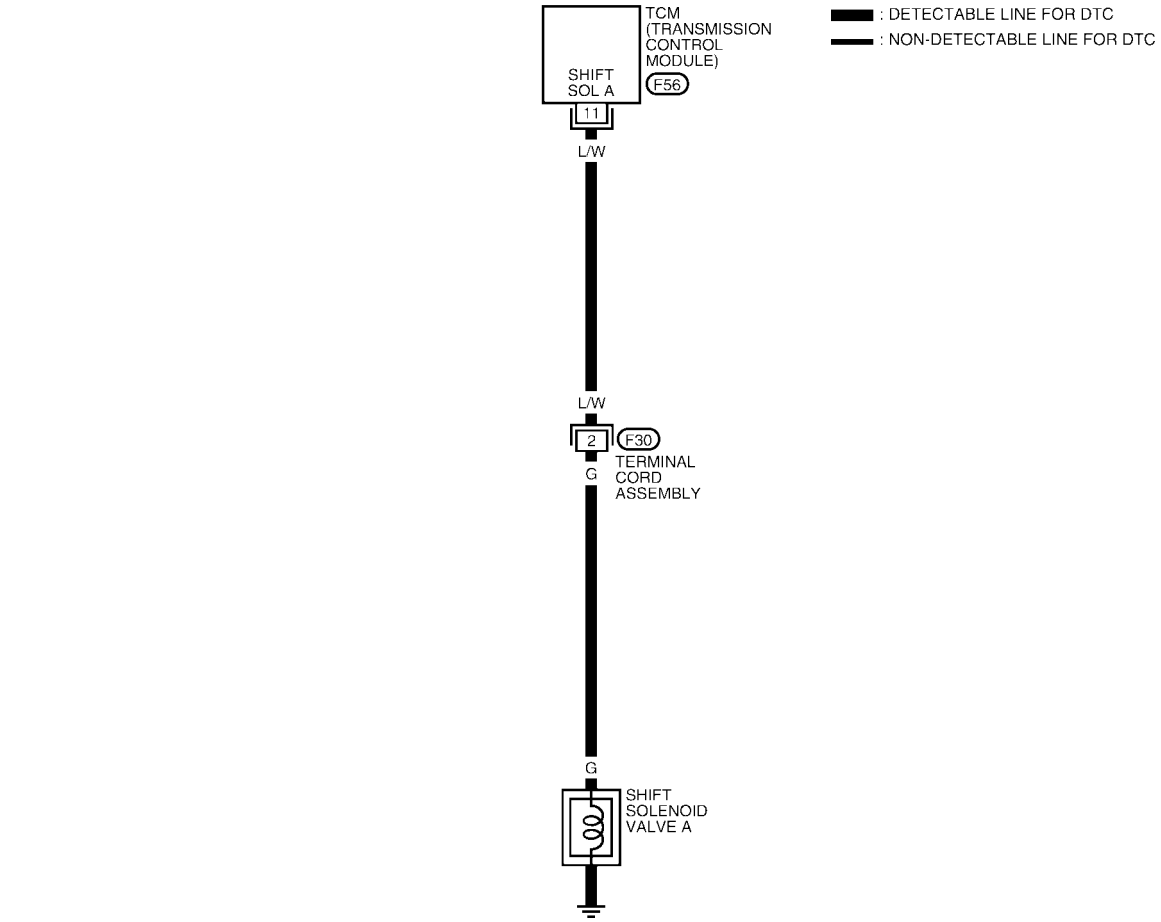
WITH GST

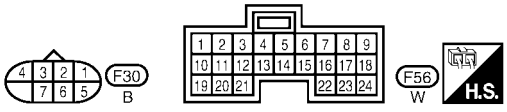
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — SSV/A

ECS0064X

AT-SSV/A-01





WCWA0028E

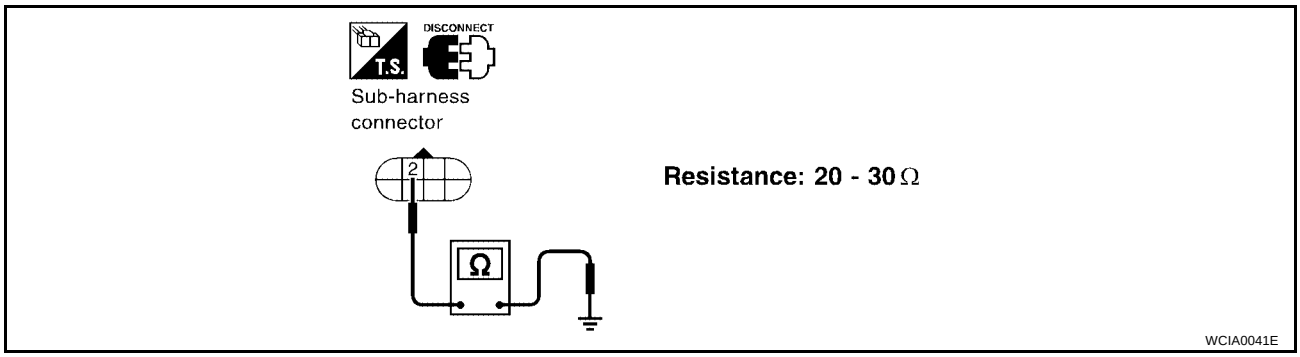
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
11	L/W	SHIFT SOLENOID VALVE A	WHEN SHIFT SOLENOID VALVE A IS OPERATING (DRIVING IN D1 OR D4)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE A IS NOT OPERATING (DRIVING IN D2 OR D3)	APPROX. 0V

Diagnostic Procedure

ECS0064Y

1. CHECK VALVE RESISTANCE

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly connector F30 terminal 2 and ground.



OK or NG

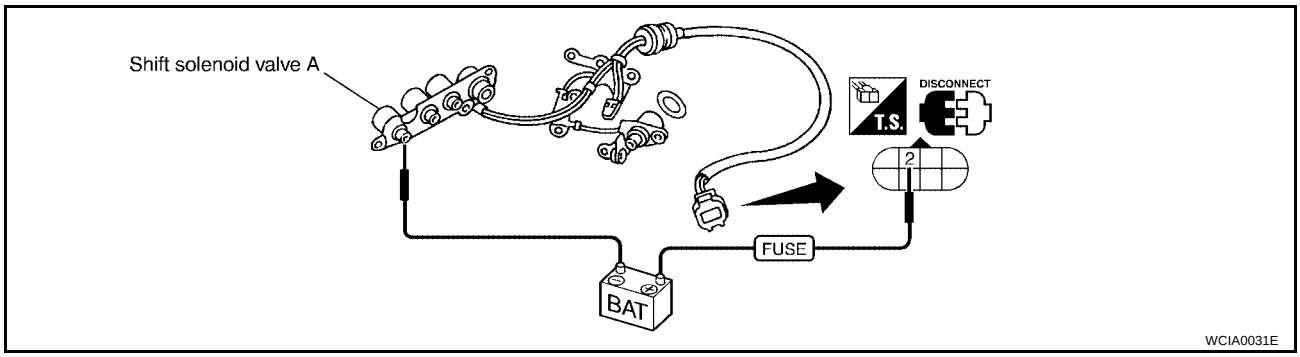
OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

- Shift solenoid valve A
- Operation check

• Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.



- Harness of terminal cord assembly for short or open

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal cord assembly harness connector F30 terminal 2 and TCM harness connector F56 terminal 11. Refer to AT-551, "Wiring Diagram — AT — SSV/A" .

Continuity should exist.

4. Reinstall any part removed.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK DTC

Perform AT-549, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 5.

5. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

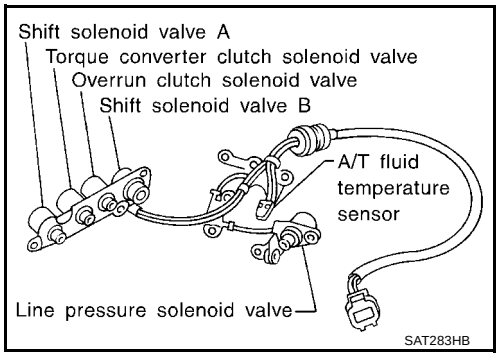
DTC P0755 SHIFT SOLENOID VALVE B

PFP:31940

Description

ECS0064Z

Shift solenoid valves A and B are turned ON or OFF by the TCM in response to signals sent from the park/neutral position (PNP) switch, vehicle speed and ECM (throttle opening). Gears will then be shifted to the optimum position.



Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

On Board Diagnosis Logic

ECS00650

Diagnostic trouble code SFT SOL B/CIRC with CONSULT-II or P0755 without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve.

Possible Cause

ECS00651

Check the following items.

- Harness or connectors
  (The solenoid circuit is open or shorted.)
- Shift solenoid valve B

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS00652

CAUTION:

Always drive vehicle at a safe speed.

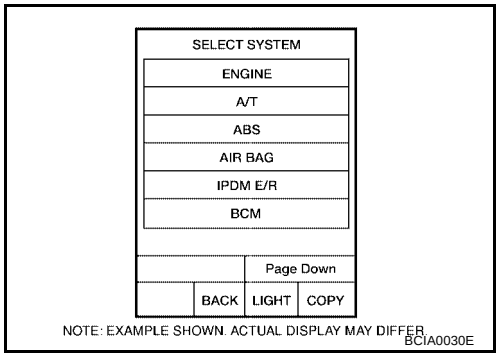
NOTE:

If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

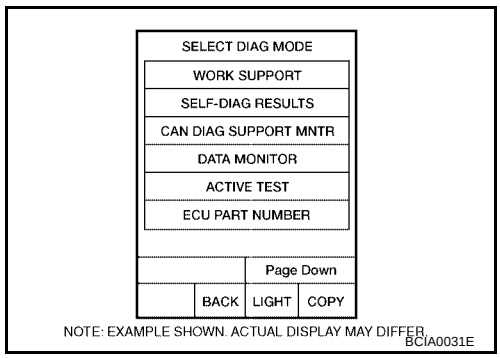
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.



2. Start engine.
3. Drive vehicle in D position and allow the transmission to shift 1 → 2 → 3 (“GEAR”).



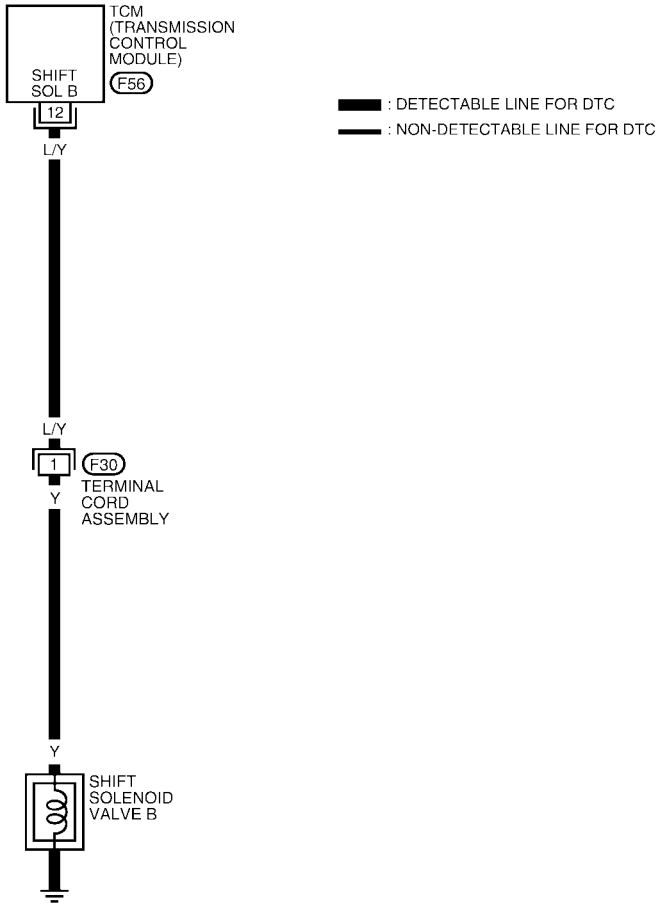
WITH GST

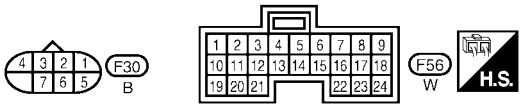
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — SSV/B

ECS00653

AT-SSV/B-01





WCWA0029E

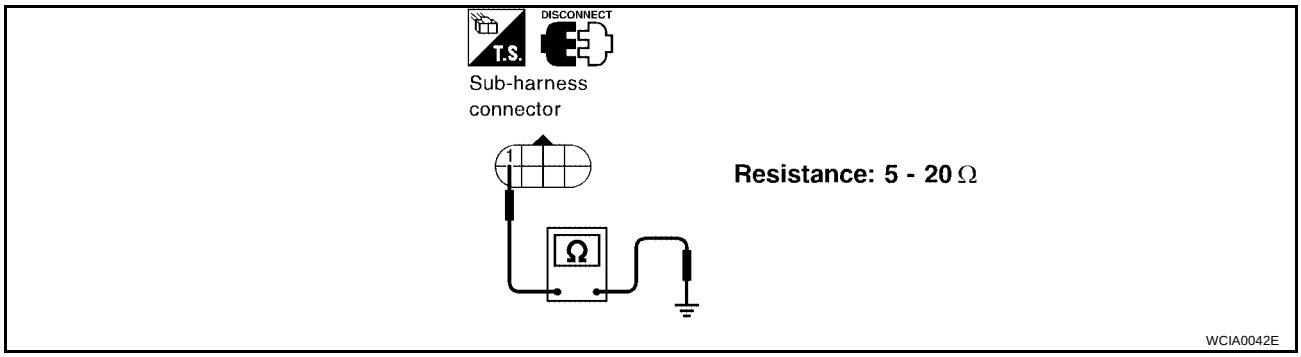
TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
12	L/Y	SHIFT SOLENOID VALVE B	WHEN SHIFT SOLENOID VALVE B IS OPERATING (DRIVING IN D1 OR D2)	BATTERY VOLTAGE
			WHEN SHIFT SOLENOID VALVE BE IS NOT OPERATING (DRIVING IN D3 OR D4)	APPROX. OV

Diagnostic Procedure

ECS00654

1. CHECK VALVE RESISTANCE

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly connector F30 terminal 1 and ground.



OK or NG

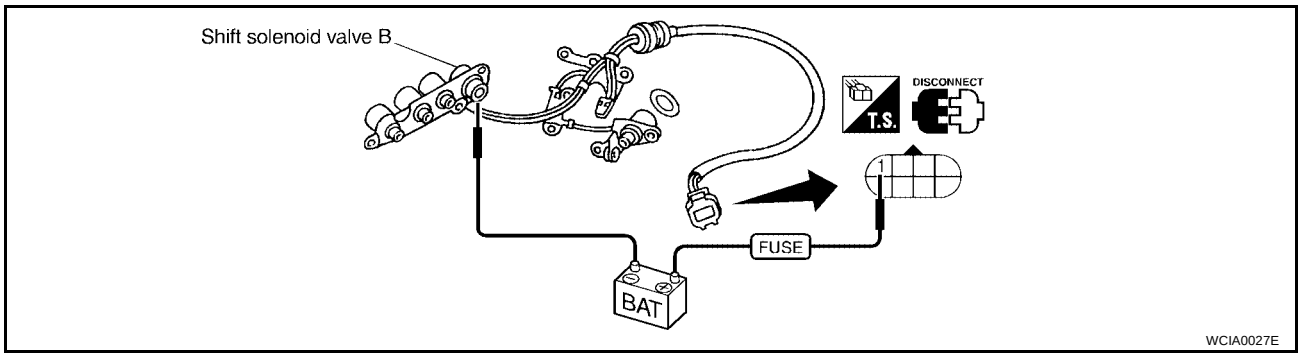
OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

– Shift solenoid valve B
– Operation check

• Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.



– Harness of terminal cord assembly for short or open

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal cord assembly harness connector F30 terminal 1 and TCM harness connector F56 terminal 12. Refer to AT-556, "Wiring Diagram — AT — SSV/B" .

Continuity should exist.

4. Reinstall any part removed.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK DTC

Perform AT-554, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 5.

5. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

PFP:22560

Description

ECS00655

The throttle position sensor [accelerator pedal position (APP) sensor] is part of the system that controls throttle position. This system also uses an electric throttle control actuator which consists of a throttle control motor and throttle position sensors. Accelerator pedal position signal is sent to the ECM.

CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification
Throttle position sensor [accelerator pedal position (APP) sensor]	Fully-closed throttle	Approximately 0.5V
	Fully-open throttle	Approximately 4V

On Board Diagnosis Logic

ECS00656

Diagnostic trouble code TP SEN/CIRC A/T with CONSULT-II or P1705 without CONSULT-II is detected when TCM receives an excessively low or high voltage from the ECM.

Possible Cause

ECS00657

Check the following items.

- Harness or connectors
  (The sensor circuit is open or shorted.)

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS00658

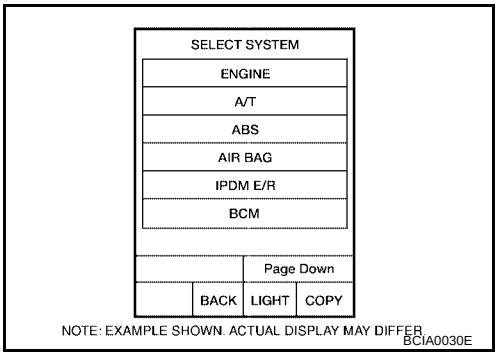
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

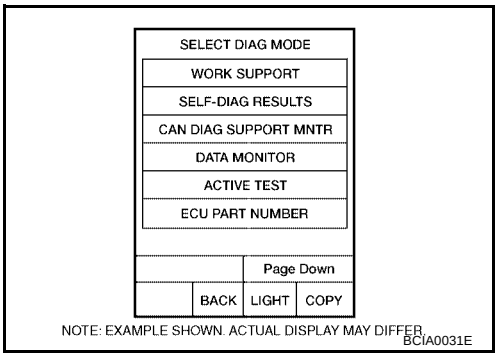
1. Turn ignition switch ON and select “DATA MONITOR” mode for “A/T” with CONSULT-II.

Accelerator pedal condition	THRTL POS SEN	CLOSED THL/SW	W/O THRL/P·SW
Fully released	Less than 4.7V	ON	OFF
Partially depressed	0.1 - 4.6V	OFF	OFF
Fully depressed	1.9 - 4.6V	OFF	ON



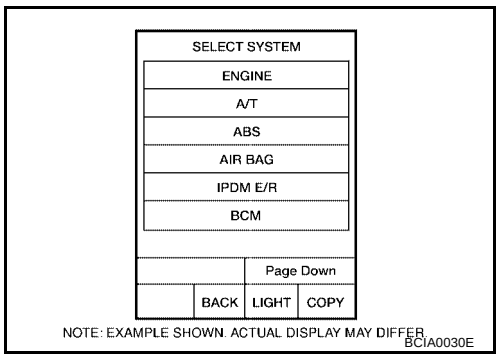
   If the check result is NG, go to AT-562, "Diagnostic Procedure" .
   If the check result is OK, go to following step.

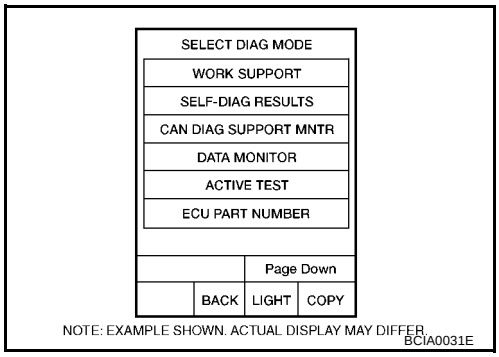
2. Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
3. Start engine and maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.
   VHCL SPEED SE: 10 km/h (6 MPH) or more
   THRTL POS SEN: Approximately 3V or less
   Selector lever: D position (O/D ON)
   If the check result is NG, go to AT-562, "Diagnostic Procedure" .
   If the check result is OK, go to following step.



4. Maintain the following conditions for at least 3 consecutive seconds. Then release accelerator pedal completely.

VHCL SPEED SE: 10 km/h (6 MPH) or more
Accelerator pedal: Wide open throttle
Selector lever: D position (O/D ON)





WITH GST

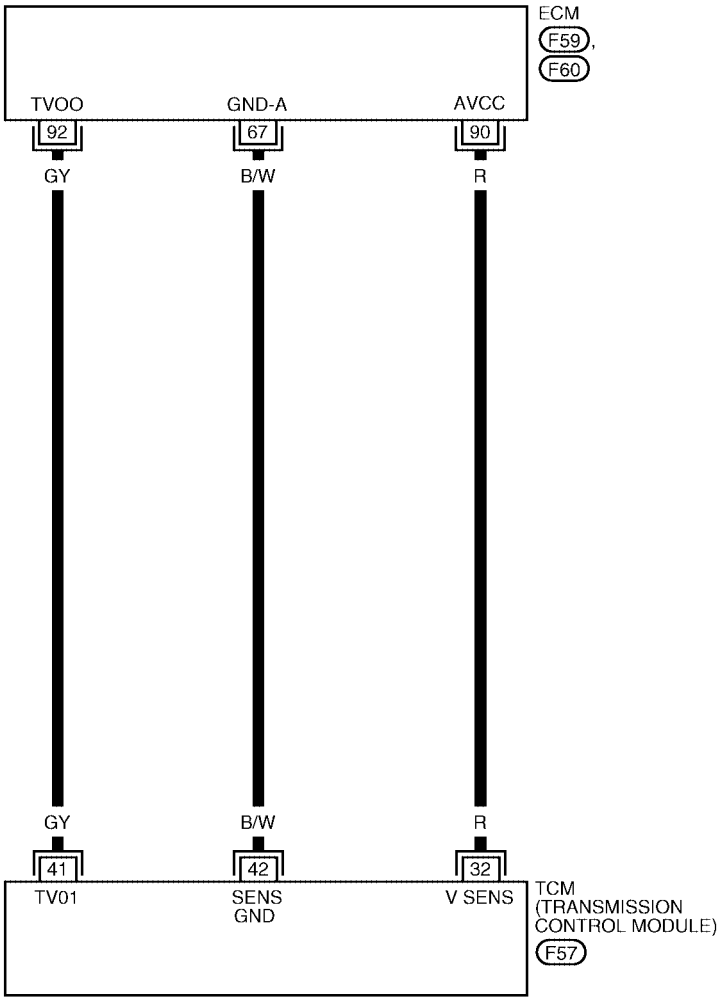
Follow the procedure “With CONSULT-II”.

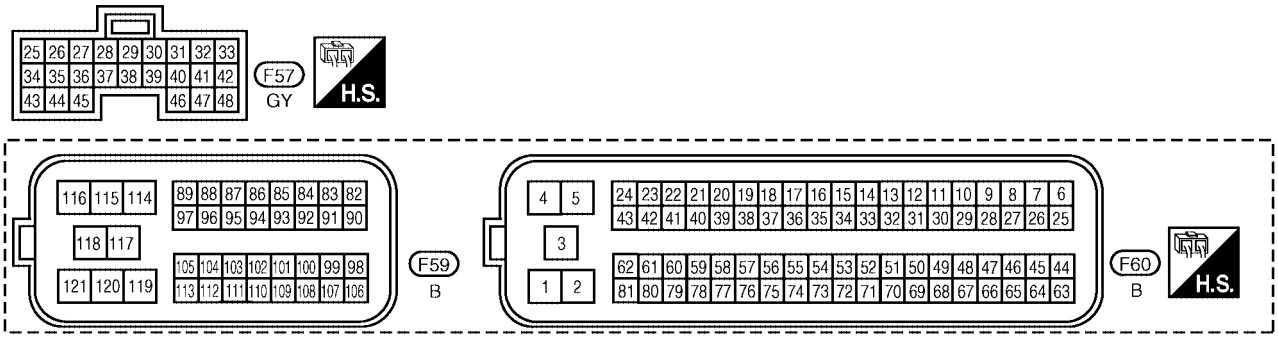
Wiring Diagram — AT — TPS

ECS00659

AT-TPS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





BCWA0250E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
32	R	SENSOR POWER	IGNITION SWITCH ON	4.5 - 5.5V
			IGNITION SWITCH OFF	0V
41	GY	THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]	IGNITION ON AND ACCELERATOR PEDAL IS DEPRESSED SLOWLY AFTER WARMING UP ENGINE	FULLY CLOSED THROTTLE: 0.5V
				WIDE OPEN THROTTLE: 4.0V
42	B/W	SENSOR GROUND	—	—

Diagnostic Procedure

ECS0065A

1. CHECK DTC WITH ECM

- Check P code with CONSULT-II “ENGINE”.
  Turn ignition switch ON and select “SELF DIAGNOSTIC RESULTS” mode for “ENGINE” with CONSULT-II.

Refer to EC-713, "Malfunction Indicator Lamp (MIL)" .

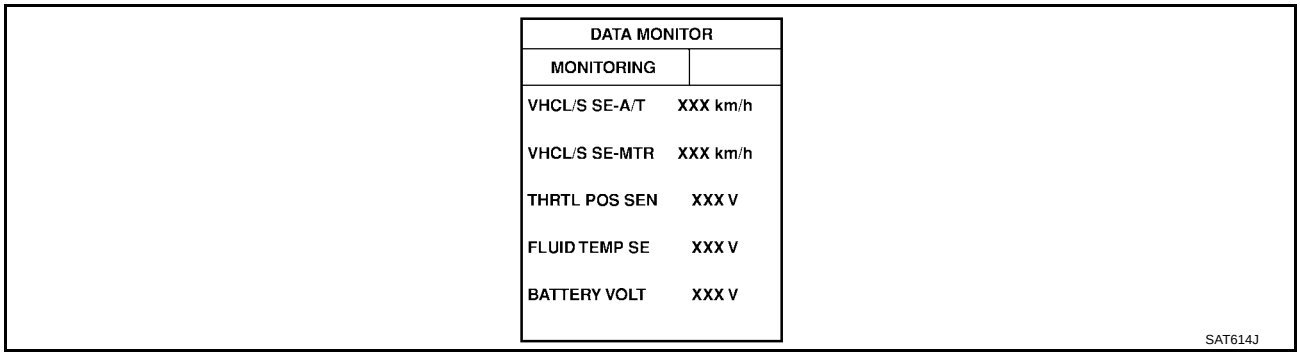
OK or NG

OK (with CONSULT-II)>>GO TO 2.
OK (without CONSULT-II)>>GO TO 3.
NG >> Check throttle position sensor [accelerator pedal position (APP) sensor] circuit for engine control. Refer to EC-971, "DTC P0222, P0223 TP SENSOR" and EC-1304, "DTC P2138 APP SENSOR" .

2. CHECK INPUT SIGNAL (WITH CONSULT-II)

With CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “THRTL POS SEN”.



Voltage:
Fully-closed throttle :Approximately 0.5V
Fully-open throttle :Approximately 4V

OK or NG

OK >> GO TO 4.
NG >> Check harness for short or open between ECM and TCM regarding throttle position sensor [accelerator pedal position (APP) sensor] circuit. (Main harness)

3. CHECK INPUT SIGNAL (WITHOUT CONSULT-II)

Without CONSULT-II

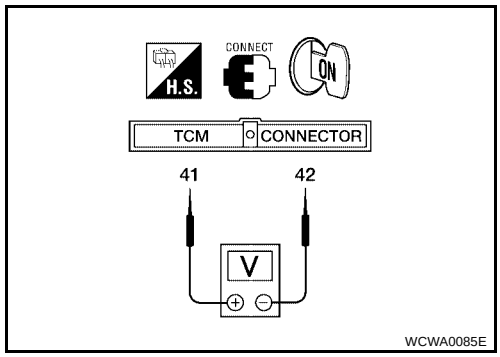
1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between TCM terminals 41 (GY) and 42 (B/W) while accelerator pedal is depressed slowly.

Voltage:

Fully-closed throttle valve **:Approximately 0.5V**

Fully-open throttle valve **:Approximately 4V**

(Voltage rises gradually in response to throttle position.)



OK or NG

OK >> GO TO 4.
NG >> Check harness for short or open between ECM and TCM regarding throttle position sensor [accelerator pedal position (APP) sensor] circuit. (Main harness)

4. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

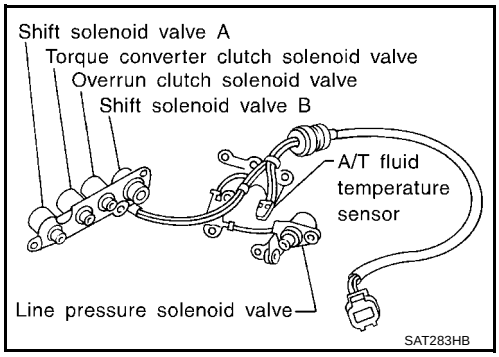
DTC P1760 OVERRUN CLUTCH SOLENOID VALVE

PFP:31940

Description

ECS0065B

The overrun clutch solenoid valve is activated by the TCM in response to signals sent from the park/neutral position (PNP) switch, overdrive control switch, vehicle speed and ECM (throttle opening). The overrun clutch operation will then be controlled.



On Board Diagnosis Logic

ECS0065C

Diagnostic trouble code O/R CLTCH SOL/CIRC with CONSULT-II or P1760 without CONSULT-II is detected when TCM detects an improper voltage drop when it tries to operate the solenoid valve.

Possible Cause

ECS0065D

Check the following items.

- Harness or connectors
  (The solenoid circuit is open or shorted.)
- Overrun clutch solenoid valve

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0065E

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If “DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

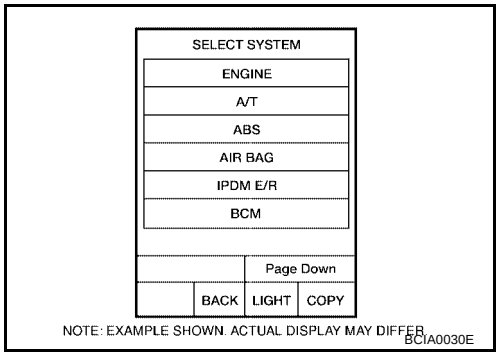
TESTING CONDITION:

Always drive vehicle on a level road to improve accuracy of test.

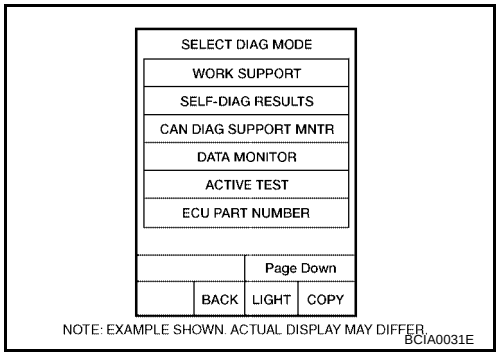
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
2. Start engine.
3. Accelerate vehicle to a speed of more than 10 km/h (6 MPH) with D position (O/D ON).



4. Release accelerator pedal completely with D position (O/D OFF).



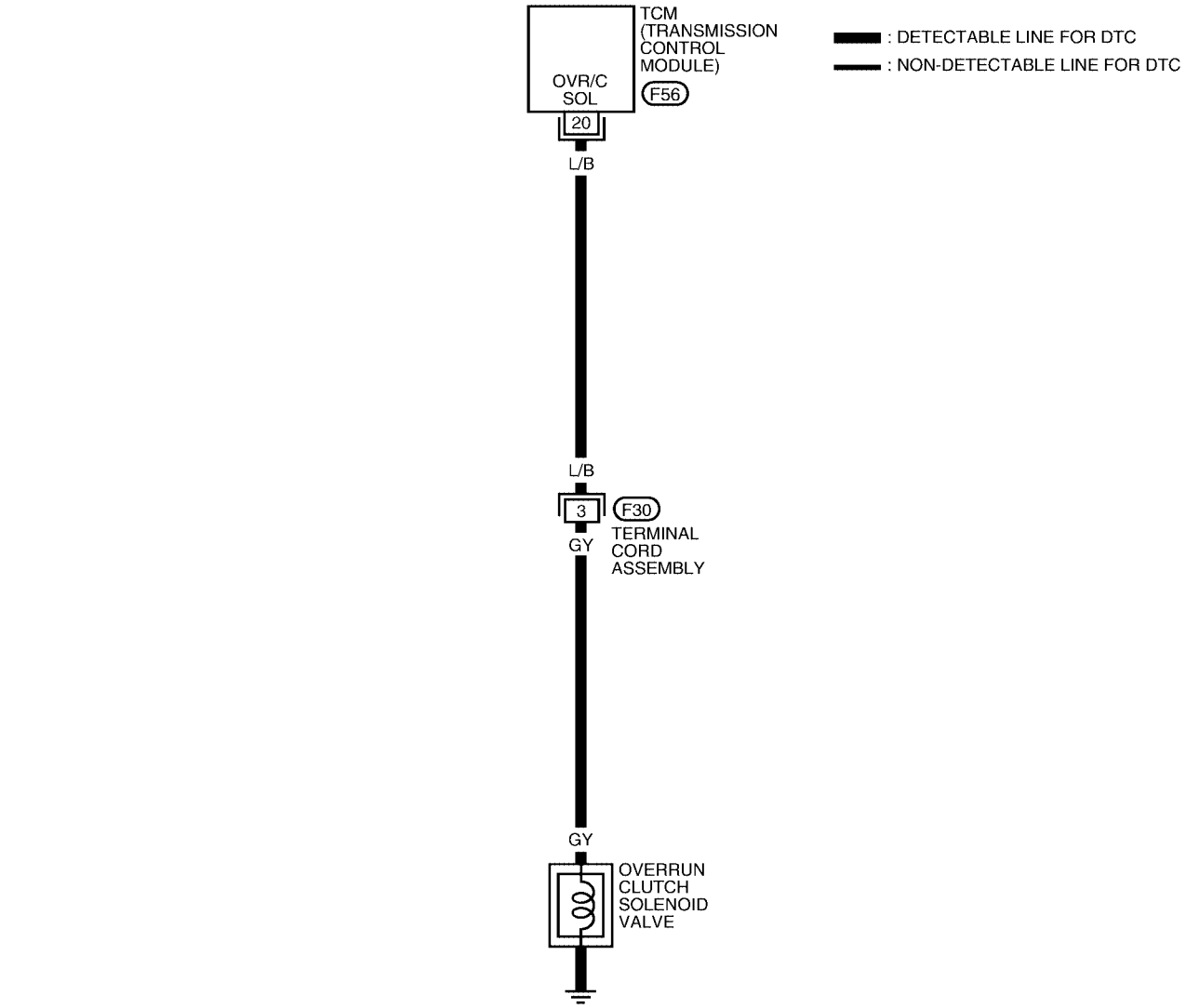
WITH GST

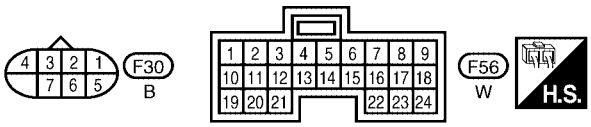
Follow the procedure “With CONSULT-II”.

Wiring Diagram — AT — OVRCSV

ECS0065F

AT-OVRCSV-01





WCWA0031E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
20	L/B	OVERRUN CLUTCH SOLENOID VALVE	WHEN OVERRUN CLUTCH SOLENOID VALVE OPERATES	BATTERY VOLTAGE
			WHEN OVERRUN CLUTCH SOLENOID VALVE DOES NOT OPERATE	APPROX. 0V

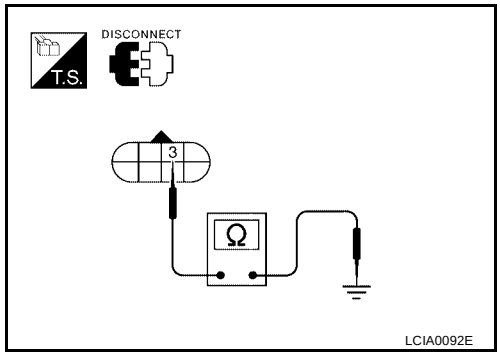
Diagnostic Procedure

ECS0065G

1. CHECK VALVE RESISTANCE

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly F30 terminal 3 (component side) and ground.

Resistance : 20 - 30Ω



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

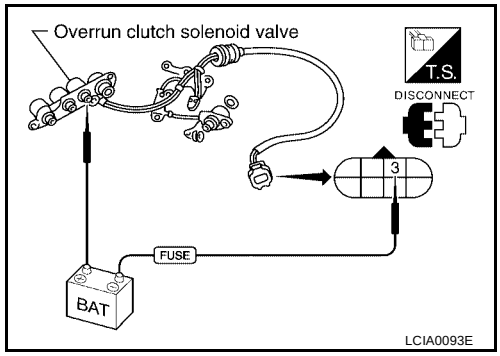
2. CHECK VALVE OPERATION

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

– Overrun clutch solenoid valve
– Operation check

• Check solenoid valve by listening for its operating sound while applying battery voltage and ground to the solenoid.

– Harness of terminal cord assembly for short or open



OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK POWER SOURCE CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between terminal cord assembly connector F30 terminal 3 and TCM harness connector F56 terminal 20. Refer to AT-566, "Wiring Diagram — AT — OVRCSV" .

Continuity should exist.

4. Reinstall any part removed.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK DTC

Perform AT-564, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 5.

5. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

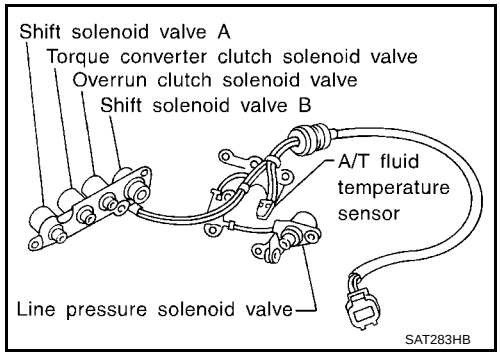
DTC BATT/FLUID TEMP SEN (A/T FLUID TEMP SENSOR CIRCUIT AND TCM POWER SOURCE)

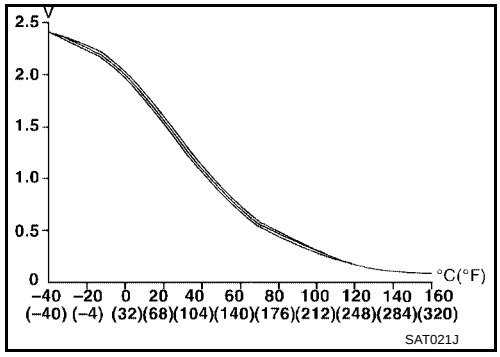
PFP:31940

Description

ECS0065H

The A/T fluid temperature sensor detects the A/T fluid temperature and sends a signal to the TCM.





CONSULT-II REFERENCE VALUE IN DATA MONITOR MODE

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approximately)	
A/T fluid temperature sensor	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]	1.5V ↓ 0.5V	2.5 kΩ ↓ 0.3 kΩ

On Board Diagnosis Logic

ECS0065I

Diagnostic trouble code BATT/FLUID TEMP SEN with CONSULT-II or 8th judgement flicker without CONSULT-II is detected when TCM receives an excessively low or high voltage from the sensor.

Possible Cause

ECS0065J

Check the following items.

- Harness or connectors
  (The sensor circuit is open or shorted.)
- A/T fluid temperature sensor

Diagnostic Trouble Code (DTC) Confirmation Procedure

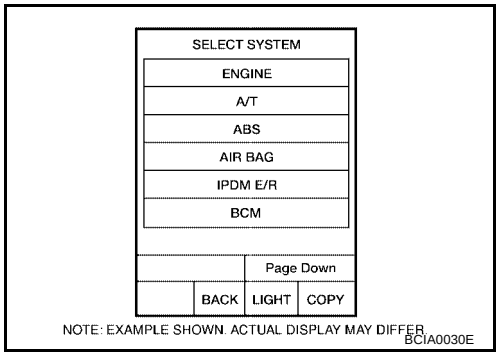
ECS0065K

After the repair, perform the following procedure to confirm the malfunction is eliminated.

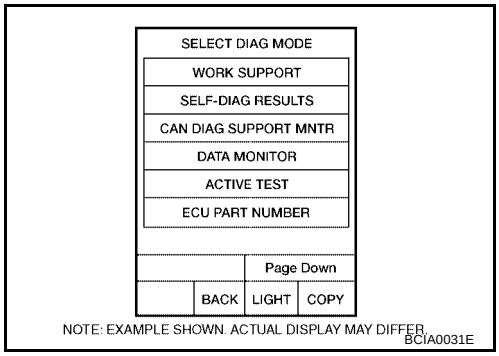
WITH CONSULT-II

1. Start engine.

2. Select “DATA MONITOR” mode for “A/T” with CONSULT-II.

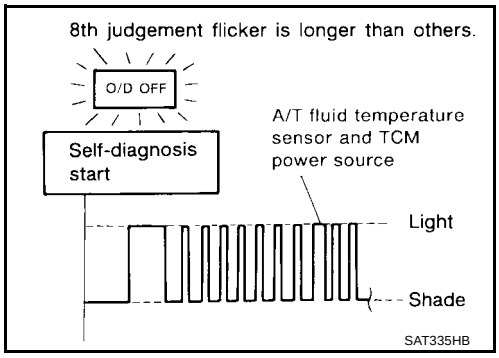


3. Drive vehicle under the following conditions:
   Selector lever in D, vehicle speed higher than 20 km/h (12 MPH).



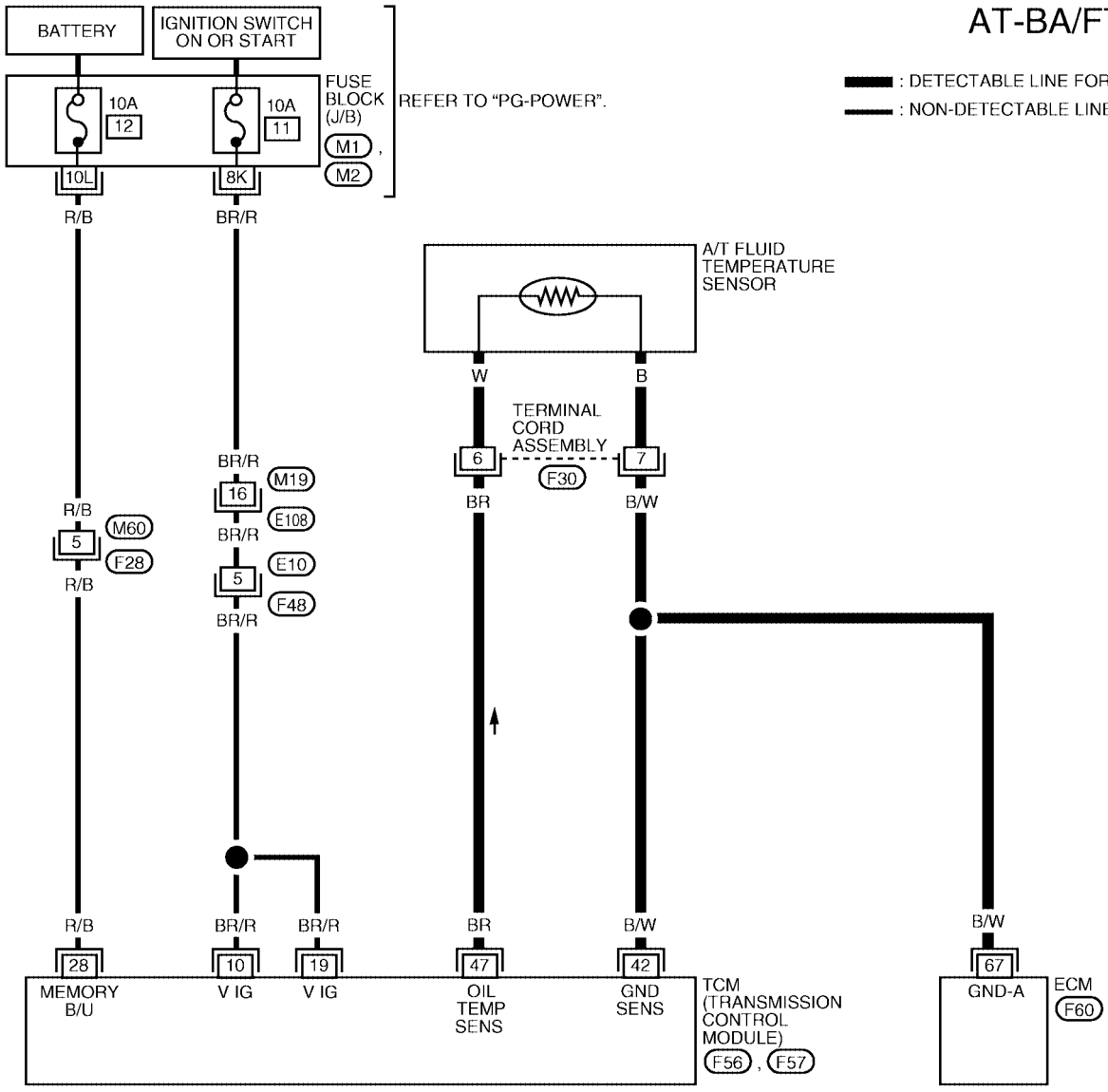
WITHOUT CONSULT-II

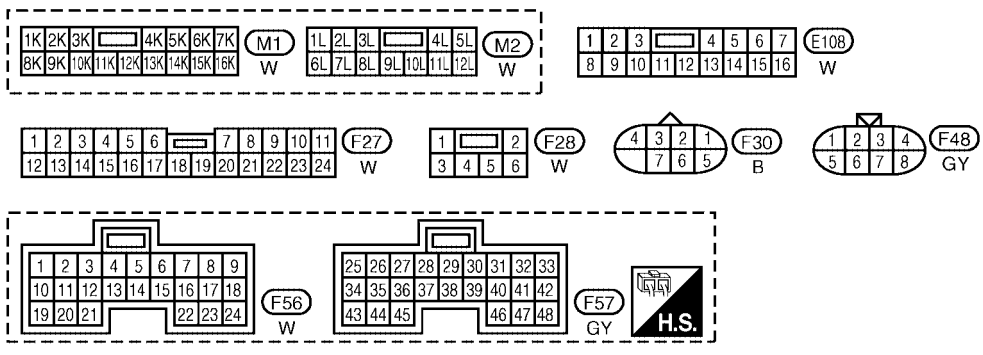
1. Start engine.
2. Drive vehicle under the following conditions:
   Selector lever in D, vehicle speed higher than 20 km/h (12 MPH).
3. Perform self-diagnosis.
   Refer to AT-439, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .



Wiring Diagram — AT — BA/FTS

ECS0065L





REFER TO THE FOLLOWING.
F60 - ELECTRICAL UNITS

BCWA0251E

TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	BR/R	POWER SOURCE	IGNITION ON	BATTERY VOLTAGE
			IGNITION OFF	APPROX. 0V
19	BR/R	POWER SOURCE	IGNITION ON	BATTERY VOLTAGE
			IGNITION OFF	APPROX. 0V
28	R/B	POWER SOURCE (MEMORY BACKUP)	IGNITION ON	BATTERY VOLTAGE
			IGNITION OFF	BATTERY VOLTAGE
42	B/W	SENSOR GROUND	—	—
47	BR	A/T FLUID TEMPERATURE SENSOR	IGNITION ON WITH ATF TEMPERATURE AT 20°C (68°F)	APPROX. 1.5V
			IGNITION ON WITH ATF TEMPERATURE AT 80°C (176°F)	APPROX. 0.5V

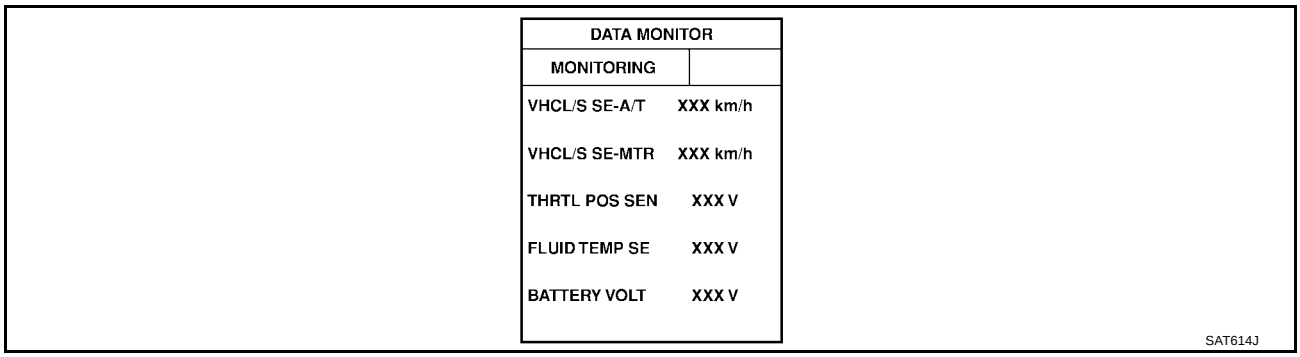
Diagnostic Procedure

ECS0065M

1. CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITH CONSULT-II)

With CONSULT-II

1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “FLUID TEMP SE”.



Voltage :Cold [20°C (68°F)] → Hot [80°C (176°F)]
:Approximately 1.5V → 0.5V

OK or NG

OK >> GO TO 9.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING ITEM

Check the following items:

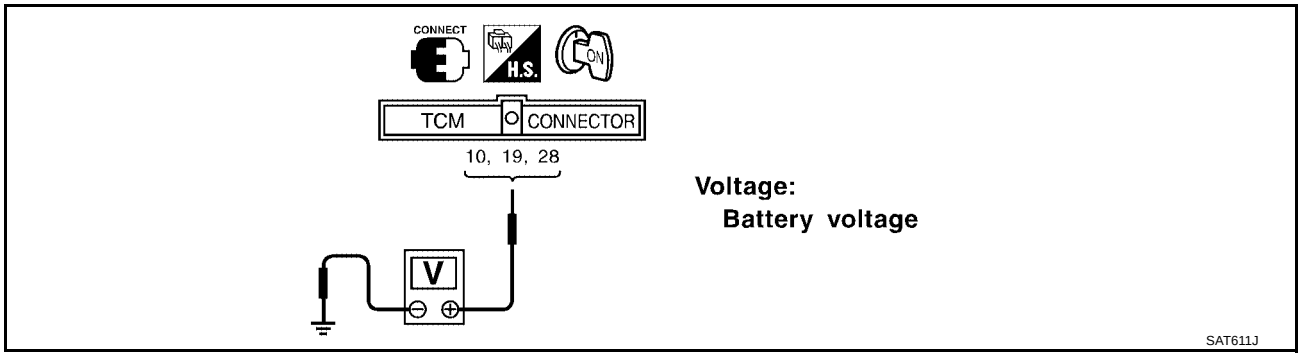
- Harness for short or open between TCM, ECM and terminal cord assembly (Main harness)
- Harness for short or open between battery and TCM (Main harness)
- Ground circuit for ECM
  Refer to EC-833, "POWER SUPPLY AND GROUND CIRCUIT" .

OK or NG

OK >> GO TO 9.
NG >> Repair or replace damaged parts.

3. CHECK TCM POWER SOURCE STEP 1

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM terminals 10, 19, 28 and ground.

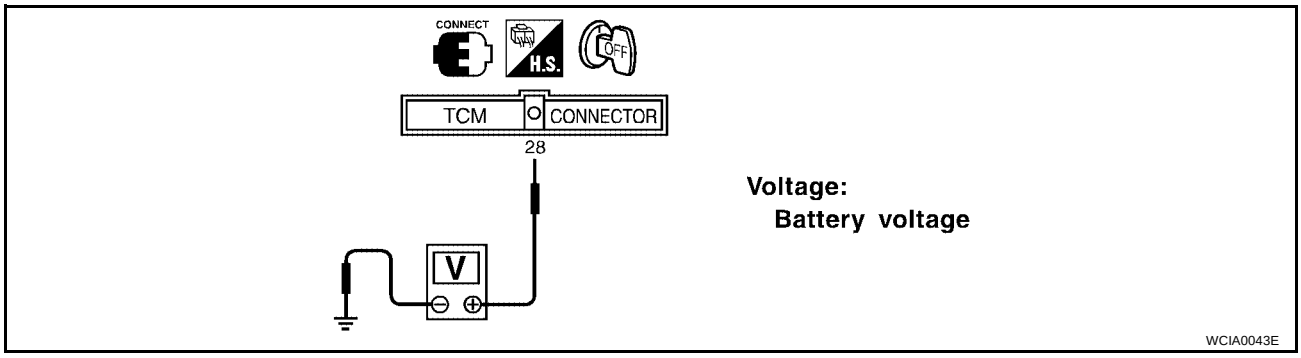


OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK TCM POWER SOURCE STEP 2

1. Turn ignition switch to OFF position.
2. Check voltage between TCM terminal 28 and ground.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING ITEM

Check the following items:

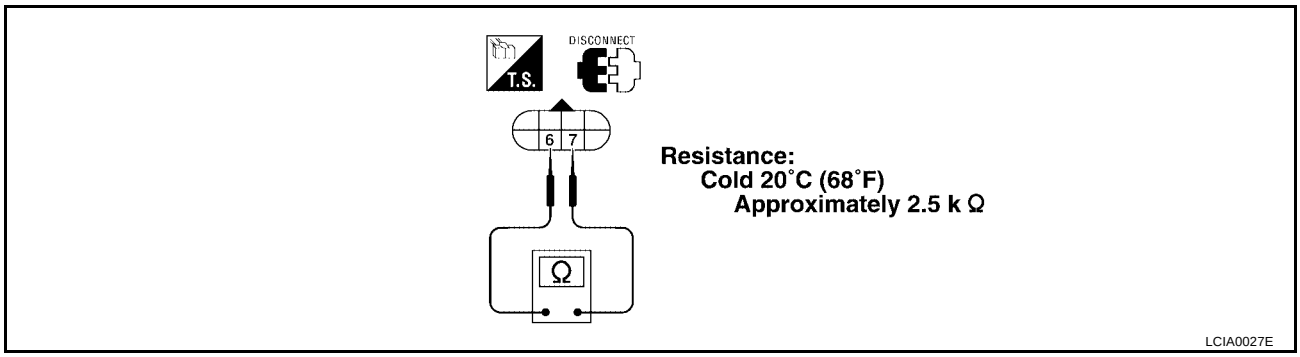
- Harness for short or open between ignition switch and TCM (Main harness)
- Harness for short or open between battery and TCM (Main harness)
- Ignition switch and fuse
  Refer to PG-3, "POWER SUPPLY ROUTING" .

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

6. CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY

1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal cord assembly F30 terminals 6 and 7 (component side) when A/T is cold.



4. Reinstall any part removed.

OK or NG

OK (without CONSULT-II) >> GO TO 8.
NG >> GO TO 7.

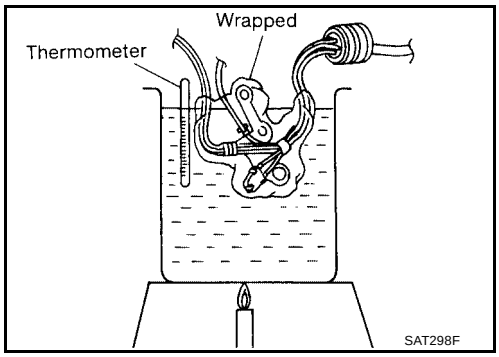
7. DETECT MALFUNCTIONING ITEM

1. Remove oil pan.
2. Check the following items:

– A/T fluid temperature sensor

• Check resistance between two terminals while changing temperature as shown.

Temperature	Resistance (Approx.)
20°C (68°F)	2.5kΩ
80°C (176°F)	0.3kΩ



– Harness of terminal cord assembly for short or open

OK or NG

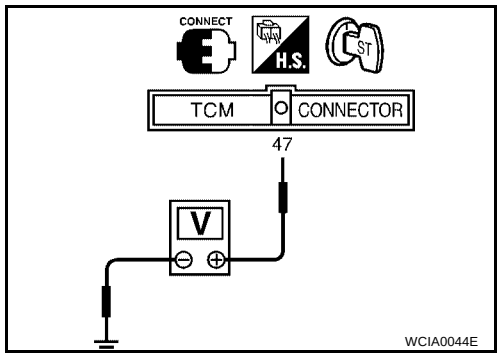
OK (without CONSULT-II) >> GO TO 8.
NG >> Repair or replace damaged parts.

8. CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR (WITHOUT CONSULT-II)

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM terminal 47 and ground while warming up A/T.

   Voltage :Cold [20°C (68°F)] → Hot [80°C (176°F)]
   :Approximately 1.5V → 0.5V



3. Turn ignition switch to OFF position.
4. Disconnect TCM harness connector.
5. Check resistance between TCM harness connector terminal 42 and ground. Refer to AT-571, "Wiring Diagram — AT — BA/FTS" .

   Continuity should exist.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short or open between TCM, ECM and terminal cord assembly (Main harness)
- Ground circuit for ECM
  Refer to PG-3, "POWER SUPPLY ROUTING" .

OK or NG

OK >> GO TO 10.
NG >> Repair or replace damaged parts.

10. CHECK DTC

Perform AT-569, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

11. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

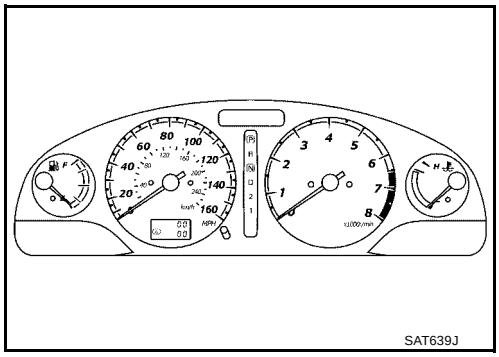
DTC VEHICLE SPEED SENSOR MTR

PFP:24814

Description

ECS0065N

The vehicle speed sensor·MTR is built into the speedometer assembly. The sensor functions as an auxiliary device to the revolution sensor when it is malfunctioning. The TCM will then use a signal sent from the vehicle speed sensor·MTR.



On Board Diagnosis Logic

ECS0065O

Diagnostic trouble code VHCL SPEED SEN·MTR with CONSULT-II or 2nd judgement flicker without CONSULT-II is detected when TCM does not receive the proper voltage signal from the sensor.

Possible Cause

ECS0065P

Check the following items.

- Harness or connectors
  (The sensor circuit is open or shorted.)
- Vehicle speed sensor

Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS0065Q

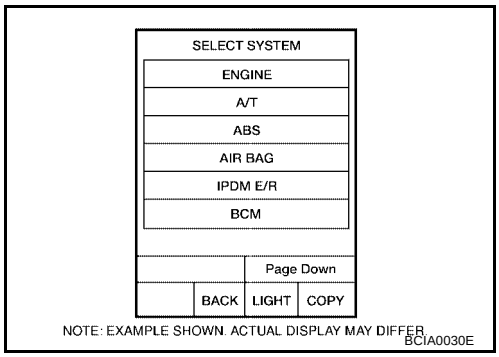
CAUTION:

- **Always drive vehicle at a safe speed.**
- **If conducting this “DTC Confirmation Procedure” again, always turn ignition switch OFF and wait at least 10 seconds before continuing.**

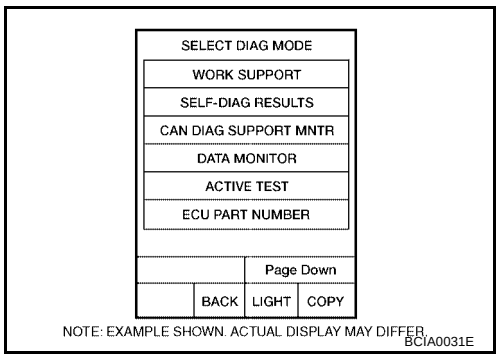
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode for “A/T” with CONSULT-II.



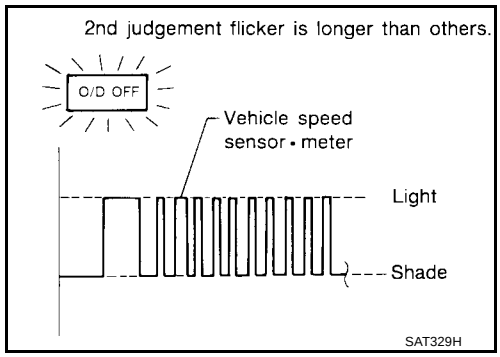
2. Start engine and accelerate vehicle from 0 to 25 km/h (0 to 16 MPH).



WITHOUT CONSULT-II

1. Start engine.

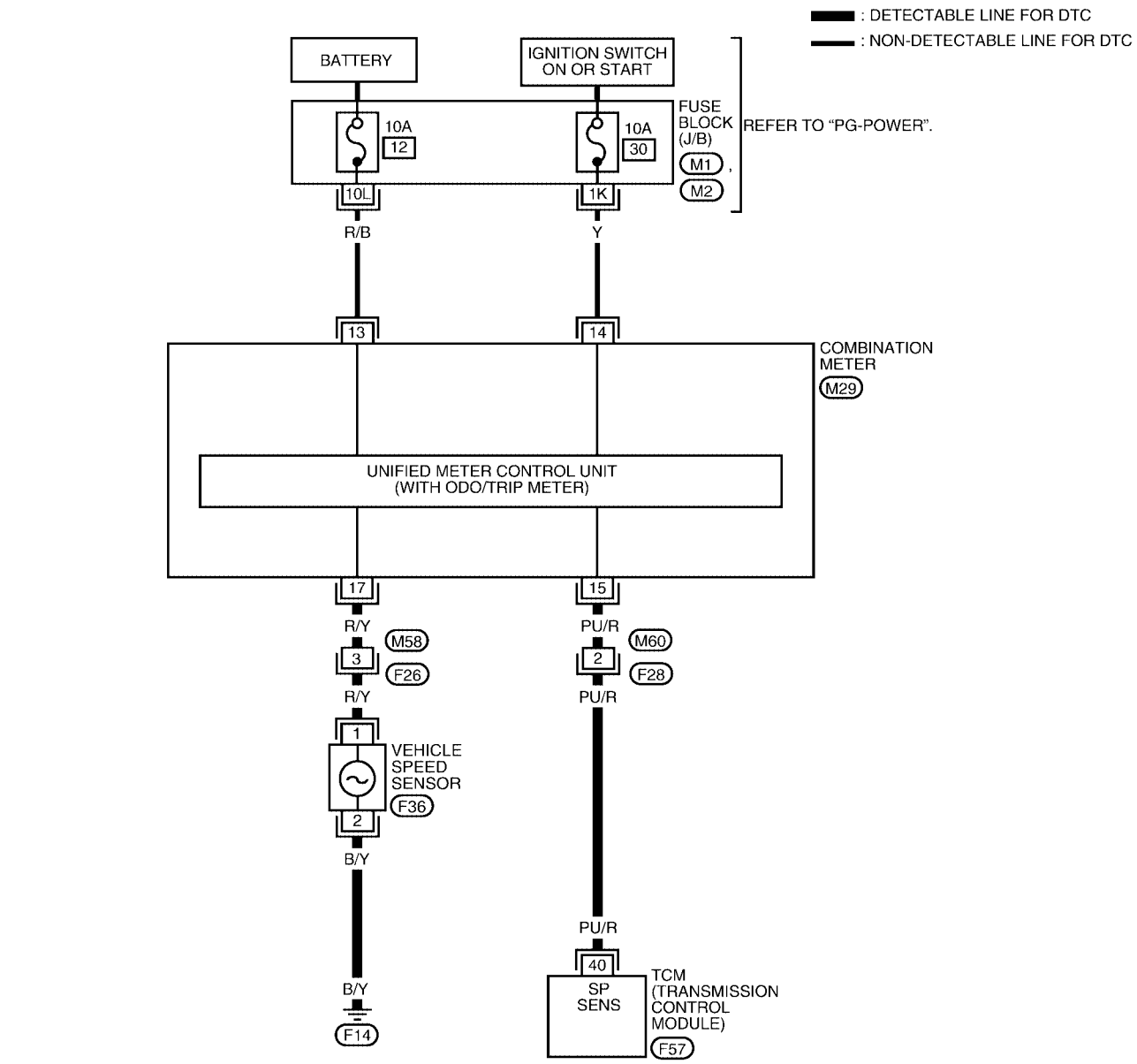
2. Drive vehicle under the following conditions:
   Selector lever in D and vehicle speed higher than 25 km/h (16 MPH).
3. Perform self-diagnosis.
   Refer to AT-439, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .

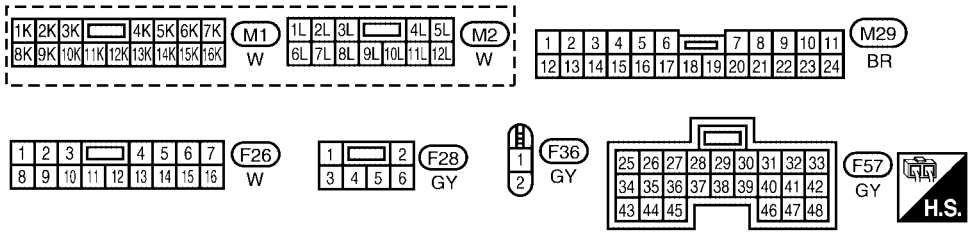


Wiring Diagram — AT — VSSMTR

ECS0065R

AT-VSSMTR-01





WCWA0137E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
40	PU/R	VEHICLE SPEED SENSOR	WHEN MOVING VEHICLE AT 2 TO 3 KM/H (1 TO 2 MPH) FOR 1 M (3 FT)	VOLTAGE VARIES BETWEEN LESS THAN 1V AND MORE THAN 4.5V

Diagnostic Procedure

ECS0065S

1. CHECK INPUT SIGNAL

With CONSULT-II

DATA MONITOR	
MONITORING	
VHCL/S SE-A/T	XXX km/h
VHCL/S SE-MTR	XXX km/h
THRTL POS SEN	XXX V
FLUID TEMP SE	XXX V
BATTERY VOLT	XXX V

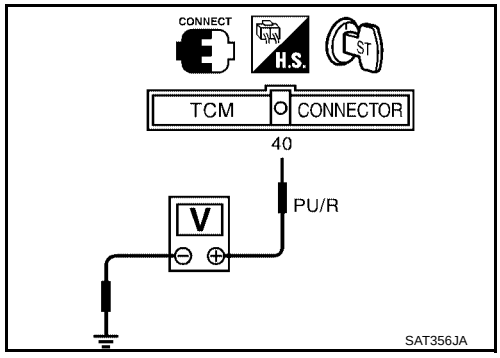
SAT614J

1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “VHCL/S SE·MTR” while driving.
   Check the value changes according to driving speed.

Without CONSULT-II

1. Start engine.
2. Check voltage between TCM terminal 40 and ground while driving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.

Voltage :Voltage varies between less than 1V and more than 4.5V.



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING ITEM

Check the following items:

- Vehicle speed sensor and ground circuit for vehicle speed sensor
  Refer to DI-4, "METERS AND GAUGES" .
- Harness for short or open between TCM and vehicle speed sensor (Main harness)

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK DTC

Perform AT-576, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

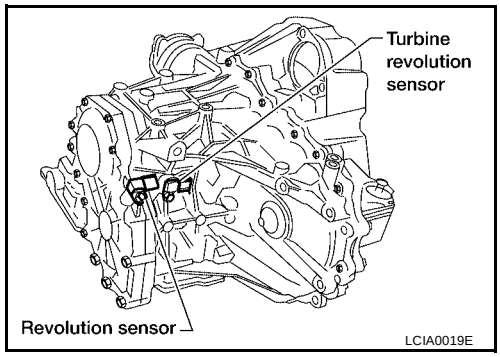
DTC TURBINE REVOLUTION SENSOR

PFP:31935

Description

ECS0065T

The turbine revolution sensor detects input shaft rpm (revolutions per minute). It is located on the input side of the automatic transaxle. The vehicle speed sensor A/T (Revolution sensor) is located on the output side of the automatic transaxle. With the two sensors, input and output shaft rpms are accurately detected. The result is optimal shift timing during deceleration and improved shifting.



ON BOARD DIAGNOSIS LOGIC

Diagnostic trouble code	Malfunction is detected when...	Check items (Possible cause)
: TURBINE REV : 10th judgement flicker	TCM does not receive the proper voltage signal from the sensor.	● Harness or connectors (The sensor circuit is open or shorted.) ● Turbine revolution sensor

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

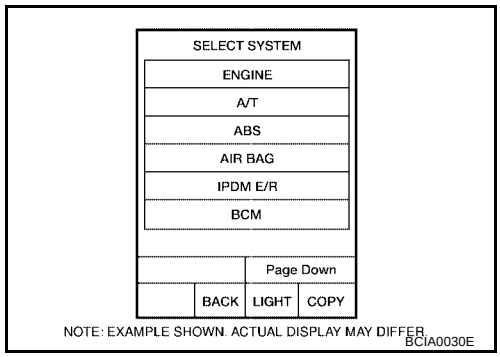
CAUTION:

- **Always drive vehicle at a safe speed.**
- **If conducting this "DTC CONFIRMATION PROCEDURE" again, always turn ignition switch OFF and wait at least 5 seconds before continuing.**

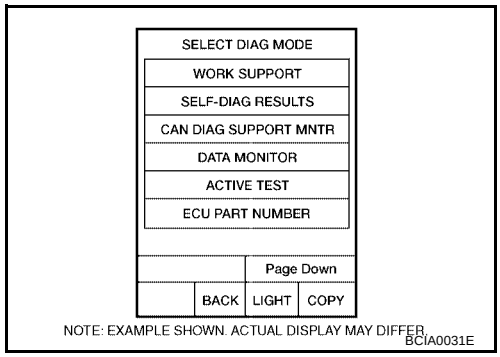
After the repair, perform the following procedure to confirm the malfunction is eliminated.

With CONSULT-II

1. Start engine.



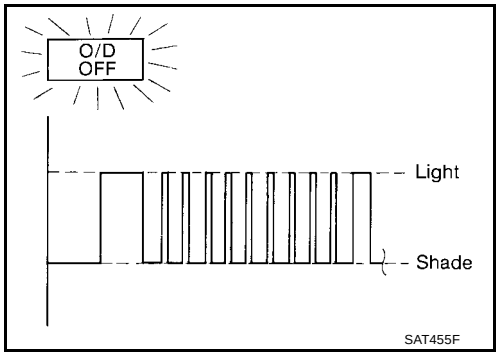
2. Select "DATA MONITOR" mode for "A/T" with CONSULT-II.
3. Drive vehicle under the following conditions:
   Selector lever in D, vehicle speed higher than 40 km/h (25 MPH), engine speed higher than 1,500 rpm, throttle opening greater than 1.0/8 of the full throttle position and driving for more than 5 seconds.



Without CONSULT-II

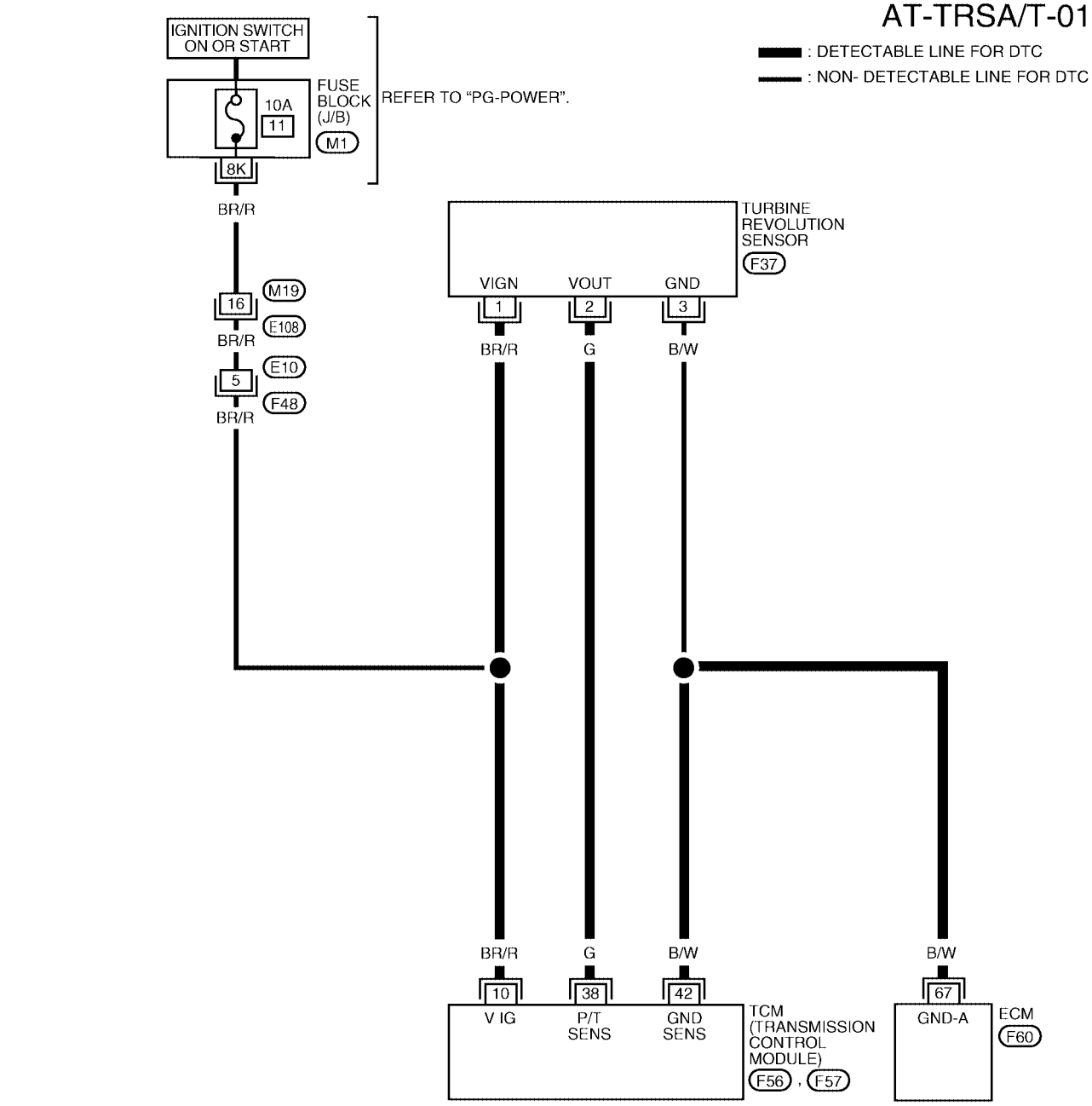
1. Start engine.
2. Drive vehicle under the following conditions:
   Selector lever in "D" and vehicle speed higher than 40 km/h (25 MPH), engine speed higher than 1,500 rpm, throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.

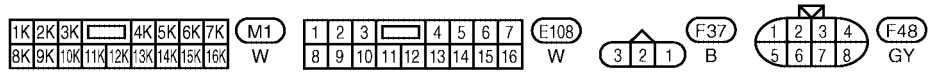
3. Perform self-diagnosis.
   Refer to AT-439, "TCM SELF-DIAGNOSTIC PROCEDURE (NO TOOLS)" .

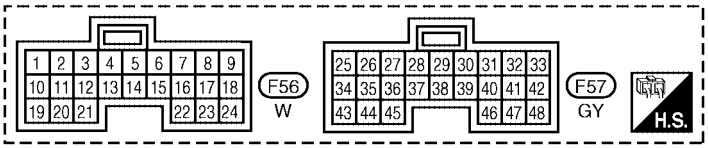


Wiring Diagram — AT — TRSA/T

ECS0065U







REFER TO THE FOLLOWING.
F60 - ELECTRICAL UNITS

BCWA0252E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	BR/R	TURBINE REVOLUTION SENSOR (POWER)	IGNITION ON	BATTERY VOLTAGE
38	G	TURBINE REVOLUTION SENSOR (SIGNAL)	WHEN MOVING AT 20 KM/H (12 MPH), USE THE CONSULT-II PULSE FREQUENCY MEASURING FUNCTION.*1 **CAUTION:** **CONNECT THE DIAGNOSIS DATA LINK CABLE TO THE VEHICLE DIAGNOSIS CONNECTOR.** *1: A CIRCUIT TESTER CANNOT BE USED TO TEST THIS ITEM.	240 Hz
			WHEN VEHICLE IS PARKED.	UNDER 1.3V OR OVER 4.5V
42	B/W	SENSOR GROUND	—	—

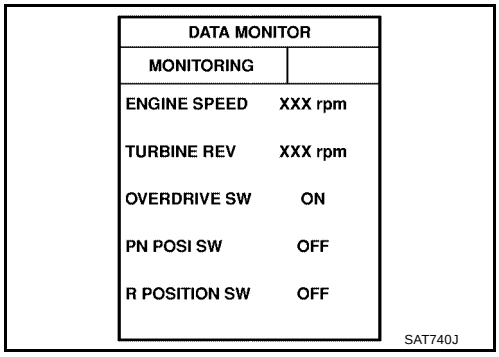
Diagnostic Procedure

ECS0065V

1. CHECK INPUT SIGNAL

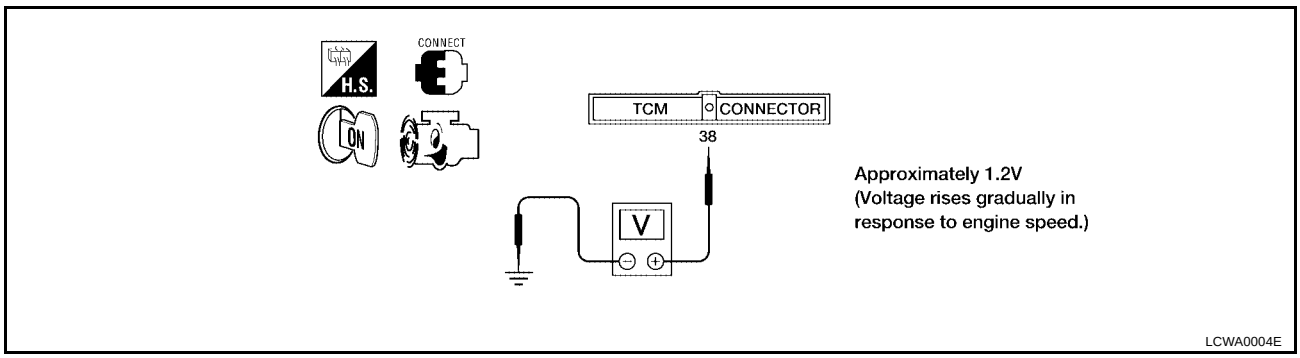
With CONSULT-II

1. Start engine.
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out the value of “TURBINE REF” while driving.
   Check the value changes according to driving speed.



Without CONSULT-II

1. Start engine.
2. Check voltage between TCM terminal 38 and ground (measure in AC range).



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING ITEM

Check harness for short or open between TCM and turbine revolution sensor.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace damaged parts.

3. CHECK DTC

Perform DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION, AT-581, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

OK or NG

OK >> **INSPECTION END.**
NG >> GO TO 4.

4. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminal for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END.**
NG >> Repair or replace damaged parts.

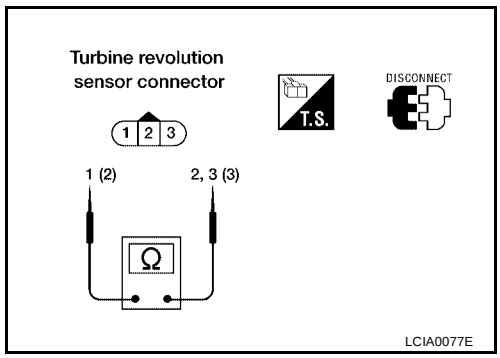
Component Inspection

ECS0065W

TURBINE REVOLUTION SENSOR

- Check resistance between terminals 1, 2 and 3.

Terminal No.		Resistance (Approx.)
1	2	2.4 - 2.8kΩ
1	3	No continuity
2	3	No continuity



DTC U1000 CAN COMMUNICATION LINE

PFP:23710

Description

ECS0065X

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

ECS0065Y

- This is an OBD-II self-diagnostic item.
- Diagnostic trouble code “CAN COMM CIRCUIT” with CONSULT-II or U1000 without CONSULT-II is detected when TCM cannot communicate to other control unit.

Possible Cause

ECS0065Z

Harness or connectors
(CAN communication line is open or shorted.)

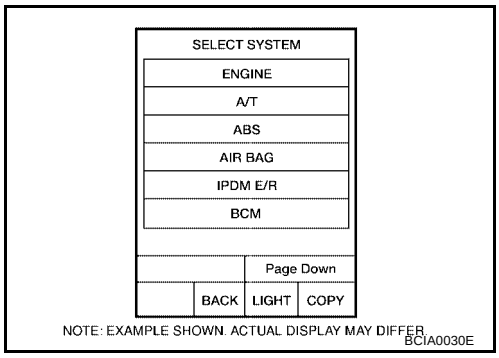
DTC Confirmation Procedure

ECS00660

NOTE:
If “DTC Confirmation Procedure” has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
After the repair, perform the following procedure to confirm the malfunction is eliminated.

WITH CONSULT-II

1. Turn ignition switch to ON position. (Do not start engine.)
2. Select “DATA MONITOR” mode for “ENGINE” with CONSULT-II.
3. Start engine and wait for at least 6 seconds.
4. If DTC is detected, go to AT-588, "Diagnostic Procedure" .



WITH GST

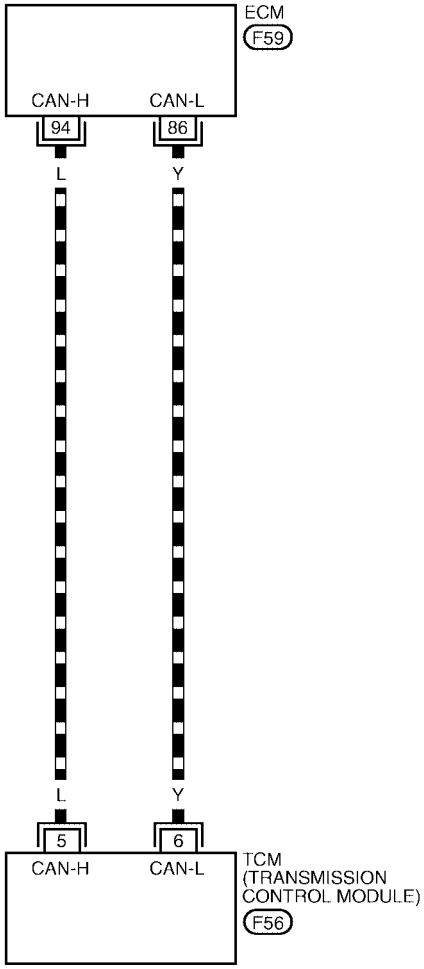
Follow the procedure “WITH CONSULT-II”.

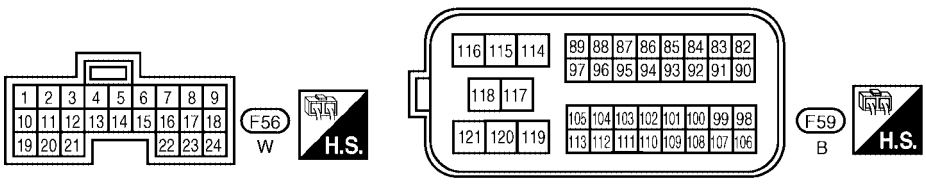
Wiring Diagram — AT — CAN

ECS00661

AT-CAN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
: DATA LINE





BCWA0253E

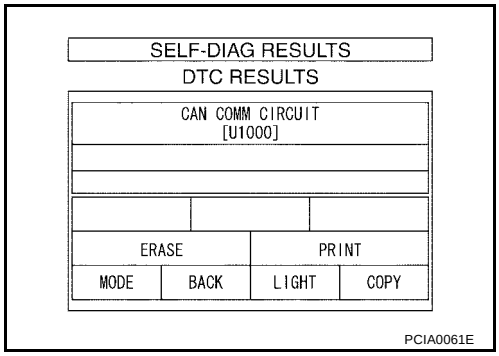
Diagnostic Procedure

ECS00662

1. CHECK CAN COMMUNICATION CIRCUIT

With CONSULT-II

1. Turn ignition switch "ON" and start engine.
2. Select “SELF-DIAG RESULTS" mode for “A/T” with CONSULT-II.



Is any malfunction of the "CAN COMM CIRCUIT" indicated?

YES >> Print out CONSULT-II screen, GO TO LAN section. Refer to LAN - LAN-4, "CAN Communication Unit"

NO >> **INSPECTION END**.

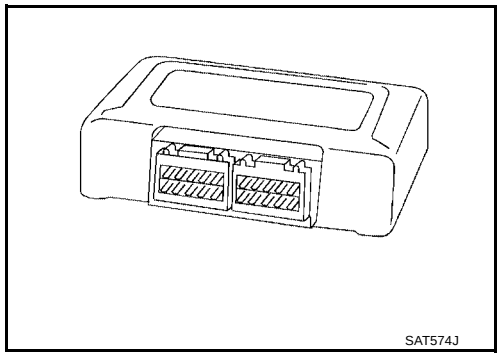
DTC CONTROL UNIT (RAM), CONTROL UNIT (ROM)

PFP:31036

Description

ECS00663

The TCM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the A/T.


SAT574J

On Board Diagnosis Logic

ECS00664

Diagnostic trouble code CONTROL UNIT (RAM), CONTROL UNIT (ROM) with CONSULT-II is detected when TCM memory (RAM) or (ROM).

Possible Cause

ECS00665

Check TCM.

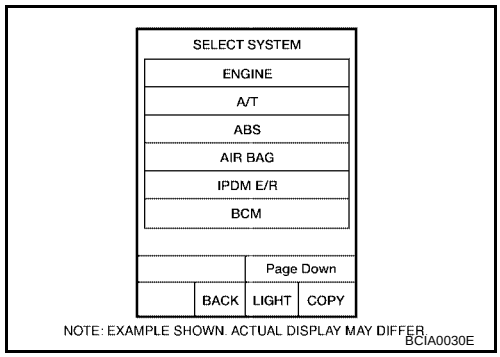
Diagnostic Trouble Code (DTC) Confirmation Procedure

ECS00666

NOTE:
If "DTC Confirmation Procedure" has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

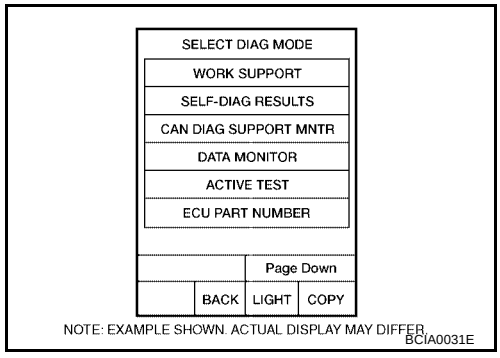
WITH CONSULT-II

1. Turn ignition switch ON and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2. Start engine.



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0030E

3. Run engine for at least 2 seconds at idle speed.



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER.
BCIA0031E

Diagnostic Procedure

ECS00667

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON and select “SELF DIAGNOSIS” mode for A/T with CONSULT-II.
2. Touch “ERASE”.
3. Perform AT-589, "Diagnostic Trouble Code (DTC) Confirmation Procedure" .
4. Is the “CONTROL UNIT (RAM)” or “CONTROL UNIT (ROM)” displayed again?

Yes or No

Yes >> Replace TCM.
No >> **INSPECTION END**

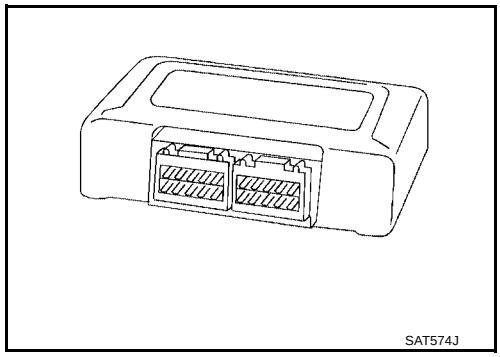
DTC CONTROL UNIT (EEP ROM)

PFP:31036

Description

ECS00668

The TCM consists of a microcomputer and connectors for signal input and output and for power supply. The unit controls the A/T.


SAT574J

ON BOARD DIAGNOSIS LOGIC

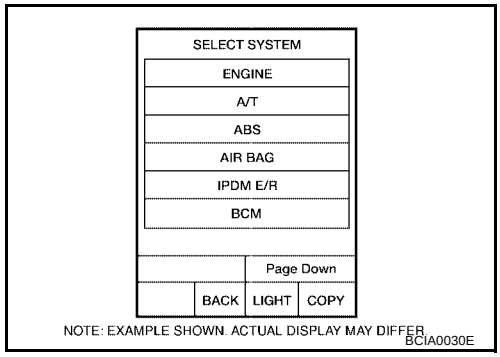
Diagnostic trouble code	Malfunction is detected when...	Check item (Possible cause)
: CONT UNIT (EEP ROM)	TCM memory (EEP ROM) is malfunctioning.	● TCM

DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE

NOTE:
If "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE" has been previously conducted, always turn ignition switch OFF and wait at least 5 seconds before conducting the next test.

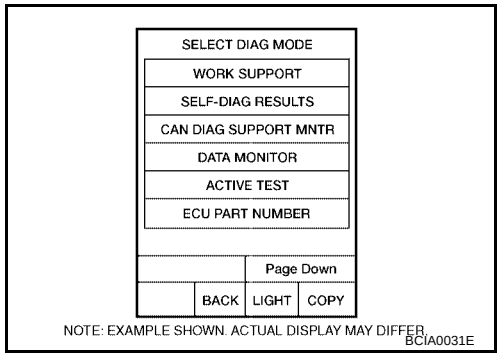
With CONSULT-II

1. Turn ignition switch ON and select "DATA MONITOR" mode for "A/T" with CONSULT-II.
2. Start engine.



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER
BCIA0030E

3. Run engine for at least 2 seconds at idle speed.



NOTE: EXAMPLE SHOWN. ACTUAL DISPLAY MAY DIFFER
BCIA0031E

Diagnostic Procedure

ECS00669

1. CHECK DTC

With CONSULT-II

1. Turn ignition switch ON and select “SELF DIAGNOSIS” mode for A/T with CONSULT-II.
2. Move selector lever to “R” position.
3. Depress accelerator pedal (Full throttle position).
4. Touch “ERASE”.
5. Turn ignition switch OFF position for 10 seconds.

Perform AT-591, "DIAGNOSTIC TROUBLE CODE (DTC) CONFIRMATION PROCEDURE" .

Is the “CONT UNIT (EEP ROM)” displayed again?

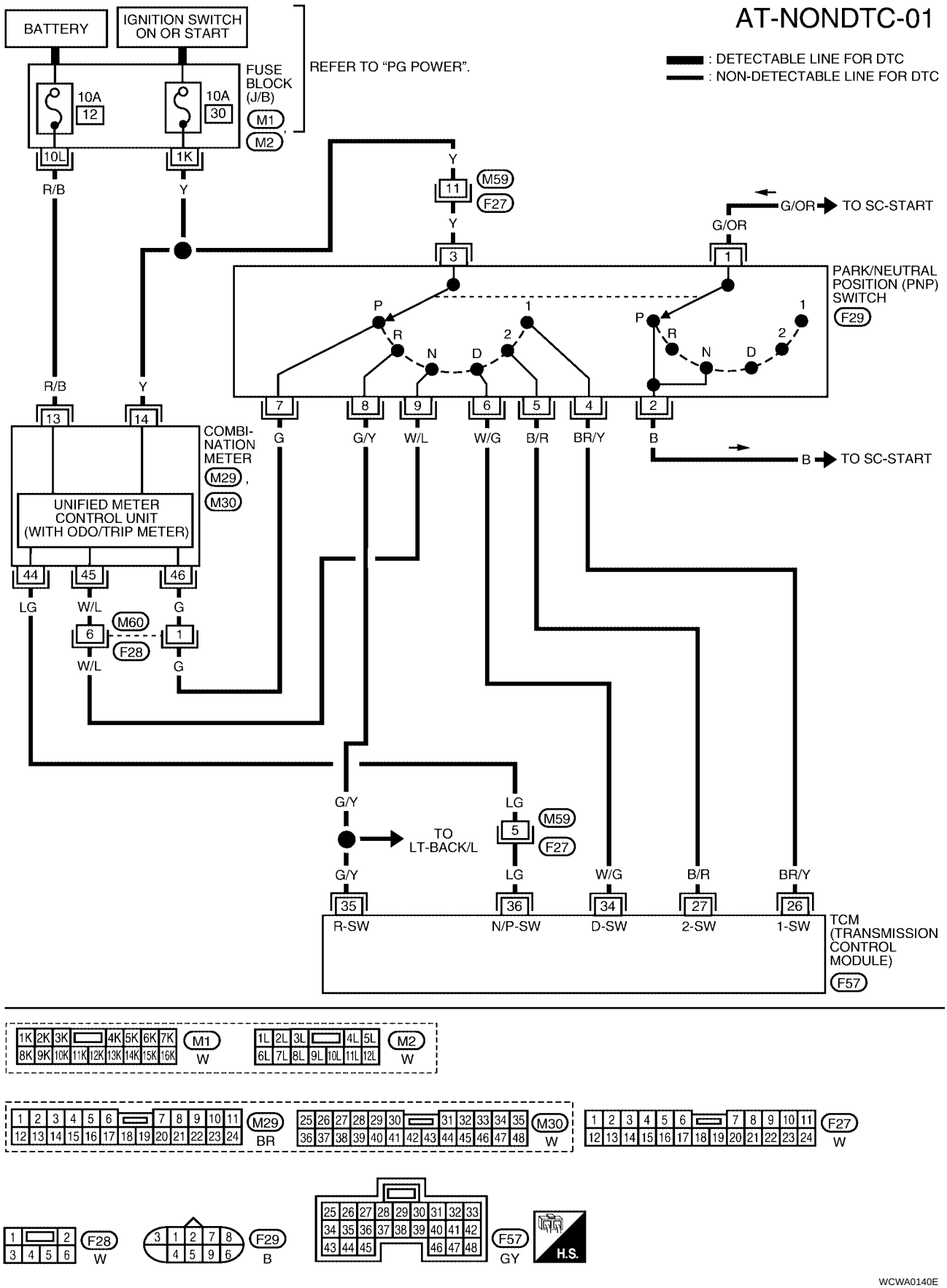
Yes >> Replace TCM.
No >> **INSPECTION END**

TROUBLE DIAGNOSIS FOR SYMPTOMS

PFP:00007

Wiring Diagram — AT — NONDTC

ECS0066A

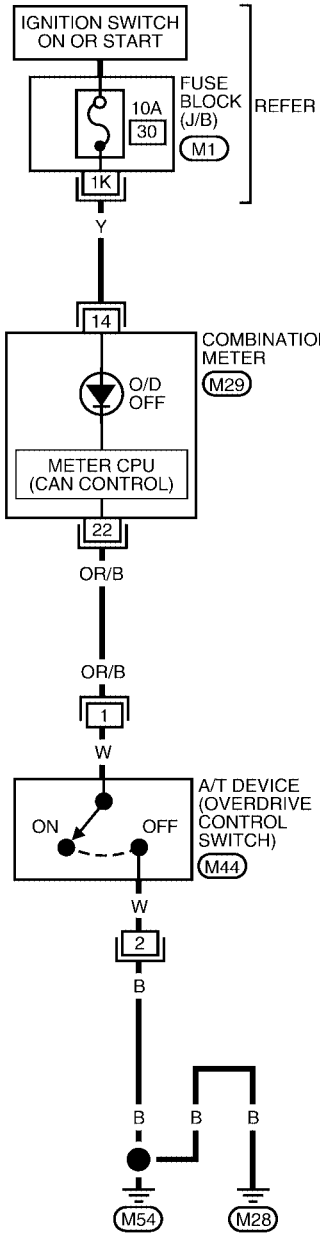


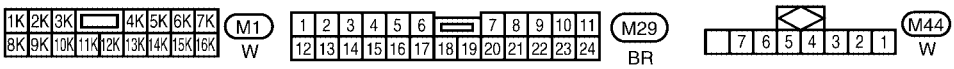
WCWA0140E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
26	BR/Y	PNP SWITCH 1 POSITION	IGNITION ON AND SELECTOR LEVER IN 1 POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
27	B/R	PNP SWITCH 2 POSITION	IGNITION ON AND SELECTOR LEVER IN 2 POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
34	W/G	PNP SWITCH D POSITION	IGNITION ON AND SELECTOR LEVER IN D POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
35	G/Y	PNP SWITCH R POSITION	IGNITION ON AND SELECTOR LEVER IN R POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V
36	LG	PNP SWITCH P OR N POSITION	IGNITION ON AND SELECTOR LEVER IN P OR N POSITION	BATTERY VOLTAGE
			IGNITION ON AND SELECTOR LEVER IN OTHER POSITIONS	APPROX. 0V

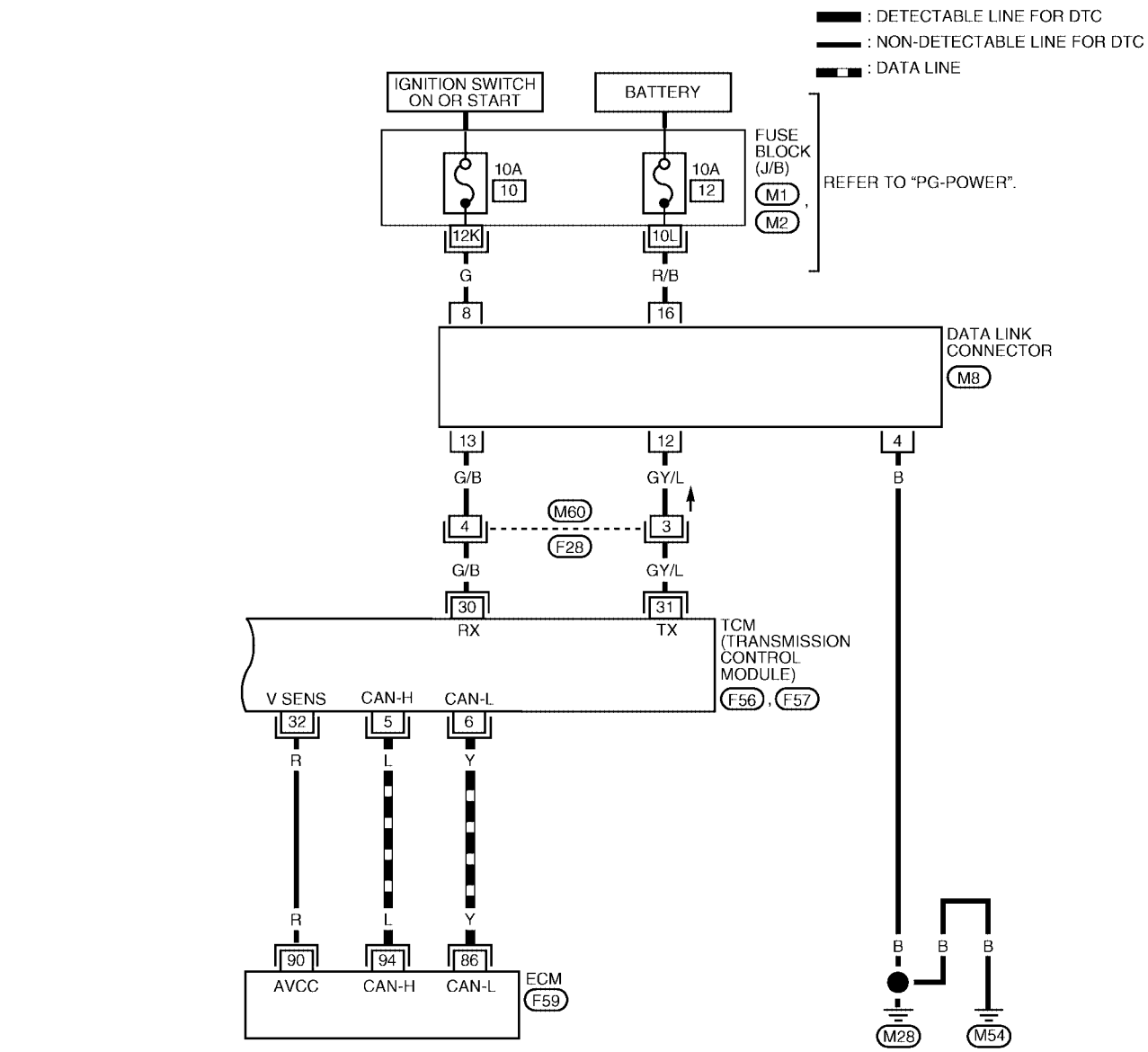
AT-NONDTC-02

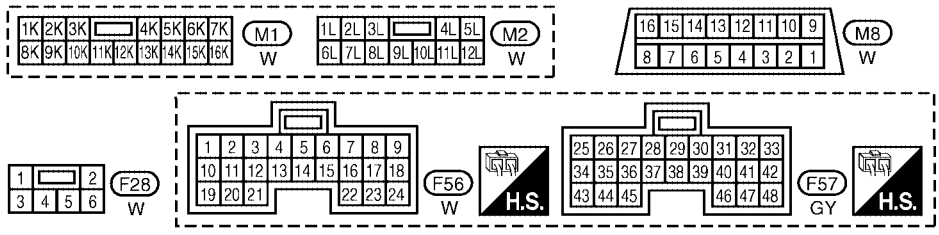




WCWA0141E

AT-NONDTC-03





REFER TO THE FOLLOWING.
F29 - ELECTRICAL UNITS

BCWA0254E

TCM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND 25 OR 48 (TCM GROUND)

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
5	L	CAN-H	—	—
6	Y	CAN-L	—	—
30	G/B	DATA LINK CONNECTOR (RX)	—	—
31	GY/L	DATA LINK CONNECTOR (TX)	—	—
32	R	SENSOR POWER	IGNITION SWITCH ON	APPROX. 4.5 - 5.5v
			IGNITION SWITCH OFF	APPROX. 0V

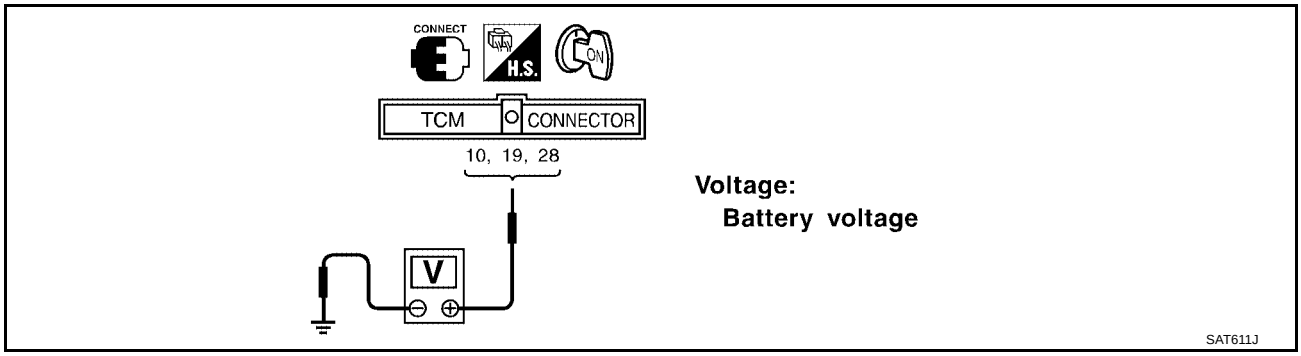
1. O/D OFF Indicator Lamp Does Not Come On

ECS0066B

SYMPTOM:
O/D OFF indicator lamp does not come on for about 2 seconds when turning ignition switch to ON.

1. CHECK TCM POWER SOURCE

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Check voltage between TCM terminals 10, 19, 28 and ground.

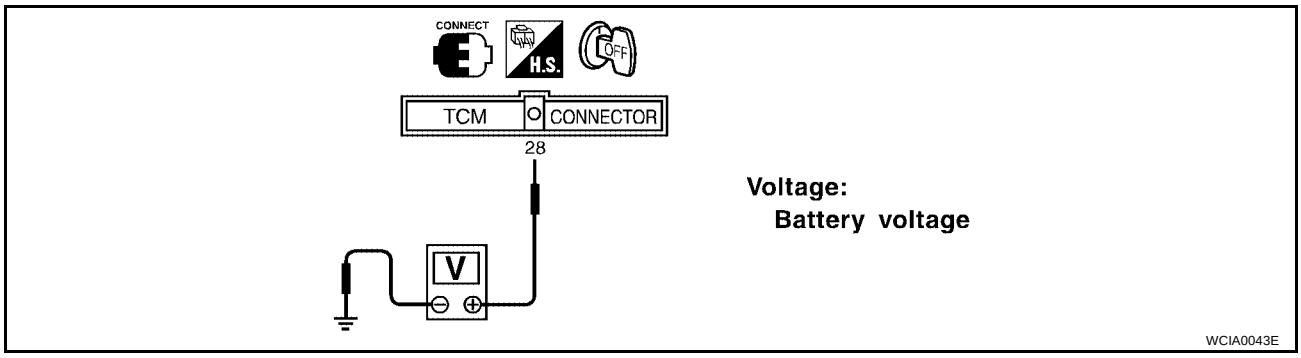


OK or NG

OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK POWER SOURCE STEP 2

1. Turn ignition switch to OFF position.
2. Check voltage between TCM terminal 28 and ground.



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness for short or open between ignition switch and TCM (Main harness)
  Refer to AT-484, "Wiring Diagram — AT — MAIN" .
- Harness for short or open between battery and TCM (Main harness)
  Refer to AT-484, "Wiring Diagram — AT — MAIN" .
- Ignition switch and fuse
  Refer to PG-3, "POWER SUPPLY ROUTING" .

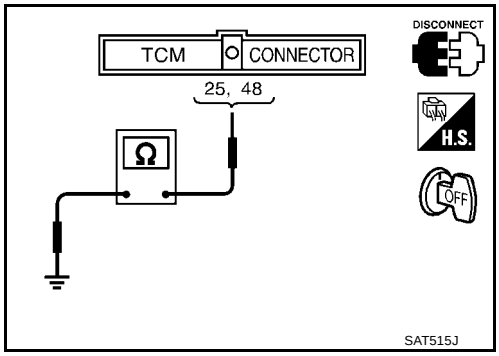
OK or NG

OK >> GO TO 4.
NG >> Repair or replace damaged parts.

4. CHECK TCM GROUND CIRCUIT

1. Turn ignition switch to OFF position.
2. Disconnect TCM harness connector.
3. Check continuity between TCM terminals 25, 48 and ground.

Continuity should exist.



OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors. Refer to AT-484, "Wiring Diagram — AT — MAIN" .

5. DETECT MALFUNCTIONING ITEM

Check the following items:

- Harness and fuse for short or open between ignition switch and O/D OFF indicator lamp (Main harness)
  Refer to PG-3, "POWER SUPPLY ROUTING" .
- Harness for short or open between O/D OFF indicator lamp and TCM.

OK or NG

OK >> GO TO 7.
NG >> Repair or replace damaged parts.

6. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 8.

7. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

2. Engine Cannot Be Started In P and N Position

ECS0066C

SYMPTOM:

- **Engine cannot be started with selector lever in P or N position.**
- **Engine can be started with selector lever in D, 2, 1 or R position.**

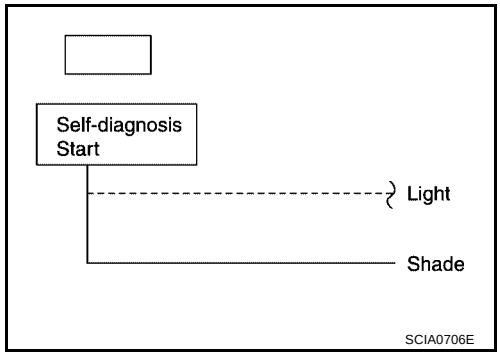
1. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT

With CONSULT-II

Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit?

Without CONSULT-II

Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?



Yes or No

Yes >> Check park/neutral position (PNP) switch circuit. Refer to AT-487, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" .

No >> GO TO 2.

2. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH

Check for short or open of park/neutral position (PNP) switch harness connector terminals 1 and 2. Refer to AT-489, "Wiring Diagram — AT — PNP/SW" .

OK or NG

OK >> GO TO 3.

NG >> Repair or replace park/neutral position (PNP) switch.

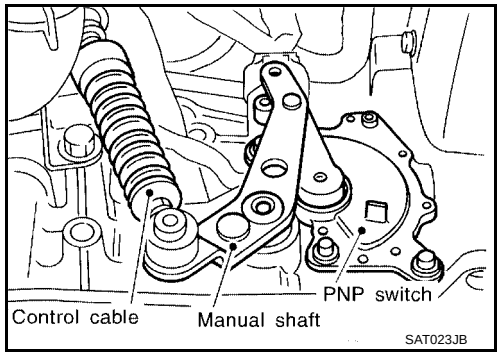
3. CHECK STARTING SYSTEM

Check control cable. Refer to AT-642, "Control Cable Adjustment" .

OK or NG

OK >> **GO TO 4.**

NG >> Adjust control cable. Refer to AT-642, "Control Cable Adjustment"



4. CHECK STARTING SYSTEM

Check starting system. Refer to SC-9, "STARTING SYSTEM" .

OK or NG

OK >> **INSPECTION END**

NG >> Repair or replace damaged parts.

3. In P Position, Vehicle Moves Forward or Backward When Pushed

ECS0066D

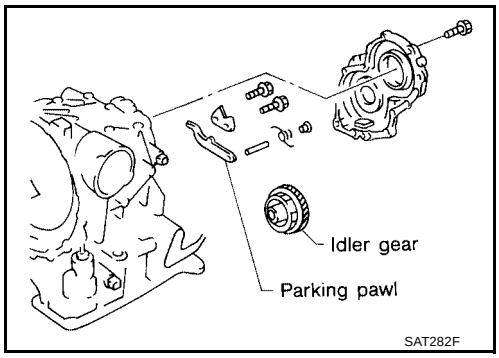
SYMPTOM:
Vehicle moves when it is pushed forward or backward with selector lever in P position.

1. CHECK PARKING COMPONENTS

Check parking components. Refer to AT-647, "OVERHAUL" and AT-724, "ASSEMBLY" .

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.



4. In N Position, Vehicle Moves

ECS0066E

SYMPTOM:
Vehicle moves forward or backward when selecting N position.

1. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT

With CONSULT-II

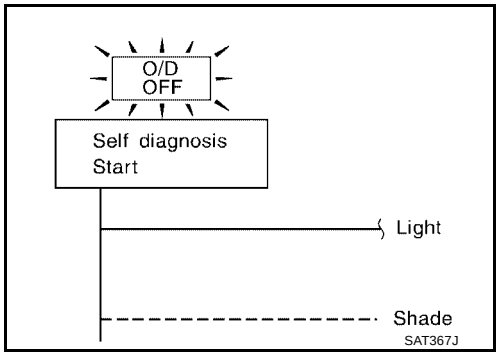
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit?

Without CONSULT-II

Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?

Yes or No

Yes >> Check park/neutral position (PNP) switch circuit. Refer to AT-487, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" .
No >> GO TO 2.



2. CHECK CONTROL LINKAGE

Check control cable.

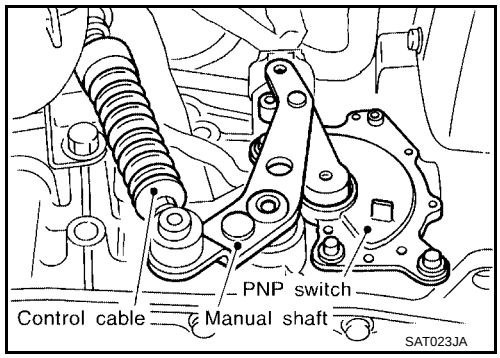
OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. ADJUST CONTROL CABLE

Adjust control cable.

>> Refer to AT-642, "Control Cable Adjustment" .

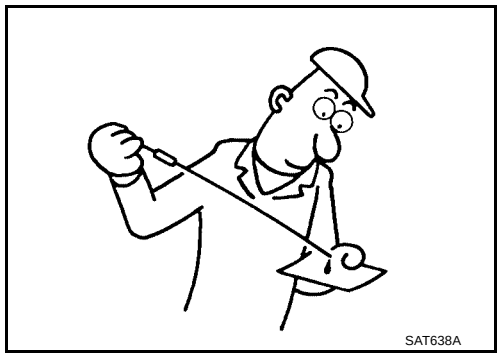


4. CHECK A/T FLUID LEVEL

Check A/T fluid level.

OK or NG

OK >> GO TO 5.
NG >> Refill ATF.

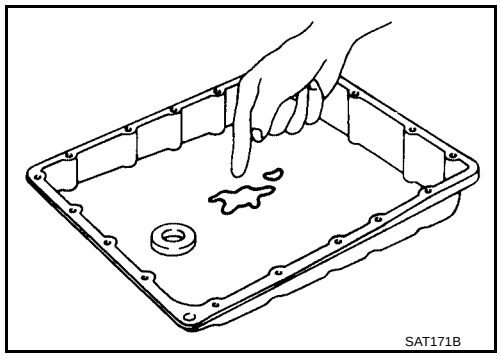


5. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.



6. DETECT MALFUNCTIONING ITEM

1. Disassemble A/T.
2. Check the following items:

- Forward clutch assembly
- Overrun clutch assembly
- Reverse clutch assembly

OK or NG

OK >> GO TO 7.
NG >> Repair or replace damaged parts.

7. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 8.

8. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

5. Large Shock N → R Position

ECS0066F

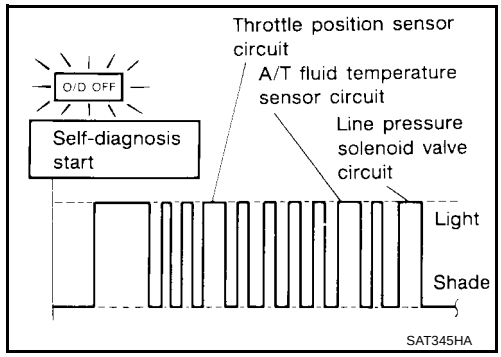
SYMPTOM:
There is large shock when changing from N to R position.

1. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to A/T fluid temperature sensor, line pressure solenoid valve or throttle position sensor [accelerator pedal position (APP) sensor] circuit?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.



2. CHECK DAMAGED CIRCUIT

Check damaged circuit.

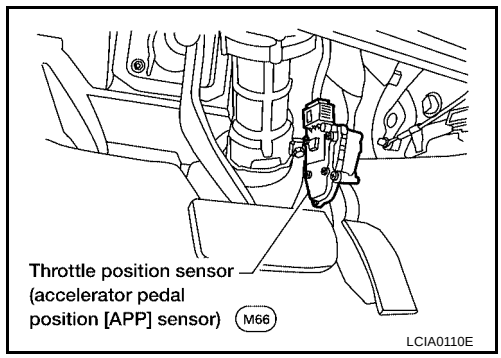
>> Refer to AT-493, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" , AT-543, "DTC P0745 LINE PRESSURE SOLENOID VALVE" , and AT-559, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]" .

3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor. Refer to EC-971, "DTC P0222, P0223 TP SENSOR" , and EC-1282, "DTC P2122, P2123 APP SENSOR" .

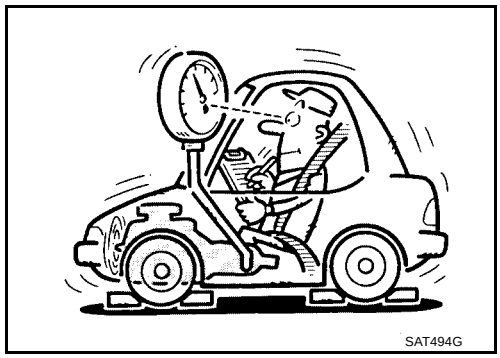
OK or NG

OK >> GO TO 4.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



4. CHECK LINE PRESSURE

Check line pressure at idle with selector lever in D position. Refer to AT-453, "Line Pressure Test" .



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

6. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

7. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

6. Vehicle Does Not Creep Backward In R Position

ECS0066G

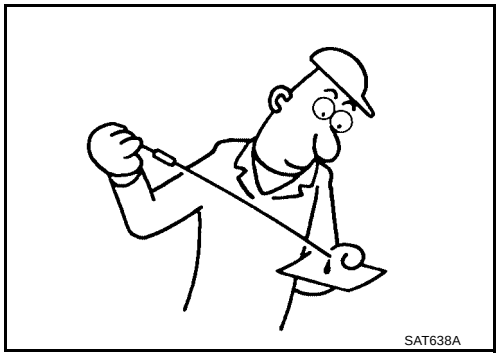
SYMPTOM:
Vehicle does not creep backward when selecting R position.

1. CHECK A/T FLUID LEVEL

Check A/T fluid level.

OK or NG

OK >> GO TO 2.
NG >> Refill ATF.

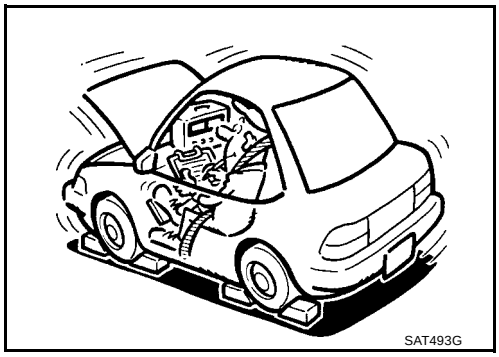

SAT638A

2. CHECK STALL REVOLUTION

Check stall revolution with selector lever in 1 and R positions.

OK or NG

OK >> GO TO 5.
OK in 1 position, NG in R position>>GO TO 3.
NG in both 1 and R positions>>GO TO 4.


SAT493G

3. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

3. Disassemble A/T.
4. Check the following items:

- Oil pump assembly
- Torque converter
- Reverse clutch assembly
- High clutch assembly

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

4. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

3. Disassemble A/T.
4. Check the following items:

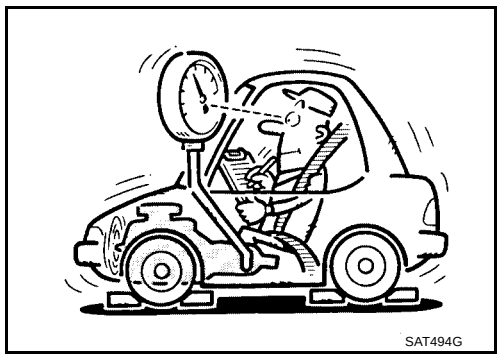
- Oil pump assembly
- Torque converter
- Reverse clutch assembly
- High clutch assembly
- Low & reverse brake assembly
- Low one-way clutch

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

5. CHECK LINE PRESSURE

Check line pressure at idle with selector lever in R position. Refer to AT-453, "Line Pressure Test" .


SAT494G

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

3. Disassemble A/T.
4. Check the following item:

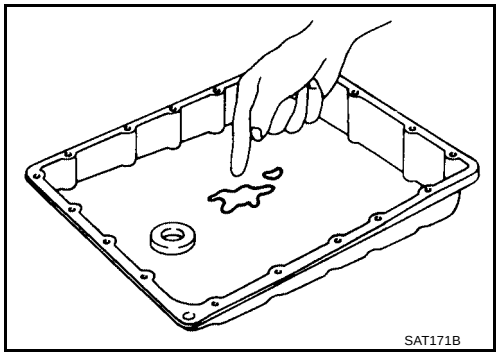
- Oil pump assembly

OK or NG

OK >> GO TO 7.
NG >> Repair or replace damaged parts.

7. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

3. Disassemble A/T.
4. Check the following items:

- Oil pump assembly
- Torque converter
- Reverse clutch assembly
- High clutch assembly
- Low & reverse brake assembly
- Low one-way clutch

OK or NG

OK >> GO TO 9.
NG >> Repair or replace damaged parts.

9. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 10.

10. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

7. Vehicle Does Not Creep Forward in D, 2 or 1 Position

ECS0066H

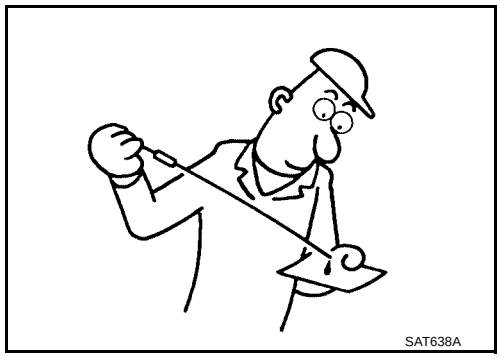
SYMPTOM:
Vehicle does not creep forward when selecting D, 2 or 1 position.

1. CHECK A/T FLUID LEVEL

Check A/T fluid level.

OK or NG

OK >> GO TO 2.
NG >> Refill ATF.

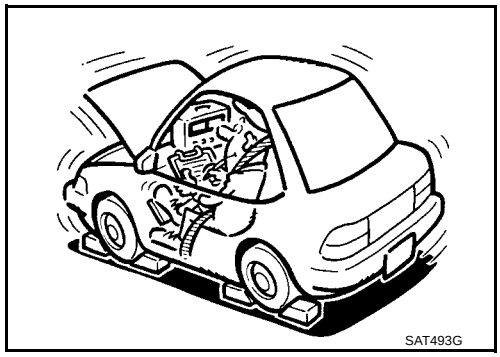

SAT638A

2. CHECK STALL REVOLUTION

Check stall revolution with selector lever in D position. Refer to AT-449, "Stall Test" .

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.


SAT493G

3. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

3. Disassemble A/T.
4. Check the following items:

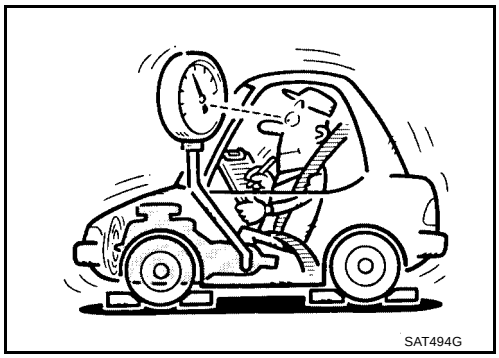
- Oil pump assembly
- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- Low & reverse brake assembly
- Torque converter

OK or NG

OK >> GO TO 4.
NG >> Repair or replace damaged parts.

4. CHECK LINE PRESSURE

Check line pressure at idle with selector lever in D position. Refer to AT-453, "Line Pressure Test" .


SAT494G

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

3. Disassemble A/T.
4. Check the following item:

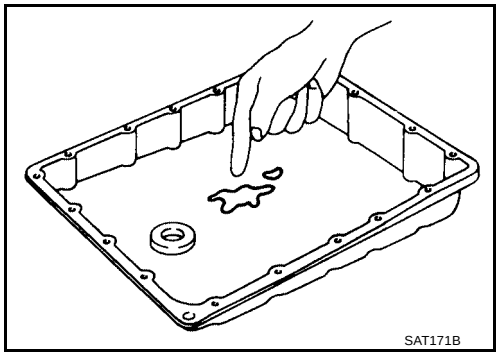
- Oil pump assembly

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

6. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.


SAT171B

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

3. Disassemble A/T.
4. Check the following items:

- Oil pump assembly
- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- Low & reverse brake assembly
- Torque converter

OK or NG

OK >> GO TO 8.
NG >> Repair or replace damaged parts.

8. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 9.

9. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

8. Vehicle Cannot Be Started From D1

ECS0066I

SYMPTOM:
Vehicle cannot be started from D1 on Cruise test — Part 1.

1. CHECK SYMPTOM

Is “6. Vehicle Does Not Creep Backward In R Position” OK?

Yes or No

Yes >> GO TO 2.
No >> Go to AT-604, "6. Vehicle Does Not Creep Backward In R Position" .

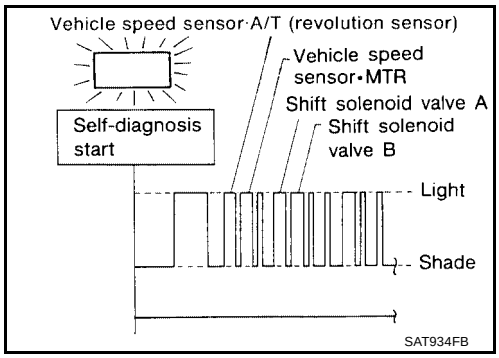
2. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to vehicle speed sensor·A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor·MTR after cruise test?

Yes or No

Yes >> Check damaged circuit. Refer to AT-499, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-549, "DTC P0750 SHIFT SOLENOID VALVE A" , or AT-554, "DTC P0755 SHIFT SOLENOID VALVE B" .

No >> GO TO 3.



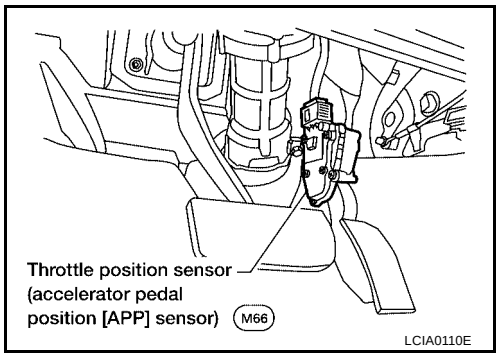
3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-888, "DTC P0122, P0123 TP SENSOR" and EC-1282, "DTC P2122, P2123 APP SENSOR" .

OK or NG

OK >> GO TO 4.

NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



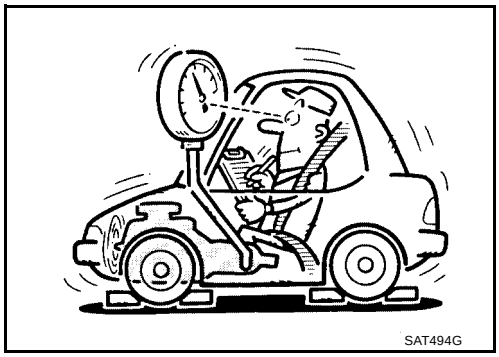
4. CHECK LINE PRESSURE

Check line pressure at stall point with selector lever in D position. Refer to AT-453, "Line Pressure Test" .

OK or NG

OK >> GO TO 6.

NG >> GO TO 5.



5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter

3. Disassemble A/T.
4. Check the following items:

- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- High clutch assembly
- Torque converter
- Oil pump assembly

OK or NG

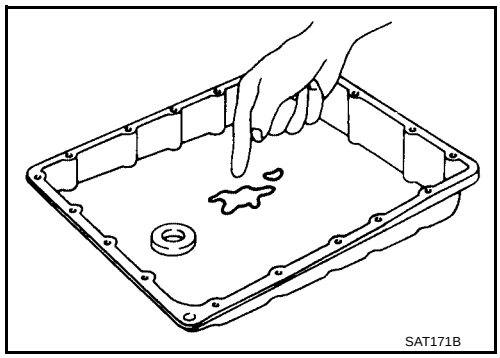
OK >> GO TO 8.
NG >> Repair or replace damaged parts.

6. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.

OK or NG

OK >> GO TO 7.
NG >> GO TO 5.



7. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

OK >> GO TO 8.
NG >> Repair or replace damage parts.

8. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 9.

9. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

9. A/T Does Not Shift: $D_1 \rightarrow D_2$ or Does Not Kickdown: $D_4 \rightarrow D_2$

ECS0066J

SYMPTOM:
A/T does not shift from D_1 to D_2 at the specified speed.
A/T does not shift from D_4 to D_2 when depressing accelerator pedal fully at the specified speed.

1. CHECK SYMPTOM

Are “7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position” and “8. Vehicle Cannot Be Started From D_1 ” OK?

Yes or No

Yes >> GO TO 2.
No >> Go to AT-607, "7. Vehicle Does Not Creep Forward in D, 2 or 1 Position" and AT-609, "8. Vehicle Cannot Be Started From D_1" .

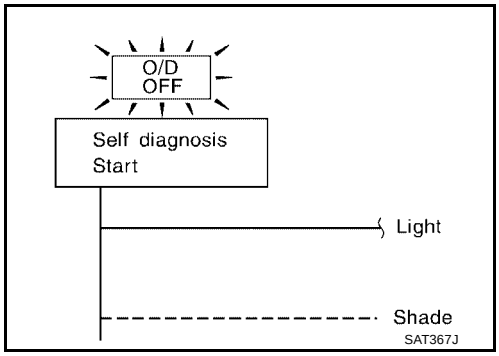
2. CHECK SELF-DIAGNOSTIC RESULTS

With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?

Yes or No

Yes >> Check park/neutral position (PNP) switch circuit. Refer to AT-487, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" .
No >> GO TO 3.



3. CHECK VEHICLE SPEED SENSOR·A/T AND VEHICLE SPEED SENSOR·MTR CIRCUIT

Check vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuit. Refer to AT-499, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" and AT-576, "DTC VEHICLE SPEED SENSOR MTR" .

OK or NG

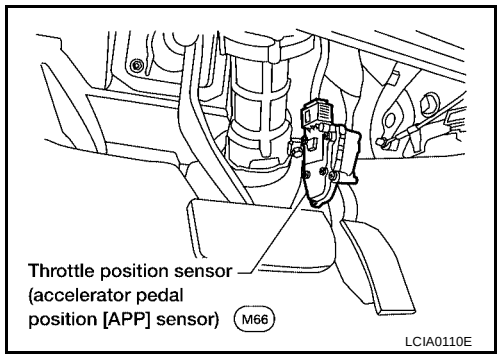
OK >> GO TO 4.
NG >> Repair or replace vehicle speed sensor·A/T (revolution sensor) and vehicle speed sensor·MTR circuits.

4. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-888, "DTC P0122, P0123 TP SENSOR" and EC-1282, "DTC P2122, P2123 APP SENSOR" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].

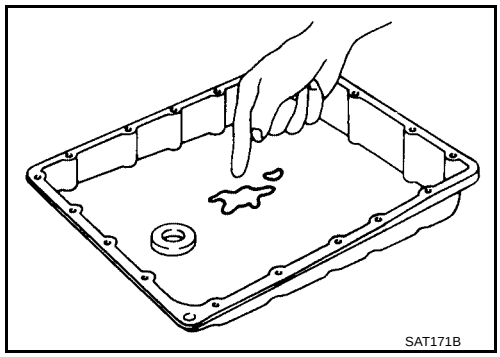


5. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.



6. DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-639, "REMOVAL" .
2. Check the following items:

- Shift valve A
- Shift solenoid valve A
- Pilot valve
- Pilot filter

3. Disassemble A/T.
4. Check the following items:

- Servo piston assembly
- Brake band
- Oil pump assembly

OK or NG

OK >> GO TO 8.
NG >> Repair or replace damaged parts.

7. DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-639, "REMOVAL" .
2. Check the following items:

- Shift valve A
- Shift solenoid valve A
- Pilot valve
- Pilot filter

OK or NG

OK >> GO TO 8.
NG >> Repair or replace damaged parts.

8. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 9.

9. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

10. A/T Does Not Shift: $D_2 \rightarrow D_3$

ECS0066K

SYMPTOM:
A/T does not shift from D_2 to D_3 at the specified speed.

1. CHECK SYMPTOM

Are "7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position" and "8. Vehicle Cannot Be Started From D_1 " OK?

Yes or No

Yes >> GO TO 2.
No >> Go to AT-607, "7. Vehicle Does Not Creep Forward in D, 2 or 1 Position" and AT-609, "8. Vehicle Cannot Be Started From D_1" .

2. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT

With CONSULT-II

Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit?

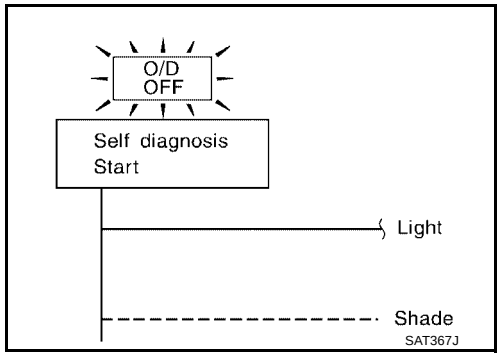
Without CONSULT-II

Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?

Yes or No

Yes >> Check park/neutral position (PNP) switch circuit. Refer to AT-487, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" .

No >> GO TO 3.



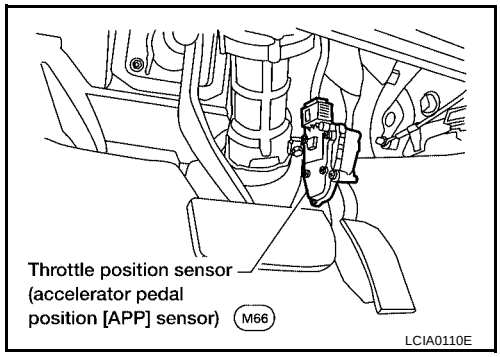
3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-888, "DTC P0122, P0123 TP SENSOR" and EC-1282, "DTC P2122, P2123 APP SENSOR" .

OK or NG

OK >> GO TO 4.

NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



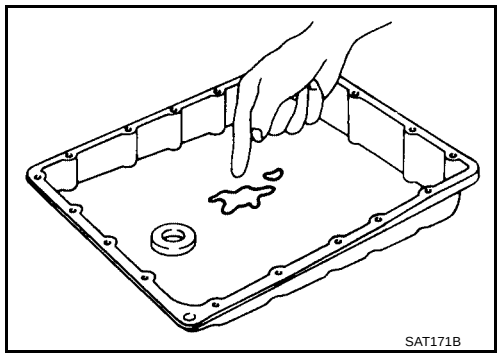
4. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.

OK or NG

OK >> GO TO 6.

NG >> GO TO 5.



5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:
- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check the following items:
- Servo piston assembly
- High clutch assembly
- Oil pump assembly

OK or NG

OK >> GO TO 7.
NG >> Repair or replace damaged parts.

6. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:
- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

OK >> GO TO 7.
NG >> Repair or replace damaged parts.

7. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 8.

8. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

11. A/T Does Not Shift: D3 → D4

ECS0066L

SYMPTOM:

- **A/T does not shift from D3 to D4 at the specified speed.**
- **A/T must be warm before D3 to D4 shift will occur.**

1. CHECK SYMPTOM

Are "7. Vehicle Does Not Creep Forward In D, 2 Or 1 Position" and "8. Vehicle Cannot Be Started From D1 " OK?

Yes or No

Yes >> GO TO 2.
No >> Go to AT-607, "7. Vehicle Does Not Creep Forward in D, 2 or 1 Position" and AT-609, "8. Vehicle Cannot Be Started From D1" .

2. CHECK SELF-DIAGNOSTIC RESULTS

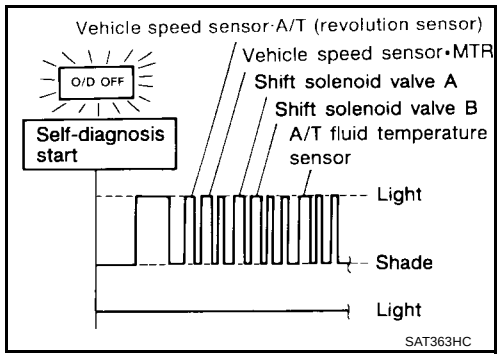
With CONSULT-II

Does self-diagnosis, after cruise test, show damage to any of the following circuits?

- Park/neutral position (PNP) switch
- Overdrive control switch
- A/T fluid temperature sensor
- Vehicle speed sensor·A/T (revolution sensor)
- Shift solenoid valve A or B
- Vehicle speed sensor·MTR

Yes or No

Yes >> Check damaged circuit. Refer to AT-487, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" , AT-493, "DTC P0710 A/T FLUID TEMPERATURE SENSOR CIRCUIT" , AT-499, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-549, "DTC P0750 SHIFT SOLENOID VALVE A" , AT-554, "DTC P0755 SHIFT SOLENOID VALVE B" , or AT-576, "DTC VEHICLE SPEED SENSOR MTR" .
No >> GO TO 3.

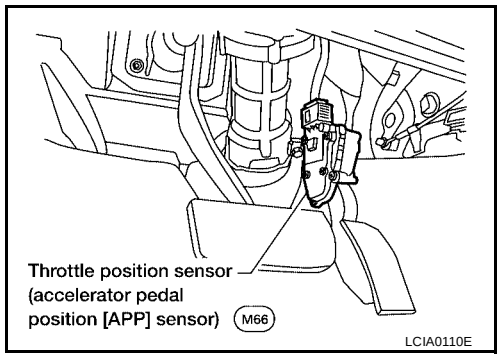


3. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-888, "DTC P0122, P0123 TP SENSOR" and EC-1304, "DTC P2138 APP SENSOR" .

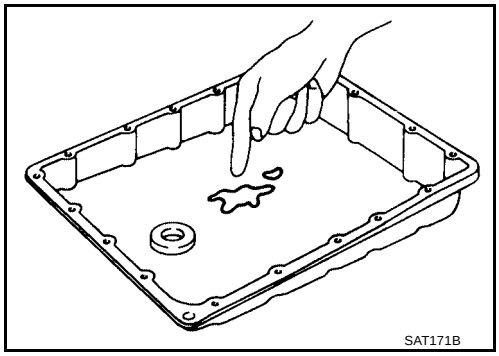
OK or NG

OK >> GO TO 4.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



4. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

- Shift valve B
- Overrun clutch control valve
- Shift solenoid valve B
- Pilot valve
- Pilot filter

3. Disassemble A/T.
4. Check the following items:

- Servo piston assembly
- Brake band
- Torque converter
- Oil pump assembly

OK or NG

OK >> GO TO 7.
NG >> Repair or replace damaged parts.

6. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:

- Shift valve B
- Overrun clutch control valve
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK or NG

OK >> GO TO 7.
NG >> Repair or replace damaged parts.

7. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 8.

8. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

12. A/T Does Not Perform Lock-up

ECS0066M

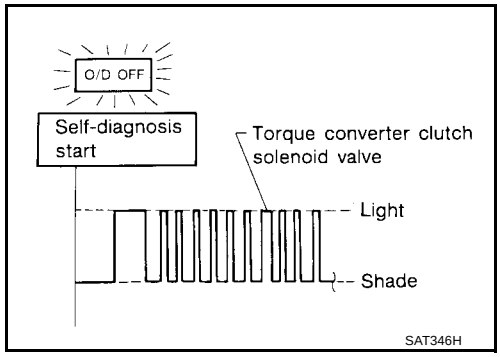
SYMPTOM:
A/T does not perform lock-up at the specified speed.

1. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to torque converter clutch solenoid valve circuit after cruise test?

Yes or No

Yes >> Check torque converter clutch solenoid valve circuit. Refer to AT-530, "DTC P0740 TORQUE CONVERTER CLUTCH SOLENOID VALVE" .
No >> GO TO 2.

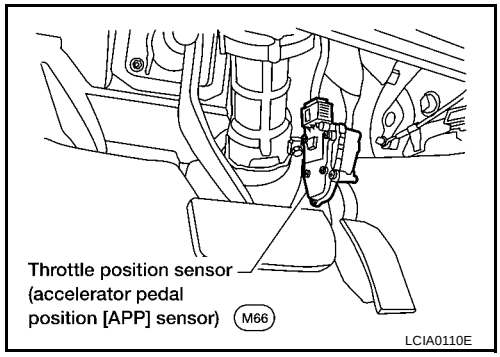


2. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-971, "DTC P0222, P0223 TP SENSOR" and EC-1304, "DTC P2138 APP SENSOR" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].



3. DETECT MALFUNCTIONING ITEM

1. Remove control valve. Refer to AT-639, "REMOVAL" .
2. Check following items:

- Torque converter clutch control valve
- Torque converter relief valve
- Torque converter clutch solenoid valve
- Pilot valve
- Pilot filter

OK or NG

OK >> GO TO 4.
NG >> Repair or replace damaged parts.

4. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 5.

5. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

13. A/T Does Not Hold Lock-up Condition

ECS0066N

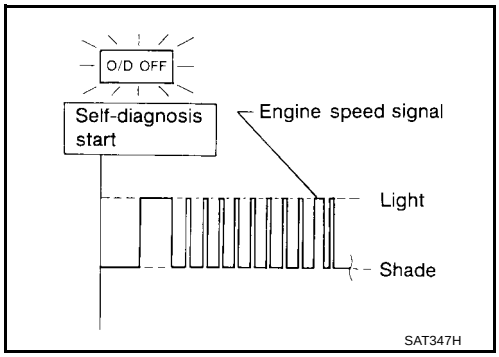
SYMPTOM:
A/T does not hold lock-up condition for more than 30 seconds.

1. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to engine speed signal circuit after cruise test?

Yes or No

Yes >> Check engine speed signal circuit. Refer to AT-504, "DTC P0725 ENGINE SPEED SIGNAL" .
No >> GO TO 2.

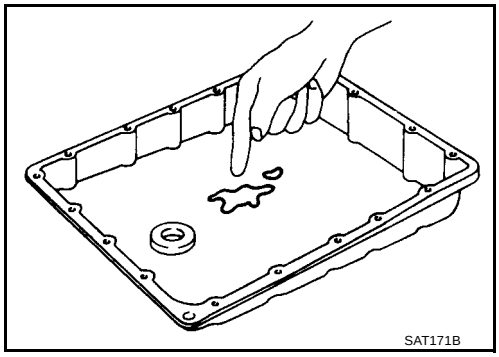


2. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:
- Torque converter clutch control valve
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check torque converter and oil pump assembly.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

4. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:
- Torque converter clutch control valve
- Pilot valve
- Pilot filter

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

5. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 6.

6. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

14. Lock-up Is Not Released

ECS0066O

SYMPTOM:
Lock-up is not released when accelerator pedal is released.

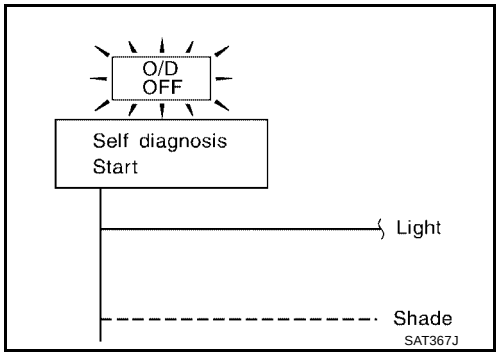
1. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR] CIRCUIT

With CONSULT-II

Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to the throttle position switch [accelerator pedal position (APP) sensor] circuit?

Without CONSULT-II

Does self-diagnosis show damage to the throttle position sensor [accelerator pedal position (APP) sensor] circuit?



Yes or No

Yes >> Check the throttle position switch [accelerator pedal position (APP) sensor circuit. Refer to EC-888, "DTC P0122, P0123 TP SENSOR" and EC-1304, "DTC P2138 APP SENSOR" .

No >> GO TO 2.

2. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**

NG >> GO TO 3.

3. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**

NG >> Repair or replace damaged parts.

15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)

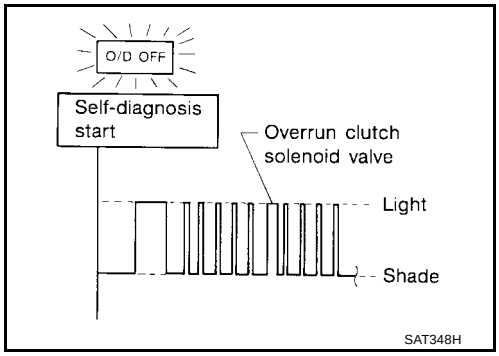
ECS0066P

SYMPTOM:

- **Engine speed does not smoothly return to idle when A/T shifts from D_4 to D_3 .**
- **Vehicle does not decelerate by engine brake when turning overdrive control switch OFF.**
- **Vehicle does not decelerate by engine brake when shifting A/T from D to 2 position.**

1. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to overrun clutch solenoid valve circuit after cruise test?



Yes or No

Yes >> Check overrun clutch solenoid valve circuit. Refer to AT-564, "DTC P1760 OVERRUN CLUTCH SOLENOID VALVE" .

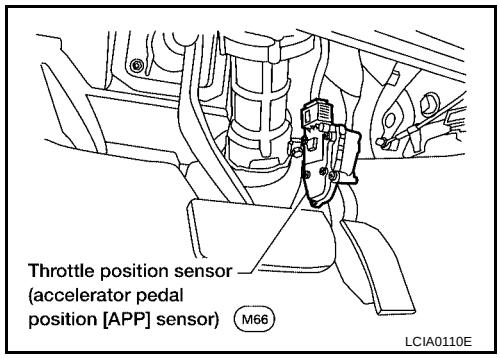
No >> GO TO 2.

2. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

Check throttle position sensor [accelerator pedal position (APP) sensor]. Refer to EC-888, "DTC P0122, P0123 TP SENSOR" and EC-1304, "DTC P2138 APP SENSOR" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace throttle position sensor [accelerator pedal position (APP) sensor].

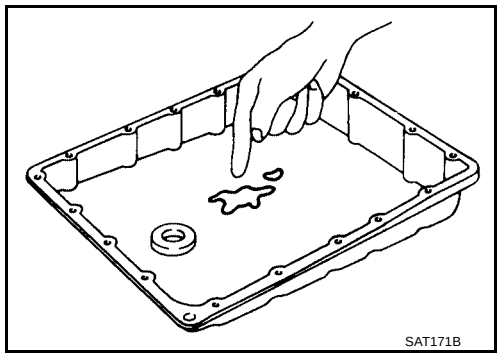


3. CHECK A/T FLUID CONDITION

1. Remove oil pan.
2. Check A/T fluid condition.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve
3. Disassemble A/T.
4. Check the following items:
- Overrun clutch assembly
- Oil pump assembly

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

5. DETECT MALFUNCTIONING ITEM

1. Remove control valve assembly. Refer to AT-639, "REMOVAL" .
2. Check the following items:
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve

OK or NG

OK >> GO TO 6.
NG >> Repair or replace damaged parts.

6. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

7. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

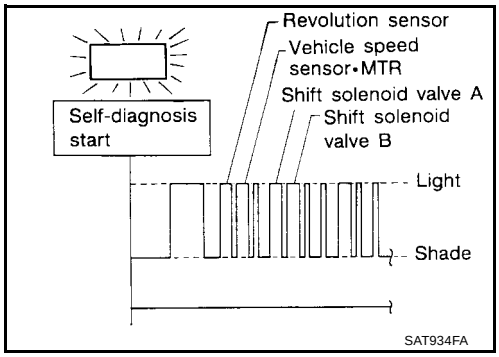
16. Vehicle Does Not Start From D1

ECS0066Q

SYMPTOM:
Vehicle does not start from D1 on Cruise test — Part 2.

1. CHECK SELF-DIAGNOSTIC RESULTS

Does self-diagnosis show damage to vehicle speed sensor·A/T (revolution sensor), shift solenoid valve A, B or vehicle speed sensor·MTR after cruise test?



Yes or No

Yes >> Check damaged circuit. Refer to AT-499, "DTC P0720 VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR)" , AT-549, "DTC P0750 SHIFT SOLENOID VALVE A" , AT-554, "DTC P0755 SHIFT SOLENOID VALVE B" or AT-576, "DTC VEHICLE SPEED SENSOR MTR" .
No >> GO TO 2.

2. CHECK SYMPTOM

Check again.

OK or NG

OK >> Go to AT-609, "8. Vehicle Cannot Be Started From D1" .
NG >> GO TO 3.

3. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

17. A/T Does Not Shift: $D_4 \rightarrow D_3$, When Overdrive Control Switch ON → OFF

ECS0066R

SYMPTOM:
A/T does not shift from D_4 to D_3 when changing overdrive control switch to OFF position.

1. CHECK OVERDRIVE SWITCH CIRCUIT

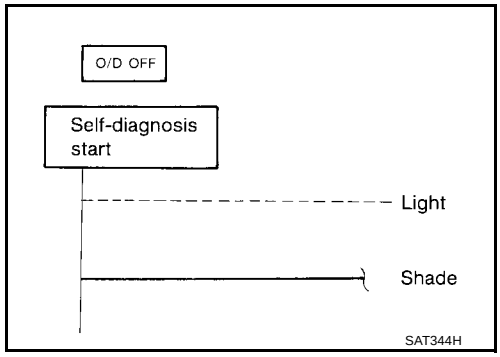
With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to overdrive control switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to overdrive control switch circuit?

Yes or No

Yes >> Check overdrive control switch circuit. Refer to AT-627, "21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}" .

No >> Go to AT-614, "10. A/T Does Not Shift: $D_2 \rightarrow D_3$" .



18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever D → 2 Position

ECS0066S

SYMPTOM:
A/T does not shift from D_3 to 2_2 when changing selector lever from D to 2 position.

1. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT

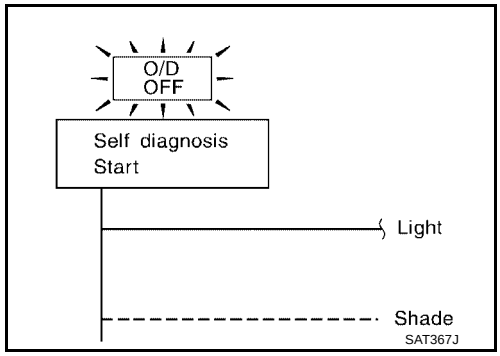
With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?

Yes or No

Yes >> Check park/neutral position (PNP) switch circuit. Refer to AT-487, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" .

No >> Go to AT-612, "9. A/T Does Not Shift: $D_1 \rightarrow D_2$ or Does Not Kickdown: $D_4 \rightarrow D_2$" .



19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever 2 $\rightarrow$ 1 Position

ECS0066T

SYMPTOM:
A/T does not shift from 2_2 to 1_1 when changing selector lever from 2 to 1 position.

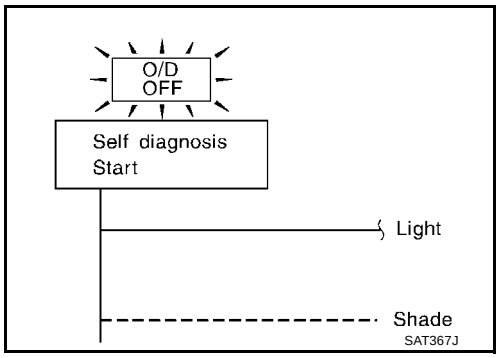
1. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT

With CONSULT-II
Does “TCM INPUT SIGNALS” in “DATA MONITOR” show damage to park/neutral position (PNP) switch circuit?

Without CONSULT-II
Does self-diagnosis show damage to park/neutral position (PNP) switch circuit?

Yes or No

Yes >> Check park/neutral position (PNP) switch circuit. Refer to AT-487, "DTC P0705 PARK/NEUTRAL POSITION SWITCH" .
No >> GO TO 2.

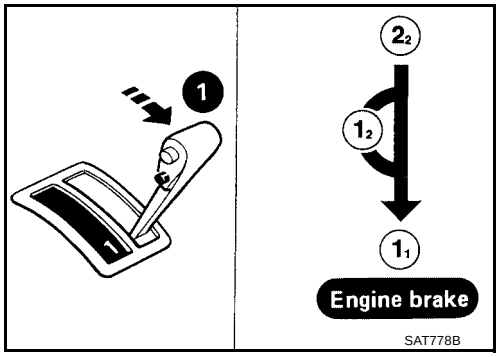


2. CHECK SYMPTOM

Check again.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.



3. CHECK TCM INSPECTION

1. Perform TCM input/output signal inspection.
2. If NG, recheck TCM pin terminals for damage or loose connection with harness connector.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace damaged parts.

20. Vehicle Does Not Decelerate By Engine Brake

ECS0066U

SYMPTOM:
Vehicle does not decelerate by engine brake when shifting from 2_2 (1_2) to 1_1.

1. CHECK SYMPTOM

Is “6. Vehicle Does Not Creep Backward In R Position” OK?

Yes or No

Yes >> Go to AT-622, "15. Engine Speed Does Not Return To Idle (Light Braking $D_4 \rightarrow D_3$)".
No >> Go to AT-604, "6. Vehicle Does Not Creep Backward In R Position".

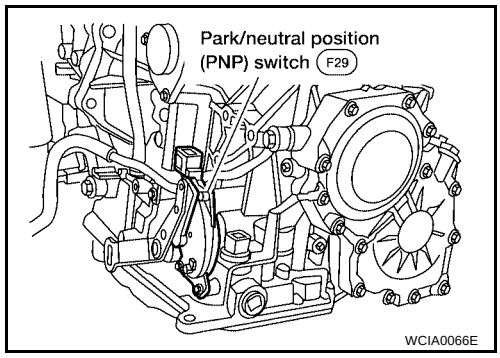
21. TCM Self-diagnosis Does Not Activate {Park/neutral Position (PNP), Overdrive Control and Throttle Position Sensor [Accelerator Pedal Position (APP) Sensor] Switches Circuit Checks}

ECS0066V

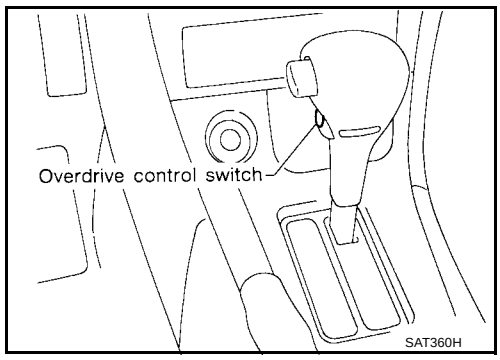
SYMPTOM:
O/D OFF indicator lamp does not come on in TCM self-diagnostic procedure even if the lamp circuit is good.

DESCRIPTION

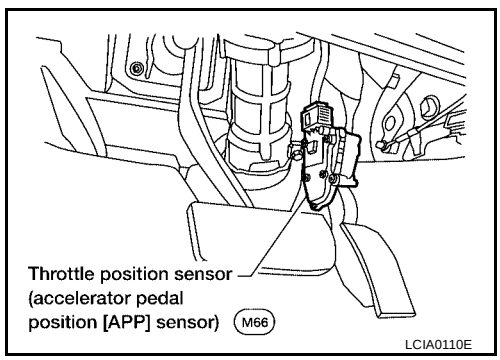
- Park/neutral position (PNP) switch
  The park/neutral (PNP) switch assembly includes a transmission range switch. The transmission range switch detects the selector lever position and sends a signal to the TCM.



- Overdrive control switch
  Detects the overdrive control switch position (ON or OFF) and sends a signal to the TCM.



- Throttle position sensor [accelerator pedal position (APP) sensor]
  The throttle position sensor [accelerator pedal position (APP) sensor] is part of the system that controls the throttle position. This system also uses an electric throttle control actuator, which consists of a throttle control motor and throttle position sensors. Accelerator pedal position signal is sent to the ECM.



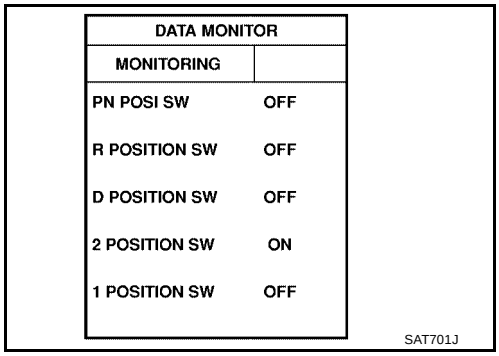
DIAGNOSTIC PROCEDURE

NOTE:
The diagnostic procedure includes inspections for the overdrive control switch circuits.

1. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT (WITH CONSULT-II)

With CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out P/N, R, D, 2 and 1 position switches moving selector lever to each position.
   Check that the signal of the selector lever position is indicated properly.



OK or NG

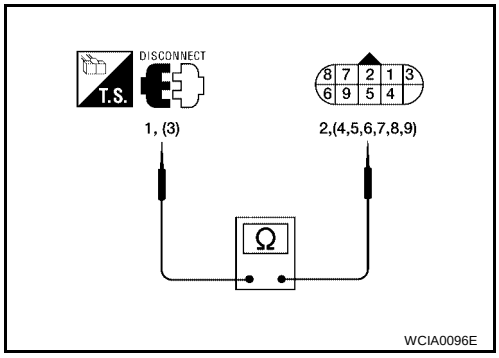
OK >> GO TO 5.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING ITEM

Check the following items:

- Park/neutral position (PNP) switch

– Check continuity between park/neutral position (PNP) switch F29 terminals 1 (G/OR) and 2 (B) and between terminals 3 (Y) and 4 (OR), 5 (L), 6 (W/G), 7 (BR/W), 8 G/W), 9 (G) while moving manual shaft through each position.



Lever position	Terminal No.	
P	3 - 7	1 - 2
R	3 - 8	
N	3 - 9	1 - 2
D	3 - 6	
2	3 - 5	
1	3 - 4	

– If NG, check again with manual control cable disconnected from manual shaft of A/T assembly. Refer to step a.
– If OK on step b, adjust manual control cable. Refer to AT-642, "Control Cable Adjustment" .
– If NG on step b, remove park/neutral position (PNP) switch from A/T and check continuity of park/neutral position (PNP) switch terminals. Refer to step a.
– If OK on step d, adjust park/neutral position (PNP) switch. Refer to AT-641, "Park/Neutral Position (PNP) Switch Adjustment" .
– If NG on step d, replace park/neutral position (PNP) switch.

- Harness for short or open between ignition switch and park/neutral position (PNP) switch (Main harness)
- Harness for short or open between park/neutral position (PNP) switch and TCM (Main harness)

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

3. CHECK PARK/NEUTRAL POSITION (PNP) SWITCH CIRCUIT (WITHOUT CONSULT-II)

Without CONSULT-II

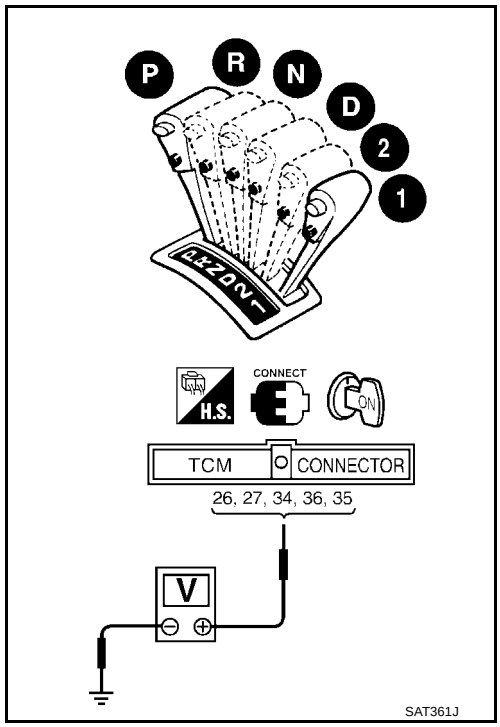
1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between TCM terminals 26 (OR), 27 (L), 34 (W/G), 35 (G/W), 36 (BR/W) and ground while moving selector lever through each position.

Lever position	Terminal No.				
	36	35	34	27	26
P,N	B	0	0	0	0
R	0	B	0	0	0
D	0	0	B	0	0
2	0	0	0	B	0
1	0	0	0	0	B

Voltage:

B : Battery voltage

0 : 0V



OK or NG

OK >> GO TO 6.
NG >> GO TO 4.

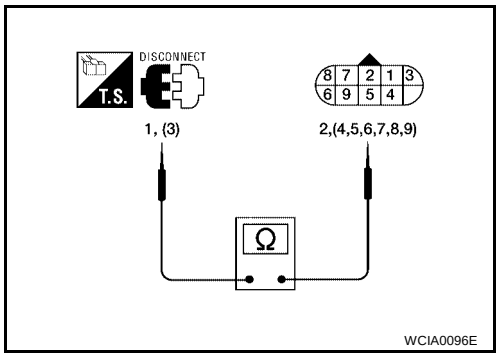
4. DETECT MALFUNCTIONING ITEM

Check the following items:

- Park/neutral position (PNP) switch

– Check continuity between park/neutral position (PNP) switch F29 terminals 1 (G/OR) and 2 (B) and between terminals 3 (Y) and 4 (OR), 5 (L), 6 (W/G), 7 (BR/W), 8 G/W), 9 (G) while moving manual shaft through each position.

Lever position	Terminal No.	
P	3 - 7	1 - 2
R	3 - 8	
N	3 - 9	1 - 2
D	3 - 6	
2	3 - 5	
1	3 - 4	



– If NG, check again with manual control cable disconnected from manual shaft of A/T assembly. Refer to step a.
– If OK on step b, adjust manual control cable. Refer to AT-642, "Control Cable Adjustment" .
– If NG on step b, remove park/neutral position (PNP) switch from A/T and check continuity of park/neutral position (PNP) switch terminals. Refer to step a.
– If OK on step d, adjust park/neutral position (PNP) switch. Refer to AT-641, "Park/Neutral Position (PNP) Switch Adjustment" .
– If NG on step d, replace park/neutral position (PNP) switch.

- Harness for short or open between ignition switch and park/neutral position (PNP) switch (Main harness)
- Harness for short or open between park/neutral position (PNP) switch and TCM (Main harness)

OK or NG

OK >> GO TO 7.
NG >> Repair or replace damaged parts.

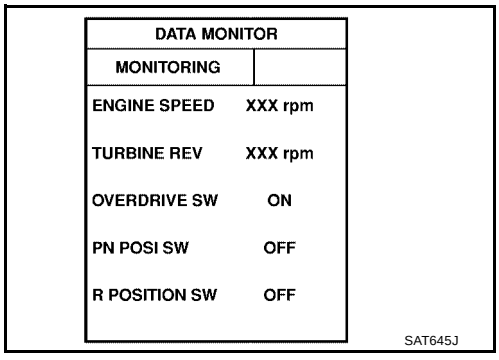
5. CHECK OVERDRIVE CONTROL SWITCH CIRCUIT (WITH CONSULT-II)

With CONSULT-II

1. Turn ignition switch to ON position.
   (Do not start engine.)
2. Select “TCM INPUT SIGNALS” in “DATA MONITOR” mode for “A/T” with CONSULT-II.
3. Read out “OVERDRIVE SW”.
   Check the signal of the overdrive control switch is indicated properly.
   (Overdrive control switch “ON” displayed on CONSULT-II means overdrive “OFF”.)

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

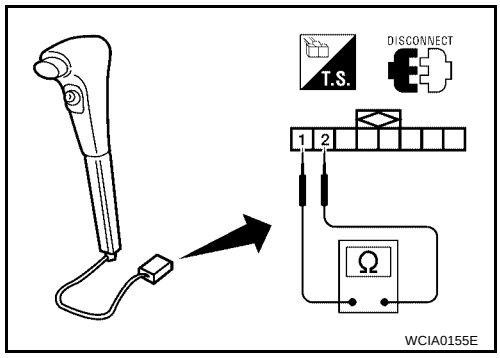


6. DETECT MALFUNCTIONING ITEM

Check the following items:

- Overdrive control switch M44.
- Check continuity between terminals 1 and 2.

Switch position	Continuity
ON	No
OFF	Yes



- Harness for short or open between TCM and overdrive control switch (Main harness)
- Harness of ground circuit for overdrive control switch (Main harness) for short or open

OK or NG

OK >> GO TO 7.
NG >> Repair or replace damaged parts.

7. CHECK THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]

- Perform throttle position sensor [accelerator pedal position (APP) sensor] inspection. Refer to AT-559, "DTC P1705 THROTTLE POSITION SENSOR [ACCELERATOR PEDAL POSITION (APP) SENSOR]" .

OK or NG

OK >> GO TO 8.
NG >> Repair or replace damaged parts.

8. CHECK TCM INSPECTION

1. Perform TCM input/output inspection. Refer to AT-480, "TCM INSPECTION TABLE" .

OK or NG

OK >> INSPECTION END.
NG >> Inspect TCM terminals and related wiring harnesses for damage or loose connections. Repair or replace damaged parts.

A/T SHIFT LOCK SYSTEM

PFP:34950

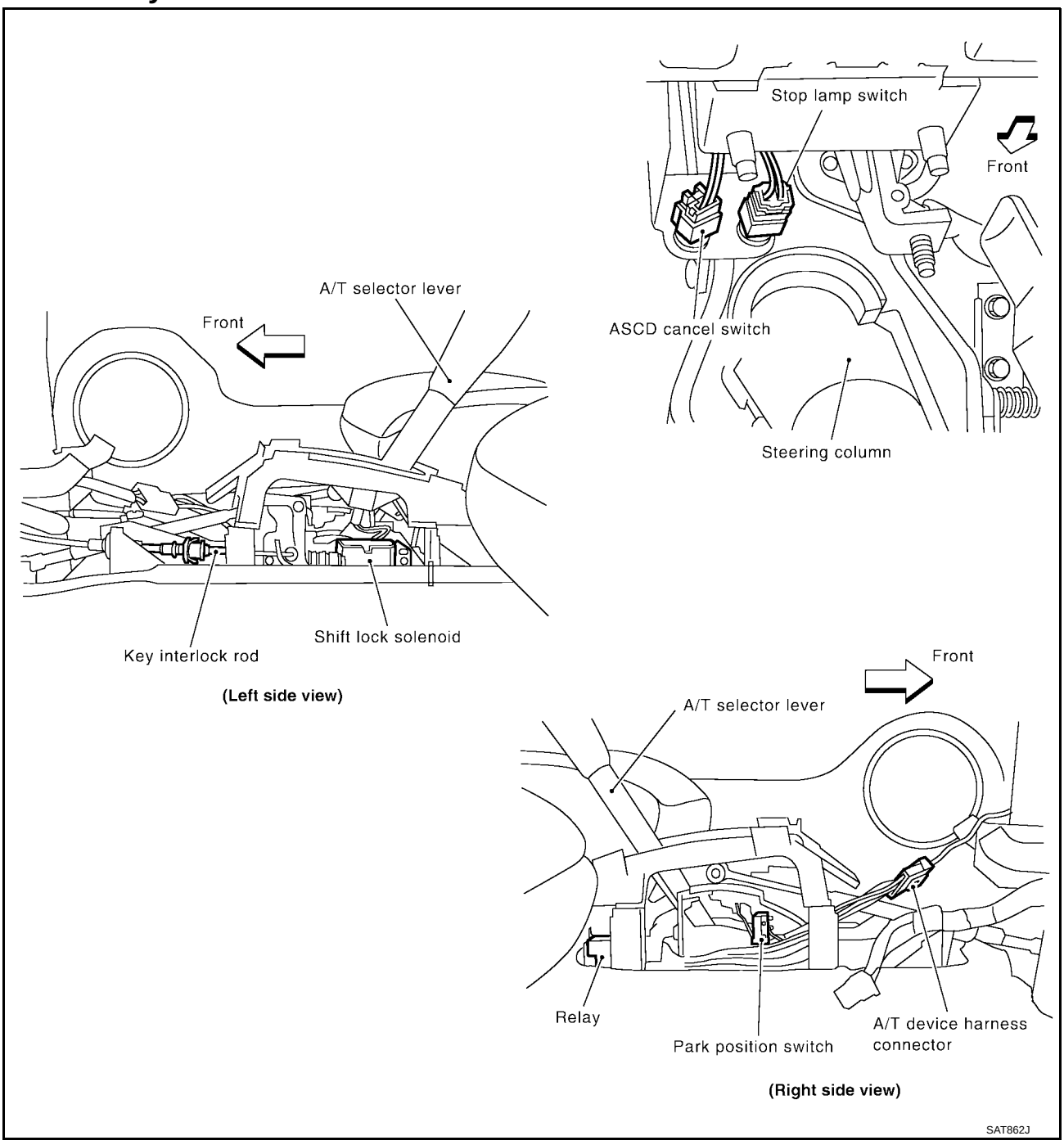
Description

ECS0066W

- The mechanical key interlock mechanism also operates as a shift lock:
  With the key switch turned to ON, the selector lever cannot be shifted from “P” (parking) to any other position unless the brake pedal is depressed.
  With the key removed, the selector lever cannot be shifted from “P” to any other position.
  The key cannot be removed unless the selector lever is placed in “P”.
- The shift lock and key interlock mechanisms are controlled by the ON-OFF operation of the shift lock solenoid and by the operation of the rotator and slider located inside the key cylinder.

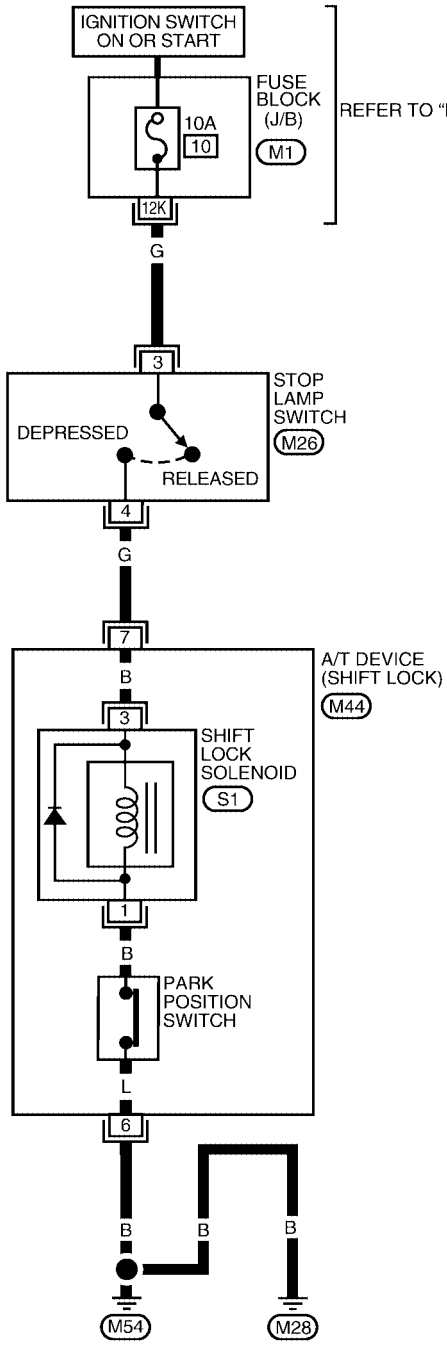
Shift Lock System Electrical Parts Location

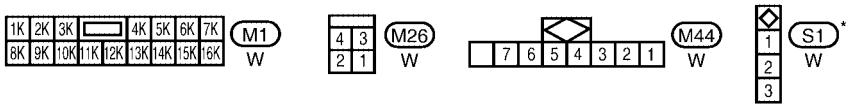
ECS0066X



Wiring Diagram — SHIFT —

ECS0066Y





*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.

WCWA0126E

Diagnostic Procedure

ECS0066Z

SYMPTOM 1:

- **Selector lever cannot be moved from “P” position with key in ON position and brake pedal applied.**
- **Selector lever can be moved from “P” position with key in ON position and brake pedal released.**
- **Selector lever can be moved from “P” position when key is removed from key cylinder.**

SYMPTOM 2:

Ignition key cannot be removed when selector lever is set to “P” position. It can be removed when selector lever is set to any position except “P”.

1. CHECK KEY INTERLOCK CABLE

Check key interlock cable for damage.

OK or NG

OK >> GO TO 2.
NG >> Repair key interlock cable. Refer to AT-637, "Components" .

2. CHECK SELECTOR LEVER POSITION

Check selector lever position for damage.

OK or NG

OK >> GO TO 3.
NG >> Check selector lever. Refer to AT-642, "Control Cable Adjustment" .

3. CHECK POWER SOURCE

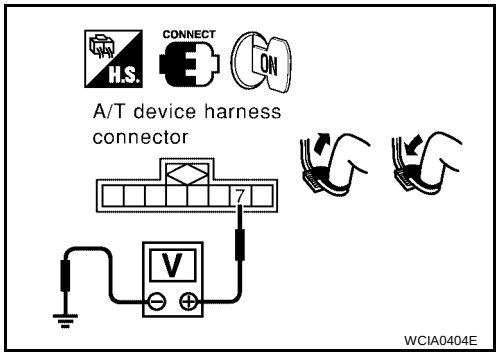
Turn ignition switch to “ON” position.
(Do not start engine.)

- Check voltage between A/T device harness connector M44 terminal 7 (G) and ground.

Voltage:

Brake pedal depressed: Battery voltage

Brake pedal released: 0V



OK or NG

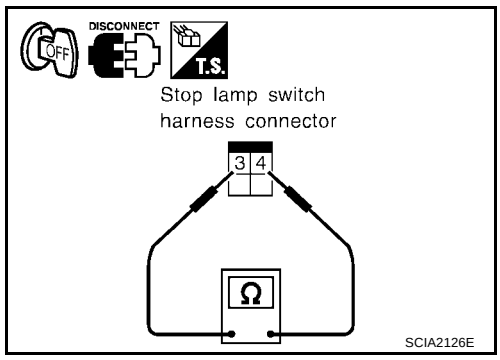
OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING ITEM

Check the following items.

1. Harness for open or short between fuse block (J/B) connector M1 terminal 12K and stop lamp switch harness connector M26 terminal 3.
2. Harness for open or short stop lamp switch harness connector M26 terminal 4 and A/T device harness connector M44 terminal 7 (G).
3. 10A fuse [10, located in the fuse block (J/B)].
4. Check continuity between stop lamp switch harness connector M26 terminals 3 (G) and 4 (G).

Condition	Continuity
When brake pedal is depressed	Yes
When brake pedal is released	No



Check stop lamp switch after adjusting brake pedal —refer to BR-12, "STOP LAMP SWITCH AND ASCD CANCEL SWITCH CLEARANCE"

OK or NG

OK >> GO TO 5.
NG >> Repair or replace damaged parts.

5. CHECK GROUND CIRCUIT

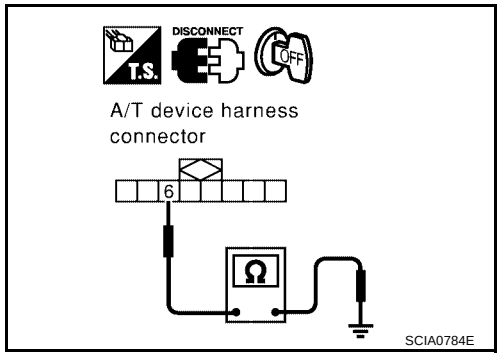
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T device harness connector.
3. Check continuity between A/T device harness M44 terminal 6 (B) and ground.

Continuity should exist

Continuity should exist.
If OK, check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit in harness.



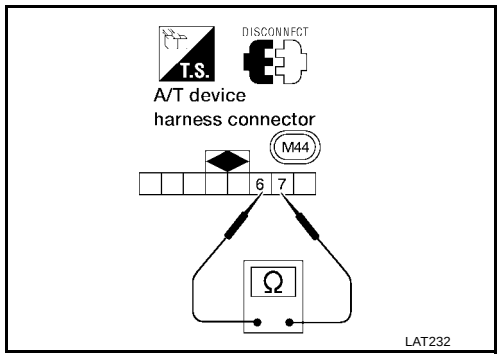
6. CHECK PARK POSITION SWITCH

Check continuity between A/T device harness connector M44 terminals 6 (B) and 7 (G).

Selector lever position	Continuity
"P" position	Yes
Other position	No

OK or NG

OK >> GO TO 7.
NG >> Replace park position switch.



7. CHECK SHIFT LOCK SOLENOID

1. Connect A/T device harness connector.
2. Turn ignition switch to "ON" position.
3. Check operation sound.

Condition	Brake pedal	Operation sound
When ignition switch is turned to "ON" position and selector lever is in the "P" position.	Depressed	Yes
	Released	No

OK or NG

OK >> GO TO 8.
NG >> Replace shift lock solenoid.

8. CHECK SHIFT LOCK OPERATION

1. Reconnect shift lock harness connector.
2. Turn ignition switch from “OFF” to “ON” position. (Do not start engine.)
3. Recheck shift lock operation.

OK or NG

OK >> INSPECTION END
NG >> GO TO 9.

9. CHECK A/T DEVICE INSPECTION

1. Perform A/T device input/output signal inspection test.
2. If NG, recheck harness connector connection.

OK or NG

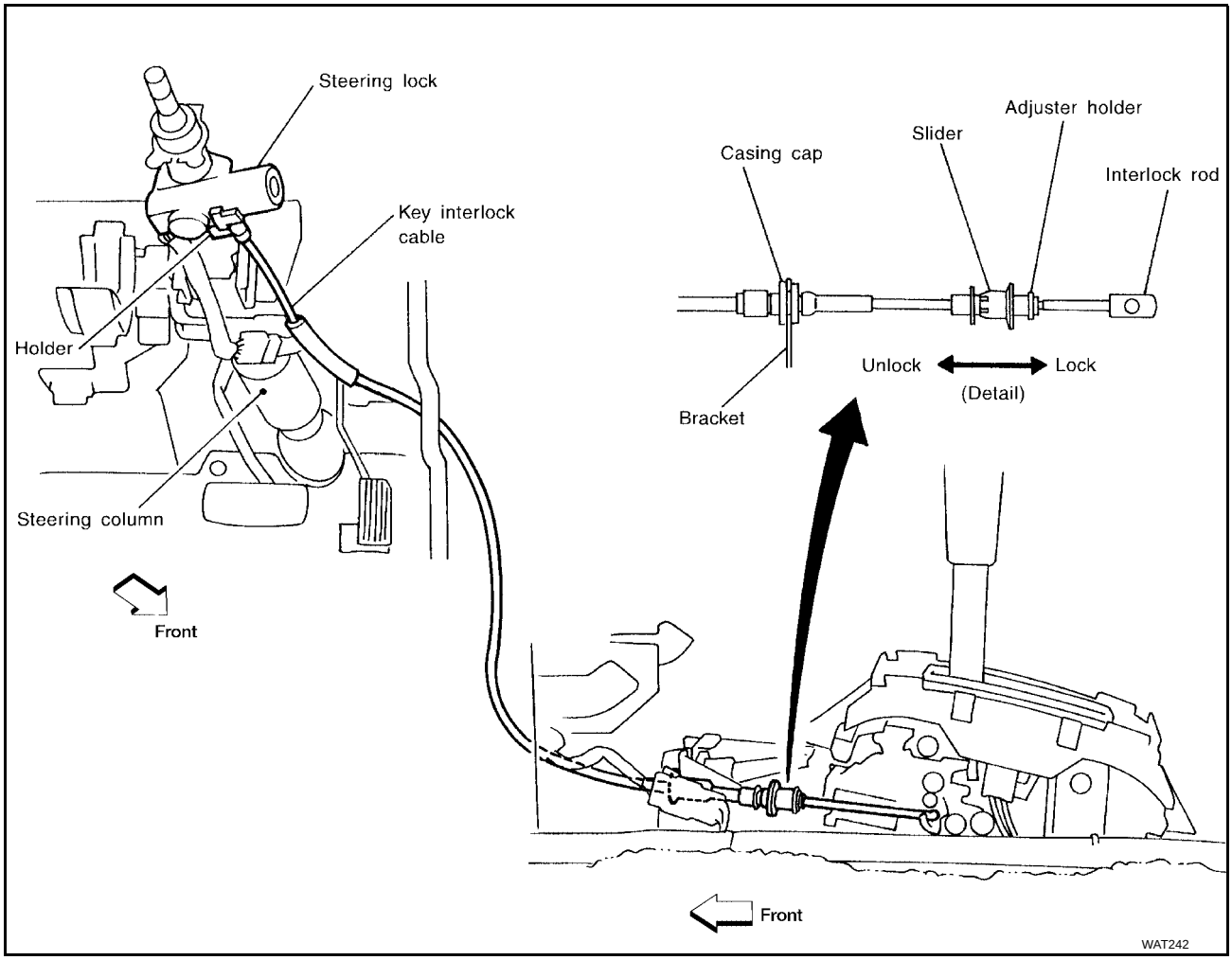
OK >> INSPECTION END
NG >> Repair or replace damaged parts.

KEY INTERLOCK CABLE

PFP:34908

Components

ECS00670



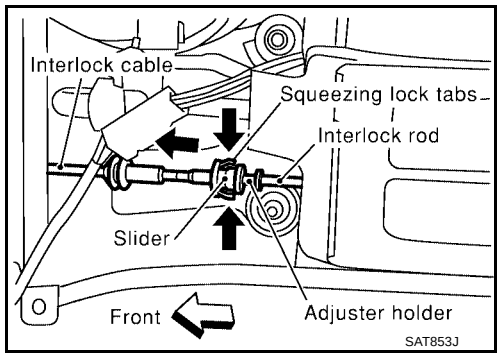
CAUTION:

- **Install key interlock cable in such a way that it will not be damaged by sharp bends, twists or interference with adjacent parts.**
- **After installing key interlock cable to control device, make sure that casing cap and bracket are firmly secured in their positions.**

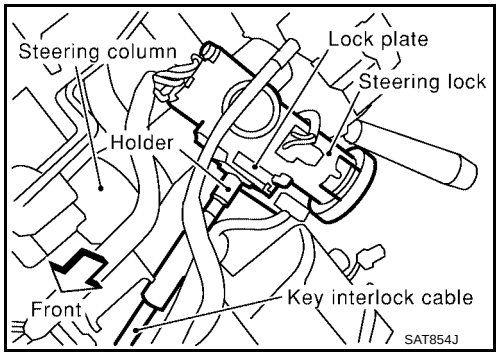
Removal

ECS00671

1. Unlock slider by squeezing lock tabs on slider from adjuster holder and remove interlock rod from cable.



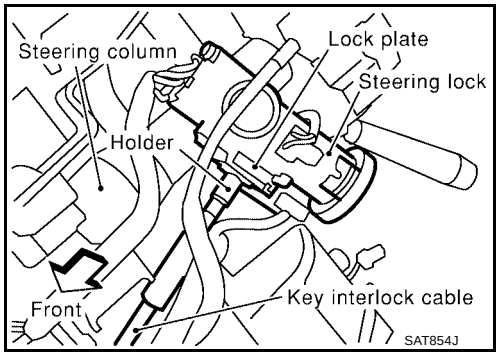
2. Remove lock plate from steering lock assembly and remove key interlock cable.



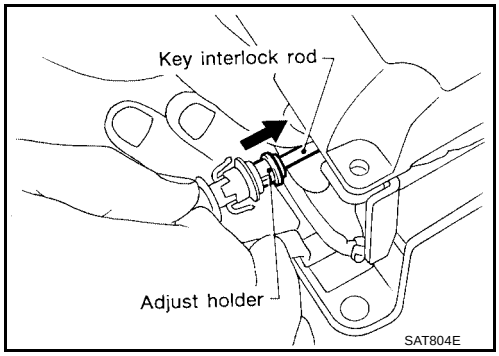
Installation

ECS00672

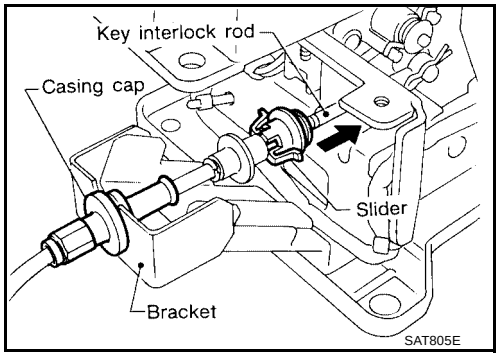
1. Turn ignition key to lock position.
2. Set A/T selector lever to P position.
3. Set key interlock cable to steering lock assembly and install lock plate.
4. Clamp cable to steering column and attach to control cable with band.



5. Insert interlock rod into adjuster holder.



6. Install casing cap to bracket.
7. Move slider in order to connect adjuster holder to interlock rod.



ON-VEHICLE SERVICE

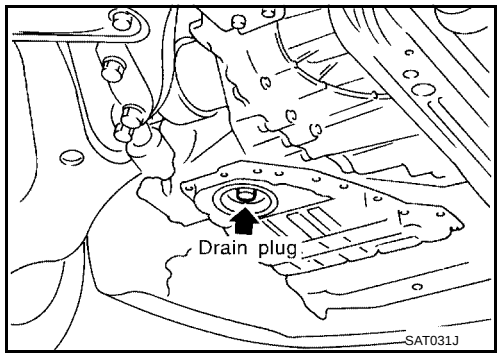
PFP:00000

Control Valve Assembly and Accumulators

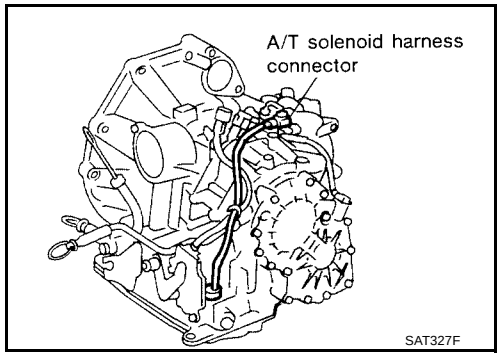
ECS00673

REMOVAL

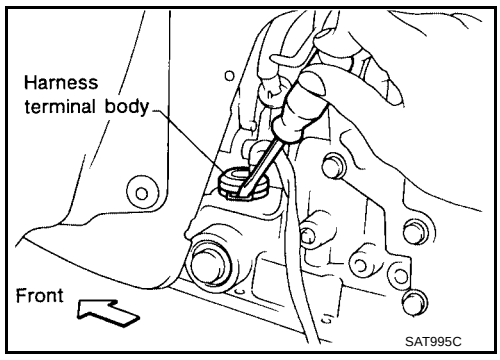
1. Drain ATF from transaxle.
2. Remove oil pan and gasket.
   - **Always replace oil pan bolts as they are self-sealing bolts.**



3. Disconnect A/T solenoid harness connector.



4. Remove snap ring from terminal cord assembly harness terminal body.
5. Remove terminal cord assembly harness from transmission case by pushing on terminal body.

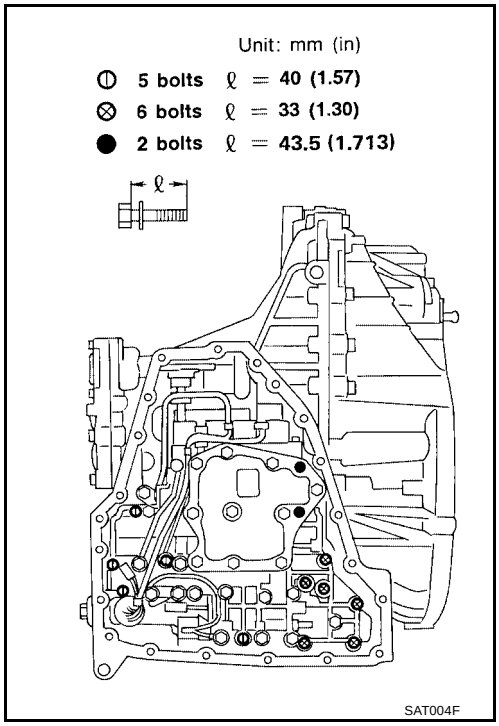


6. Remove control valve assembly by removing fixing bolts **I** , **X** and ●.

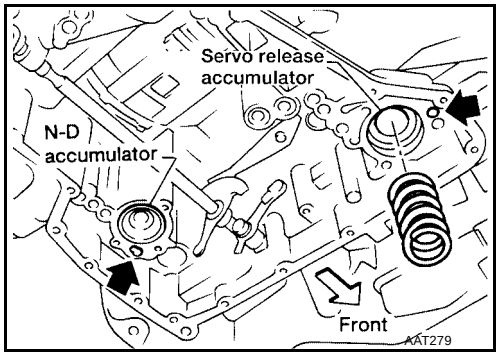
Bolt length, number and location are shown in the illustration.

- **Be careful not to drop manual valve and servo release accumulator return spring.**

7. Disassemble and inspect control valve assembly if necessary. Refer to AT-674, "Control Valve Assembly" .

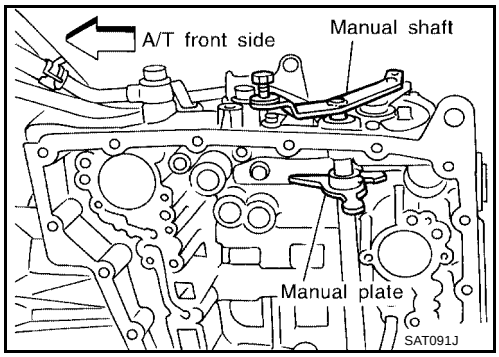


8. Remove servo release and N-D accumulators by applying compressed air if necessary.
   - **Hold each piston with a rag.**



INSTALLATION

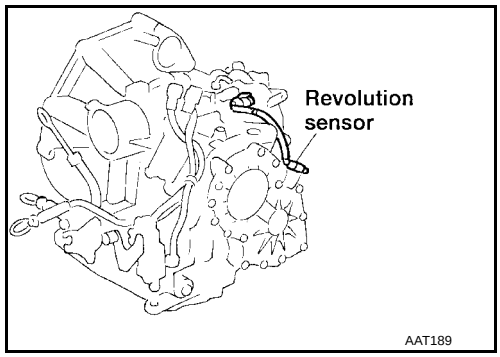
- **Set manual shaft in Neutral, then align manual plate with groove in manual valve.**
- **After installing control valve assembly, make sure that selector lever can be moved to all positions.**



Revolution Sensor Replacement

ECS00674

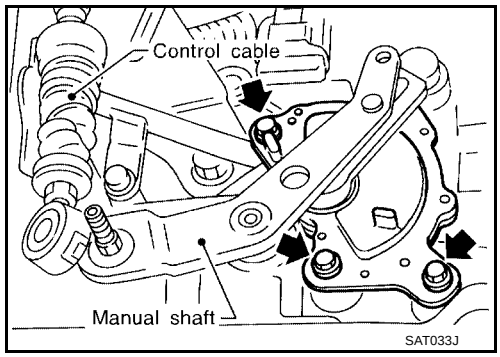
1. Remove under cover.
2. Remove revolution sensor from A/T.
3. Reinstall any part removed.
   - **Always use new sealing parts.**



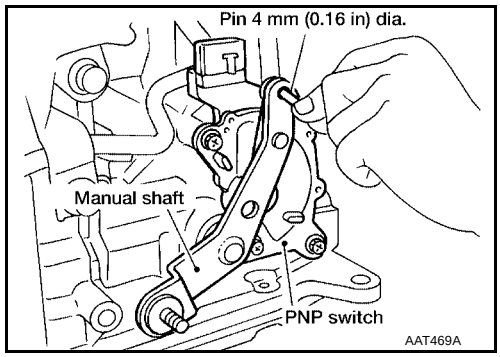
Park/Neutral Position (PNP) Switch Adjustment

ECS00675

1. Remove control cable from manual shaft.
2. Set manual shaft in N position.
3. Loosen park/neutral position (PNP) switch fixing bolts.



4. Insert pin into adjustment holes in both park/neutral position (PNP) switch and manual shaft as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of park/neutral position (PNP) switch. Refer to AT-490, "Diagnostic Procedure" .



Control Cable Adjustment

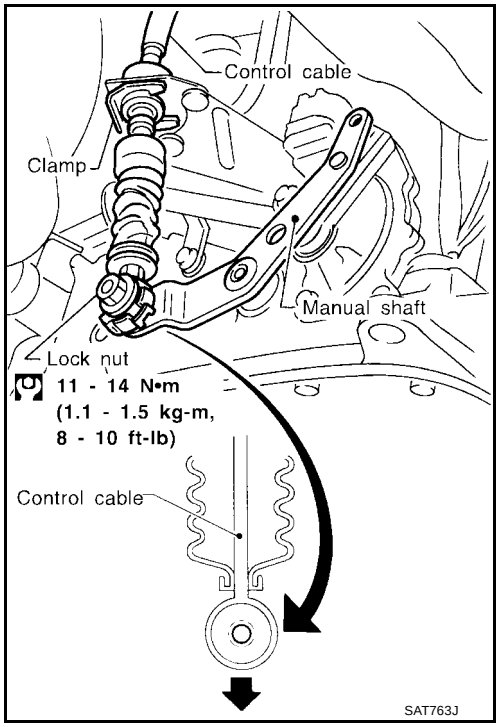
ECS00676

Move selector lever from the P position to the 1 position. You should be able to feel the detents in each position. If the detents cannot be felt or the pointer indicating the position is improperly aligned, the control cable needs adjustment.

1. Place selector lever in P position.
2. Loosen control cable lock nut and place manual shaft in P position.

   CAUTION:
   Turn wheels more than 1/4 rotations and apply the park lock.
3. Push control cable in the direction of the arrow shown in the illustration by specified force.

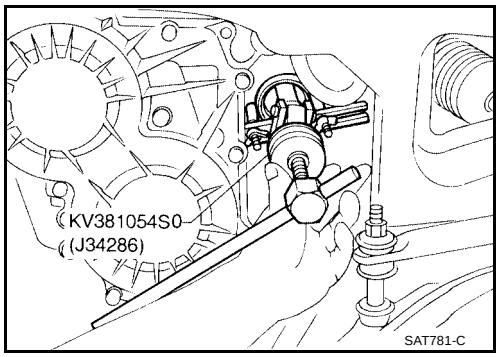
   Specified force : 4.9 - 9.8 N (0.5 - 1.0 kg, 1.1 - 2.2 lb)
4. Tighten control cable lock nut.
5. Move selector lever from P to 1 position again. Make sure that selector lever moves smoothly.
   - **Make sure that the starter operates when the selector lever is placed in the N or P position.**
   - **Make sure that the transmission is locked properly when the selector lever is placed in the P position.**



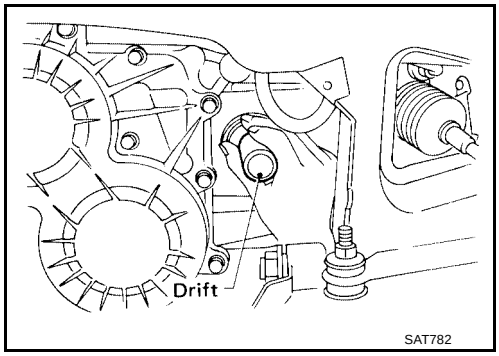
Differential Side Oil Seal Replacement

ECS00677

1. Remove drive shaft assembly. Refer to FAX-14, "Removal" .
2. Remove oil seal.



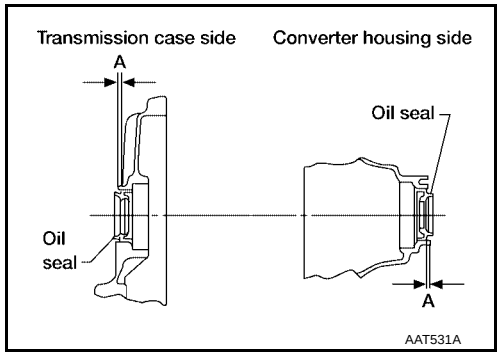
3. Install oil seal.
   - **Apply ATF before installing.**



- **Install oil seals so dimension A is within specification**

  A : −0.5 mm (−0.02 in) to 0.5 mm (0.02 in)

4. Reinstall any part removed.



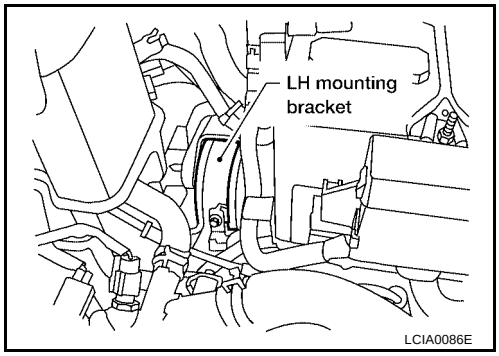
REMOVAL AND INSTALLATION

PFP:00000

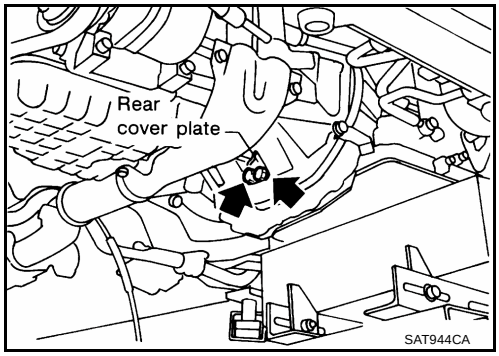
Removal

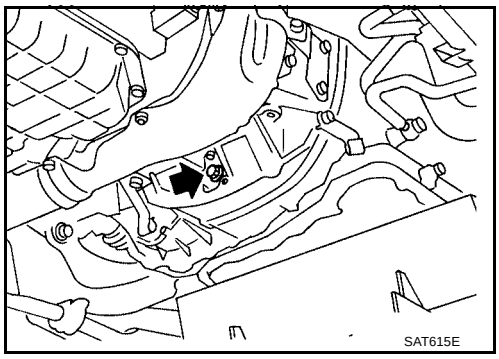
ECS00678

1. Remove battery and bracket.
2. Remove air duct and air cleaner assembly, refer to EM-106, "REMOVAL" .
3. Disconnect terminal cord assembly harness connector and park/neutral position (PNP) switch harness connectors.
4. Disconnect harness connectors of mass air flow sensor, intake air temperature sensor, revolution sensor, turbine revolution sensor, vehicle speed sensor and ground cable.
5. Remove LH mounting bracket from transaxle and body.
6. Disconnect control cable at transaxle side.
7. Remove drive shafts, refer to FAX-14, "Removal" .
8. Drain ATF.
9. Remove push clips and engine undercover.
10. Disconnect fluid cooler piping.
11. Disconnect and remove starter motor from transaxle, refer to SC-21, "Removal" .

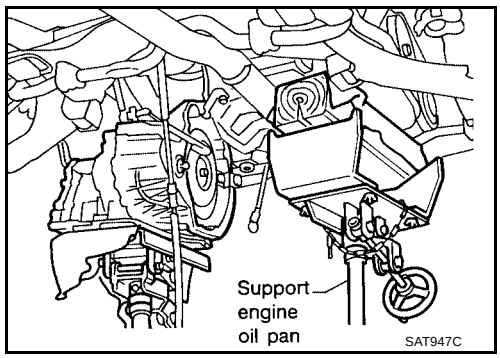


12. Support engine by placing a jack under oil pan.
    - **Do not place jack under oil pan drain plug.**
13. Remove center member.
14. Remove rear cover plate and bolts securing torque converter to drive plate.
    - **Rotate crankshaft for access to securing bolts.**





15. Support transaxle with a jack.
16. Remove bolts fixing A/T to engine.
17. Lower transaxle while supporting it with a jack.

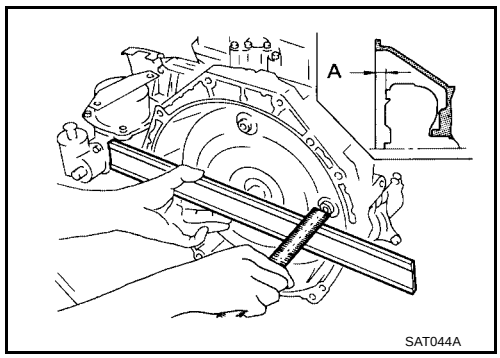


Installation

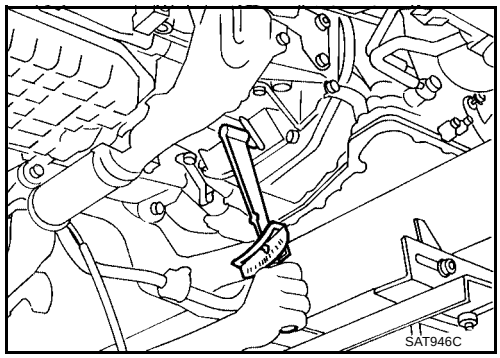
ECS00679

- When connecting torque converter to transaxle, measure distance “A” to be certain that they are correctly assembled.

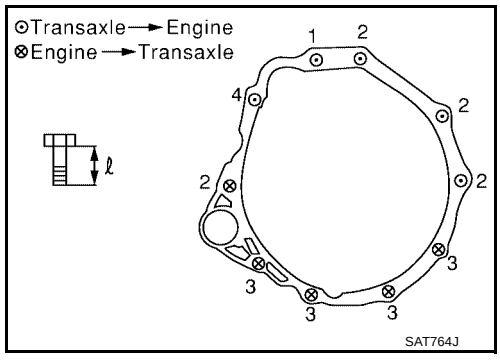
  Distance “A” : 14 mm (0.55 in) or more



- Install bolts fixing converter to drive plate.
- **With converter installed, rotate crankshaft several turns to check that transaxle rotates freely without binding.**



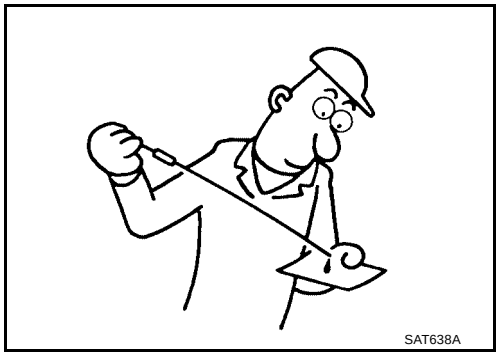
- Tighten bolts securing transaxle.
- Tighten LH mounting bracket bolts to the specified torque. Refer to EM-159, "Removal and Installation" .
- Tighten center member bolts to the specified torque. Refer to EM-159, "Removal and Installation" .
- Tighten rear plate cover bolts to the specified torque. Refer to EM-115, "OIL PAN AND OIL STRAINER" .



Bolt No.	Tightening torque N-m (kg-m, ft-lb)	l mm (in)
1	70 - 79 (7.1 - 8.1, 52 - 58)	65 (2.56)
2	70 - 79 (7.1 - 8.1, 52 - 58)	52 (2.05)
3	70 - 79 (7.1 - 8.1, 52 - 58)	40 (1.57)
4	78 - 98 (7.9 - 10.0, 58 - 72)	124 (4.88)

- Reinstall any part removed.

- Check fluid level in transaxle.
- Move selector lever through all positions to be sure that transaxle operates correctly.
  With parking brake applied, rotate engine at idling. Move selector lever through N to D, to 2, to 1 and to R position. A slight shock should be felt by hand gripping selector each time transaxle is shifted.
- Perform road test. Refer to AT-454, "Road Test" .



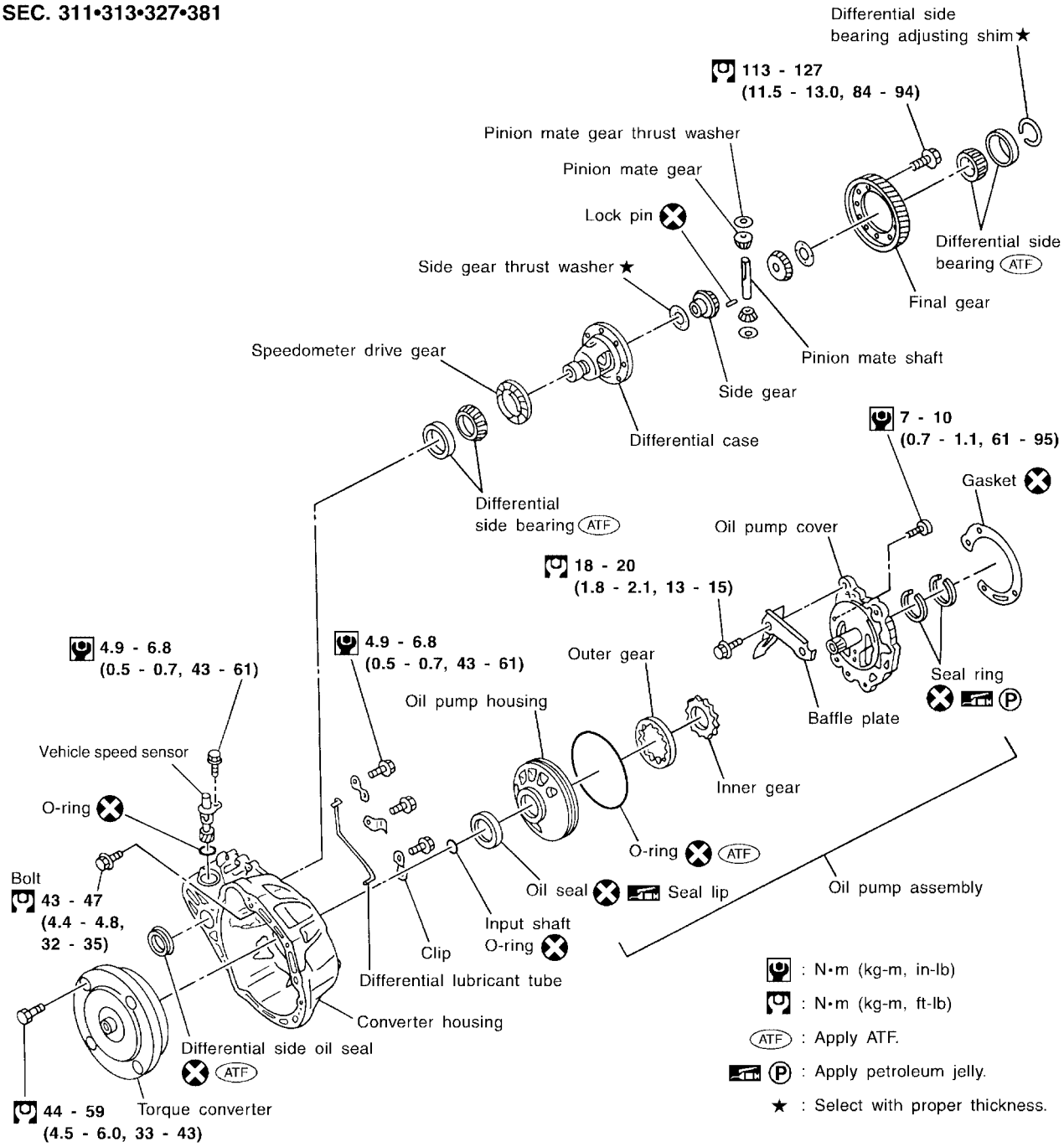
OVERHAUL

PFP:00000

Components

ECS0067A

SEC. 311•313•327•381



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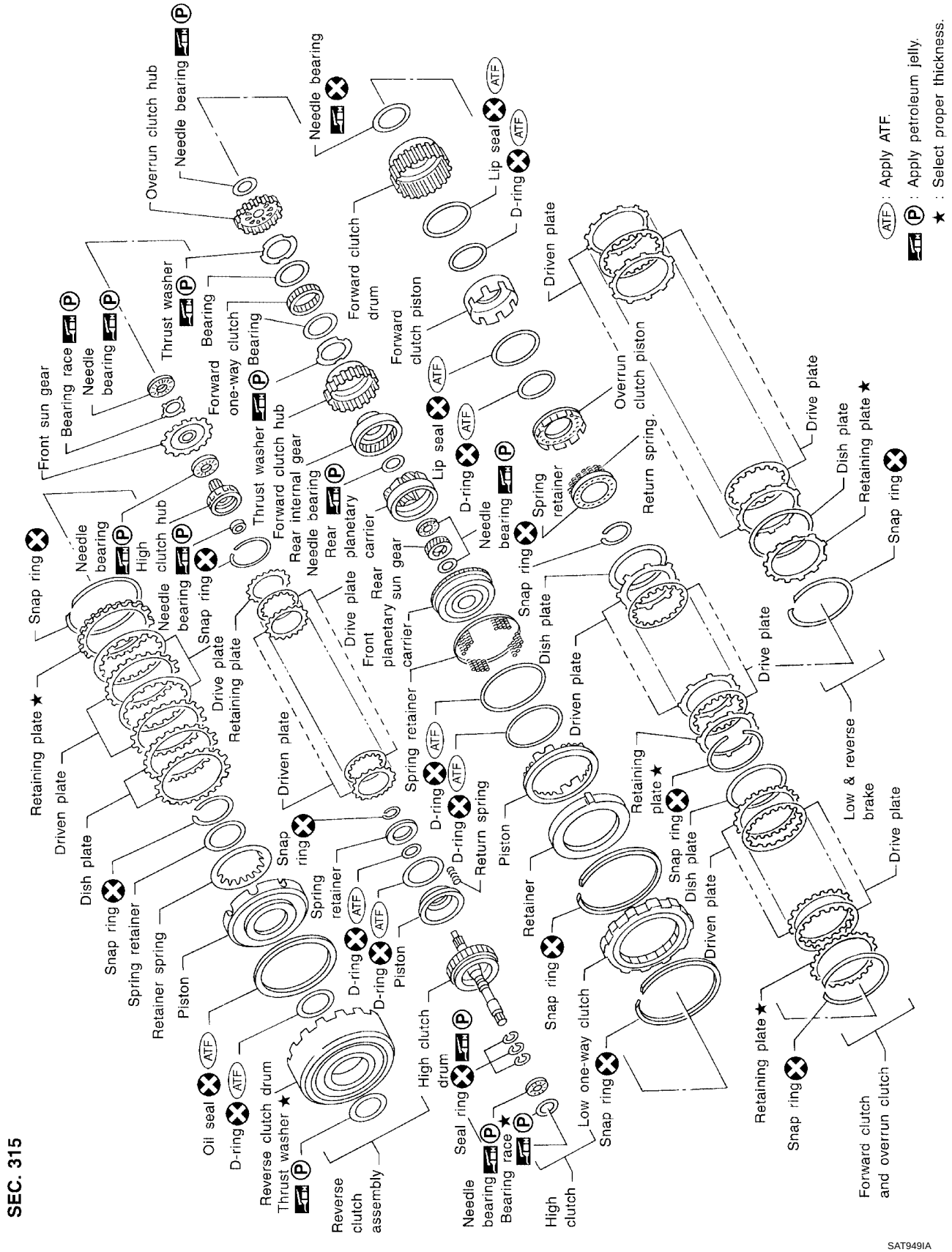
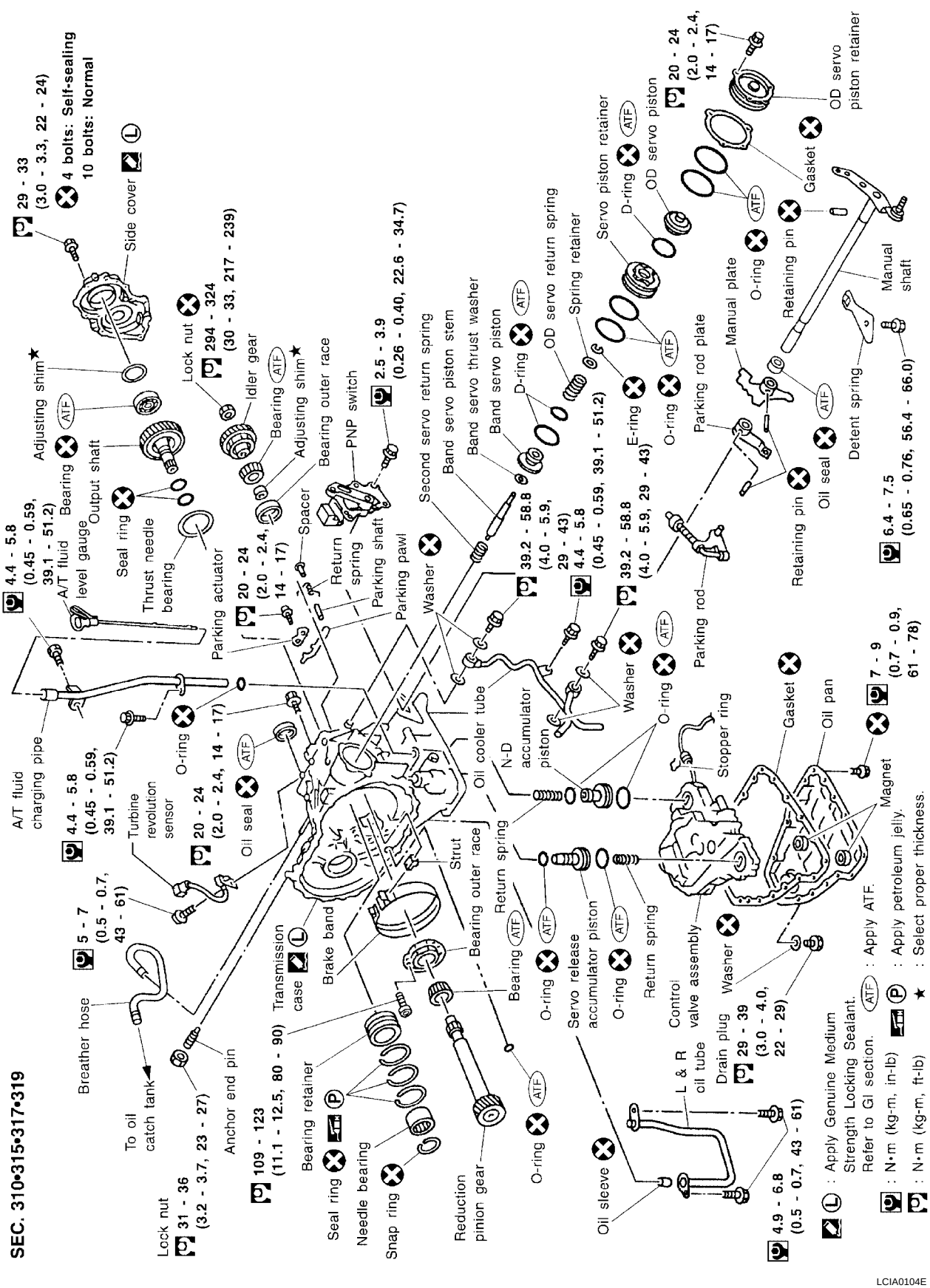
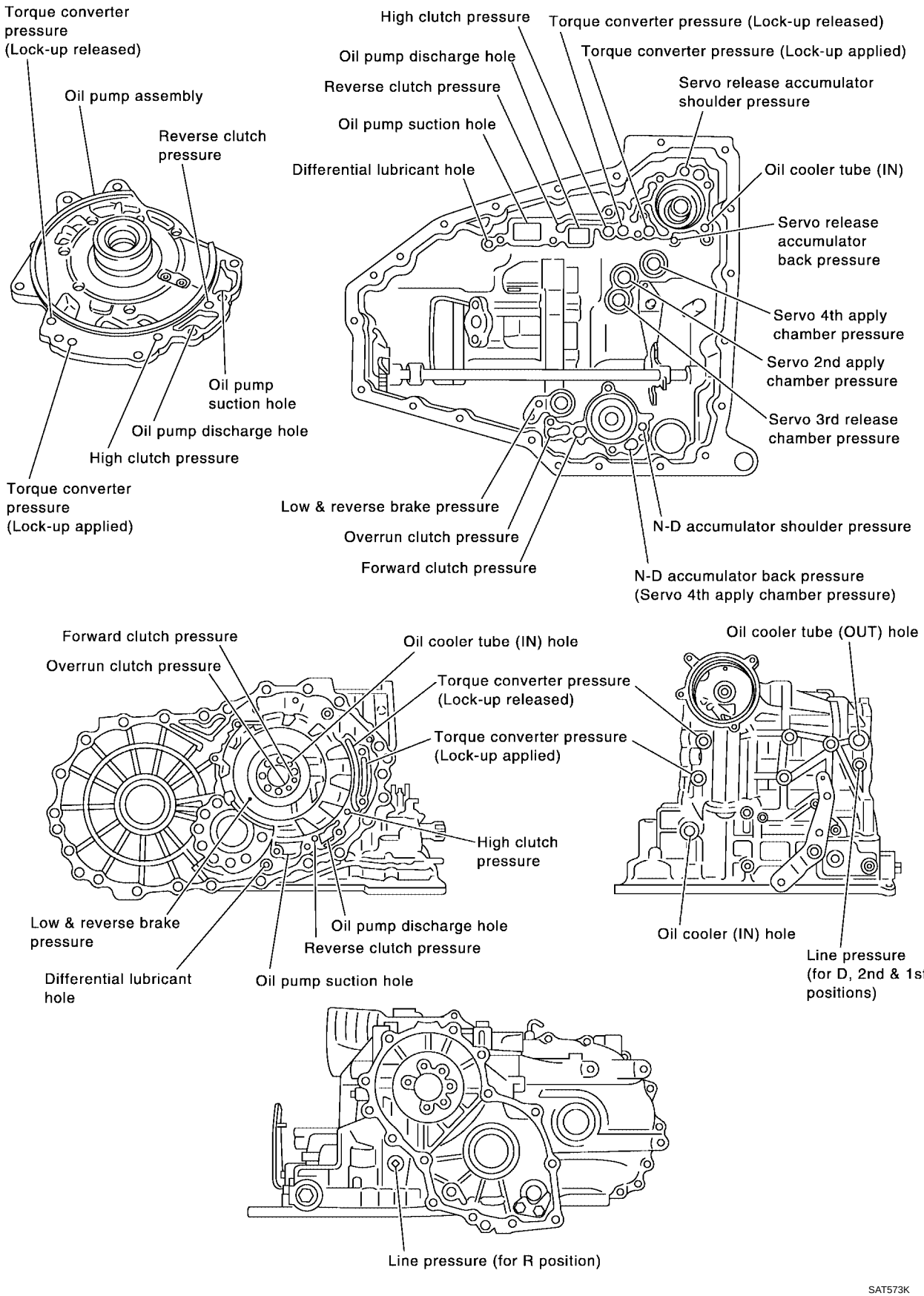

SEC. 315
Front sun gear
Bearing race
Needle bearing
Thrust washer
Overrun clutch hub
Needle bearing
Needle bearing
Forward clutch drum
Lip seal
D-ring
Driven plate
Forward one-way clutch
Bearing
Forward clutch piston
Thrust washer
Forward clutch hub
Rear internal gear
Needle bearing
Rear planetary carrier
Lip seal
D-ring
Needle bearing
Spring retainer
Overrun clutch piston
Return spring
Snap ring
Needle bearing
High clutch hub
Needle bearing
Snap ring
Drive plate
Retaining plate
Drive plate
Front planetary carrier
Rear sun gear
Snap ring
Dish plate
Drive plate
Retaining plate
Snap ring
Retaining plate
Driven plate
Driven plate
Dish plate
Driven plate
Drive plate
Spring retainer
D-ring
D-ring
Return spring
Piston
Retainer
Retaining plate
Snap ring
Dish plate
Driven plate
Low & reverse brake
Drive plate
Snap ring
Spring retainer
Piston
Oil seal
D-ring
Reverse clutch drum
Thrust washer
Reverse clutch assembly
Snap ring
Spring retainer
D-ring
D-ring
Piston
High clutch drum
Seal ring
Needle bearing
Bearing race
High clutch
Low one-way clutch
Snap ring
Retaining plate
Snap ring
Forward clutch and overrun clutch
: Apply ATF.
: Apply petroleum jelly.
: Select proper thickness.
SAT949IA


SEC. 310•315•317•319
29 - 33 (3.0 - 3.3, 22 - 24)
4 bolts: Self-sealing
10 bolts: Normal
Side cover
Adjusting shim
Bearing
A/T fluid level gauge
Output shaft
Seal ring
Thrust needle bearing
Parking actuator
Lock nut 294 - 324 (30 - 33, 217 - 239)
Idler gear
Bearing
Adjusting shim
Bearing outer race
Spacer
Return spring
PNP switch
2.5 - 3.9 (0.26 - 0.40, 22.6 - 34.7)
Parking shaft
Parking pawl
Second servo return spring
Band servo piston stem
Band servo thrust washer
Band servo piston
D-ring
OD servo return spring
Spring retainer
Servo piston retainer
D-ring
OD servo piston
20 - 24 (2.0 - 2.4, 14 - 17)
OD servo piston retainer
Gasket
Manual plate
O-ring
Retaining pin
Parking rod plate
Manual shaft
Detent spring
Oil seal
Retaining pin
6.4 - 7.5 (0.65 - 0.76, 56.4 - 66.0)
4.4 - 5.8 (0.45 - 0.59, 39.1 - 51.2)
A/T fluid charging pipe
A/T fluid level gauge
Bearing
Output shaft
Seal ring
Thrust needle bearing
Parking actuator
20 - 24 (2.0 - 2.4, 14 - 17)
Parking shaft
Return spring
Spacer
Adjusting shim
Bearing outer race
Idler gear
Lock nut
Parking pawl
Washer
Second servo return spring
Band servo piston stem
Band servo thrust washer
Band servo piston
D-ring
OD servo return spring
Spring retainer
Servo piston retainer
D-ring
OD servo piston
20 - 24 (2.0 - 2.4, 14 - 17)
Gasket
OD servo piston retainer
Manual plate
O-ring
Retaining pin
Parking rod plate
Manual shaft
Detent spring
Oil seal
Retaining pin
6.4 - 7.5 (0.65 - 0.76, 56.4 - 66.0)
4.4 - 5.8 (0.45 - 0.59, 39.1 - 51.2)
Turbine revolution sensor
20 - 24 (2.0 - 2.4, 14 - 17)
Oil seal
O-ring
Oil cooler tube
N-D accumulator piston
39.2 - 58.8 (4.0 - 5.9, 29 - 43)
4.4 - 5.8 (0.45 - 0.59, 39.1 - 51.2)
Washer
39.2 - 58.8 (4.0 - 5.9, 29 - 43)
E-ring
O-ring
Parking rod
Stopper ring
Gasket
Oil pan
7 - 9 (0.7 - 0.9, 61 - 78)
Magnet
5 - 7 (0.5 - 0.7, 43 - 61)
Breather hose
To oil catch tank
Lock nut 31 - 36 (3.2 - 3.7, 23 - 27)
Anchor end pin
109 - 123 (11.1 - 12.5, 80 - 90)
Transmission case
Bearing retainer
Seal ring
Needle bearing
Snap ring
Reduction pinion gear
Brake band
Strut
Bearing outer race
Return spring
Bearing
O-ring
Servo release accumulator piston
O-ring
Return spring
Control valve assembly
Washer
Drain plug 29 - 39 (3.0 - 4.0, 22 - 29)
L & R oil tube
Oil sleeve
4.9 - 6.8 (0.5 - 0.7, 43 - 61)
: Apply Genuine Medium Strength Locking Sealant. Refer to GI section.
: Apply ATF.
: Apply petroleum jelly.
: N•m (kg-m, in-lb)
: N•m (kg-m, ft-lb)
: Select proper thickness.

LCIA0104E

Oil Channel

ECS0067B



Locations of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings

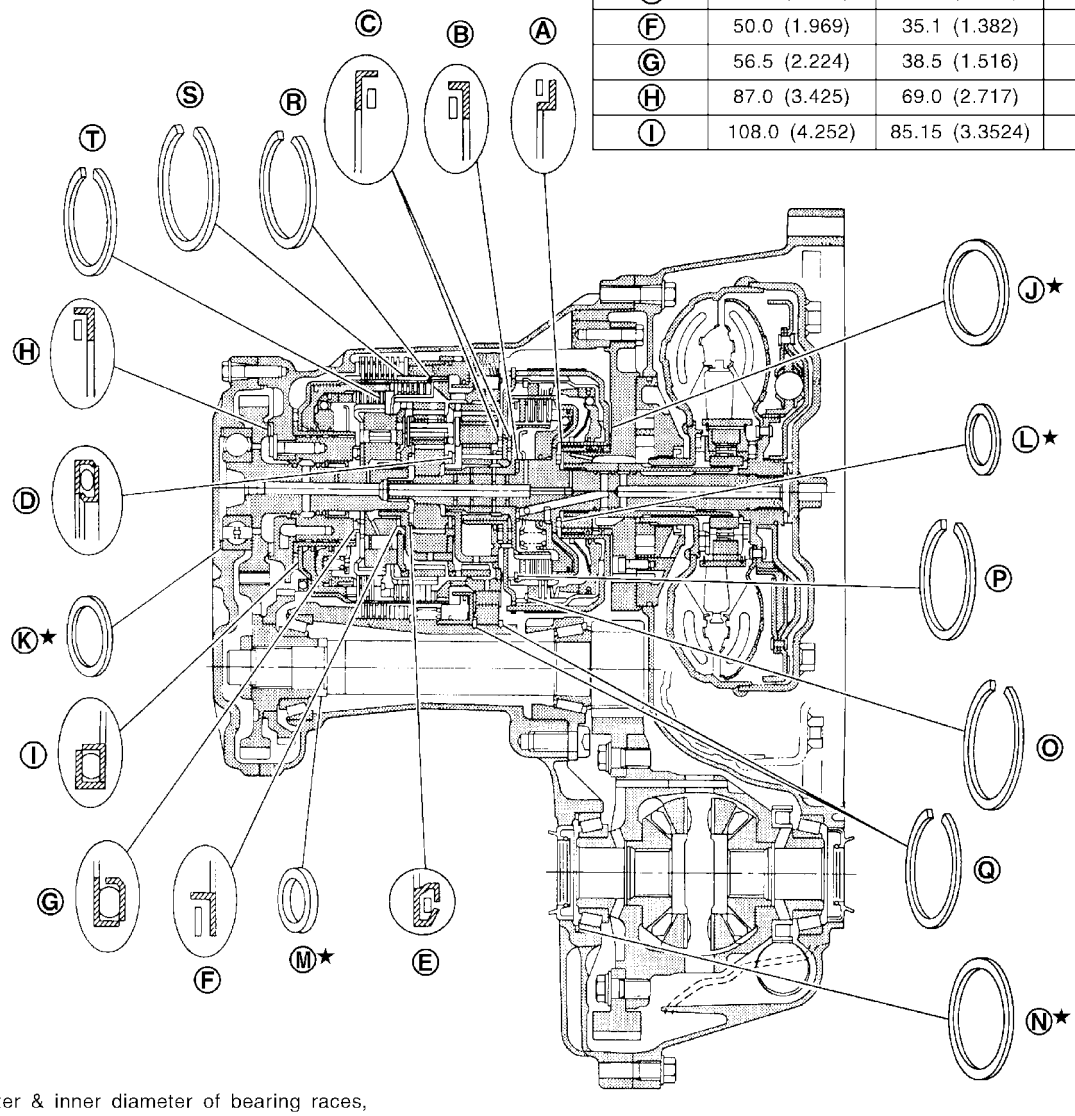
ECS0067C

Outer diameter of thrust washers

Item number	Outer diameter mm (in)	Parts number*
Ⓙ★	76.0 (2.992)	31508 80X13 - 31508 80X20
Ⓚ★	80.0 (3.150)	31438 80X60 - 31438 80X70

Outer and inner diameter of needle bearings

Item number	Outer diameter mm (in)	Inner diameter mm (in)	Parts number*
Ⓐ	50.0 (1.969)	35.1 (1.382)	31407 80X10
Ⓑ	42.0 (1.654)	23.7 (0.933)	31407 80X01
Ⓒ	70.0 (2.756)	50.0 (1.969)	31407 80X09
Ⓓ	51.0 (2.008)	33.1 (1.303)	31407 80X02
Ⓔ	48.0 (1.890)	30.0 (1.181)	31407 80X03
Ⓕ	50.0 (1.969)	35.1 (1.382)	31407 80X10
Ⓖ	56.5 (2.224)	38.5 (1.516)	31407 80X08
Ⓗ	87.0 (3.425)	69.0 (2.717)	31407 80X07
Ⓘ	108.0 (4.252)	85.15 (3.3524)	31407 80X06



Outer & inner diameter of bearing races, adjusting shims and adjusting spacer

Item number	Outer diameter mm (in)	Inner diameter mm (in)	Parts number*
Ⓛ★	51.0 (2.008)	36.0 (1.417)	31435 80X00 - 31439 80X14
Ⓜ★	38.0 (1.496)	28.1 (1.106)	31439 85X01 - 31439 85X06 31439 83X11 - 31439 83X24 31439 81X00 - 31439 81X24 31439 81X46 - 31439 81X49 31439 81X60 - 31439 81X74
Ⓝ★	75.0 (2.953)	67.0 (2.638)	31438 80X00 - 31439 80X11

★ : Select proper thickness.

* : Always check with the Parts Department for the latest parts information.

Outer diameter of snap rings

Item number	Outer diameter mm (in)	Parts number*
Ⓞ	150 (5.91)	31506 80X13
Ⓟ	119.1 (4.689)	31506 80X06
Ⓠ	182.8 (7.197)	31506 80X08
Ⓡ	144.8 (5.701)	31506 80X03
Ⓢ	173.8 (6.843)	31506 80X09
Ⓣ	133.9 (5.272)	31506 80X01

SAT565K

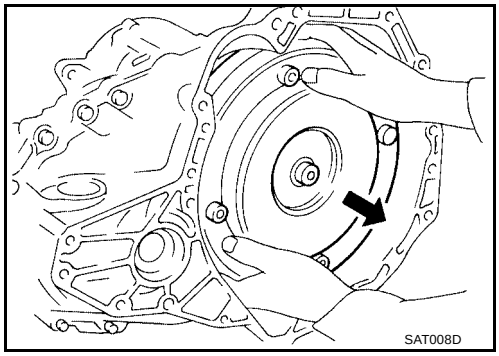
DISASSEMBLY

PFP:31020

Disassembly

ECS0067D

1. Drain ATF through drain plug.
2. Remove torque converter.

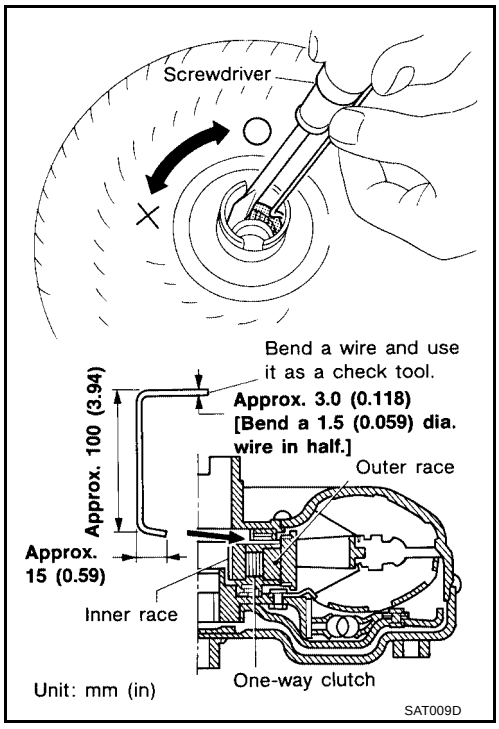


3. Check torque converter one-way clutch using check tool.

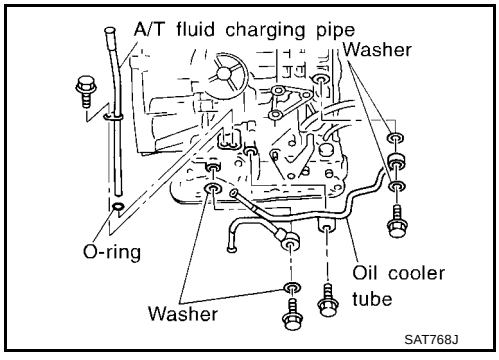
a. Insert check tool into the groove of bearing support built into one-way clutch outer race.

b. When fixing bearing support with check tool, rotate one- way clutch spline using screwdriver.

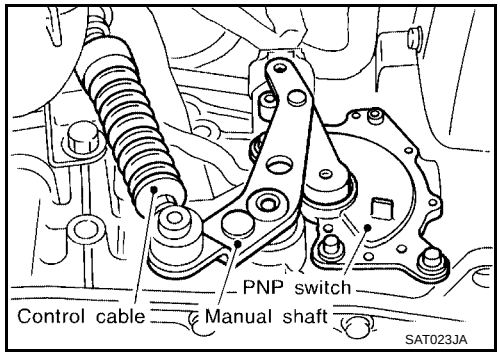
c. Check that inner race rotates clockwise only. If not, replace torque converter assembly.



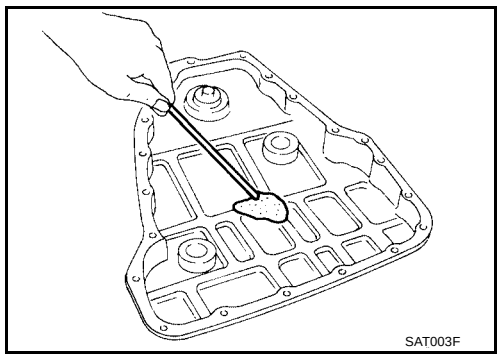
4. Remove A/T fluid charging pipe and fluid cooler tube.



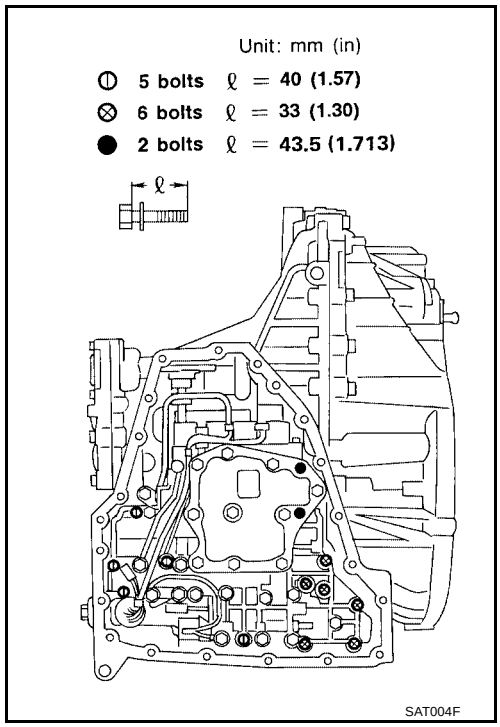
5. Set manual shaft to position P.
6. Remove park/neutral position (PNP) switch.



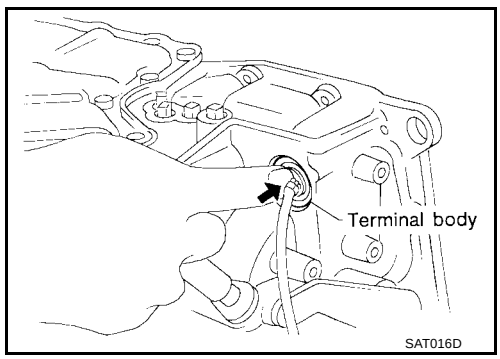
7. Remove oil pan and oil pan gasket.
   - **Always replace oil pan bolts as they are self-sealing bolts.**
8. Check foreign materials in oil pan to help determine causes of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. Varnish can cause valves, servo, and clutches to stick and can inhibit pump pressure.
   - **If frictional material is detected, replace radiator after repair of A/T. Refer to CO-32, "RADIATOR" .**
9. Remove control valve assembly according to the following procedures.



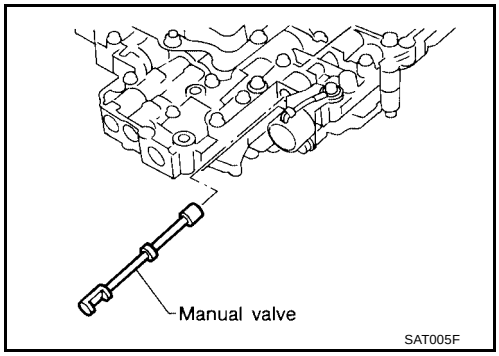
a. Remove control valve assembly mounting bolts **I** , **X** and ●.
b. Remove snap ring from terminal cord assembly connector.



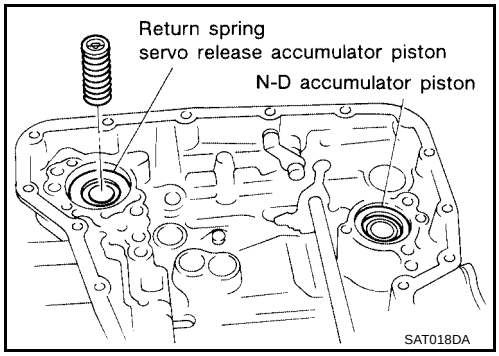
c. Push terminal body into transmission case and draw out solenoid harness.



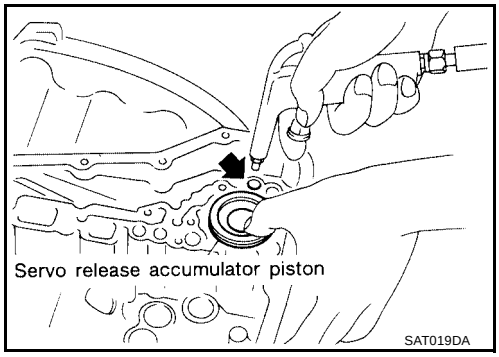
10. Remove manual valve from control valve assembly.



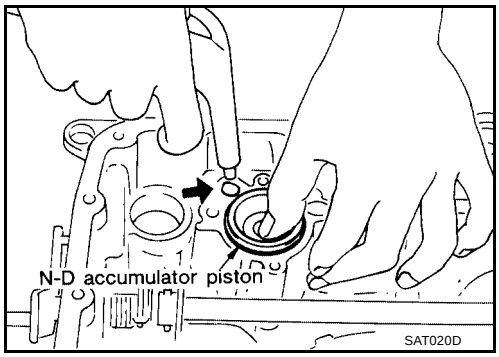
11. Remove return spring from servo release accumulator piston.



12. Remove servo release accumulator piston with compressed air.

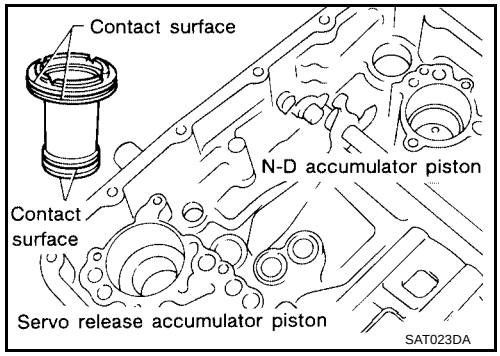


13. Remove O-rings from servo release accumulator piston.
14. Remove N-D accumulator piston and return spring with compressed air.

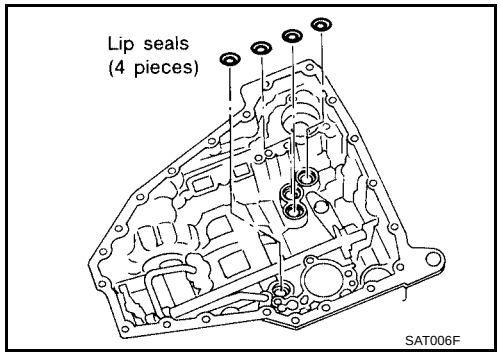


15. Remove O-rings from N-D accumulator piston.

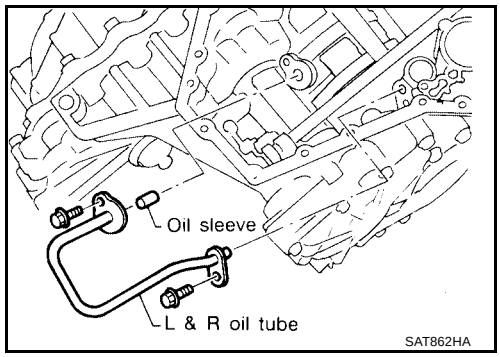
16. Check accumulator pistons and contact surface of transmission case for damage.



17. Check accumulator return springs for damage and free length.
18. Remove lip seals.

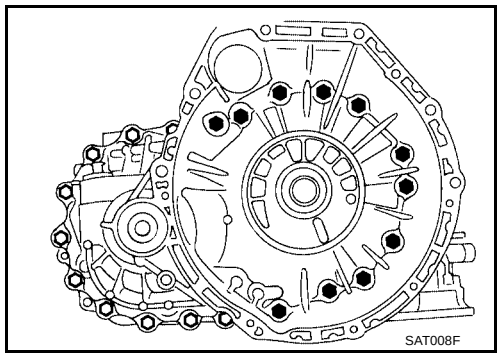


19. Remove L & R oil tube and oil sleeve.

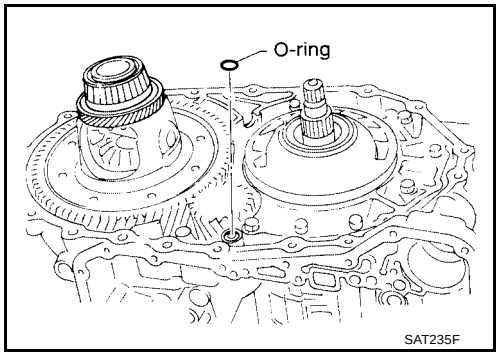


20. Remove converter housing according to the following procedures.

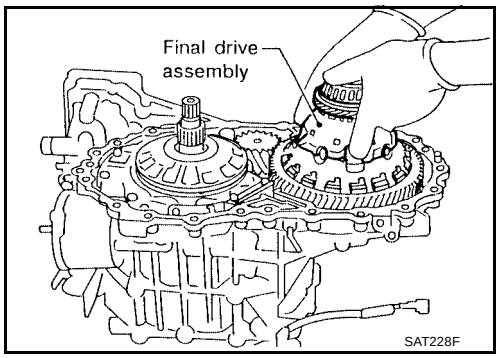
a. Remove converter housing mounting bolts.
b. Remove converter housing by tapping it lightly.



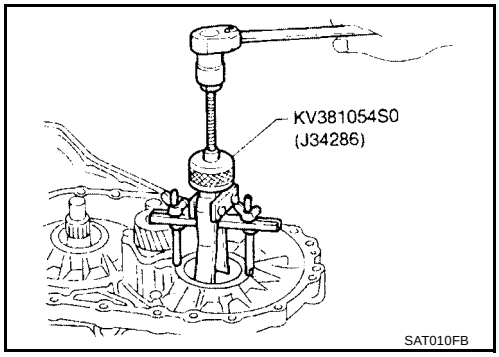
c. Remove O-ring from differential oil port.



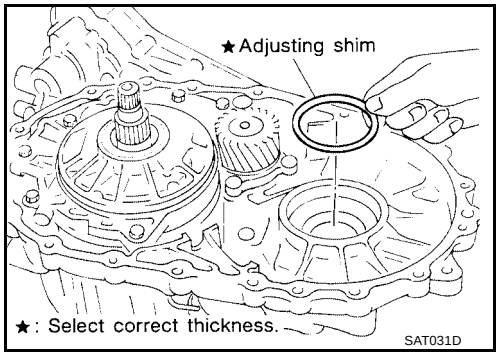
21. Remove final drive assembly from transmission case.



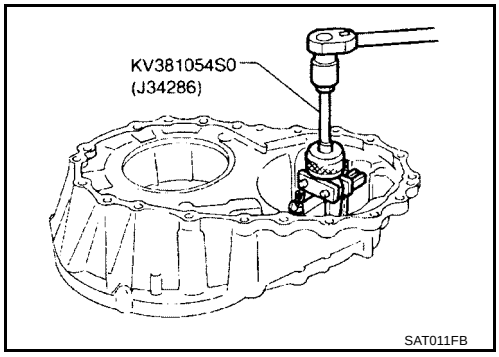
22. Remove differential side bearing outer race and side bearing adjusting shim from transmission case.



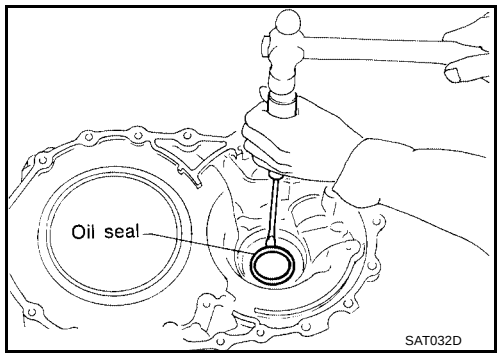
23. Remove differential side bearing adjusting shim from transmission case.



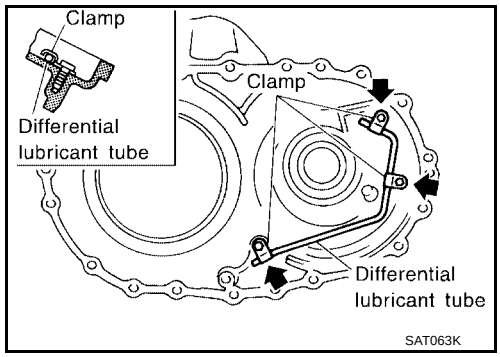
24. Remove differential side bearing outer race from converter housing.



25. Remove oil seal with screwdriver from converter housing.
    - **Be careful not to damage case.**

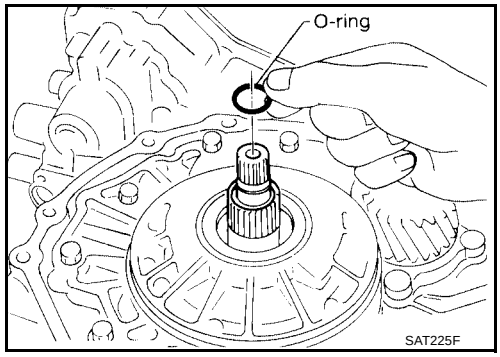


26. Remove differential lubricant tube from converter housing.

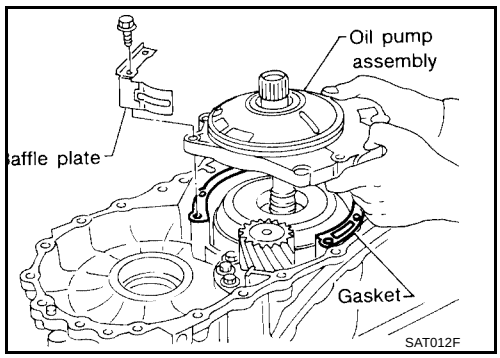


27. Remove oil pump according to the following procedures.

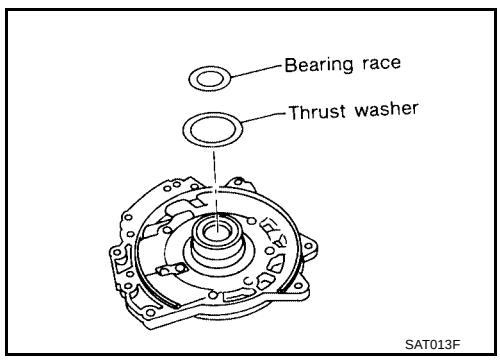
a. Remove O-ring from input shaft.



b. Remove oil pump assembly, baffle plate and gasket from transmission case.



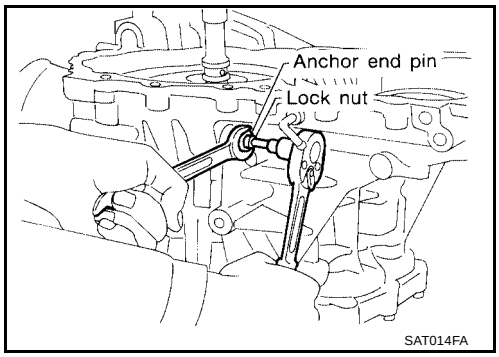
c. Remove thrust washer and bearing race from oil pump assembly.



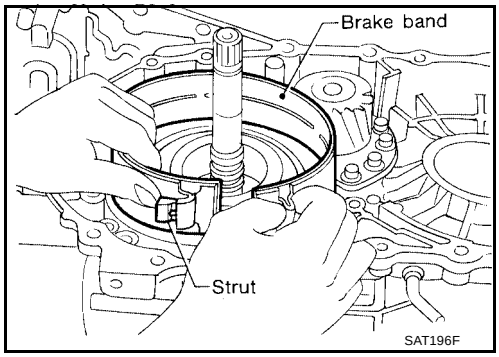
28. Remove brake band according to the following procedures.

a. Loosen lock nut, then back off anchor end pin.

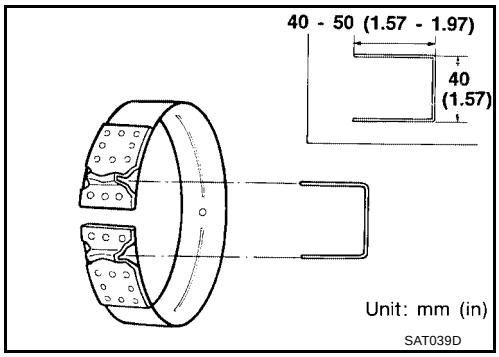
- **Do not reuse anchor end pin.**



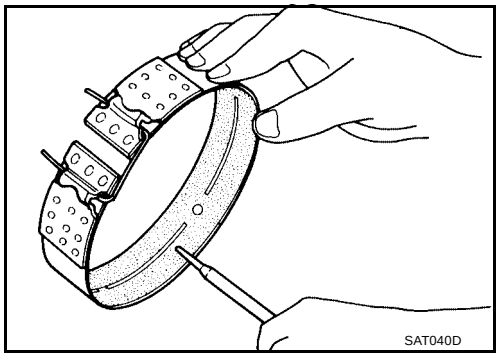
b. Remove brake band and strut from transmission case.



- **To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown. Leave the clip in position after removing the brake band.**

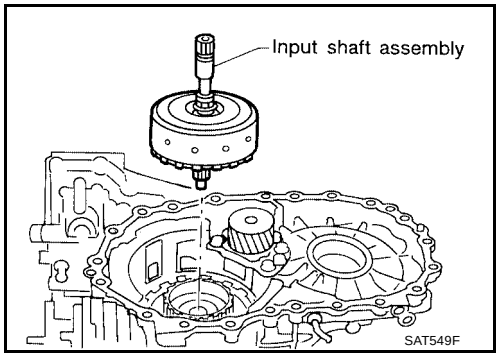


c. Check brake band facing for damage, cracks, wear or burns.

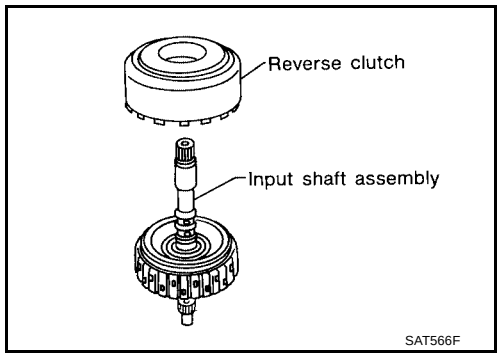


29. Remove input shaft assembly (high clutch) and reverse clutch according to the following procedures.

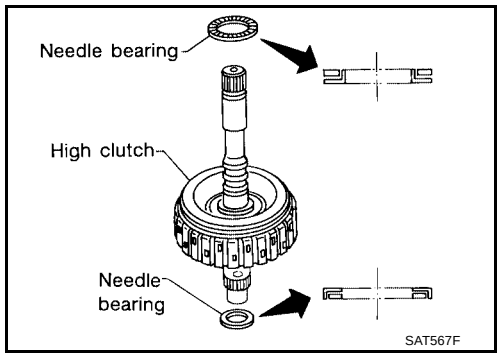
a. Remove input shaft assembly (high clutch) with reverse clutch.



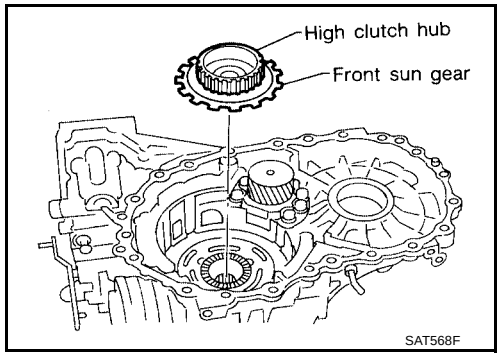
b. Remove input shaft assembly (high clutch) from reverse clutch.



c. Remove needle bearings from high clutch drum and check for damage or wear.

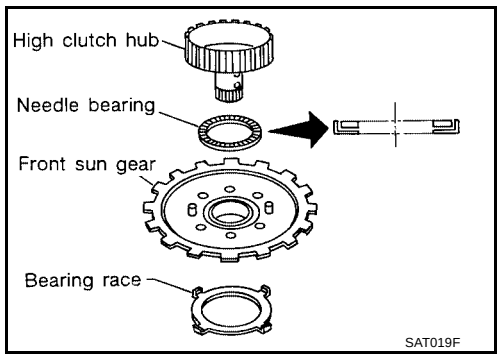


d. Remove high clutch hub and front sun gear from transmission case.

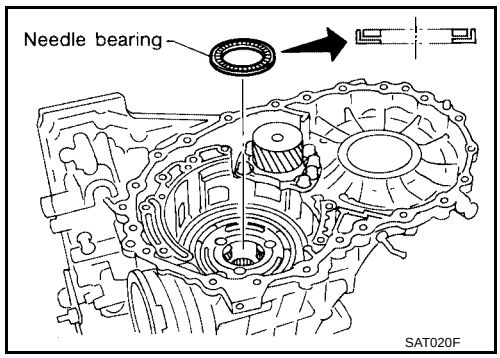


e. Remove front sun gear and needle bearing from high clutch hub and check for damage or wear.

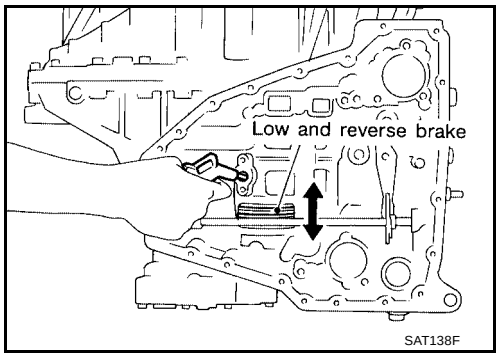
f. Remove bearing race from front sun gear and check for damage or wear.



30. Remove needle bearing from transmission case and check for damage or wear.

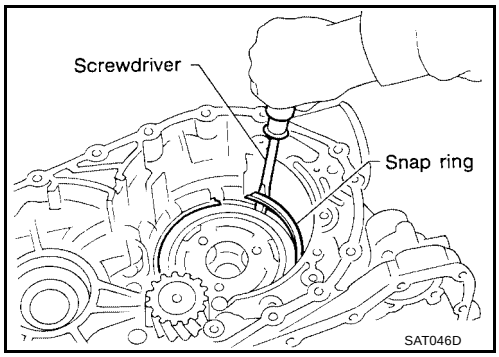


31. Apply compressed air and check to see that low and reverse brake operates.

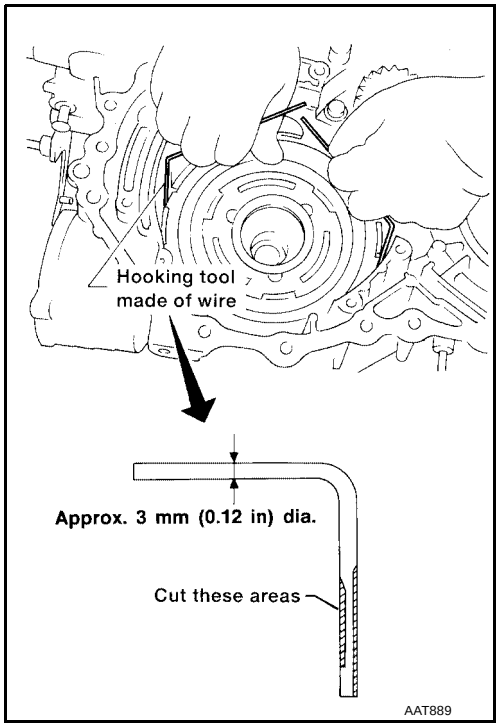


32. Remove low one-way clutch and front planetary carrier assembly according to the following procedures.

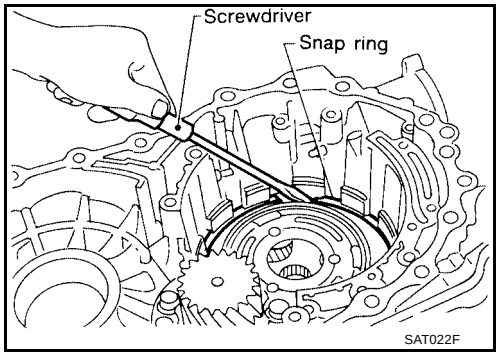
a. Remove snap ring with flat-bladed screwdriver.



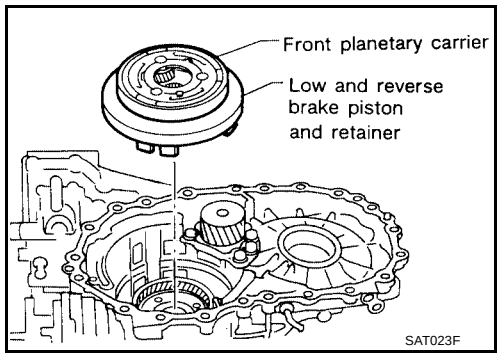
b. Remove low one-way clutch with a hook made of wire.



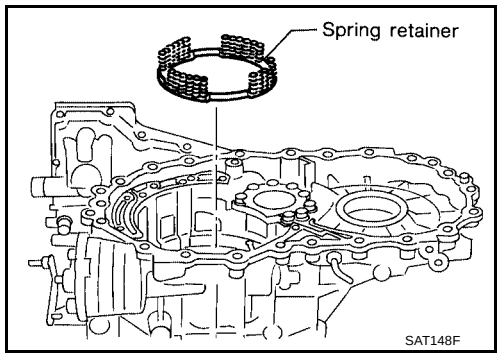
c. Remove snap ring with flat-bladed screwdriver.



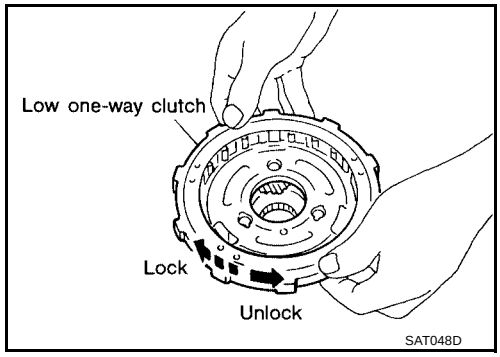
d. Remove front planetary carrier with low and reverse brake piston and retainer.



e. Remove low and reverse brake spring retainer.
- **Do not remove return springs from spring retainer.**

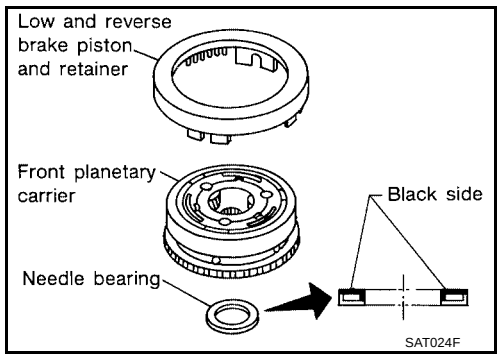


f. Check that low one-way clutch rotates in the direction of the arrow and locks in the opposite direction.



g. Remove needle bearing, low and reverse brake piston and retainer from front planetary carrier.

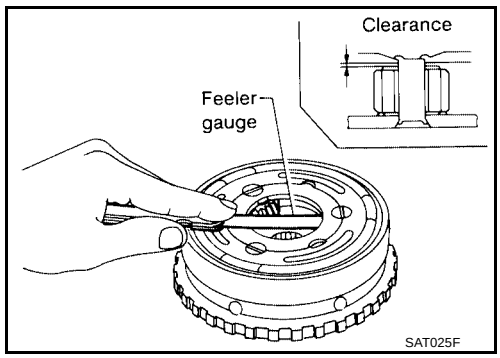
h. Check front planetary carrier, low one-way clutch and needle bearing for damage or wear.



i. Check clearance between planetary gears and planetary carrier with feeler gauge.

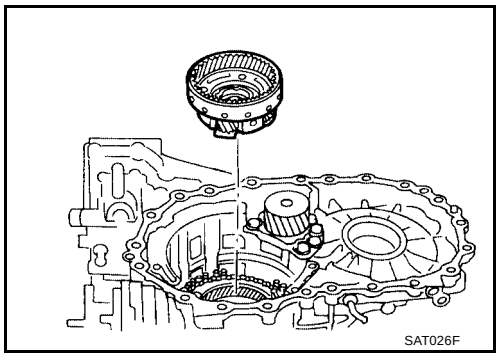
Standard clearance	**: 0.20 - 0.70 mm (0.0079 - 0.0276 in)**
Allowable limit	**: 0.80 mm (0.0315 in)**

Replace front planetary carrier if the clearance exceeds allowable limit.

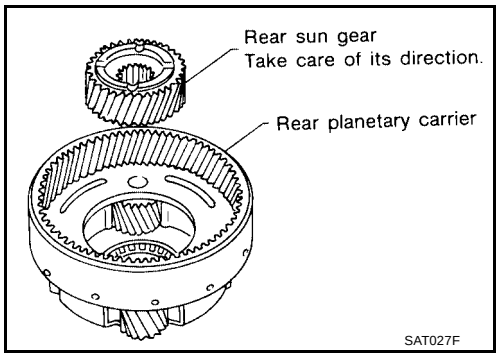


33. Remove rear planetary carrier assembly and rear sun gear according to the following procedures.

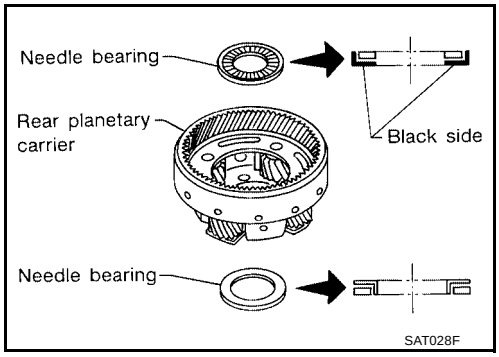
a. Remove rear planetary carrier assembly from transmission case.



b. Remove rear sun gear from rear planetary carrier.



c. Remove needle bearings from rear planetary carrier assembly.

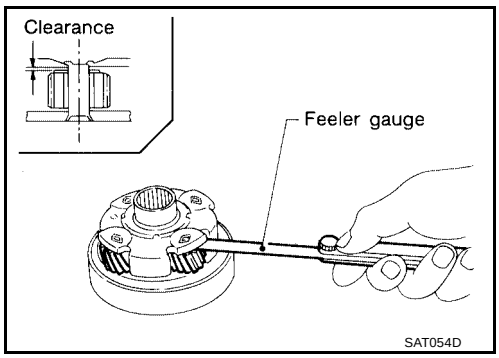


d. Check rear planetary carrier, rear sun gear and needle bearings for damage or wear.

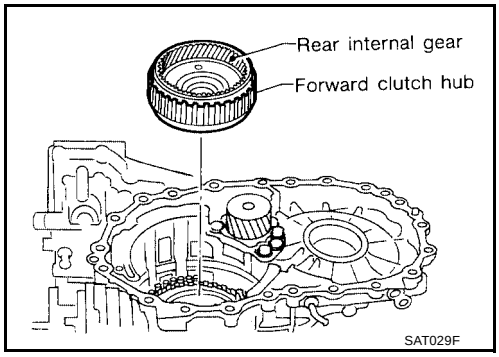
e. Check clearance between pinion washer and rear planetary carrier with feeler gauge.

Standard clearance	**: 0.20 - 0.70 mm (0.0079 - 0.0276 in)**
Allowable limit	**: 0.80 mm (0.0315 in)**

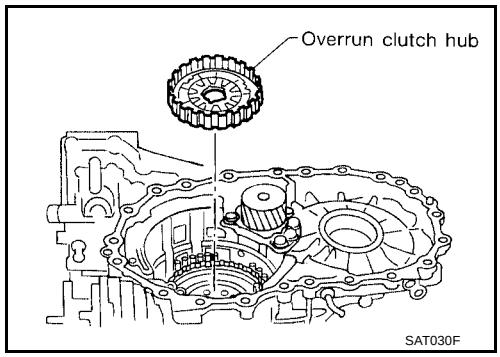
Replace rear planetary carrier if the clearance exceeds allowable limit.



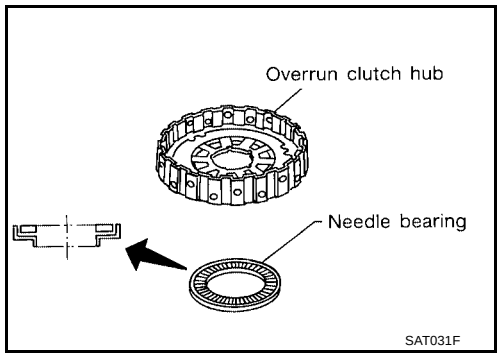
34. Remove rear internal gear and forward clutch hub from transmission case.



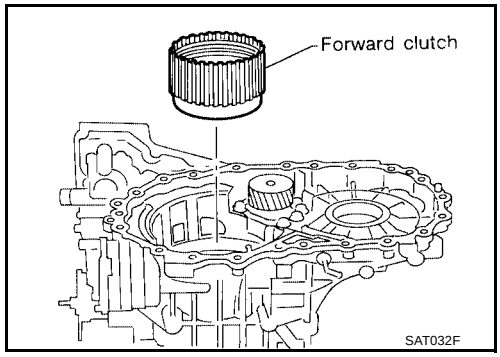
35. Remove overrun clutch hub from transmission case.



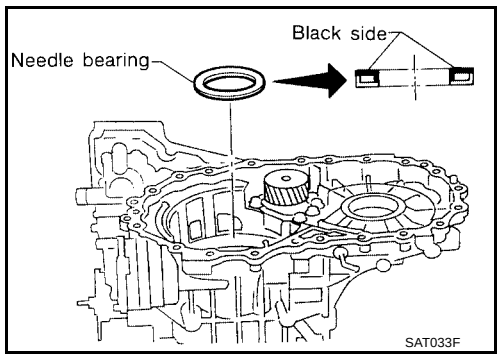
36. Remove needle bearing from overrun clutch hub and check for damage or wear.



37. Remove forward clutch assembly from transmission case.



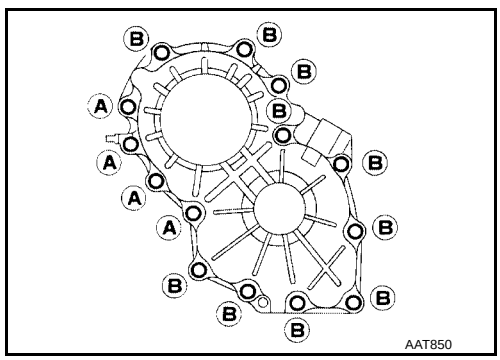
38. Remove needle bearing from transmission case.



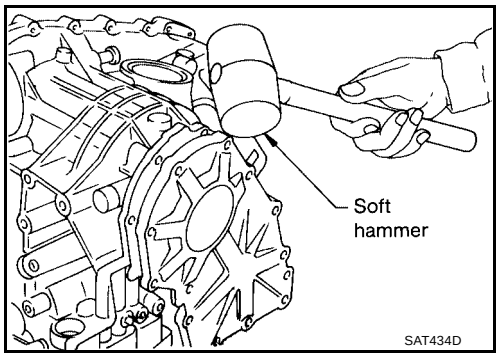
39. Remove output shaft assembly according to the following procedures.

a. Remove side cover bolts.

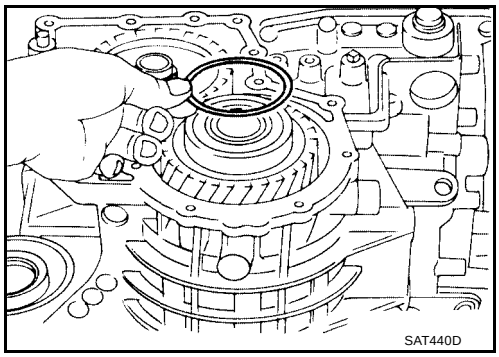
- **Do not mix bolts A and B.**
- **Always replace bolts A as they are self-sealing bolts.**



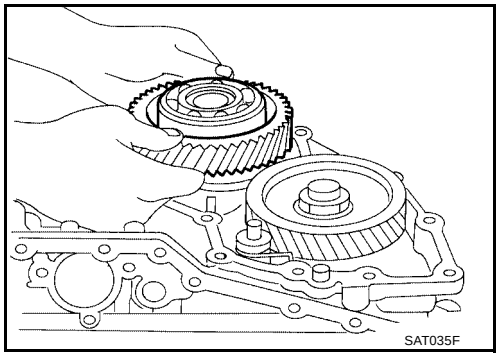
b. Remove side cover by lightly tapping it with a soft hammer.
   - **Be careful not to drop output shaft assembly. It might come out when removing side cover.**



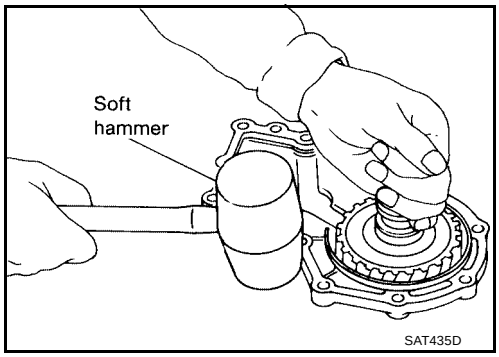
c. Remove adjusting shim.



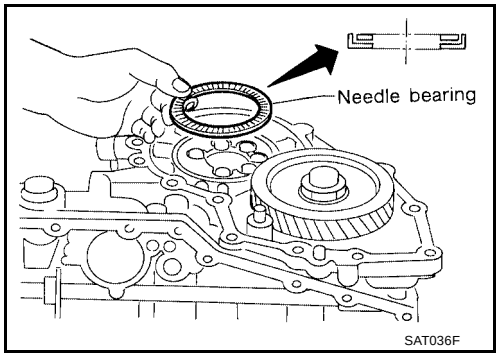
d. Remove output shaft assembly.



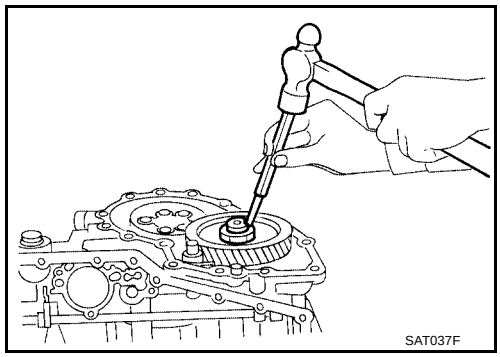
   - If output shaft assembly came off with side cover, tap cover with a soft hammer to separate.



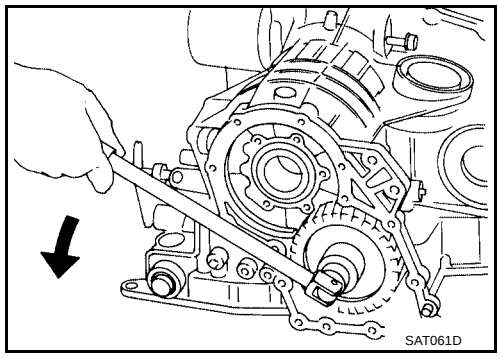
e. Remove needle bearing.



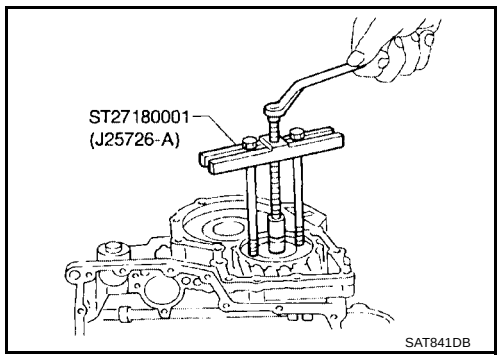
40. Disassemble reduction pinion gear according to the following procedures.
a. Set manual shaft to position P to fix idler gear.
b. Unlock idler gear lock nut using a pin punch.



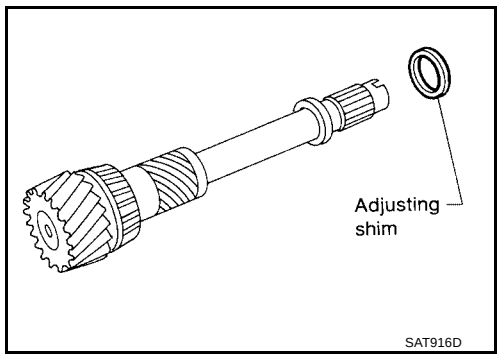
c. Remove idler gear lock nut.
- **Do not reuse idler gear lock nut.**



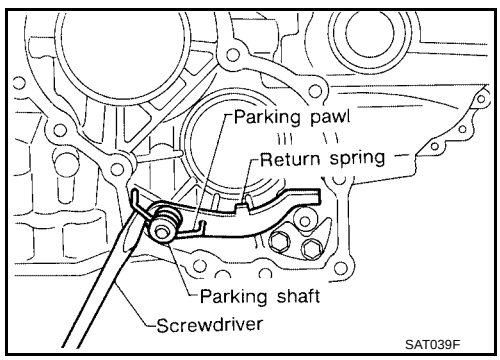
d. Remove idler gear with puller.



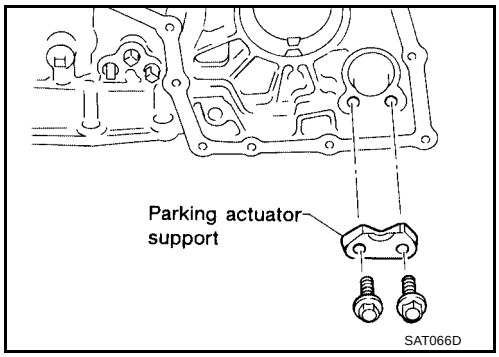
e. Remove reduction pinion gear.
f. Remove adjusting shim from reduction pinion gear.



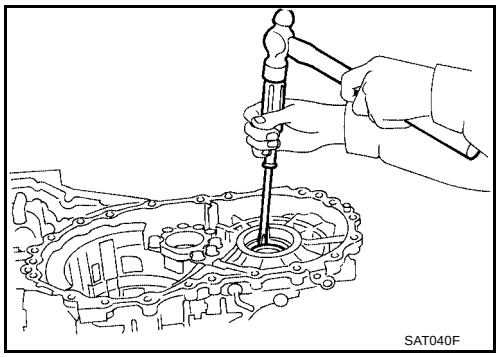
41. Remove return spring from parking shaft with screwdriver.
42. Draw out parking shaft and remove parking pawl from transmission case.
43. Check parking pawl and shaft for damage or wear.



44. Remove parking actuator support from transmission case.
45. Check parking actuator support for damage or wear.



46. Remove side oil seal with screwdriver from transmission case.



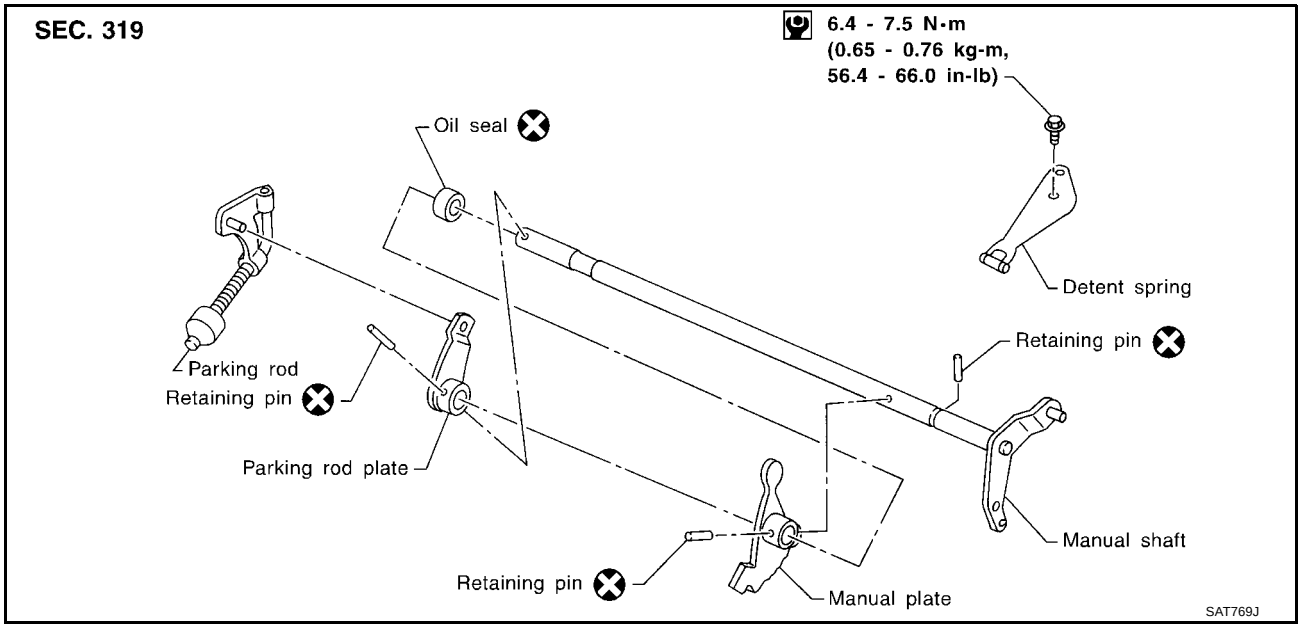
REPAIR FOR COMPONENT PARTS

PFP:00000

Manual Shaft

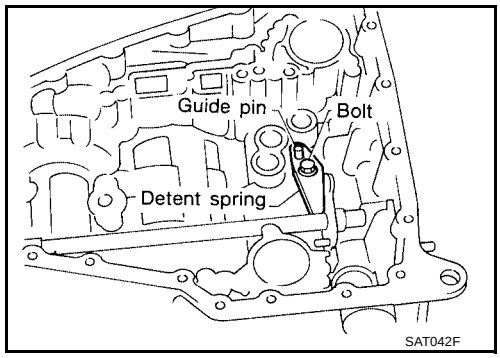
ECS0067E

COMPONENTS

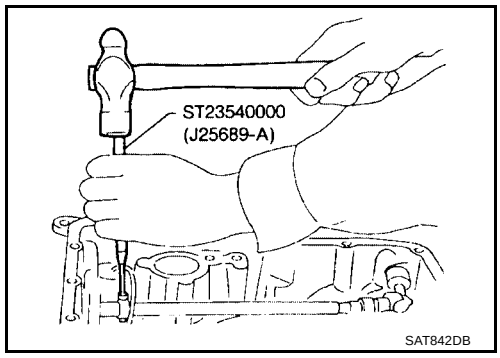


REMOVAL

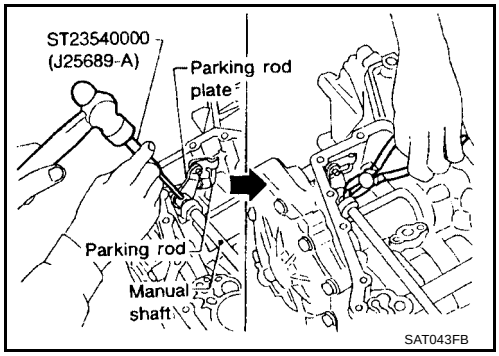
1. Remove detent spring from transmission case.



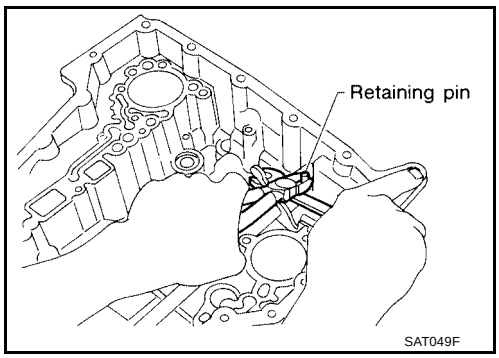
2. Drive out manual plate retaining pin.



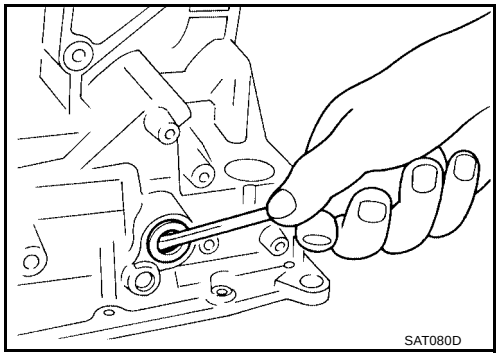
3. Drive and pull out parking rod plate retaining pin.
4. Remove parking rod plate from manual shaft.
5. Draw out parking rod from transmission case.



6. Pull out manual shaft retaining pin.
7. Remove manual shaft and manual plate from transmission case.



8. Remove manual shaft oil seal.

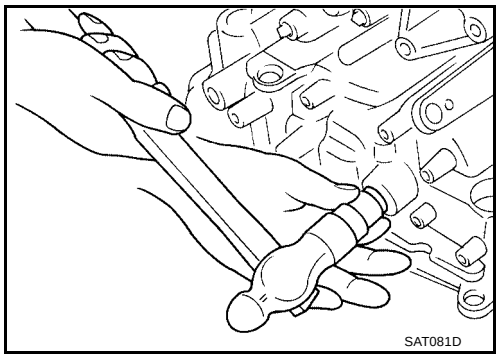


INSPECTION

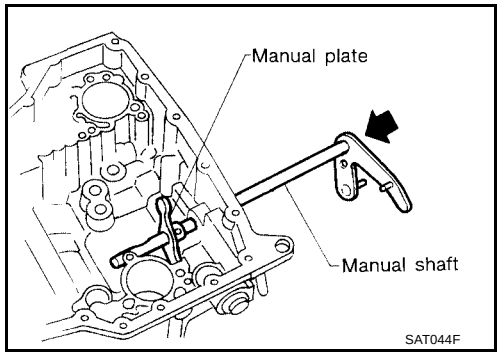
- Check component parts for wear or damage. Replace if necessary.

INSTALLATION

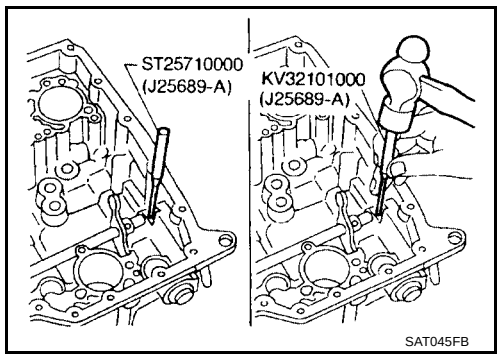
1. Install manual shaft oil seal.
   - **Apply ATF to outer surface of oil seal.**



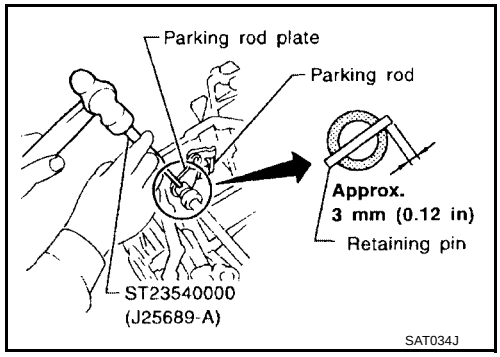
2. Install manual shaft and manual plate.



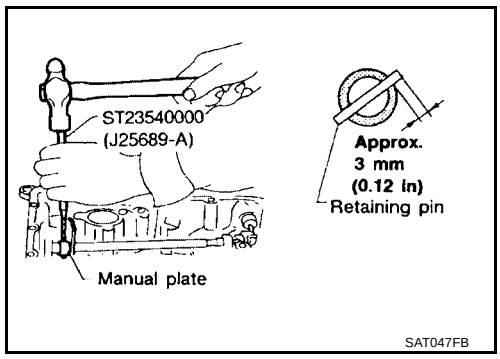
3. Align groove of manual shaft and hole of transmission case.
4. Install manual shaft retaining pin up to bottom of hole.



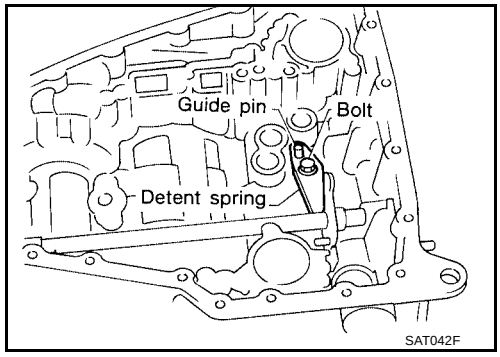
5. Install parking rod to parking rod plate.
6. Set parking rod assembly onto manual shaft and drive retaining pin.
   - **Both ends of pin should protrude.**



7. Drive manual plate retaining pin.
   - **Both ends of pin should protrude.**



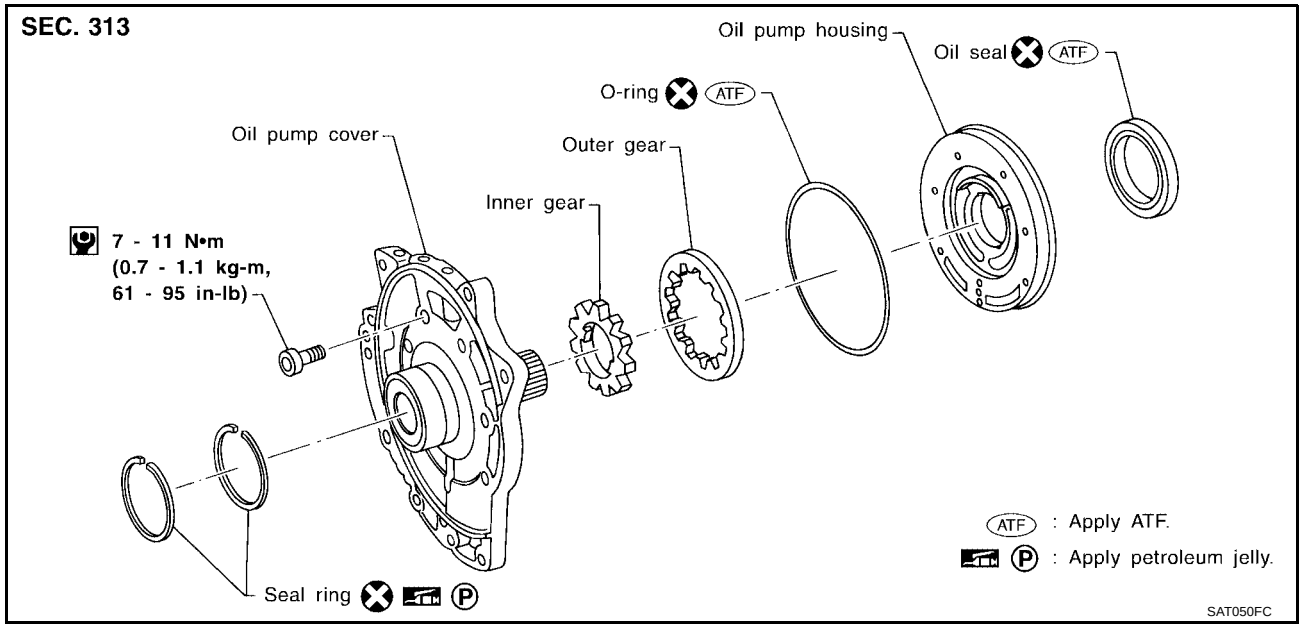
8. Install detent spring. Tighten detent spring bolts to the specified torque. Refer to AT-667, "COMPONENTS" .



Oil Pump

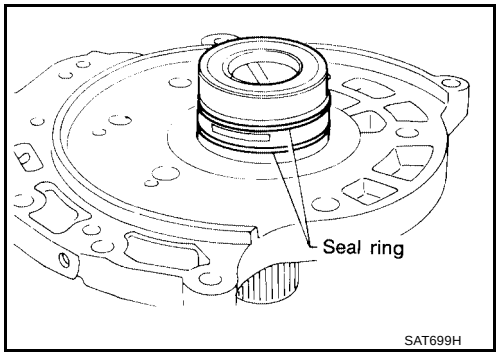
ECS0067F

COMPONENTS

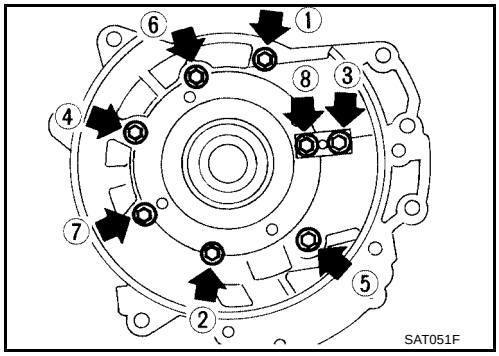


DISASSEMBLY

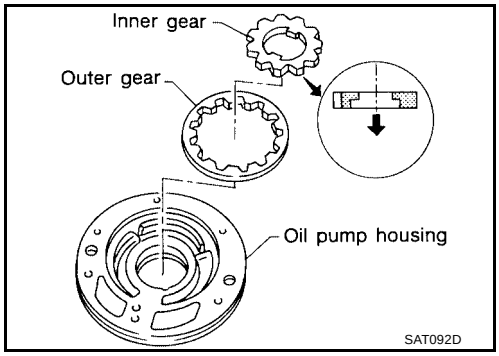
1. Remove seal rings.



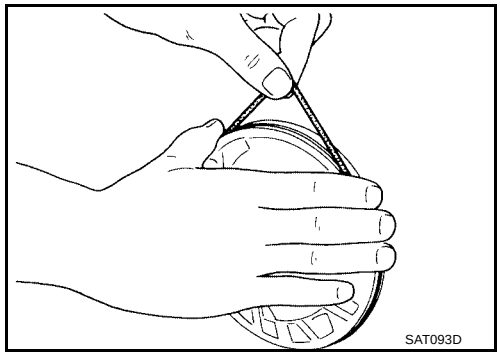
2. Loosen bolts in a crisscross pattern and remove oil pump cover.



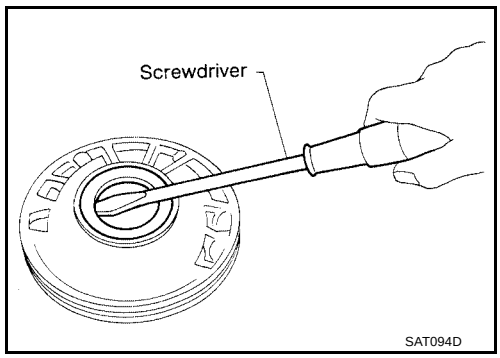
3. Remove inner and outer gear from oil pump housing.



4. Remove O-ring from oil pump housing.



5. Remove oil pump housing oil seal.



INSPECTION

Oil Pump Housing, Oil Pump Cover, Inner Gear and Outer Gear

- Check for wear or damage.

Side Clearances

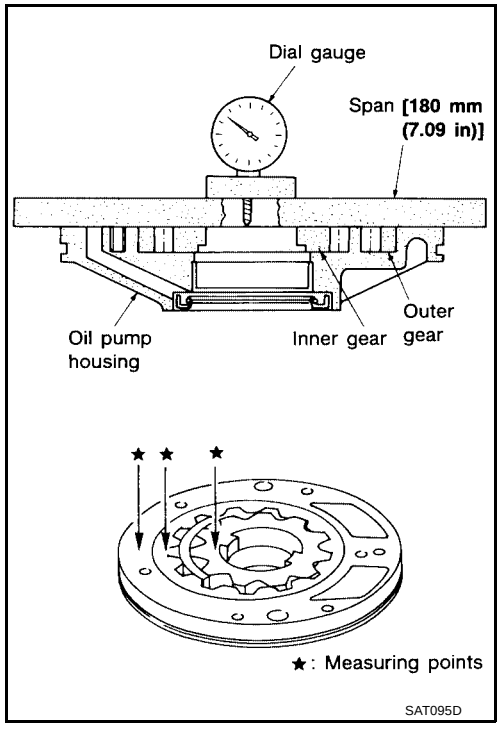
- Measure side clearance of inner and outer gears in at least four places around each outside edge. Maximum measured values should be within specified positions.

Standard clearance **: 0.030 - 0.050 mm (0.0012 - 0.0020 in)**

- If clearance is less than standard, select inner and outer gear as a set so that clearance is within specifications.

Inner and outer gear **: Refer to AT-752, "OIL PUMP" .**

- If clearance is more than standard, replace whole oil pump assembly except oil pump cover.

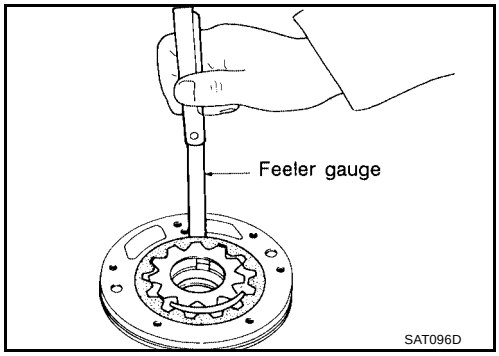


- Measure clearance between outer gear and oil pump housing.

  Standard clearance : 0.111 - 0.181 mm (0.0044 - 0.0071 in)

  Allowable limit : 0.181 mm (0.0071 in)

- If not within allowable limit, replace whole oil pump assembly except oil pump cover.



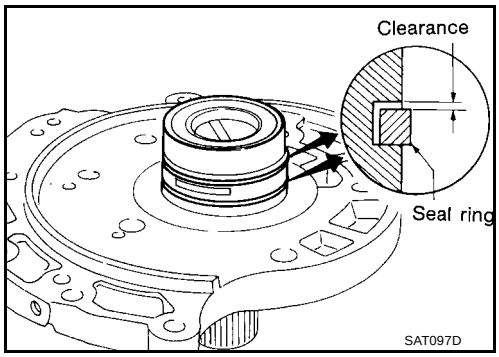
SEAL RING CLEARANCE

- Measure clearance between seal ring and ring groove.

  Standard clearance : 0.1 - 0.25 mm (0.0039 - 0.0098 in)

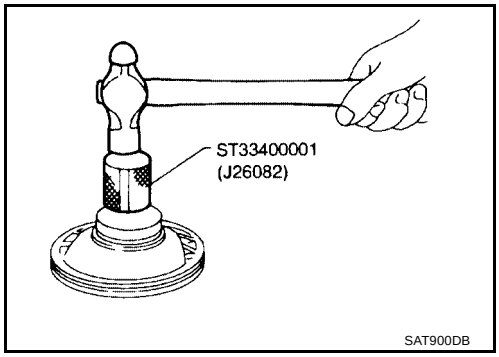
  Allowable limit : 0.25 mm (0.0098 in)

- If not within allowable limit, replace oil pump cover assembly.

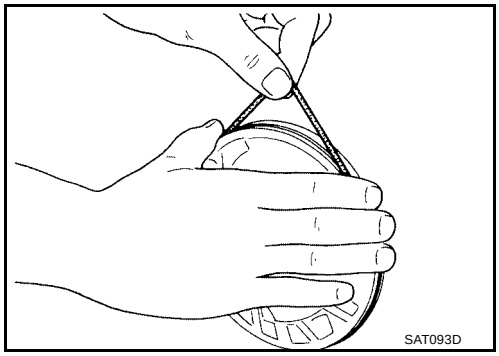


ASSEMBLY

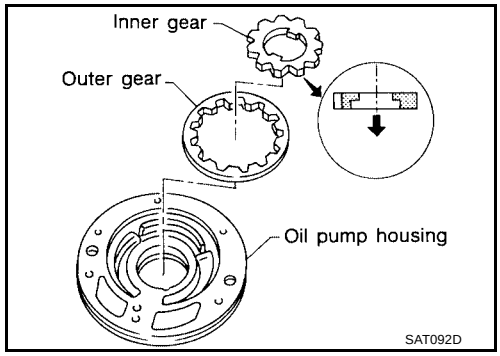
1. Install oil seal on oil pump housing.



2. Install O-ring on oil pump housing.
   - **Apply ATF to O-ring.**



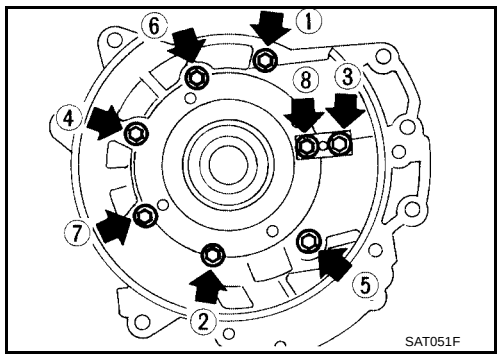
3. Install inner and outer gears on oil pump housing.
   - **Be careful of direction of inner gear.**



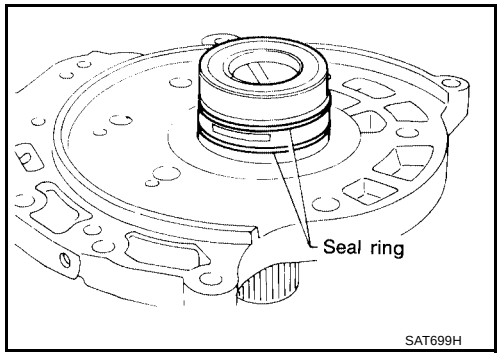
4. Install oil pump cover on oil pump housing.

a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly on oil pump housing assembly, then remove masking tape.

b. Tighten bolts in a crisscross pattern. Tighten oil pump cover bolts to the specified torque. Refer to AT-670, "COMPONENTS" .



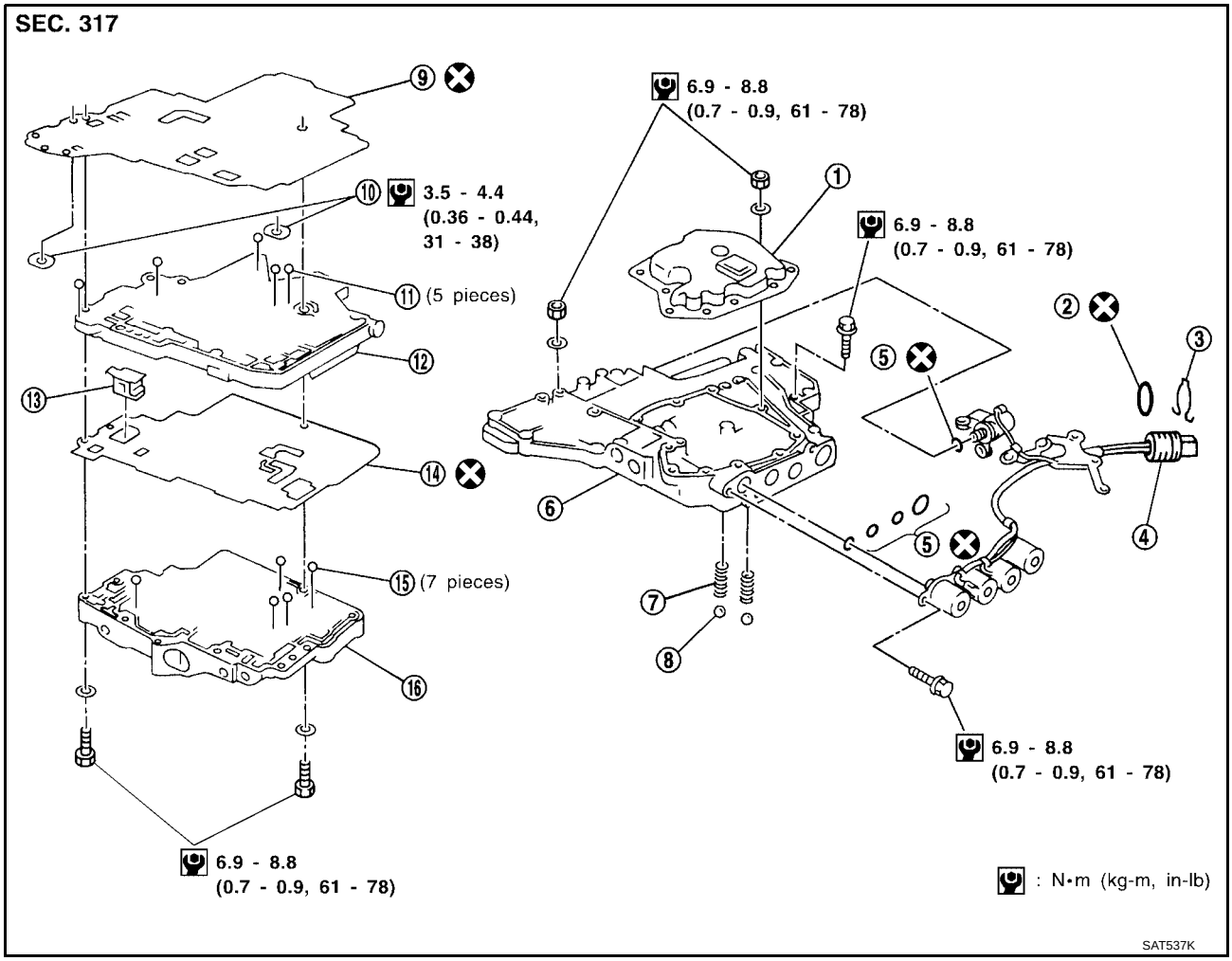
5. Install new seal rings carefully after packing ring groove with petroleum jelly.
   - **Do not spread gap of seal ring excessively while installing. The ring may be deformed.**



Control Valve Assembly

ECS0067G

COMPONENTS



1.	Oil strainer Terminal body	2.	O-ring	3.	Snap ring
5.	O-rings	6.	Control valve lower body	7.	Oil cooler relief valve spring
8.	Check ball	9.	Separating plate	10.	Support plate
11.	Steel ball	12.	Control valve inter body	13.	Pilot filter
14.	Separating plate	15.	Steel ball	16.	Control valve upper body

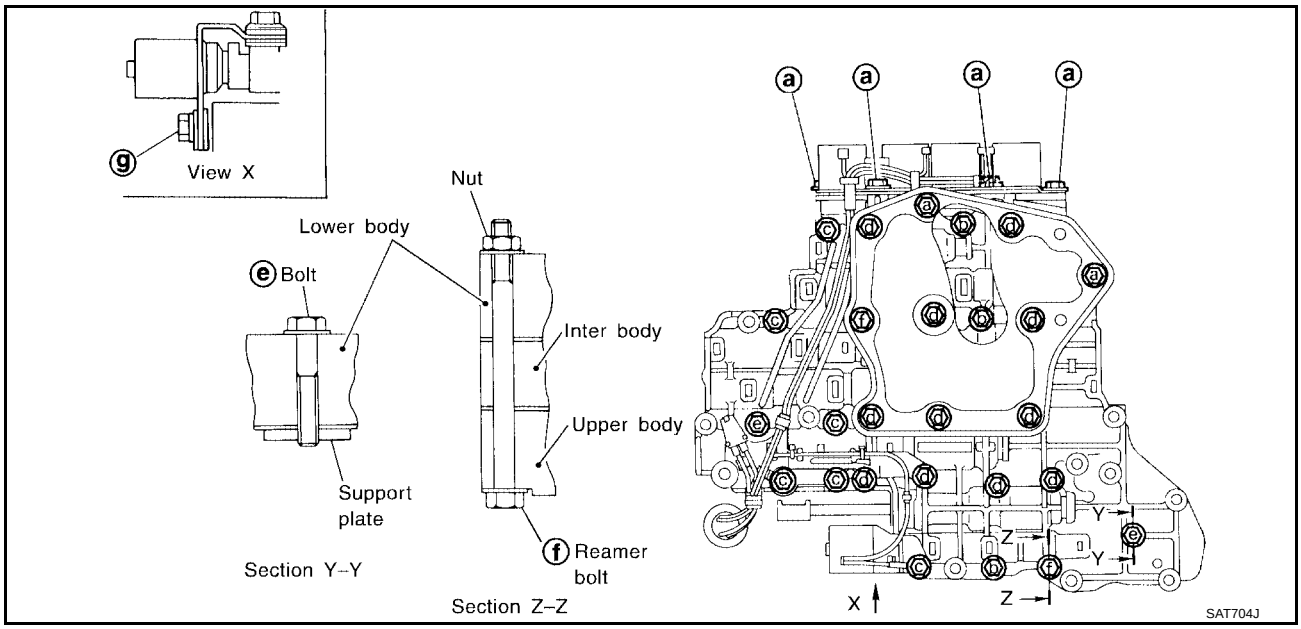
DISASSEMBLY

Disassemble upper, inter and lower bodies.

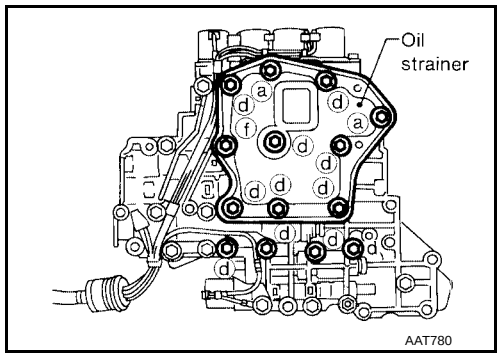
Bolt length, number and location:

Bolt symbol	a	b	c	d	e	f	g
Bolt length " ℓ " mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)	18.0 (0.709)
Number of bolts	6	3	6	11	2	2	1

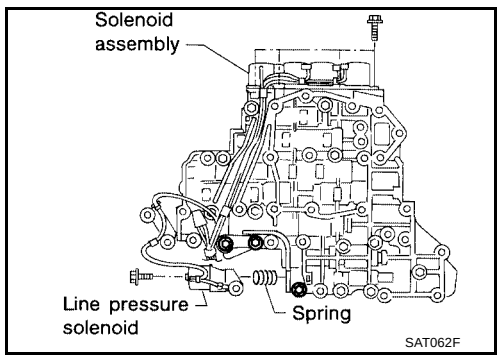
f: Reamer bolt and nut.



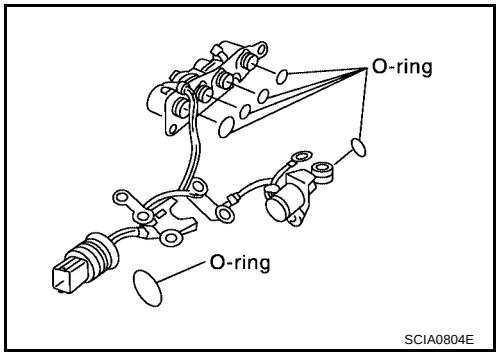
1. Remove bolts **a** , **d** and nut **f** and remove oil strainer from control valve assembly.



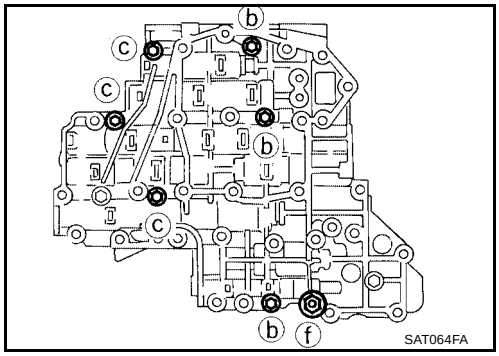
2. Remove solenoid valve assembly and line pressure solenoid valve from control valve assembly.



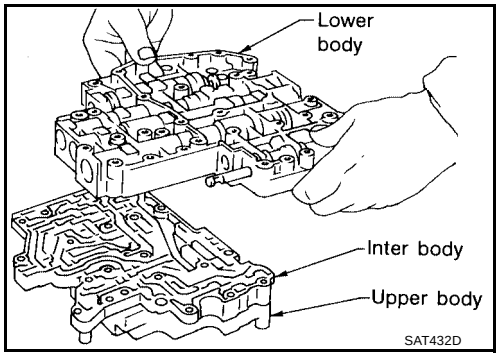
3. Remove O-rings from solenoid valves and terminal body.



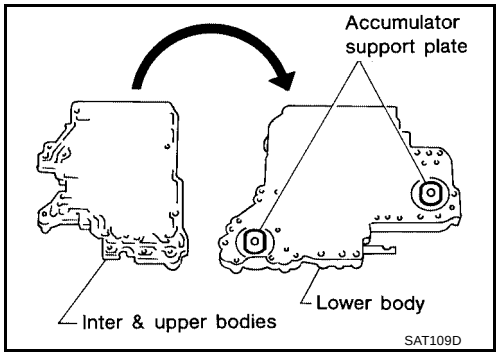
4. Place upper body facedown, and remove bolts **b** , **c** and nut **f** .



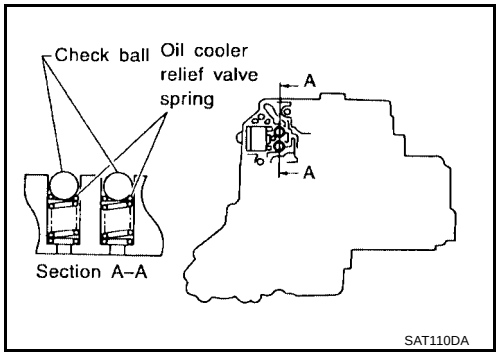
5. Remove inter body from lower body.



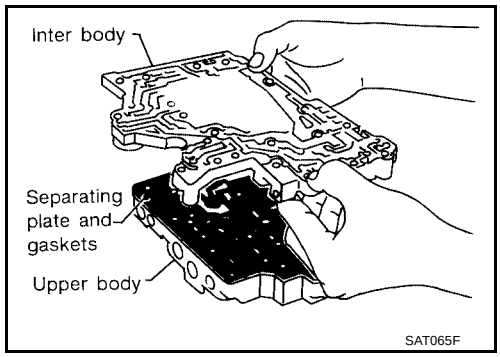
6. Turn over lower body, and remove accumulator support plate.



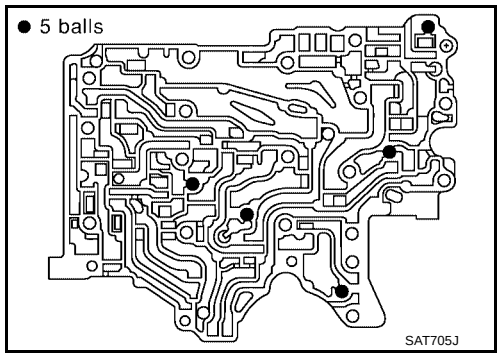
7. Remove bolts **e** , separating plate and separating gasket from lower body.
8. Remove check balls and oil cooler relief valve springs from lower body.
   - **Be careful not to lose check balls and oil cooler relief valve springs.**



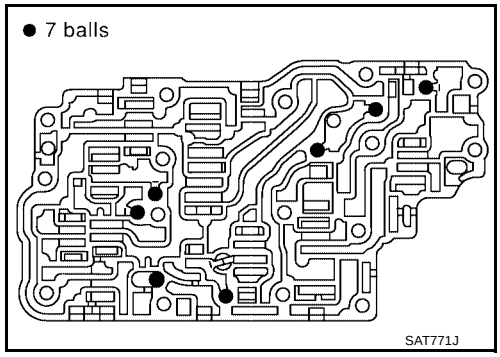
9. Remove inter body from upper body.



10. Check to see that steel balls are properly positioned in inter body and then remove them.
    - **Be careful not to lose steel balls.**



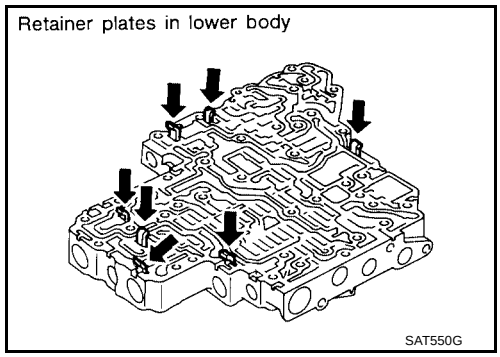
11. Check to see that steel balls are properly positioned in upper body and then remove them.
    - **Be careful not to lose steel balls.**



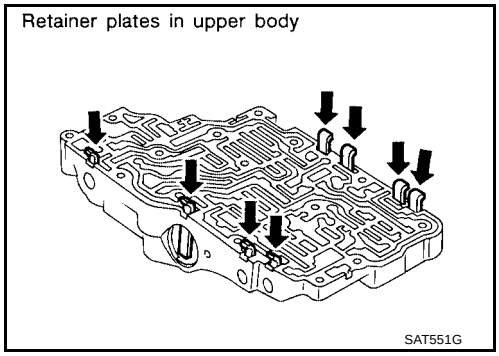
INSPECTION

Lower and Upper Bodies

- Check to see that retainer plates are properly positioned in lower body.



- Check to see that retainer plates are properly positioned in upper body.
- **Be careful not to lose these parts.**

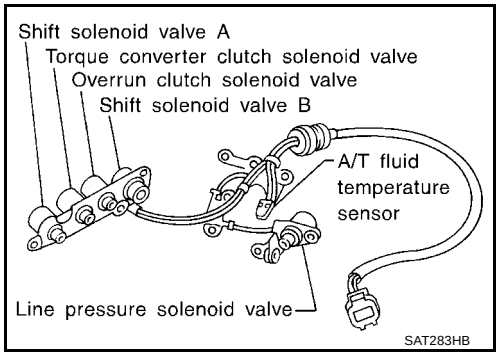


Oil Strainer

- Check wire netting of oil strainer for damage.

Shift Solenoid Valves “A” and “B”, Line Pressure Solenoid Valve, Torque Converter Clutch Solenoid Valve and Overrun Clutch Solenoid Valve

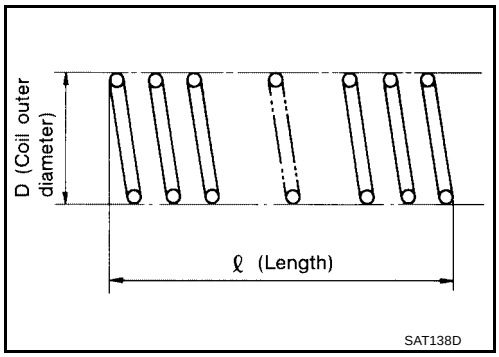
- Measure resistance.
- For shift solenoid valve A, refer to AT-552 .
- For shift solenoid valve B, refer to AT-557 .
- For line pressure solenoid valve, refer to AT-546 .
- For torque converter clutch solenoid valve, refer to AT-533 .
- For overrun clutch solenoid valve, refer to AT-567 .



Oil Cooler Relief Valve Spring

- Check springs for damage or deformation.
- Measure free length and outer diameter.

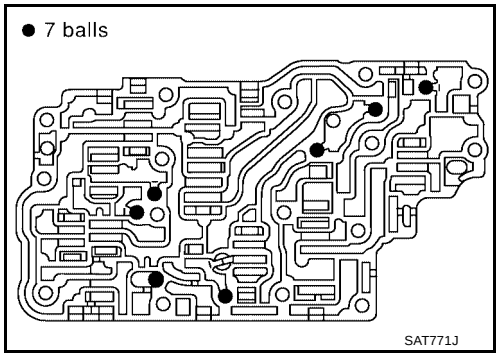
Inspection standard : Refer to **AT-748, "CONTROL VALVE AND PLUG RETURN SPRINGS"** .



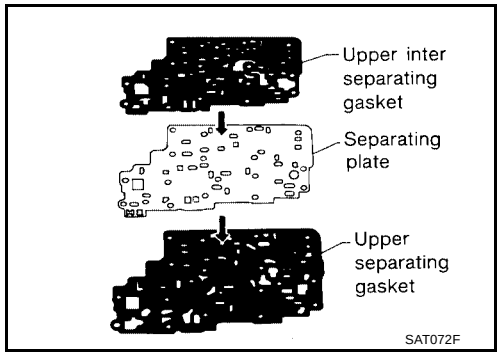
ASSEMBLY

1. Install upper, inter and lower body.

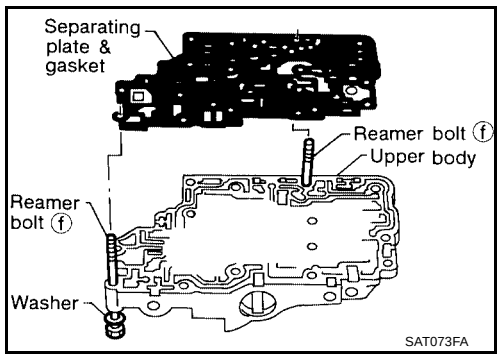
a. Place oil circuit of upper body face up. Install steel balls in their proper positions.



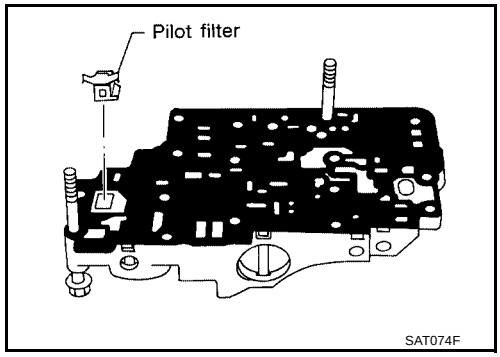
b. Install upper separating gasket, upper inter separating gasket and upper separating plate in order shown in illustration.



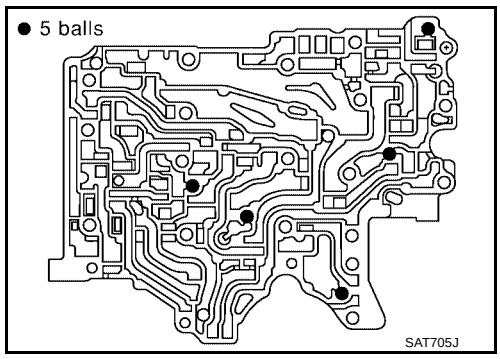
c. Install reamer bolts **f** from bottom of upper body. Using reamer bolts as guides, install separating plate and gaskets as a set.



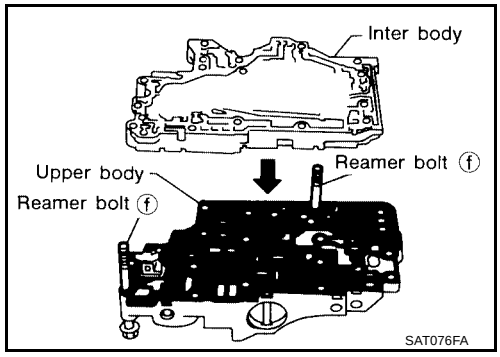
d. Install pilot filter.



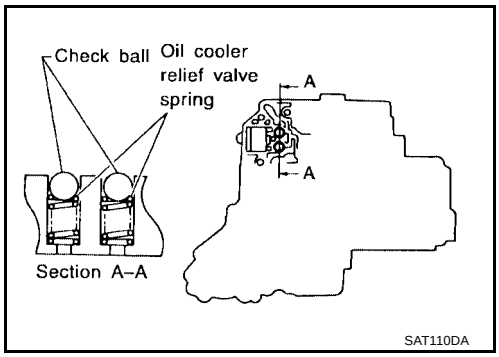
e. Place lower body as shown in illustration (side of inter body face up). Install steel balls in their proper positions.



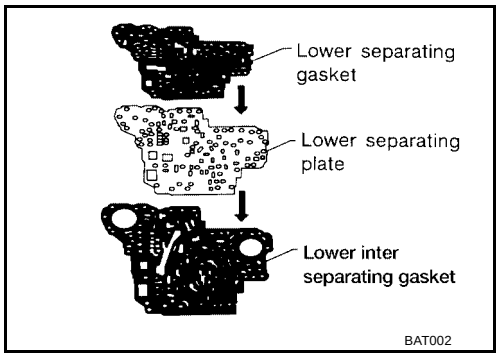
f. Install inter body on upper body using reamer bolts **f** as guides.
- **Be careful not to dislocate or drop steel balls.**



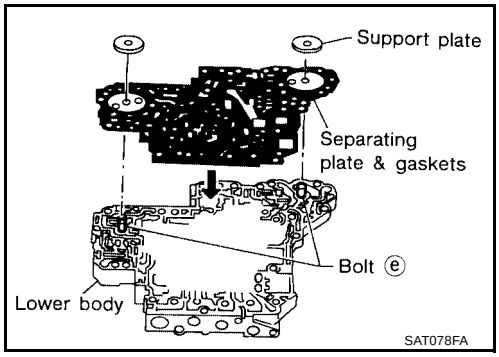
g. Install check balls and oil cooler relief valve springs in their proper positions in lower body.



h. Install lower separating gasket, lower inter separating gasket and lower separating plate in order shown in illustration.

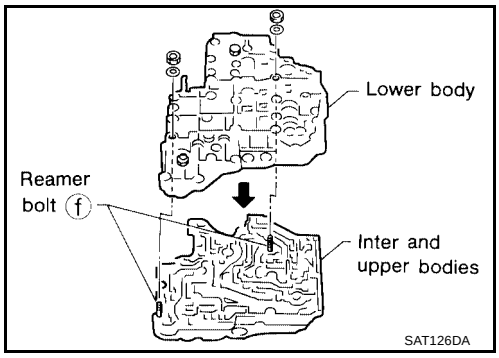


i. Install bolts **e** from bottom of lower body. Using bolts **e** as guides, install separating plate and gaskets as a set.

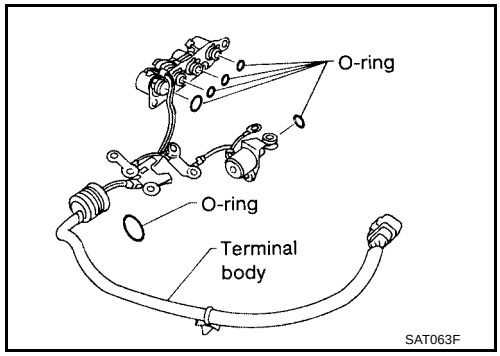


j. Temporarily install support plates on lower body.

k. Install lower body on inter body using reamer bolts **f** as guides and tighten reamer bolts **f** slightly.



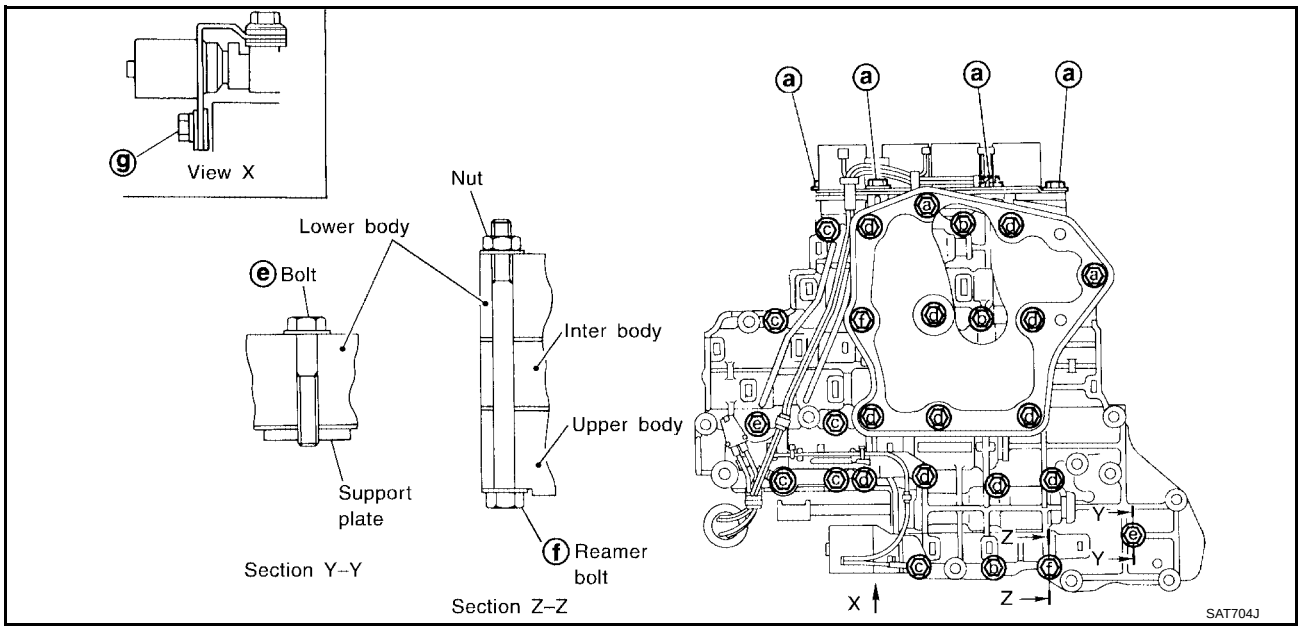
2. Install O-rings to solenoid valves and terminal body.
   - **Apply ATF to O-rings.**



3. Install and tighten bolts.

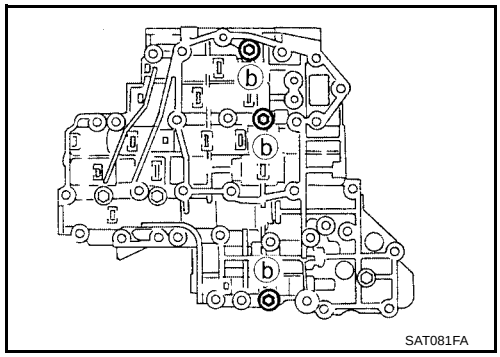
Bolt length, number and location:

Bolt symbol	a	b	c	d	e	f	g
Bolt length "ℓ" mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)	18.0 (0.709)
Number of bolts	6	3	6	11	2	2	1

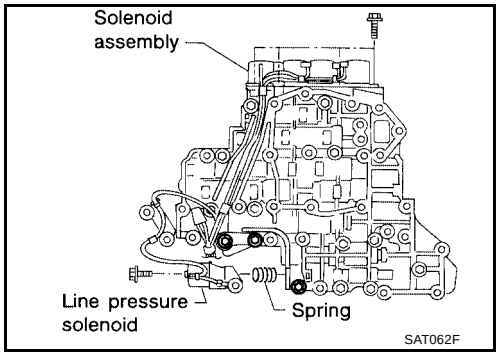


a. Install and tighten bolts **b** to specified torque.

: **7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)**

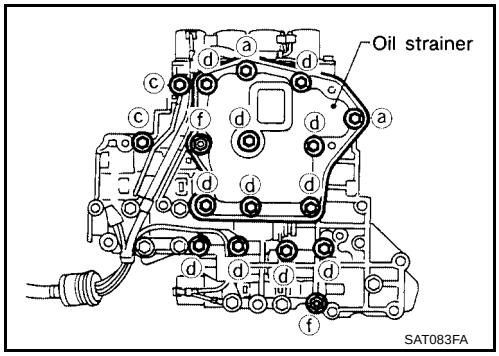


b. Install solenoid valve assembly and line pressure solenoid valve to lower body.



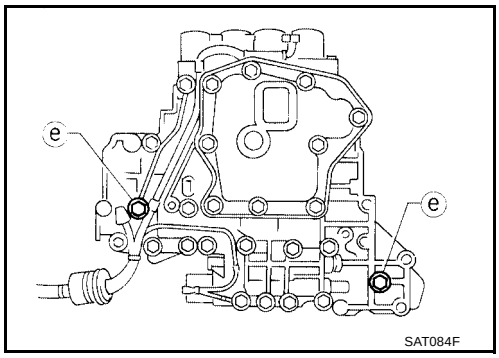
c. Set oil strainer, then tighten bolts **a** , **c** , **d** and nuts **f** to specified torque.

: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)



d. Tighten bolts **e** to specified torque.

: 3.4 - 4.4 N·m (0.35 - 0.45 kg-m, 30.4 - 39.1 in-lb)



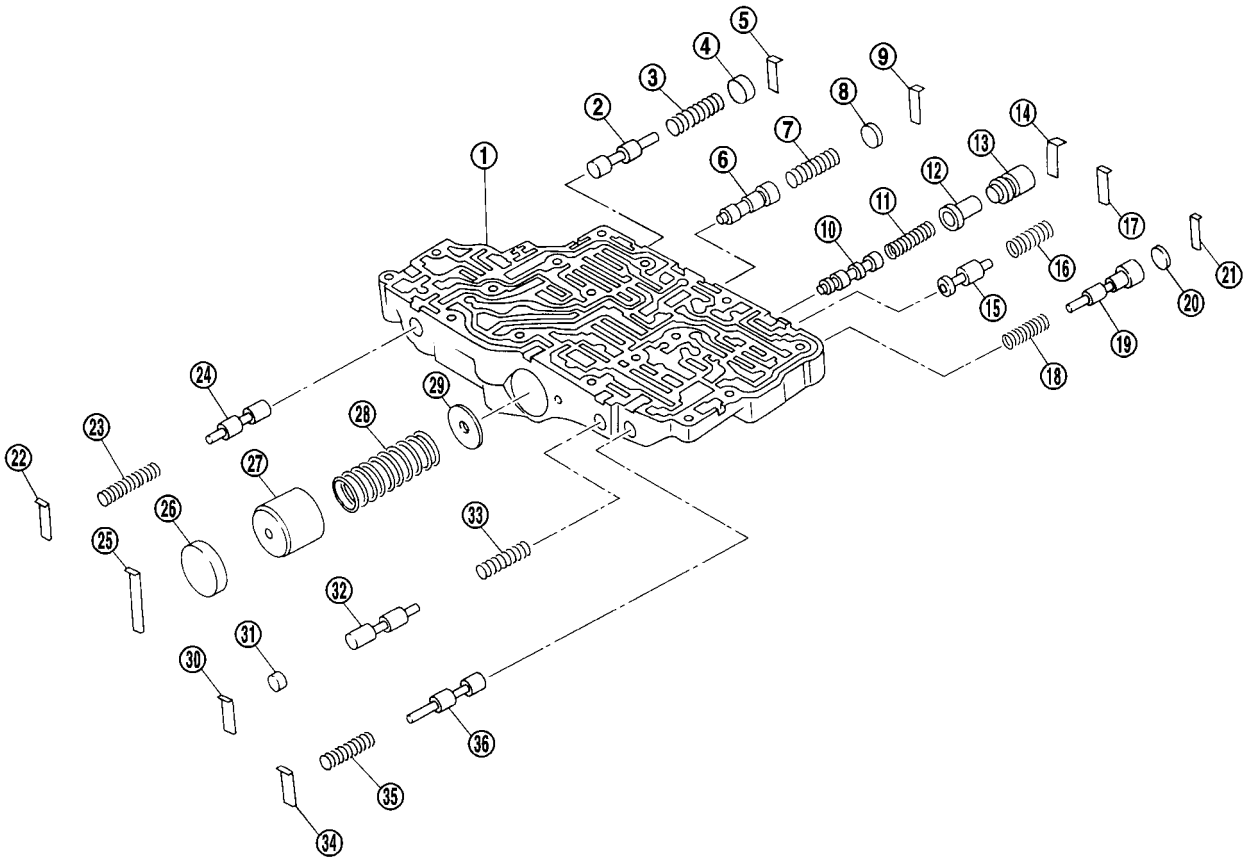
Control Valve Upper Body

ECS0067H

COMPONENTS

Apply ATF to all components before installation.

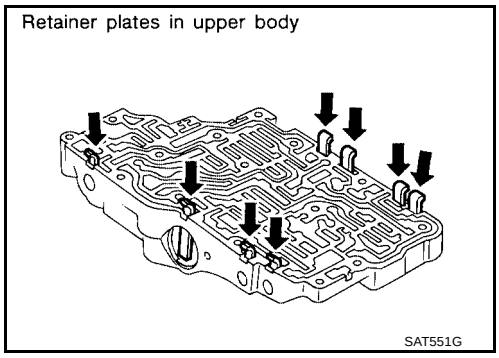
SEC. 317



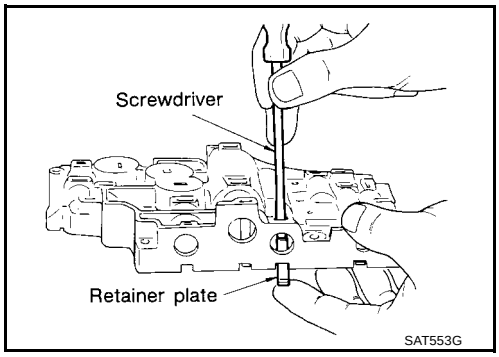
1. Upper body	2. Cooler check valve	3. Return spring
4. Plug	5. Retainer plate	6. 1-2 accumulator valve
7. Return spring	8. Plug	9. Retainer plate
10. Torque converter clutch control valve	11. Return spring	12. Torque converter clutch control plug
13. Torque converter clutch control sleeve	14. Retainer plate	15. Torque converter relief valve
16. Return spring	17. Retainer plate	18. Return spring
19. Overrun clutch reducing valve	20. Plug	21. Retainer plate
22. Retainer plate	23. Return spring	24. Pilot valve
25. Retainer plate	26. Plug	27. 1-2 accumulator piston
28. Return spring	29. 1-2 accumulator retainer plate	30. Retainer plate
31. Plug	32. 1st reducing valve	33. Return spring
34. Retainer plate	35. Return spring	36. 3-2 timing valve

DISASSEMBLY

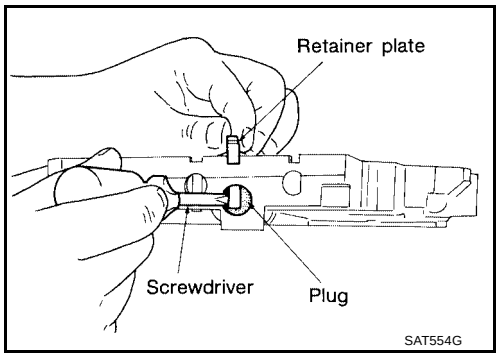
1. Remove valves at retainer plates.
   - **Do not use a magnetic pick-up tool.**



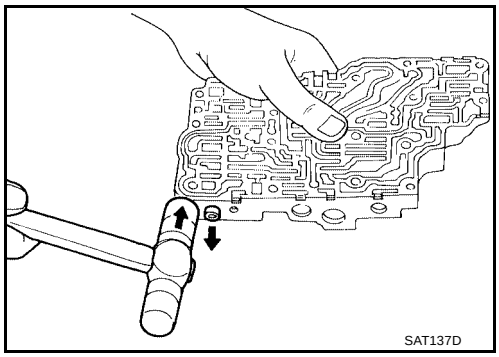
a. Use a screwdriver to remove retainer plates.



b. Remove retainer plates while holding spring, plugs or sleeves.
   - **Remove plugs slowly to prevent internal parts from jumping out.**



c. Place mating surface of valve body face down, and remove internal parts.
   - **If a valve is hard to remove, place valve body face down and lightly tap it with a soft hammer.**
   - **Be careful not to drop or damage valves and sleeves.**

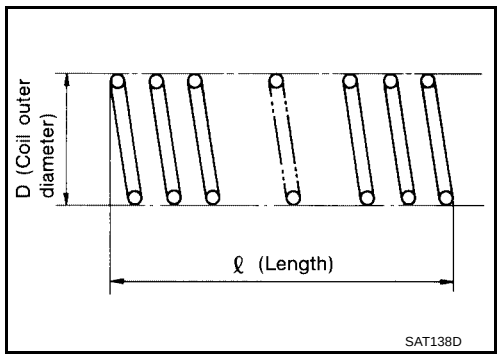


INSPECTION

Valve Spring

- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.

Inspection standard : Refer to AT-748, "CONTROL VALVE AND PLUG RETURN SPRINGS" .



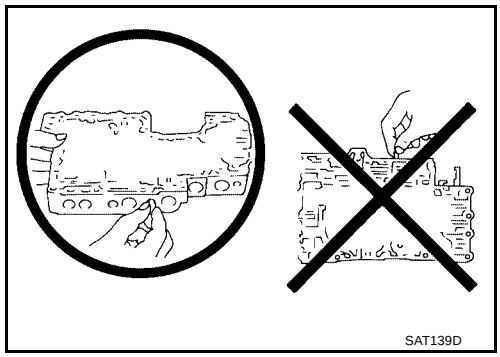
- Replace valve springs if deformed or fatigued.

Control Valves

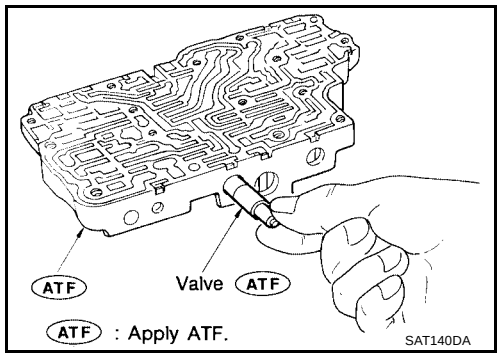
- Check sliding surfaces of valves, sleeves and plugs.

ASSEMBLY

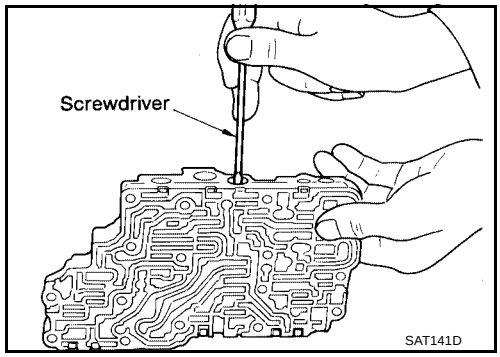
- **Lay control valve body down when installing valves. Do not stand the control valve body upright.**



1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.
   - **Be careful not to scratch or damage valve body.**

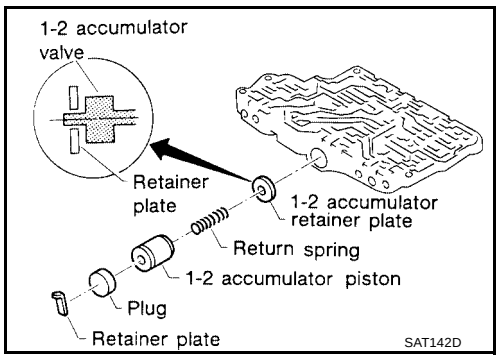


   - Wrap a small screwdriver with vinyl tape and use it to insert the valves into their proper positions.

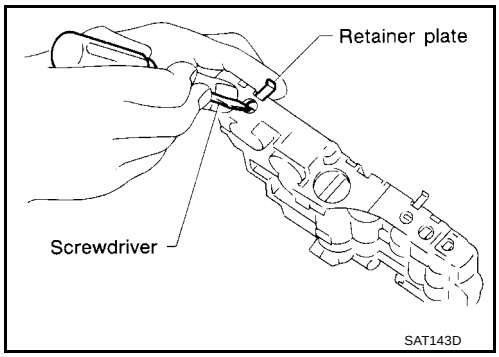


1-2 Accumulator Valve

- Install 1-2 accumulator valve. Align 1-2 accumulator retainer plate from opposite side of control valve body.
- Install return spring, 1-2 accumulator piston and plug.



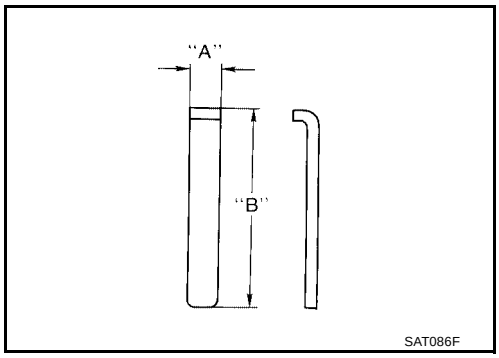
1. Install retainer plates.
   - While pushing plug or return spring, install retainer plate.



Retainer Plate (Upper Body)

Unit: mm (in)

No.	Name of control valve	Width A	Length B
22	Pilot valve	6.0 (0.236)	21.5 (0.846)
30	1st reducing valve		
34	3-2 timing valve		
17	Torque converter relief valve		
9	1-2 accumulator valve		38.5 (1.516)
25	1-2 accumulator piston valve		
21	Overrun clutch reducing valve		24.0 (0.945)
5	Cooler check valve		
14	Torque converter clutch control valve		28.0 (1.102)



- Install proper retainer plates.
  Refer to AT-682, "Control Valve Upper Body" .

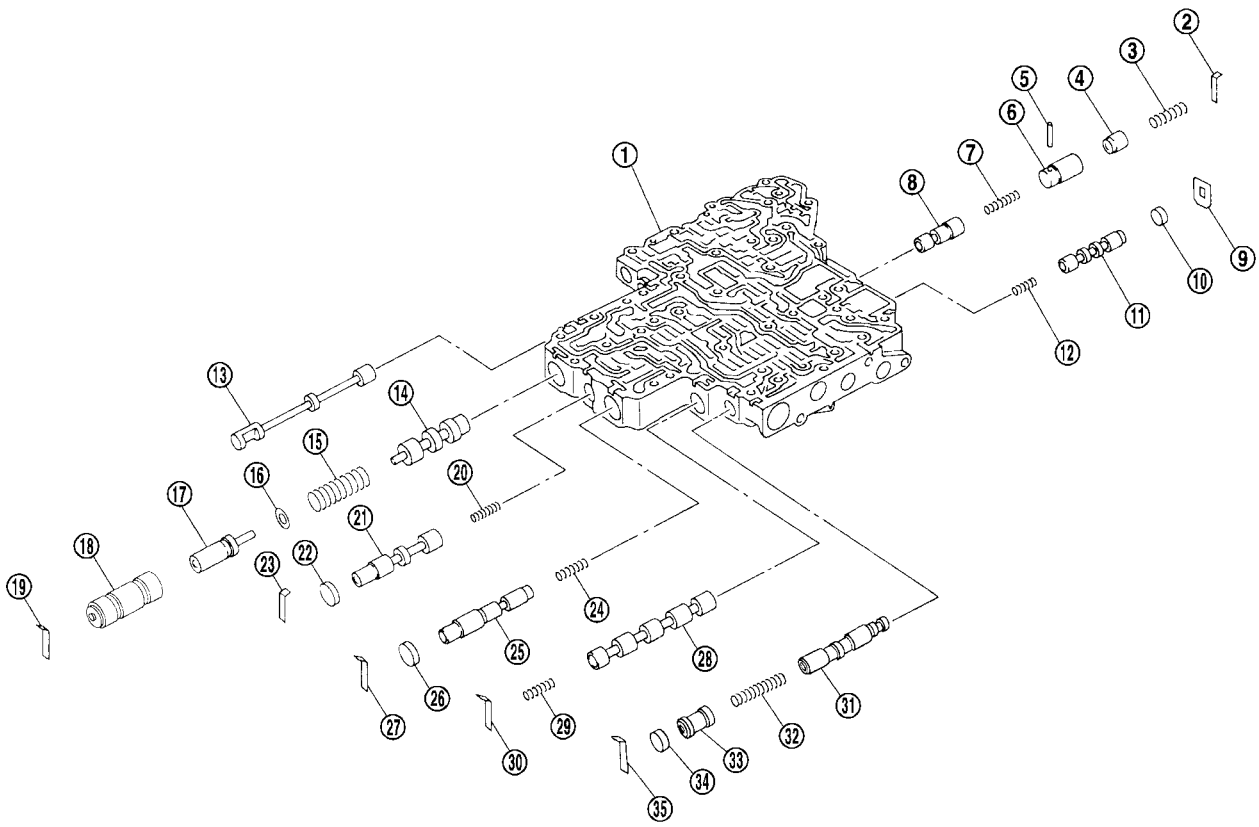
Control Valve Lower Body

ECS0067I

COMPONENTS

Apply ATF to all components before installation.

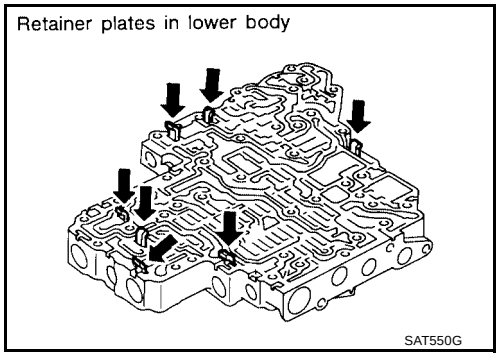
SEC. 317



1. Lower body	2. Retainer plate	3. Return spring
4. Piston	5. Parallel pin	6. Sleeve
7. Return spring	8. Pressure modifier valve	9. Retainer plate
10 Plug	11 Shift valve B	12 Return spring
13 Manual valve	14 Pressure regulator valve	15 Return spring
16 Spring seat	17 Plug	18 Sleeve
19 Retainer plate	20 Return spring	21 Overrun clutch control valve
22 Plug	23 Retainer plate	24 Return spring
25 Accumulator control valve	26 Plug	27 Retainer plate
28 Shift valve A	29 Return spring	30 Retainer plate
31 Shuttle valve	32 Return spring	33 Plug
34 Plug	35 Retainer plate	

DISASSEMBLY

- Remove valves at retainer plate.
  For removal procedures, refer to AT-684, "DISASSEMBLY" .



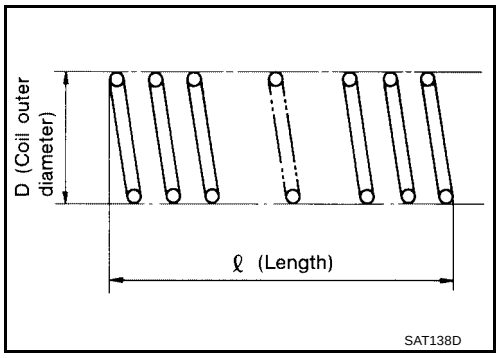
INSPECTION

Valve Springs

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.

  Inspection standard : **Refer to AT-748, "CONTROL VALVE AND PLUG RETURN SPRINGS" .**

- Replace valve springs if deformed or fatigued.

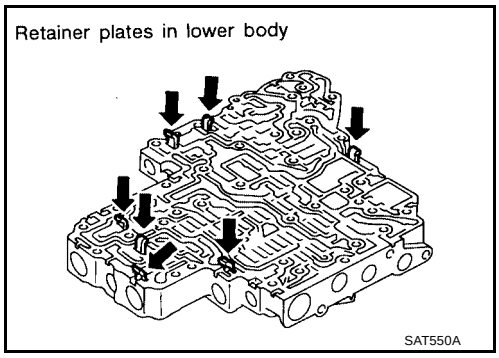


Control Valves

- Check sliding surfaces of control valves, sleeves and plugs for damage.

ASSEMBLY

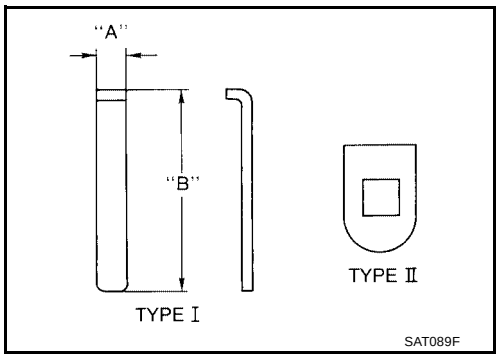
- Install control valves.
  For installation procedures, refer to AT-685, "ASSEMBLY" .



Retainer Plate (Lower Body)

Unit: mm (in)

No.	Name of control valve and plug	Width A	Length B	Type
19	Pressure regulator valve	6.0 (0.236)	28.0 (1.102)	I
27	Accumulator control valve			
30	Shift valve A			
23	Overrun clutch control valve			
2	Pressure modifier valve			
35	Shuttle valve			
9	Shift valve B	—	—	II

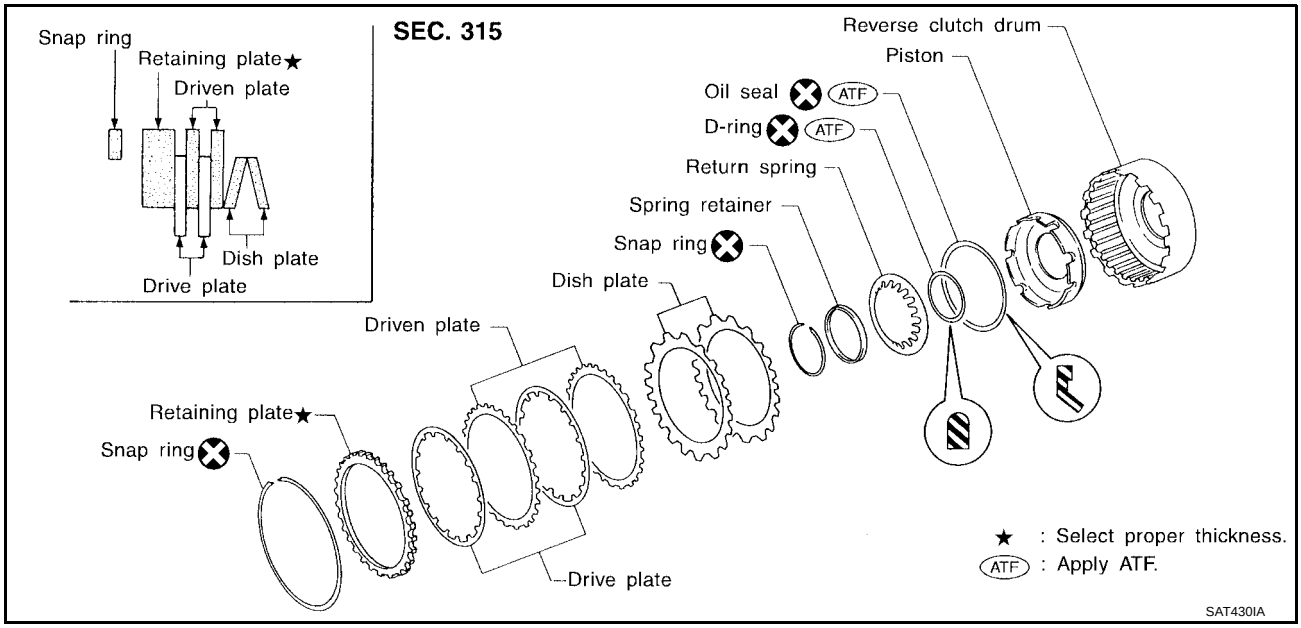


- Install proper retainer plates.
  Refer to AT-686, "Control Valve Lower Body" .

Reverse Clutch

ECS0067J

COMPONENTS



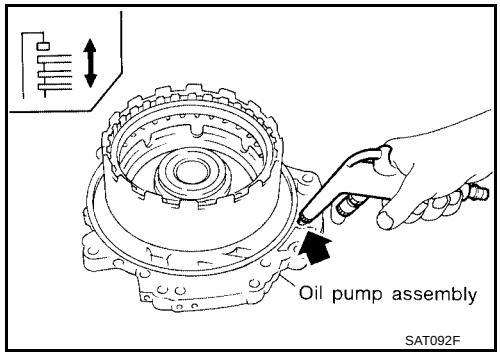
DISASSEMBLY

1. Check operation of reverse clutch

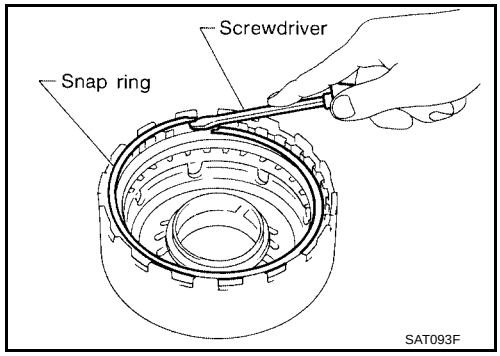
a. Install seal ring onto drum support of oil pump cover and install reverse clutch assembly. Apply compressed air to oil hole.

b. Check to see that retaining plate moves to snap ring.

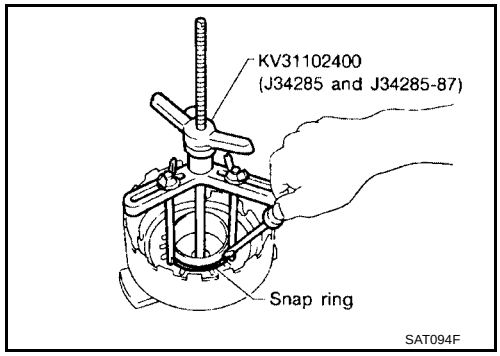
c. If retaining plate does not contact snap ring:
   - D-ring might be damaged.
   - Oil seal might be damaged.
   - Fluid might be leaking past piston check ball.



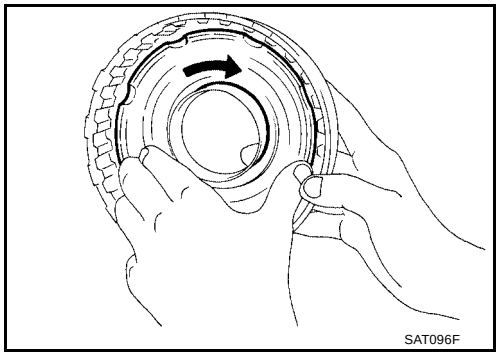
2. Remove snap ring.
3. Remove drive plates, driven plates, retaining plate, and dish plates.



4. Set Tool on spring retainer and remove snap ring from reverse clutch drum while compressing return springs.
   - **Set Tool directly over springs.**
   - **Do not expand snap ring excessively.**
5. Remove spring retainer and return springs.



6. Remove piston from reverse clutch drum by turning it.
7. Remove D-ring and oil seal from piston.



INSPECTION

Reverse Clutch Snap Ring, Spring Retainer and Return Springs

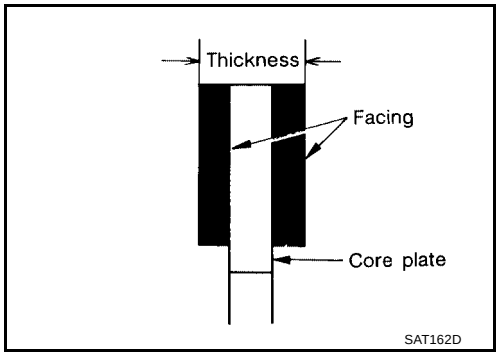
- Check for deformation, fatigue or damage.
  If necessary, replace.

Reverse Clutch Drive Plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:
Standard value : 1.6 mm (0.063 in)
Wear limit : 1.4 mm (0.055 in)

- If not within wear limit, replace.

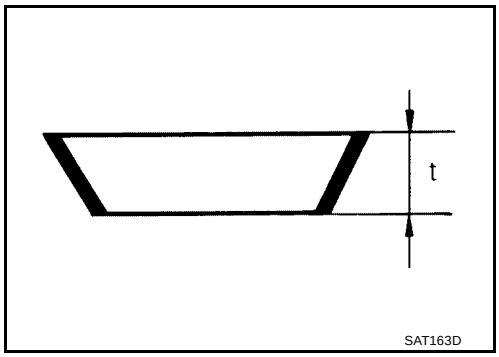


Reverse Clutch Dish Plates

- Check for deformation or damage.
- Measure thickness of dish plate.

Thickness of dish plate : 3.08 mm (0.1213 in)

- If deformed or fatigued, replace.

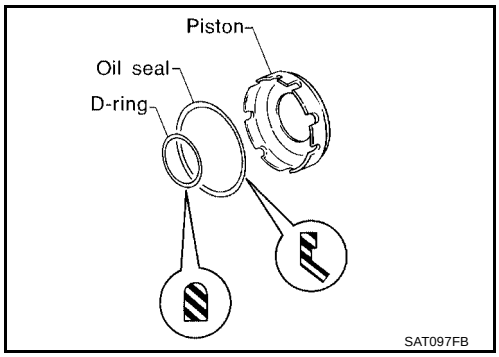


Reverse Clutch Piston

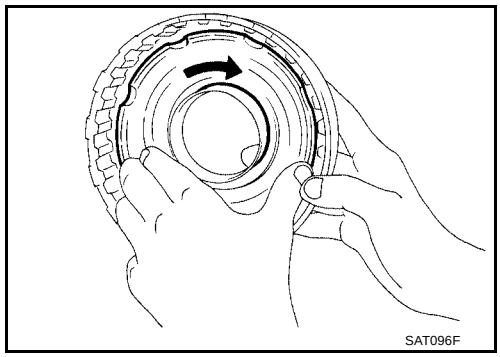
- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure that air leaks past ball.

ASSEMBLY

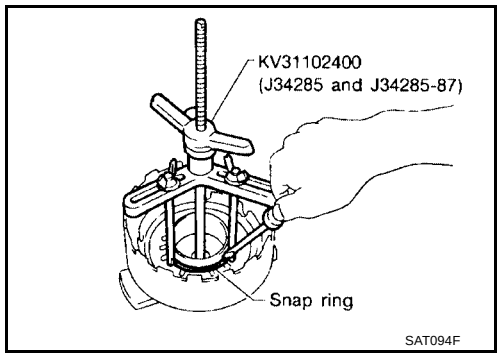
1. Install D-ring and oil seal on piston.
   - **Take care with the direction of oil seal.**
   - **Apply ATF to both parts.**



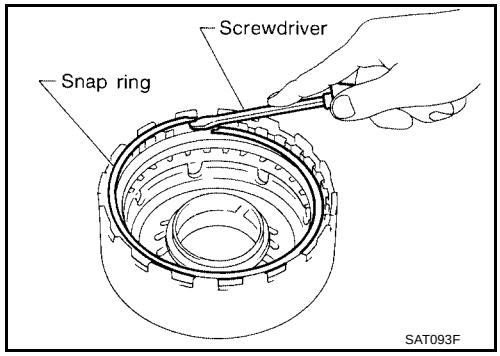
2. Install piston assembly by turning it slowly.
   - **Apply ATF to inner surface of drum.**



3. Install return springs and spring retainer on piston.



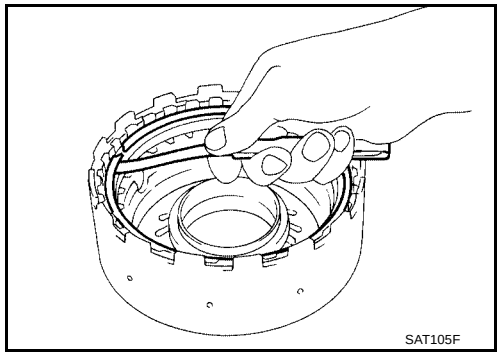
4. Set Tool on spring retainer and install snap ring while compressing return springs.
   - **Set Tool directly over return springs.**
5. Install drive plates, driven plates, retaining plate and dish plates.
   - **Take care with order of plates.**
6. Install snap ring.



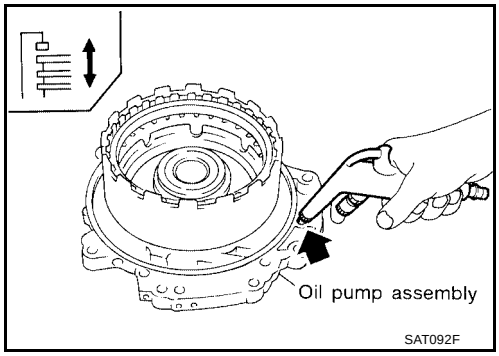
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

Specified clearance

Standard	**: 0.5 - 0.8 mm (0.020 - 0.031 in)**
Allowable limit	**: 1.2 mm (0.047 in)**
Retaining plate	**: Refer to AT-749, "REVERSE CLUTCH" .**



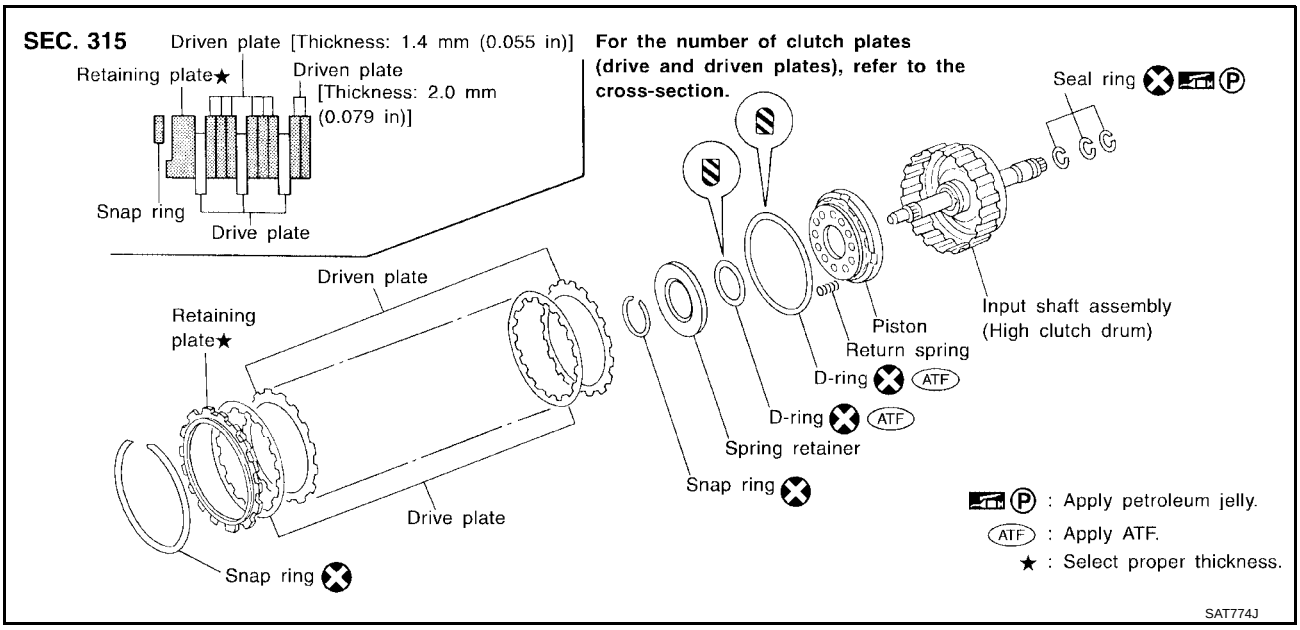
8. Check operation of reverse clutch.
   Refer to AT-689, "DISASSEMBLY" .



High Clutch

ECS0067K

COMPONENTS



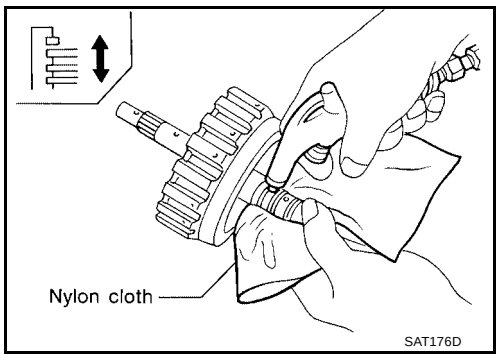
DISASSEMBLY

1. Check operation of high clutch.

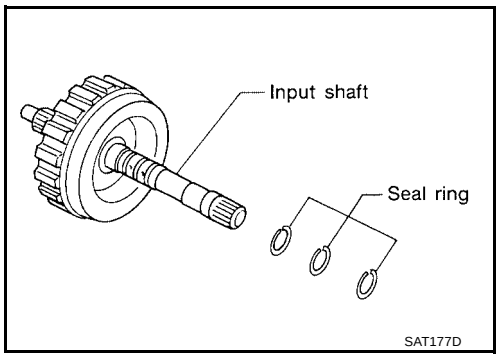
a. Apply compressed air to oil hole of input shaft with nylon cloth.
   - **Stop up hole on opposite side of input shaft with nylon cloth.**

b. Check to see that retaining plate moves to snap ring.

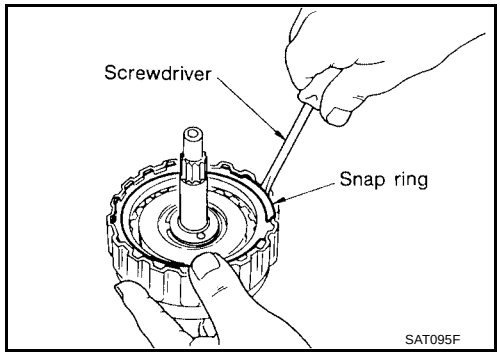
c. If retaining plate does not contact snap ring:
   - D-ring might be damaged.
   - Oil seal might be damaged.
   - Fluid might be leaking past piston check ball.



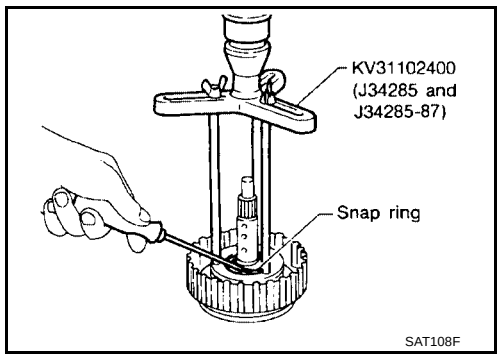
2. Remove seal rings from input shaft.
   - **Always replace when removed.**



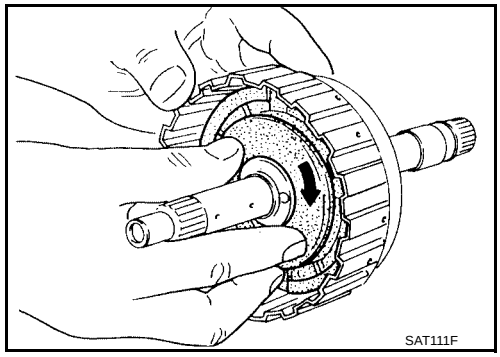
3. Remove snap ring.
4. Remove drive plates, driven plates and retaining plate.



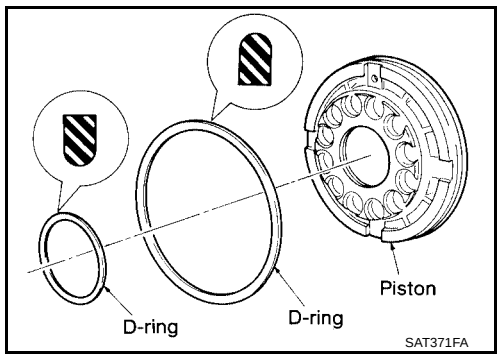
5. Set Tool on spring retainer and remove snap ring from high clutch drum while compressing return springs.
   - **Set Tool directly over springs.**
   - **Do not expand snap ring excessively.**
6. Remove spring retainer and return springs.



7. Remove piston from high clutch drum by turning it.



8. Remove D-rings from piston.



INSPECTION

High Clutch Snap Ring, Spring Retainer and Return Springs

- Check for deformation, fatigue or damage.
  If necessary, replace.
- **When replacing spring retainer and return springs, replace them as a set.**

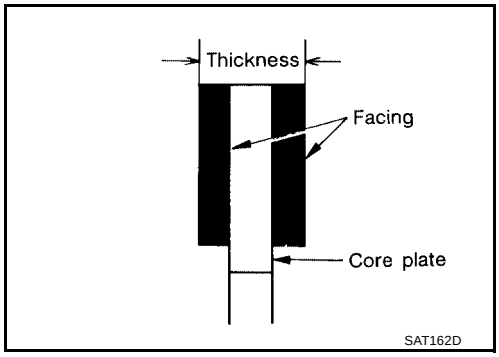
High Clutch Drive Plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:

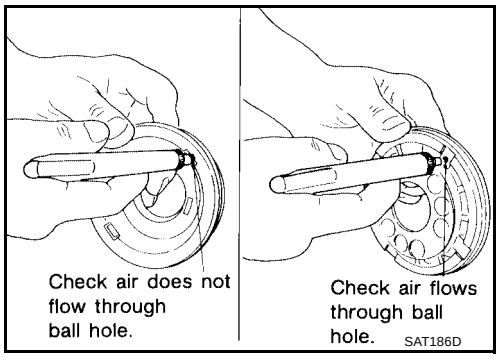
Standard value	**: 1.6 mm (0.063 in)**
Wear limit	**: 1.4 mm (0.055 in)**

- If not within wear limit, replace.



High Clutch Piston

- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure that air leaks past ball.

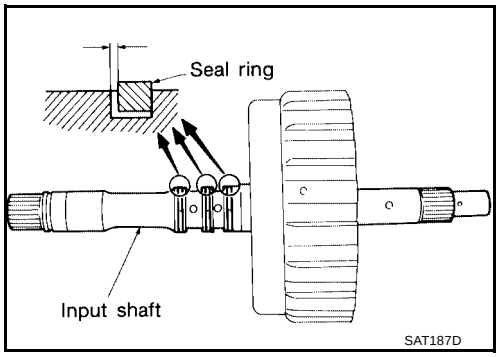


Seal Ring Clearance

- Install new seal rings onto input shaft.
- Measure clearance between seal ring and ring groove.

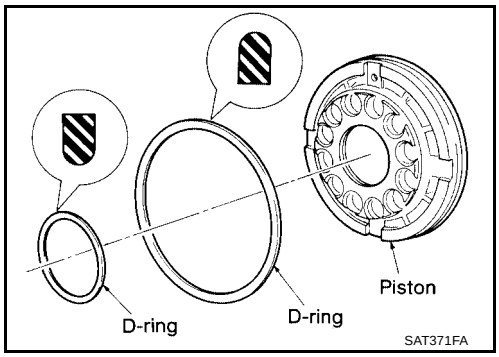
Standard clearance	**: 0.08 - 0.23 mm (0.0031 - 0.0091 in)**
Allowable limit	**: 0.23 mm (0.0091 in)**

- If not within allowable limit, replace input shaft assembly.

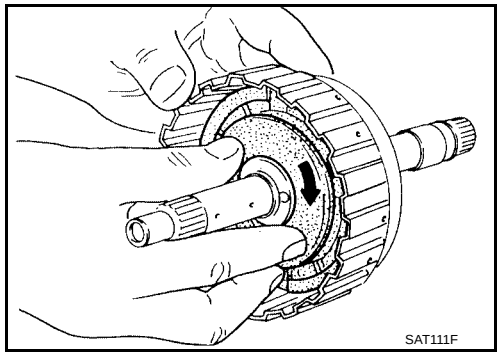


ASSEMBLY

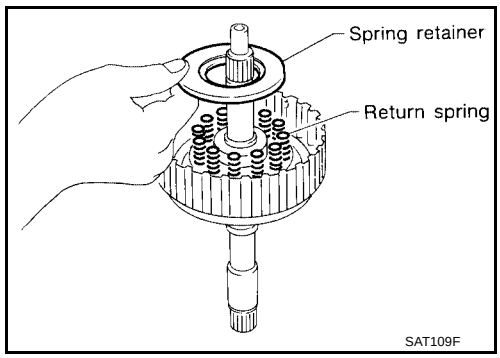
1. Install D-rings on piston.
   - **Apply ATF to both parts.**



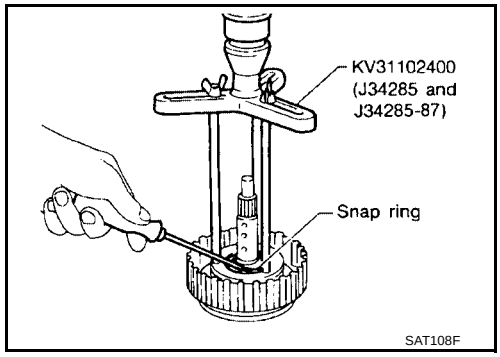
2. Install piston assembly by turning it slowly.
   - **Apply ATF to inner surface of drum.**



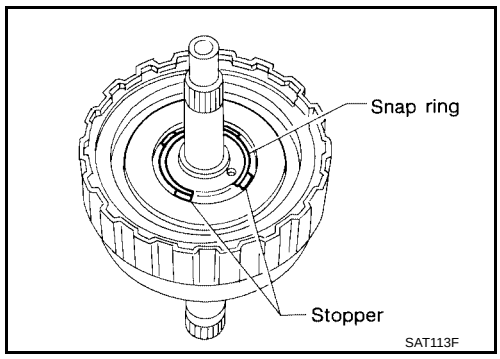
3. Install return springs and spring retainer on piston.



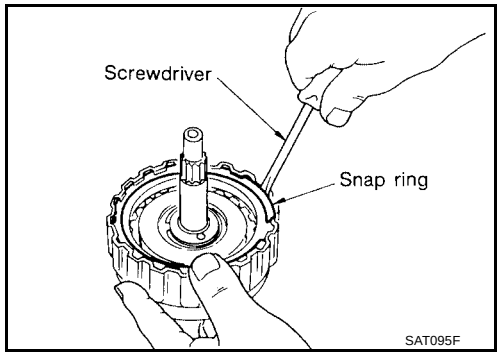
4. Set Tool on spring retainer and install snap ring while compressing return springs.
   - **Set Tool directly over return springs.**



   - **Do not align snap ring gap with spring retainer stopper.**



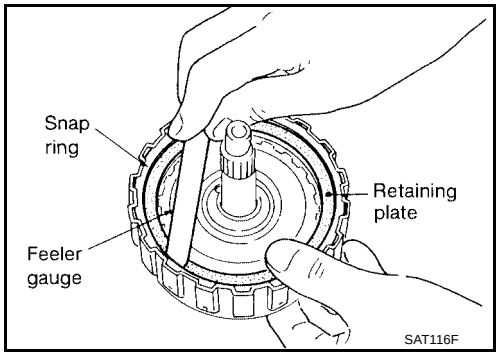
5. Install drive plates, driven plates and retaining plate.
   - **Take care with the order and direction of plates.**



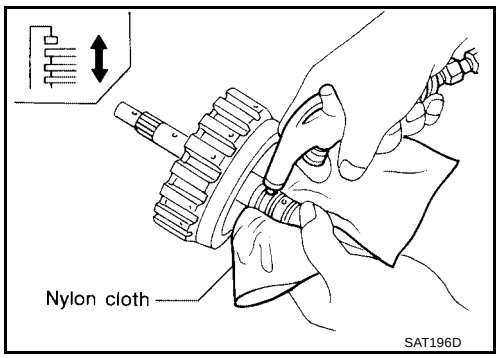
6. Install snap ring.
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

Specified clearance

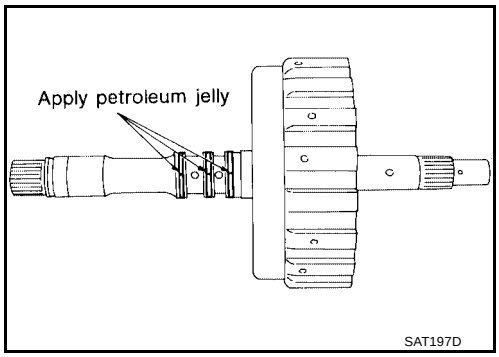
Standard	**: 1.8 - 2.2 mm (0.071 - 0.087 in)**
Allowable limit	**: 2.8 mm (0.110 in)**
Retaining plate	**: Refer to AT-749, "HIGH CLUTCH" .**



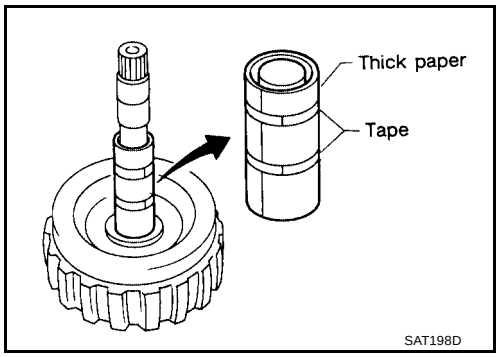
8. Check operation of high clutch.
Refer to AT-692, "DISASSEMBLY" .



9. Install seal rings to input shaft.
   - **Apply petroleum jelly to seal rings.**
   - **Always replace when removed.**



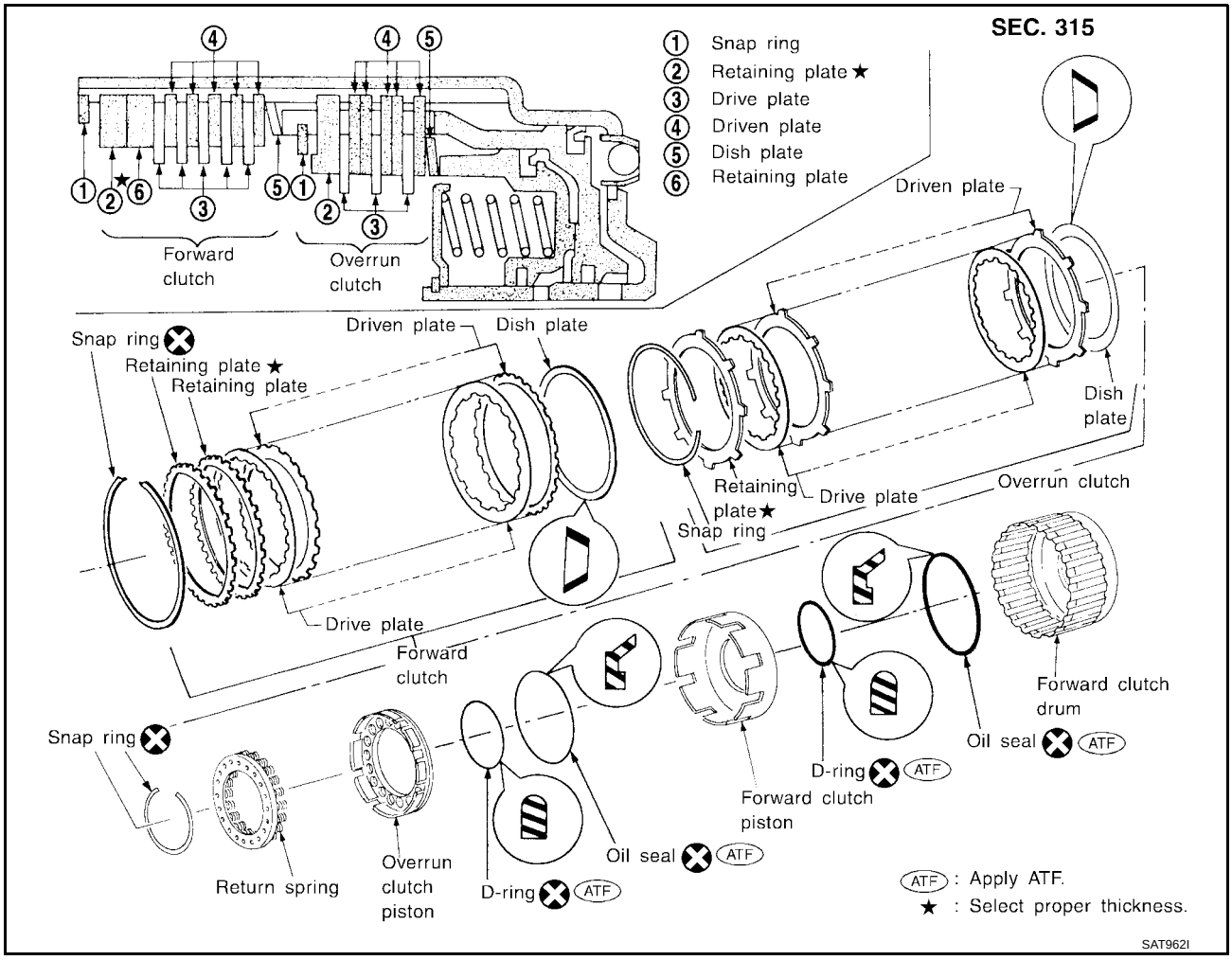
   - **Roll paper around seal rings to prevent seal rings from spreading.**



Forward And Overrun Clutches

ECS0067L

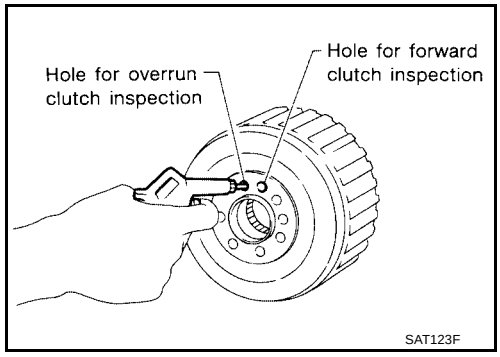
COMPONENTS



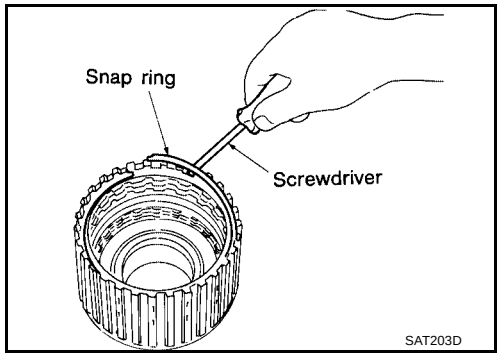
DISASSEMBLY

1. Check operation of forward clutch and overrun clutch.

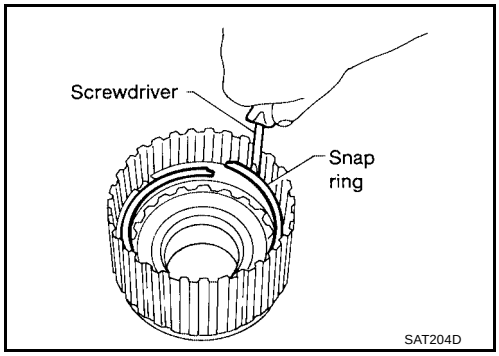
a. Install bearing retainer on forward clutch drum.
b. Apply compressed air to oil hole of forward clutch drum.
c. Check to see that retaining plate moves to snap ring.
d. If retaining plate does not contact snap ring:
   - D-ring might be damaged.
   - Oil seal might be damaged.
   - Fluid might be leaking past piston check ball.



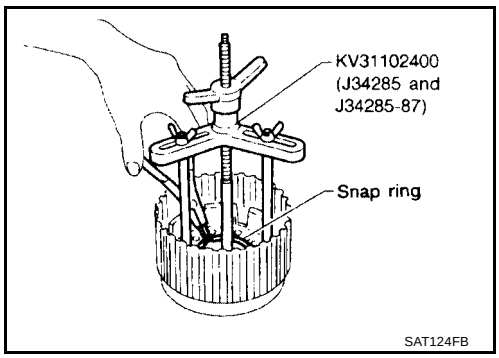
2. Remove snap ring for forward clutch.
3. Remove drive plates, driven plates, retaining plate and dish plate for forward clutch.



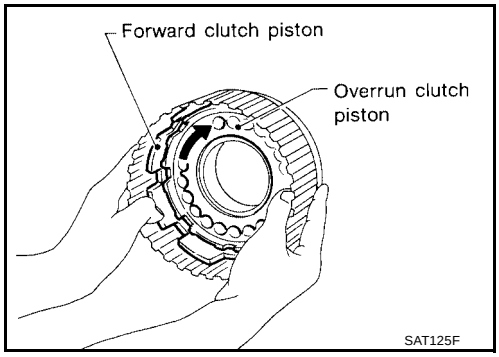
4. Remove snap ring for overrun clutch.
5. Remove drive plates, driven plates, retaining plate and dish plate for overrun clutch.



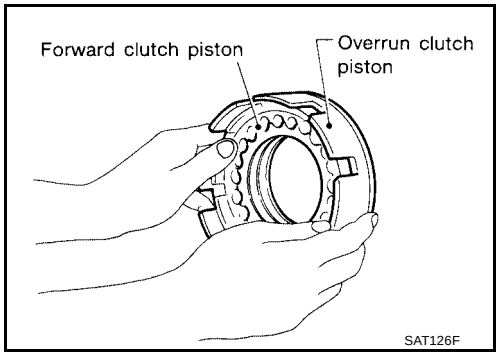
6. Set Tool on spring retainer and remove snap ring from forward clutch drum while compressing return springs.
   - **Set Tool directly over return springs.**
   - **Do not expand snap ring excessively.**
7. Remove spring retainer and return springs.
   - **Do not remove return springs from spring retainer.**



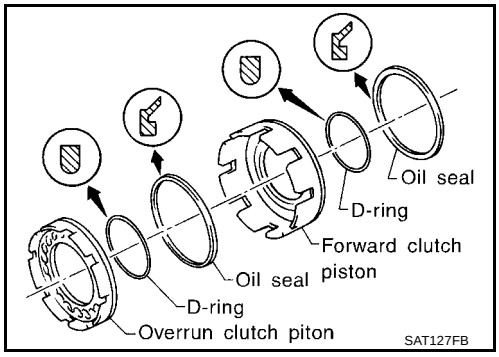
8. Remove forward clutch piston with overrun clutch piston from forward clutch drum by turning it.



9. Remove overrun clutch piston from forward clutch piston by turning it.



10. Remove D-rings and oil seals from forward clutch piston and overrun clutch piston.



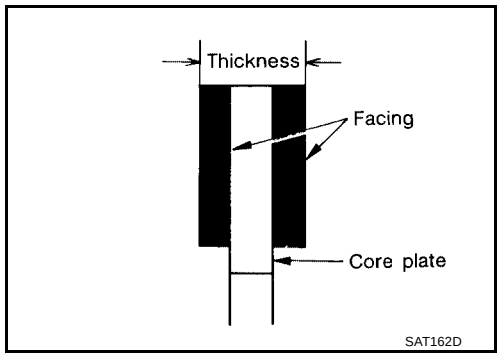
INSPECTION

Snap Rings, Spring Retainer and Return Springs

- Check for deformation, fatigue or damage.
- Replace if necessary.
- **When replacing spring retainer and return springs, replace them as a set.**

Forward Clutch and Overrun Clutch Drive Plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.



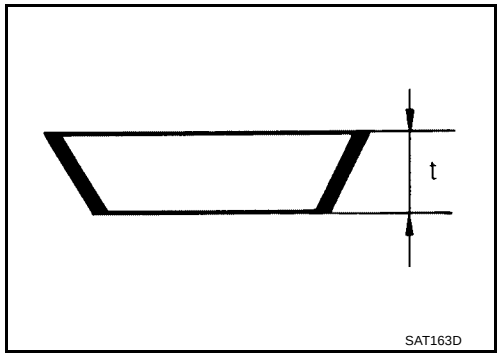
Thickness of drive plate:

Forward clutch	
Standard value	**: 1.6 mm (0.063 in)**
Wear limit	**: 1.4 mm (0.055 in)**
Overrun clutch	
Standard value	**: 1.6 mm (0.063 in)**
Wear limit	**: 1.4 mm (0.055 in)**

- If not within wear limit, replace.

Forward Clutch and Overrun Clutch Dish Plates

- Check for deformation or damage.
- Measure thickness of dish plate.



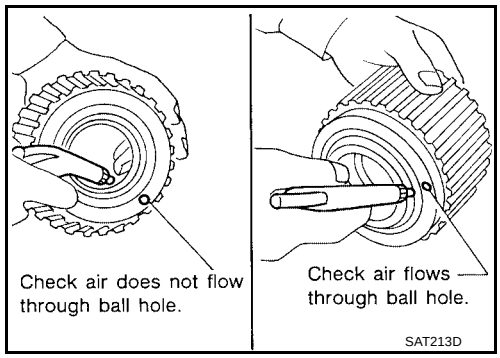
Thickness of dish plate

Forward clutch	**: 2.7 mm (0.106 in)**
Overrun clutch	**: 2.7 mm (0.106 in)**

- If deformed or fatigued, replace.

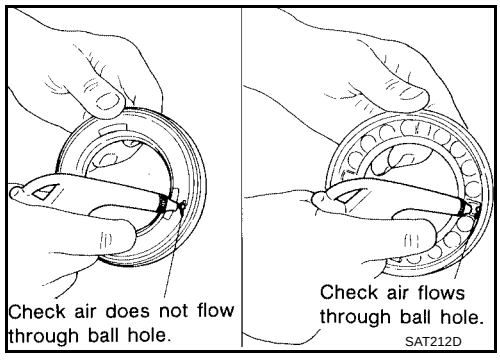
Forward Clutch Drum

- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole from outside of forward clutch drum. Make sure air leaks past ball.
- Apply compressed air to oil hole from inside of forward clutch drum. Make sure there is no air leakage.



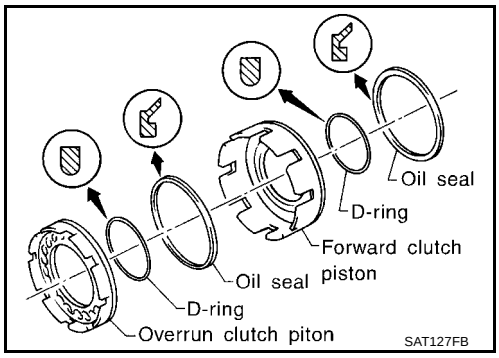
Overrun Clutch Piston

- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side. Make sure that air leaks past ball.

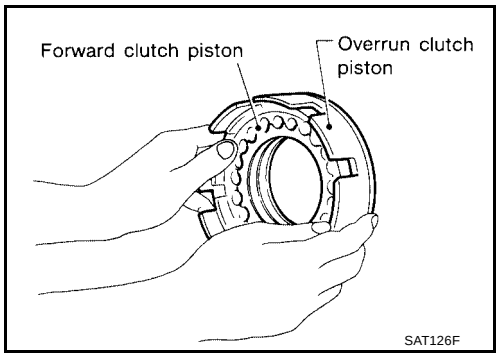


ASSEMBLY

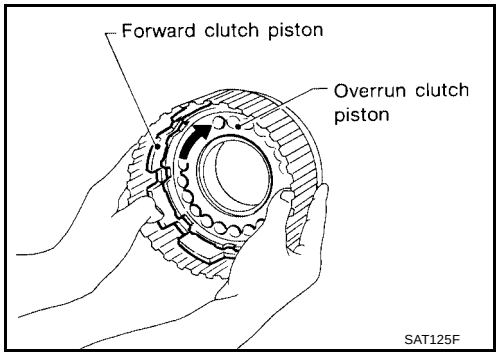
1. Install D-rings and oil seals on forward clutch piston and overrun clutch piston.
   - **Take care with direction of oil seal.**
   - **Apply ATF to both parts.**



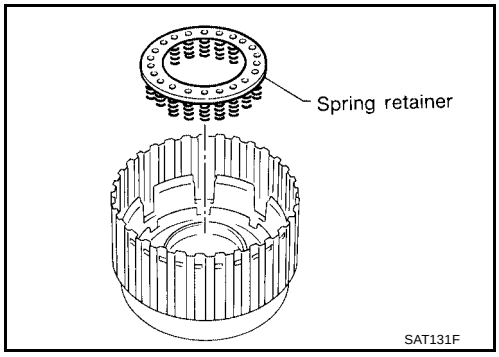
2. Install overrun clutch piston assembly on forward clutch piston by turning it slowly.
   - **Apply ATF to inner surface of forward clutch piston.**



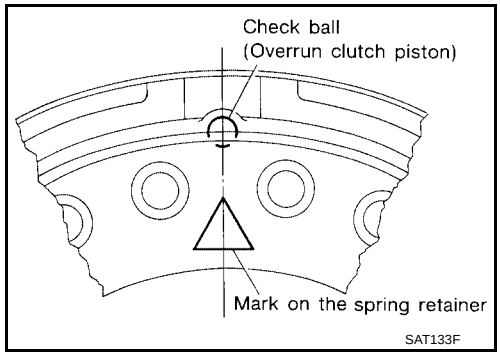
3. Install forward clutch piston assembly on forward clutch drum by turning it slowly.
   - **Apply ATF to inner surface of drum.**



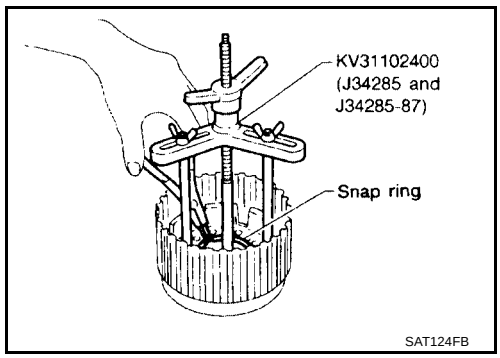
4. Install return spring on overrun clutch piston.



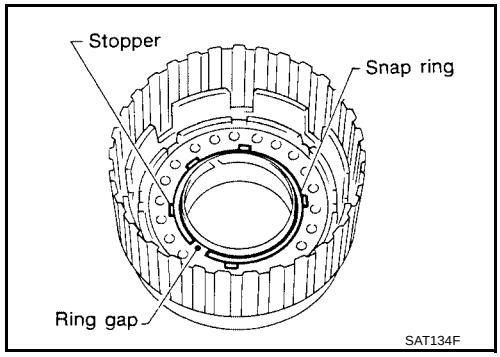
- Align the mark on spring retainer with check ball in overrun clutch piston.



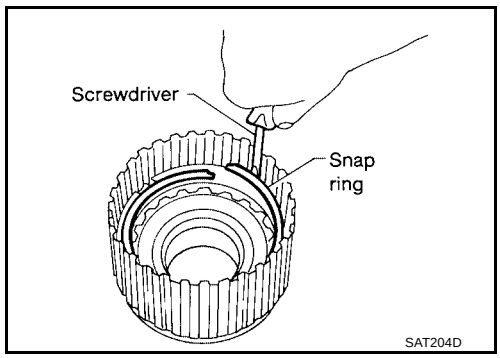
5. Set Tool on spring retainer and install snap ring while compressing return springs.
   - **Set Tool directly over return springs.**



   - **Do not align snap ring gap with spring retainer stopper.**



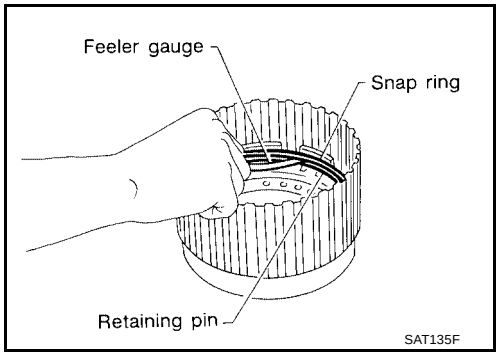
6. Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.
   - **Take care with order of plates.**



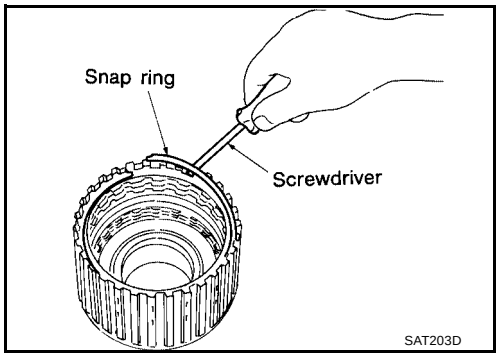
7. Install snap ring for overrun clutch.

8. Measure clearance between overrun clutch retaining plate and snap ring.
If not within allowable limit, select proper retaining plate.

Specified clearance	
Standard	**: 0.7 - 1.1 mm (0.028 - 0.043 in)**
Allowable limit	**: 1.7 mm (0.067 in)**
Overrun clutch retaining plate	**Refer to AT-750, "OVERRUN CLUTCH" .**

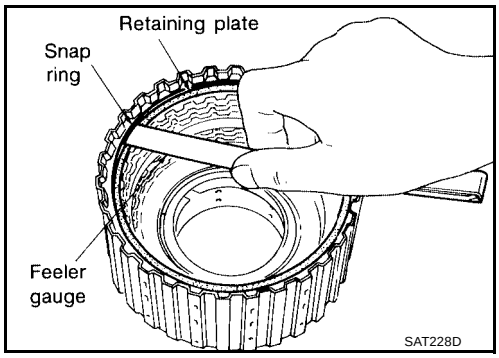


9. Install drive plates, driven plates, retaining plate and dish plate for forward clutch.
   - **Take care with order of plates.**
10. Install snap ring for forward clutch.

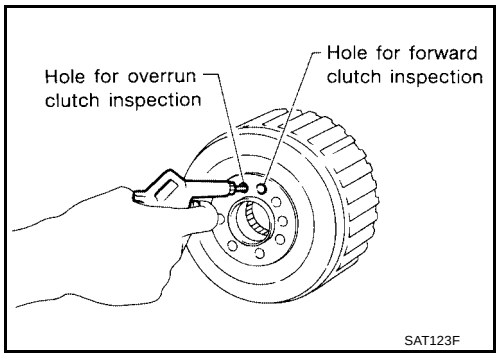


11. Measure clearance between forward clutch retaining plate and snap ring.
If not within allowable limit, select proper retaining plate.

Specified clearance	
Standard	**: 0.45 - 0.85 mm (0.0177 - 0.0335 in)**
Allowable limit	**: 1.85 mm (0.0728 in)**
Forward clutch retaining plate	**: Refer to AT-749, "FORWARD CLUTCH" .**



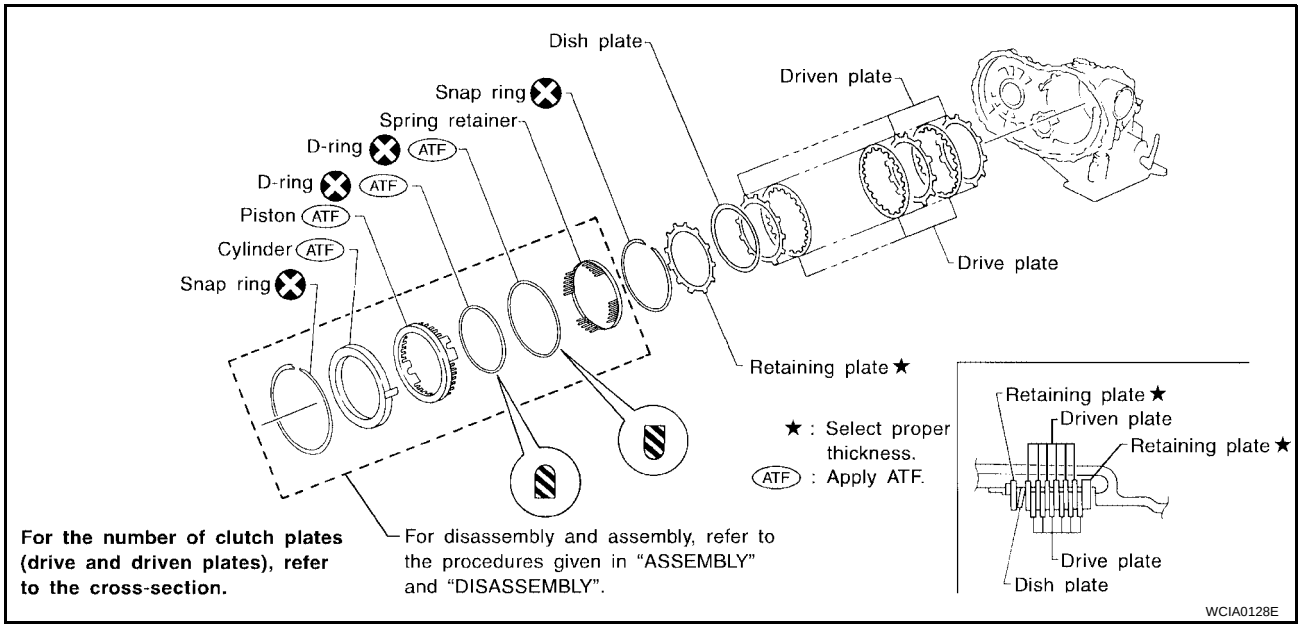
12. Check operation of forward clutch.
Refer to AT-697, "DISASSEMBLY" .
13. Check operation of overrun clutch.
Refer to AT-697, "DISASSEMBLY" .



Low & Reverse Brake

ECS0067M

COMPONENTS



DISASSEMBLY

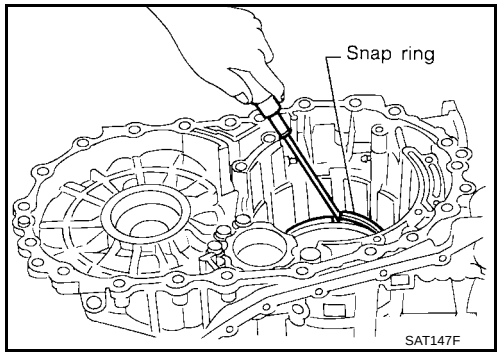
1. Check operation of low & reverse brake.

a. Apply compressed air to oil hole of transmission case.

b. Check to see that retaining plate moves to snap ring.

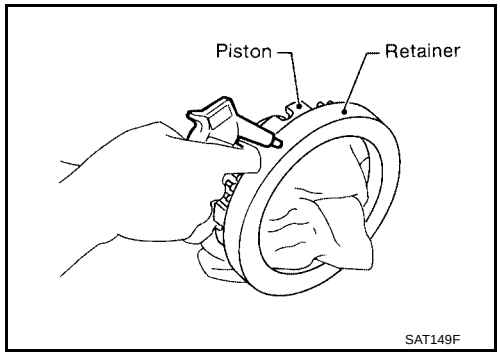
c. If retaining plate does not contact snap ring:

- D-ring might be damaged.
- Fluid might be leaking past piston check ball.

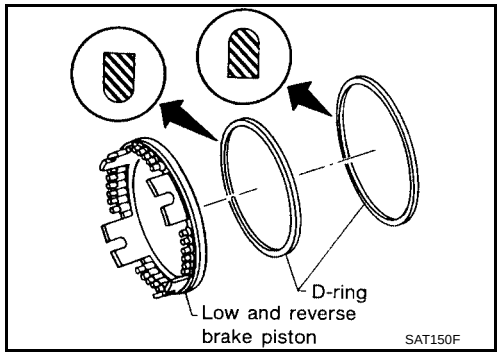


2. In order to remove piston, apply compressed air to oil hole of retainer while holding piston.

- **Apply air gradually and allow piston to come out evenly.**



3. Remove D-rings from piston.



INSPECTION

Low and Reverse Brake Snap Ring, Spring Retainer and Return Springs

- Check for deformation, fatigue or damage.
  If necessary, replace.
- **When replacing spring retainer and return springs, replace them as a set.**

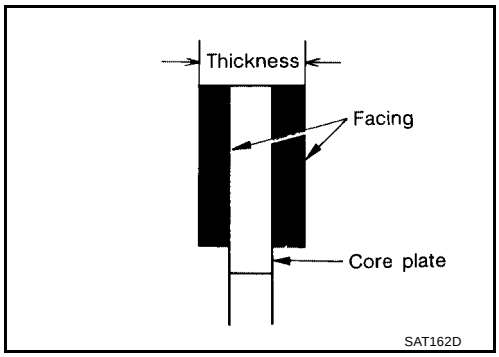
Low and Reverse Brake Drive Plate

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate

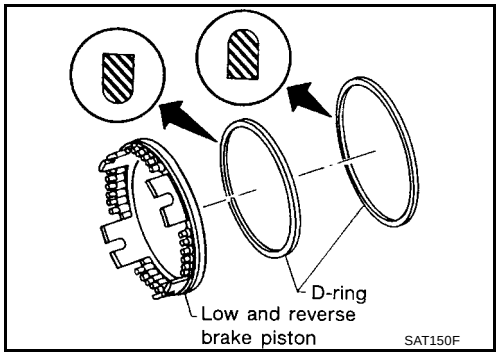
Standard value	**: 1.8 mm (0.071 in)**
Wear limit	**: 1.6 mm (0.063 in)**

- If not within wear limit, replace.

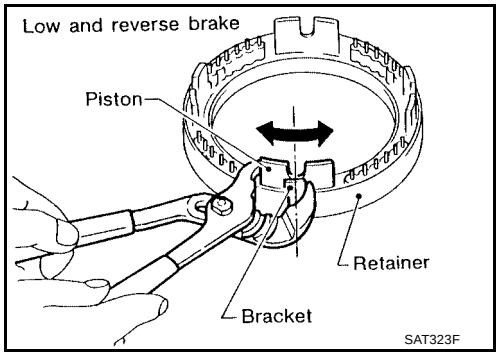


ASSEMBLY

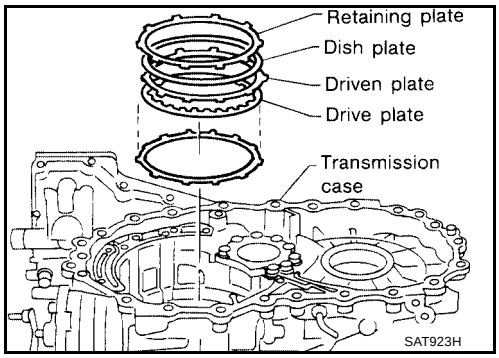
1. Install D-rings on piston.
   - **Apply ATF to both parts.**



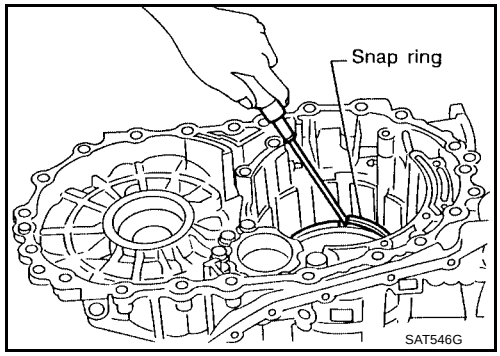
2. Set and align piston with retainer.
   - **This operation is required in order to engage the protrusions of piston to return springs correctly.**
     Further procedures are given in "ASSEMBLY". Refer to AT-724, "ASSEMBLY" .



3. Install driven plates, drive plates, retaining plate and dish plate on transmission case.
   - **Take care with order of plates and direction of dish plate.**



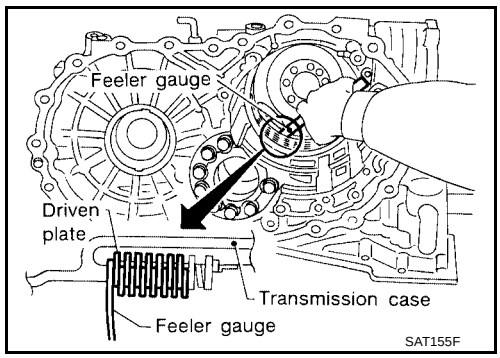
4. Install snap ring.



5. Measure clearance between driven plate and transmission case. If not within allowable limit, select proper retaining plate. (front side)

Specified clearance

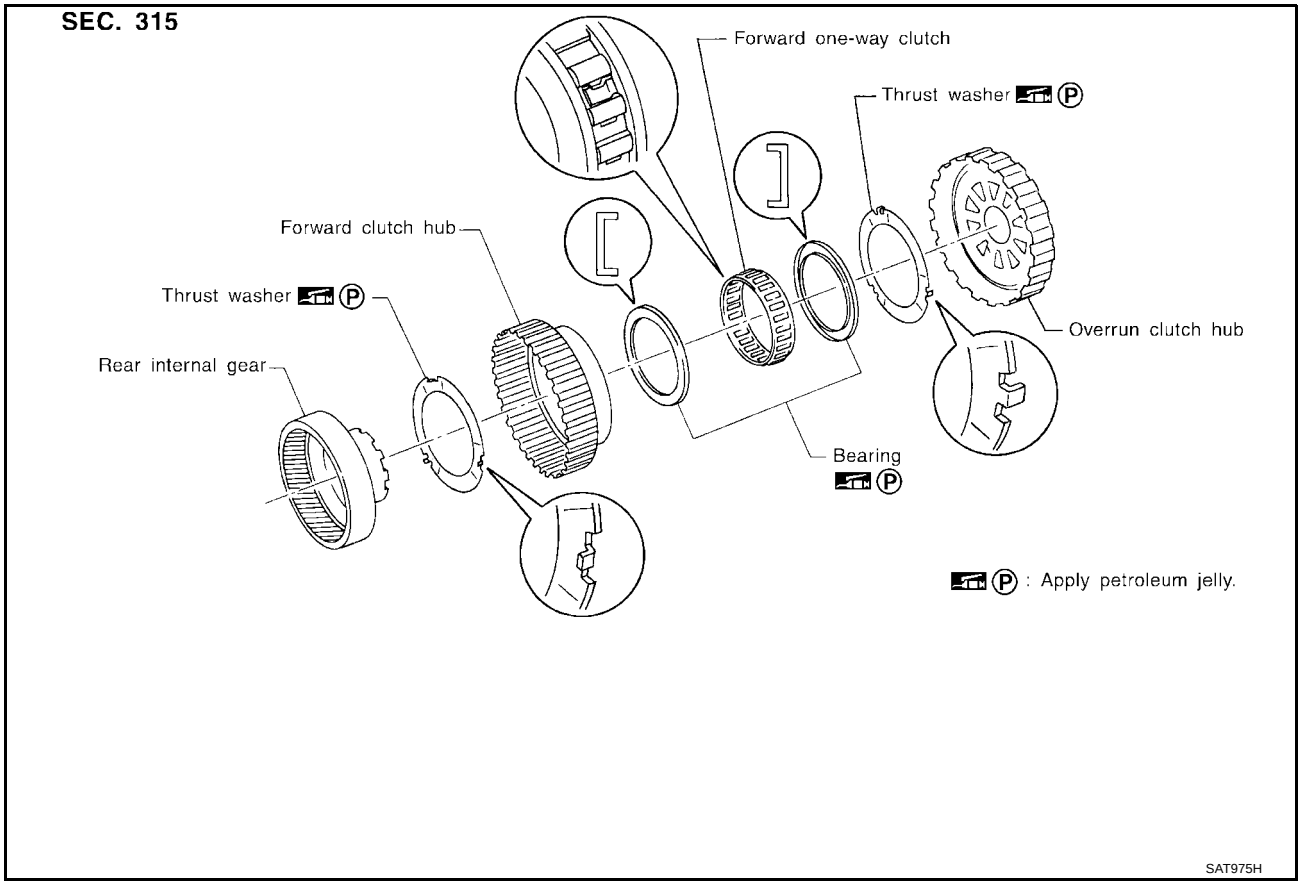
Standard	**: 1.7 - 2.1 mm (0.067 - 0.083 in)**
Allowable limit	**: 3.3 mm (0.130 in)**
Retaining plate	**Refer to AT-750, "LOW & REVERSE BRAKE" .**



Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

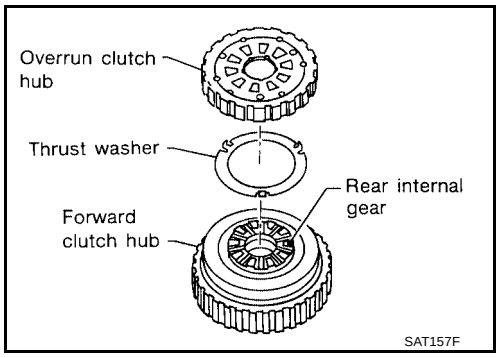
ECS0067N

COMPONENTS

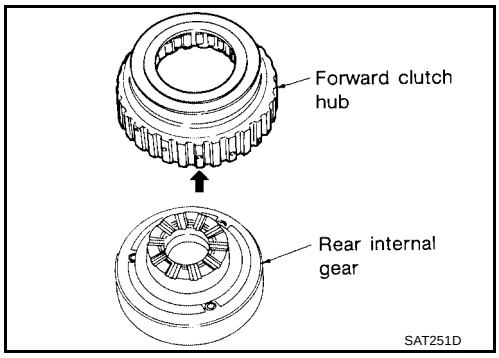


DISASSEMBLY

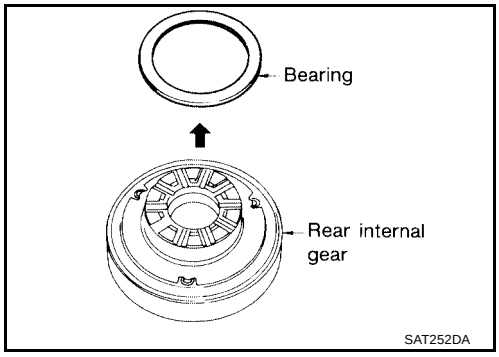
1. Remove overrun clutch hub and thrust washer from forward clutch hub.



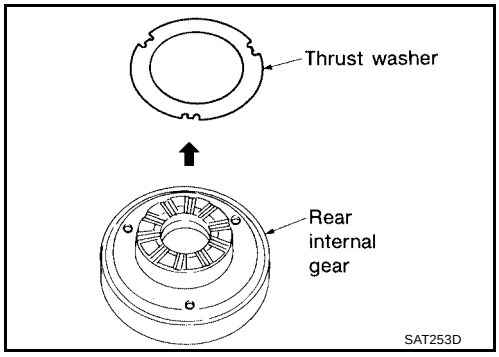
2. Remove forward clutch hub from rear internal gear.



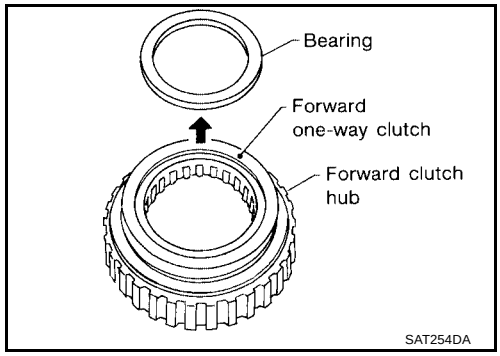
3. Remove bearing from rear internal gear.



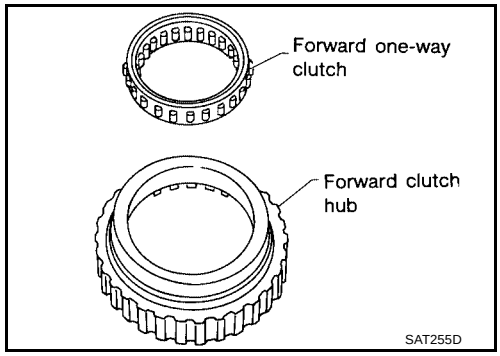
4. Remove thrust washer from rear internal gear.



5. Remove bearing from forward one-way clutch.



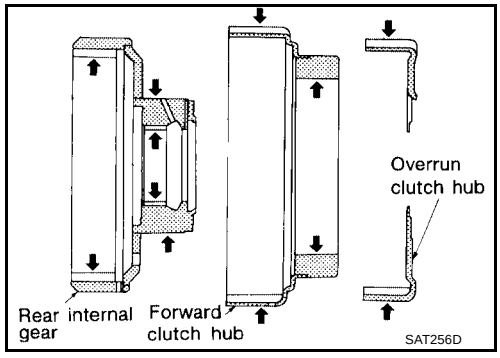
6. Remove forward one-way clutch from forward clutch hub.



INSPECTION

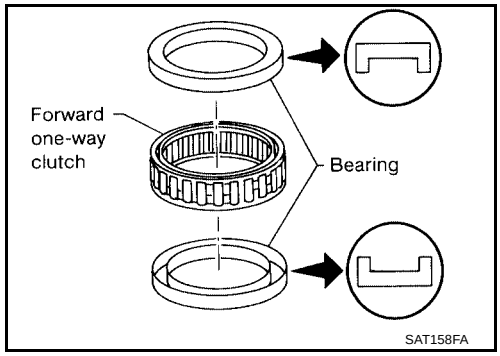
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

- Check rubbing surfaces for wear or damage.



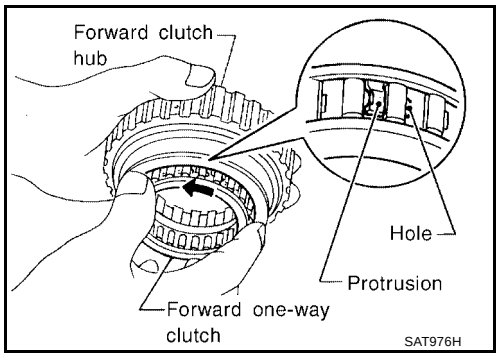
Bearings and Forward One-Way Clutch

- Check bearings for deformation and damage.
- Check forward one-way clutch for wear and damage.

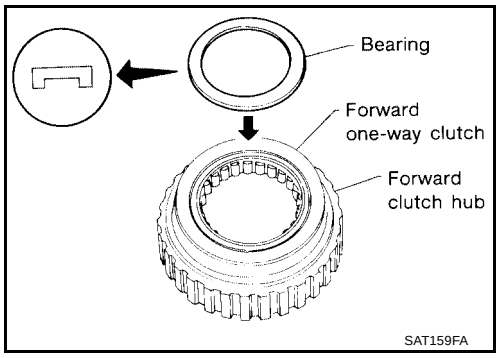


ASSEMBLY

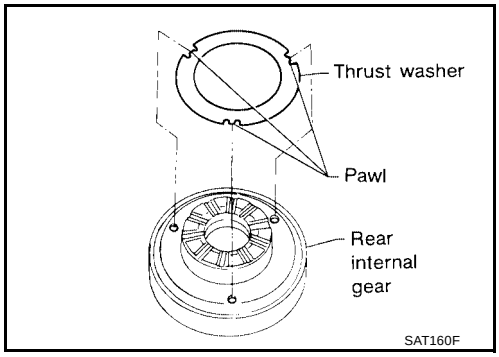
1. Install forward one-way clutch on forward clutch.
   - **Take care with the direction of forward one-way clutch.**



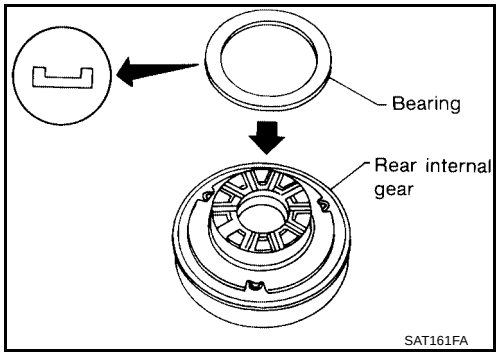
2. Install bearing on forward one-way clutch.
   - **Apply petroleum jelly to bearing.**



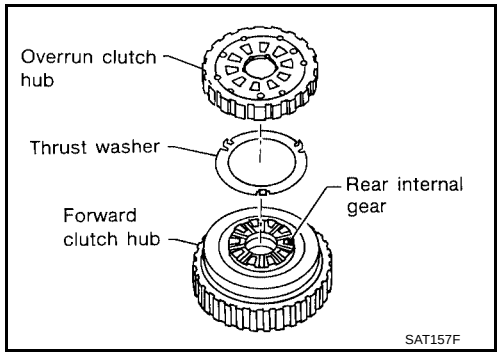
3. Install thrust washer on rear internal gear.
   - **Apply petroleum jelly to thrust washer.**
   - **Align hooks of thrust washer with holes of rear internal gear.**



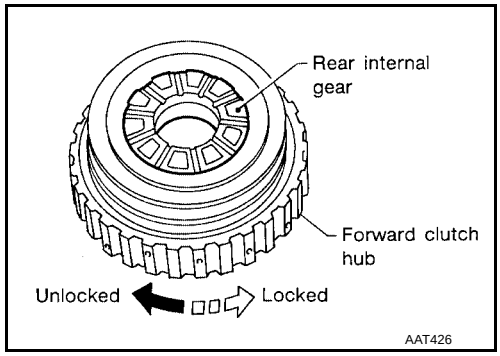
4. Install bearing on rear internal gear.
   - **Apply petroleum jelly to bearing.**



5. Install thrust washer and overrun clutch hub.
   - **Apply petroleum jelly to thrust washer.**
   - **Align hooks of thrust washer with holes of overrun clutch hub.**
   - **Align projections of rear internal gear with holes of overrun clutch hub.**



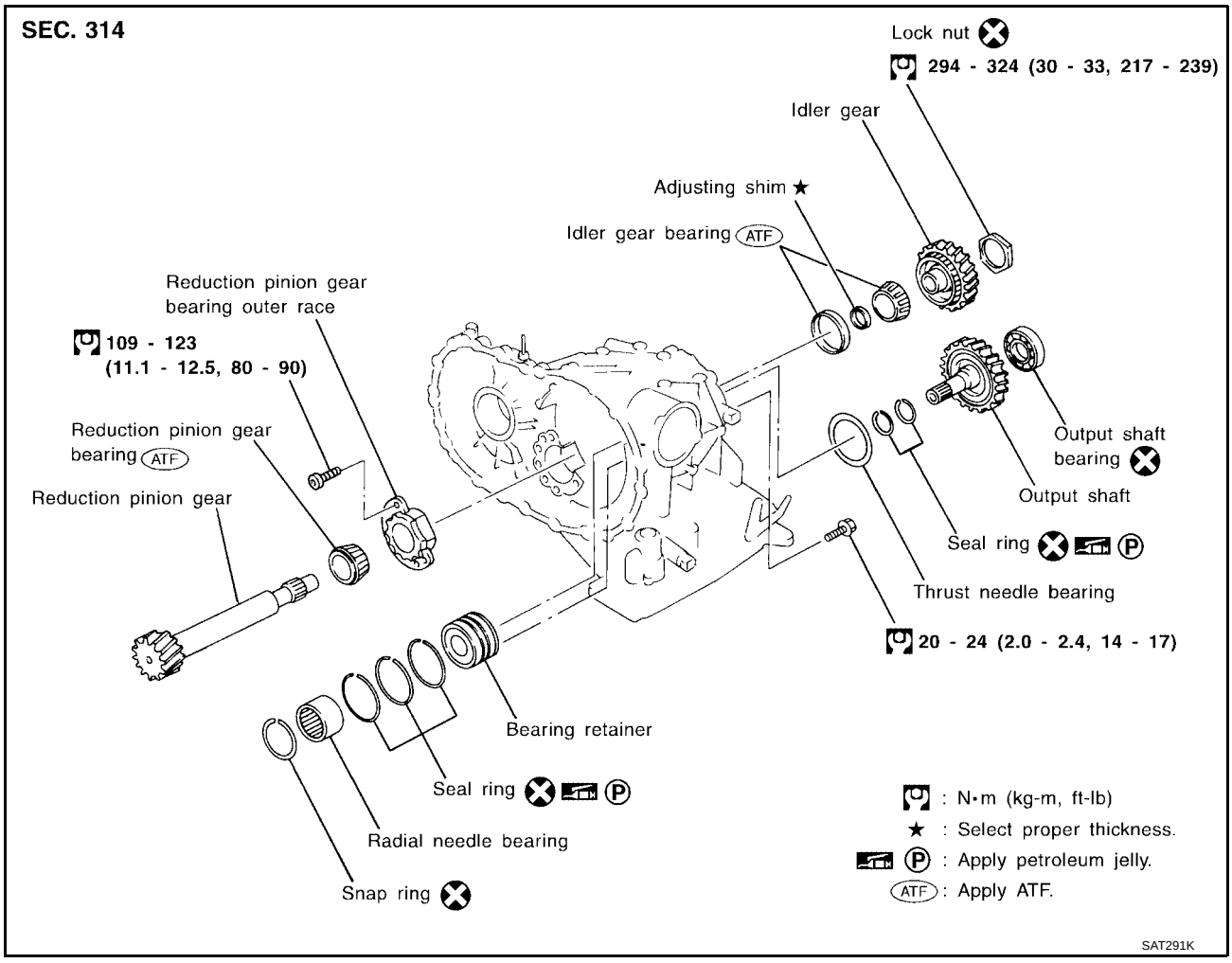
6. Install forward clutch hub on rear internal gear.
   - **Check operation of forward one-way clutch.**
     Hold rear internal gear and turn forward clutch hub.
     Check forward clutch hub for correct locking and unlocking directions.
   - **If not as shown in illustration, check installation direction of forward one-way clutch.**



Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer

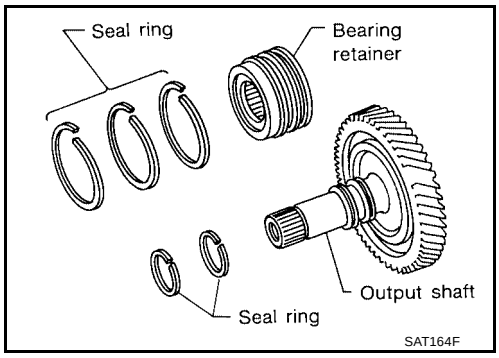
ECS0067O

COMPONENTS

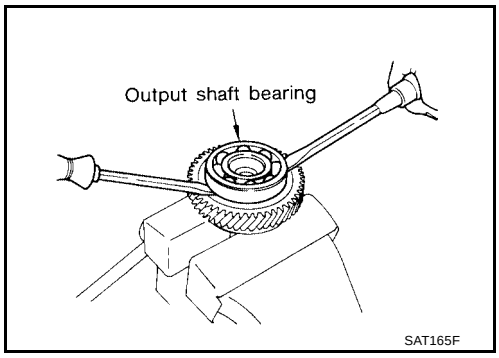


DISASSEMBLY

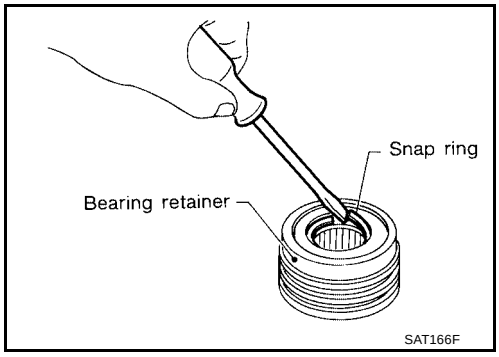
1. Remove seal rings from output shaft and bearing retainer.



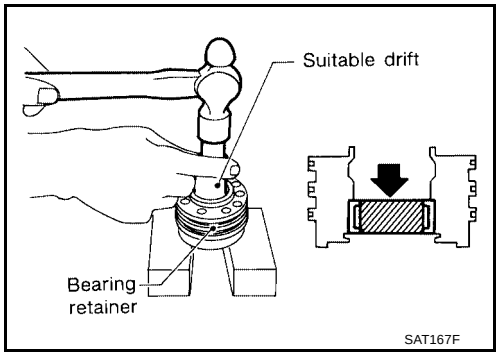
2. Remove output shaft bearing with screwdrivers.
   - **Always replace bearing with a new one when removed.**
   - **Do not damage output shaft.**



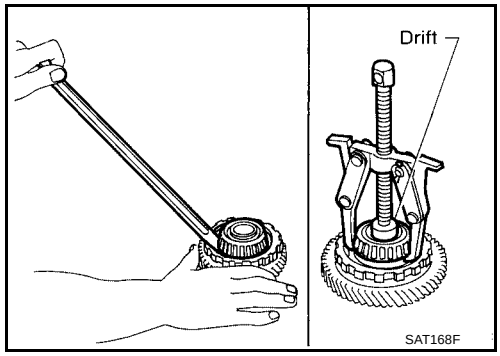
3. Remove snap ring from bearing retainer.



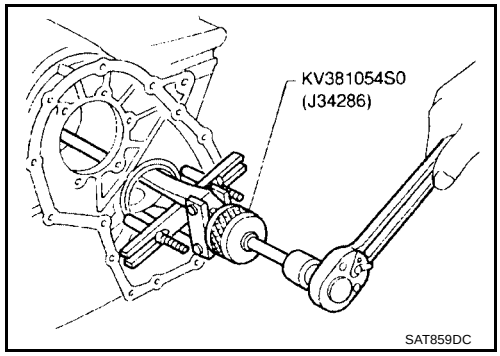
4. Remove needle bearing from bearing retainer.



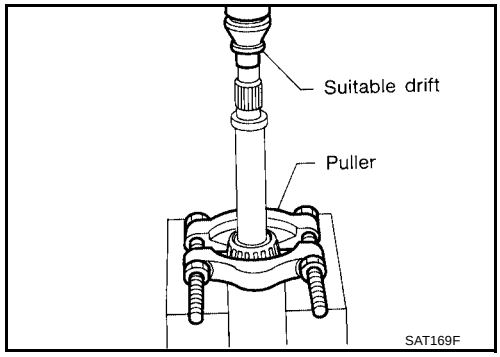
5. Remove idler gear bearing inner race from idler gear.



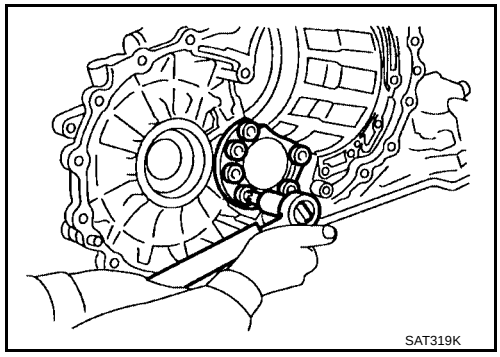
6. Remove idler gear bearing outer race from transmission case.



7. Press out reduction pinion gear bearing inner race from reduction pinion gear.



8. Remove reduction pinion gear bearing outer race from transmission case.



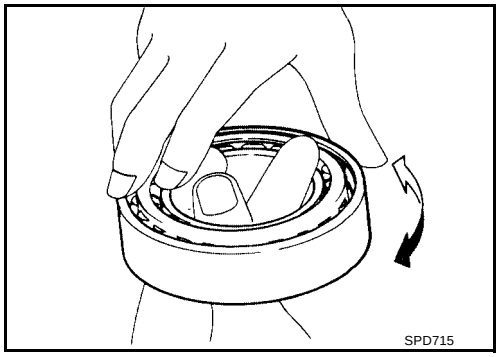
INSPECTION

Output Shaft, Idler Gear and Reduction Pinion Gear

- Check shafts for cracks, wear or bending.
- Check gears for wear, chips and cracks.

Bearing

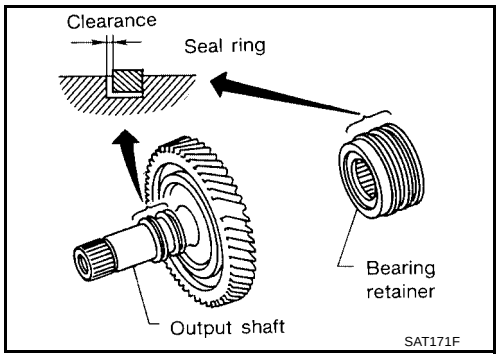
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**



Seal Ring Clearance

- Install new seal rings to output shaft.
- Measure clearance between seal ring and ring groove of output shaft.

Standard clearance	**: 0.10 - 0.25 mm (0.0039 - 0.0098 in)**
Allowable limit	**: 0.25 mm (0.0098 in)**



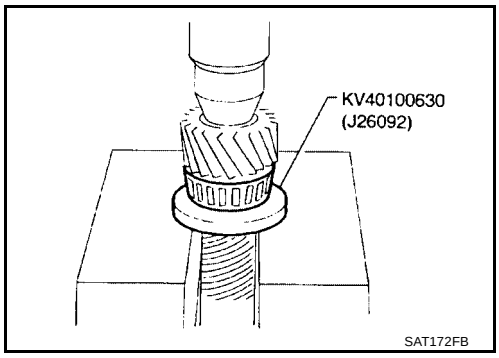
- If not within allowable limit, replace output shaft.
- Install new seal rings to bearing retainer.
- Measure clearance between seal ring and ring groove of bearing retainer.

Standard clearance	**: 0.10 - 0.30 mm (0.0039 - 0.0118 in)**
Allowable limit	**: 0.30 mm (0.0118 in)**

- If not within allowable limit, replace bearing retainer.

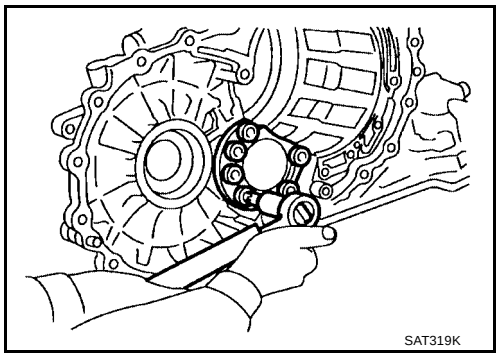
ASSEMBLY

1. Press reduction pinion gear bearing inner race on reduction pinion gear.

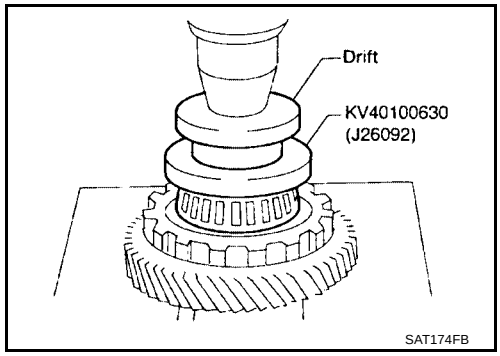


2. Install reduction pinion gear bearing outer race on transmission case.

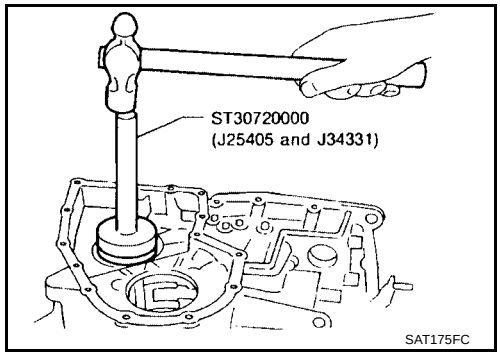
: 109 - 123 N·m (11.1 - 12.5 kg-m, 80 - 90 ft-lb)



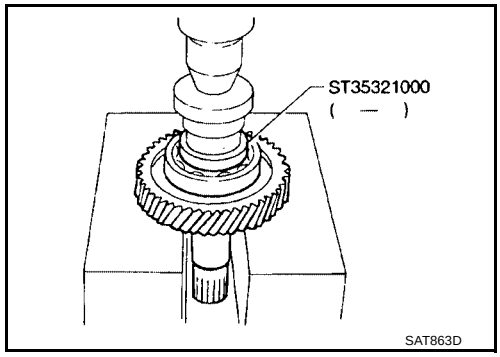
3. Press idler gear bearing inner race on idler gear.



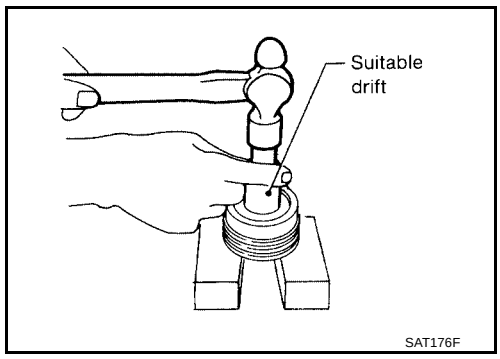
4. Install idler gear bearing outer race on transmission case.



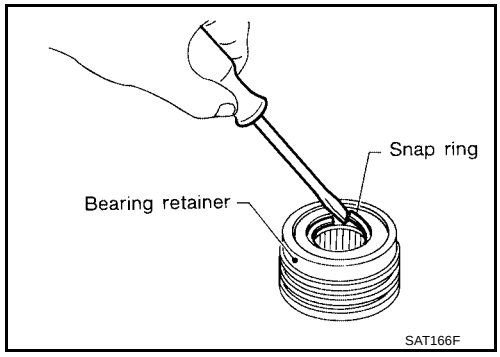
5. Press output shaft bearing on output shaft.



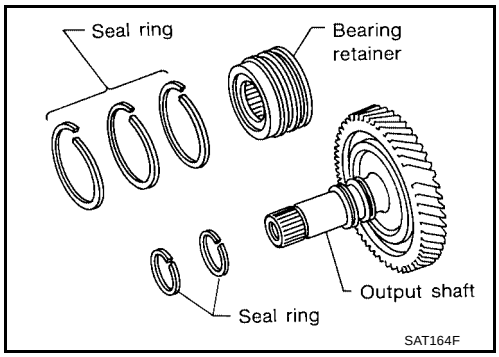
6. Press needle bearing on bearing retainer.



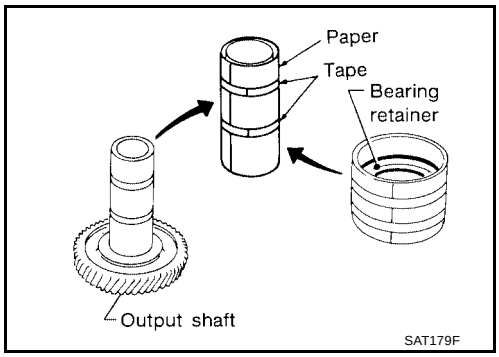
7. Install snap ring to bearing retainer.



8. After packing ring grooves with petroleum jelly, carefully install new seal rings on output shaft and bearing retainer.



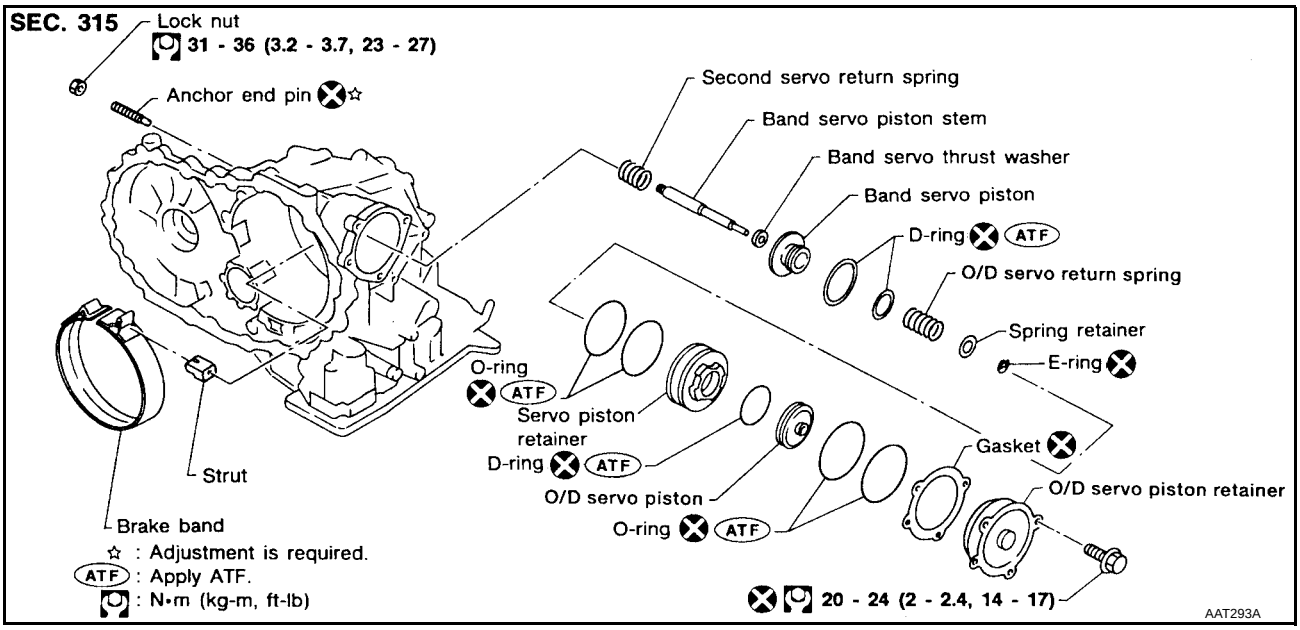
- **Roll paper around seal rings to prevent seal rings from spreading.**



Band Servo Piston Assembly

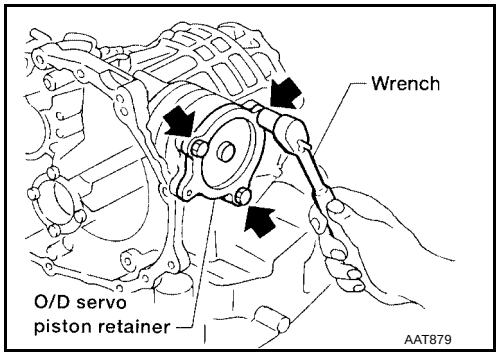
ECS0067P

COMPONENTS

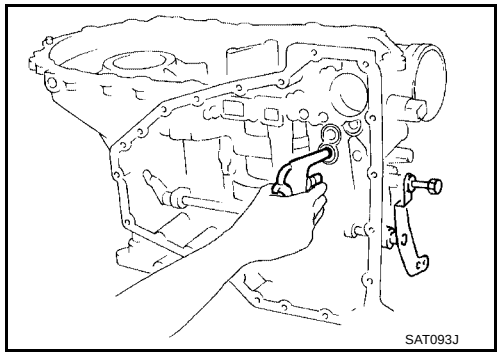


DISASSEMBLY

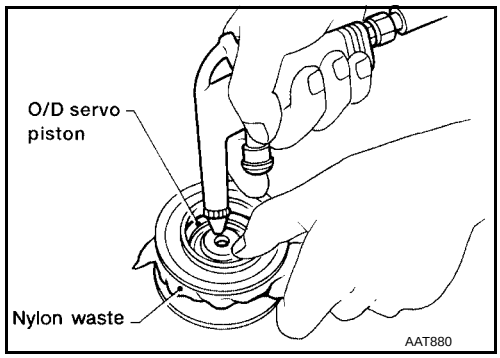
1. Remove band servo piston fixing bolts.



2. Apply compressed air to oil hole in transmission case to remove O/D servo piston retainer and band servo piston assembly.
   - **Hold band servo piston assembly with a rag or nylon waste.**

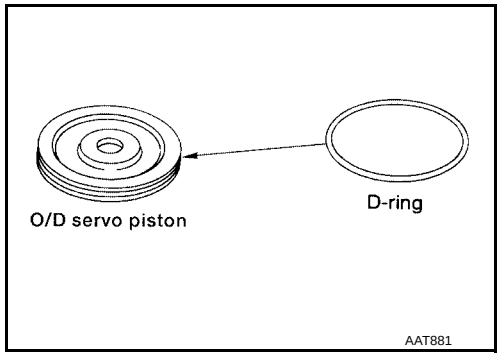

SAT093J

3. Apply compressed air to oil hole in O/D servo piston retainer to remove O/D servo piston from retainer.
   - **Hold O/D band servo piston while applying compressed air.**



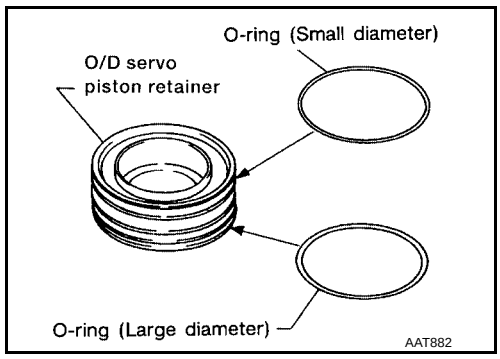
AAT880

4. Remove D-ring from O/D servo piston.



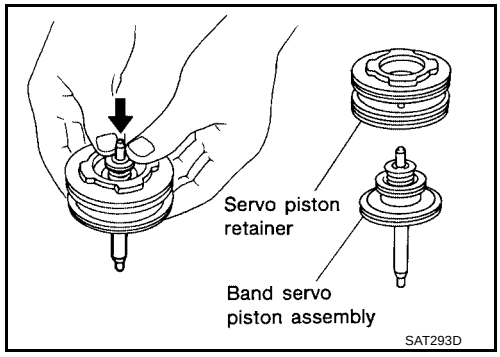
AAT881

5. Remove O-rings from O/D servo piston retainer.



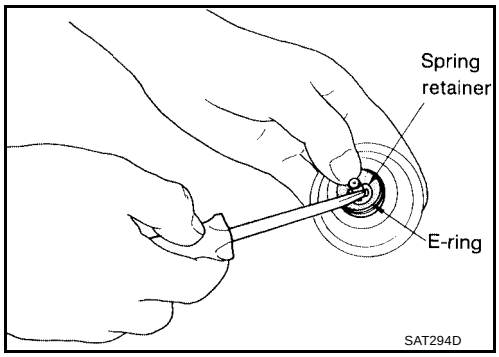
AAT882

6. Remove band servo piston assembly from servo piston retainer by pushing it forward.

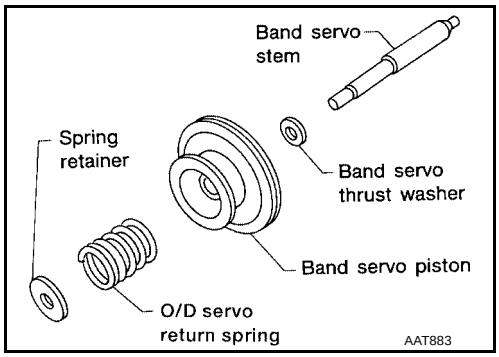


SAT293D

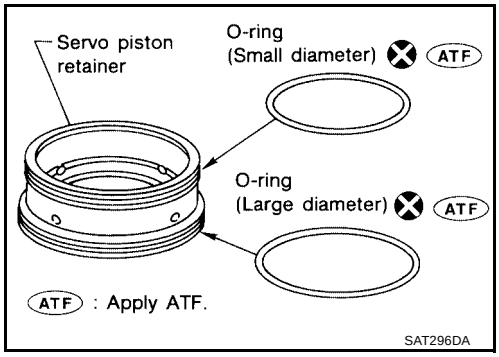
7. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.



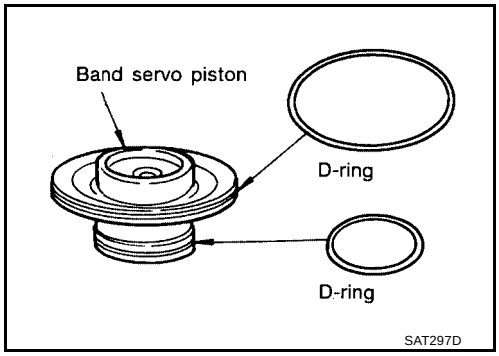
8. Remove O/D servo return spring, band servo thrust washer and band servo piston stem from band servo piston.



9. Remove O-rings from servo piston retainer.



10. Remove D-rings from band servo piston.



INSPECTION

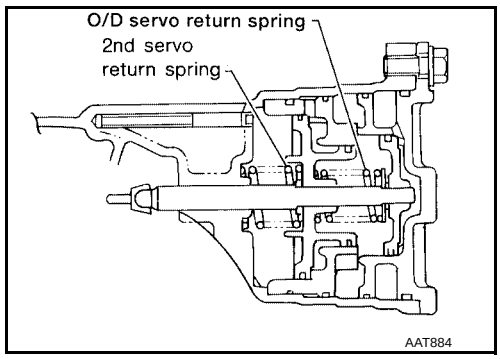
Pistons, Retainers and Piston Stem

- Check frictional surfaces for abnormal wear or damage.

Return Springs

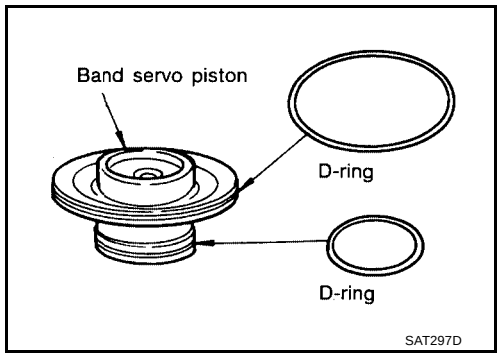
- Check for deformation or damage.
- Measure free length and outer diameter.

Inspection standard **: Refer to AT-753, "RETURN SPRING" .**

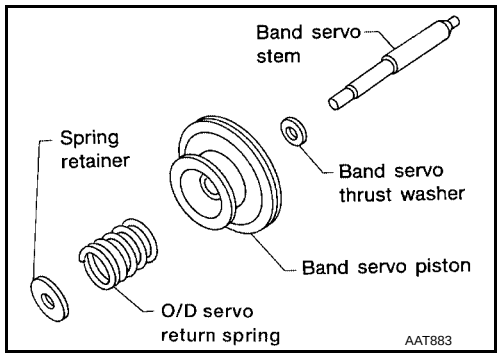


ASSEMBLY

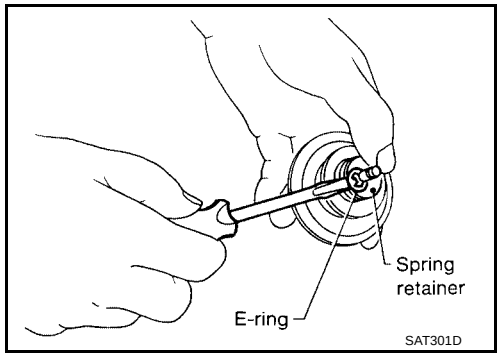
1. Install D-rings to servo piston retainer.
   - **Apply ATF to D-rings.**
   - **Pay attention to position of each O-ring.**



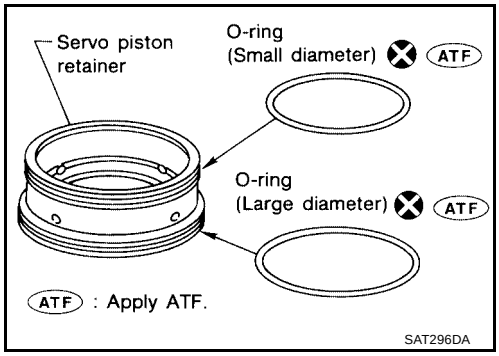
2. Install band servo piston stem, band servo thrust washer, O/D servo return spring and spring retainer to band servo piston.



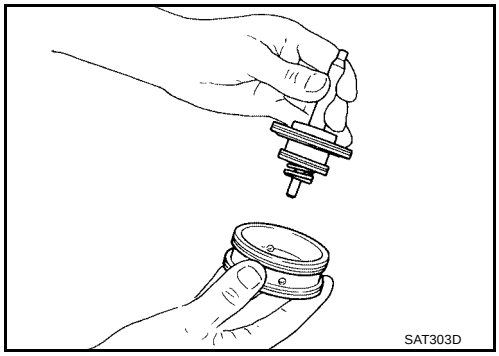
3. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



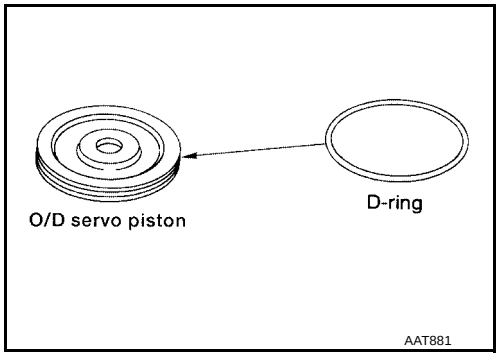
4. Install O-rings to servo piston retainer.
   - **Apply ATF to O-rings.**
   - **Pay attention to position of each O-ring.**



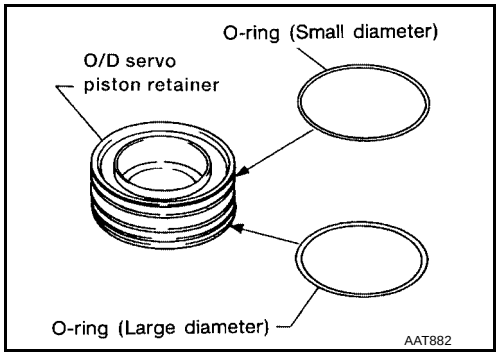
5. Install band servo piston assembly to servo piston retainer by pushing it inward.



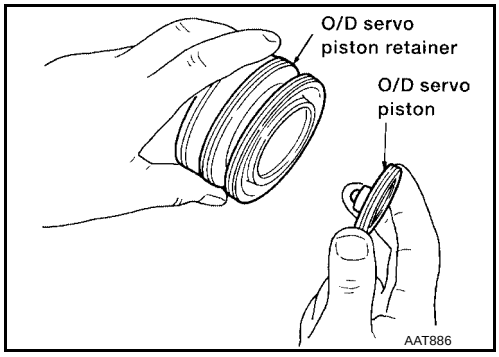
6. Install D-ring to O/D servo piston.
   - **Apply ATF to D-ring.**



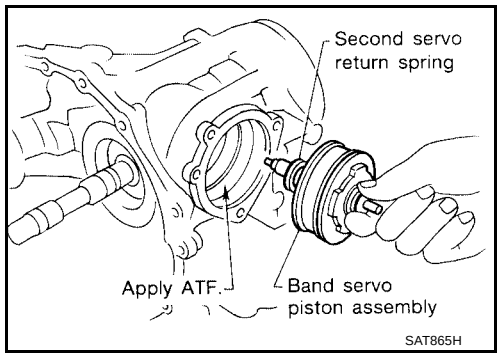
7. Install O-rings to O/D servo piston retainer.
   - **Apply ATF to O-rings.**
   - **Pay attention to position of each O-ring.**



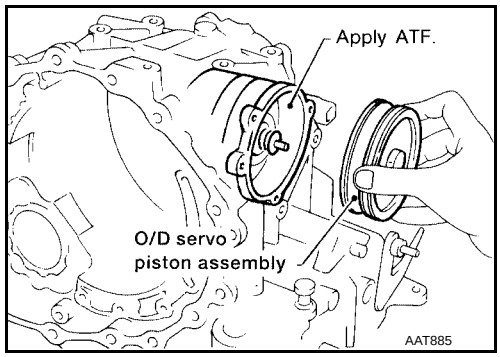
8. Install O/D servo piston to O/D servo piston retainer.



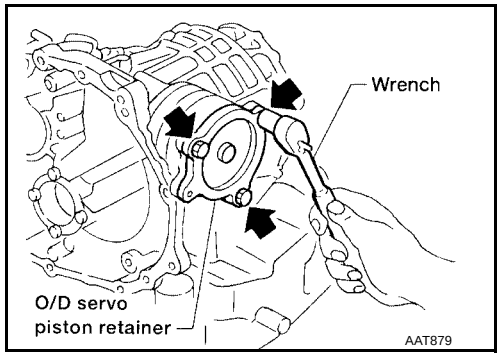
9. Install band servo piston assembly and 2nd servo return spring to transmission case.
   - **Apply ATF to O-ring of band servo piston and transmission case.**



10. Install O/D servo piston assembly to transmission case.
    - **Apply ATF to O-ring of band servo piston and transmission case.**

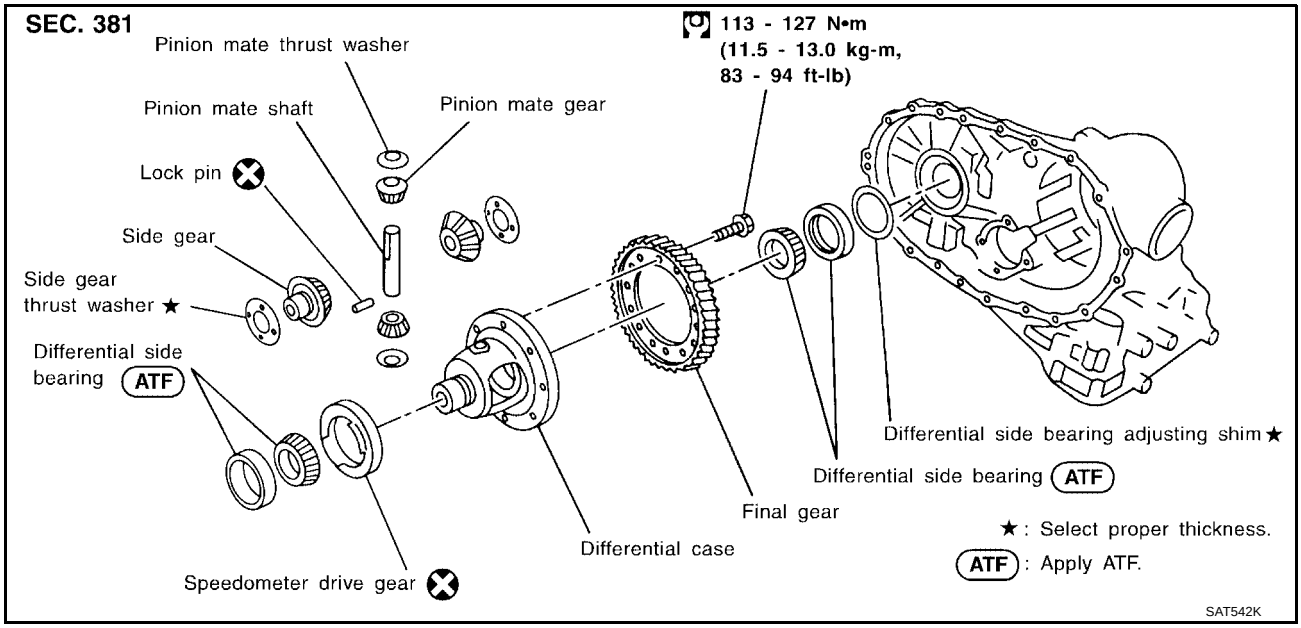


11. Install O/D servo piston retainer to transmission case. Refer to AT-717, "ASSEMBLY" .



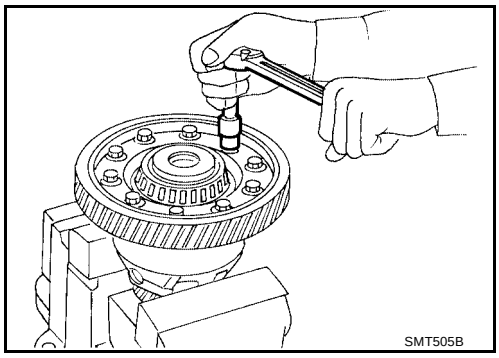
Final Drive
COMPONENTS

ECS0067Q

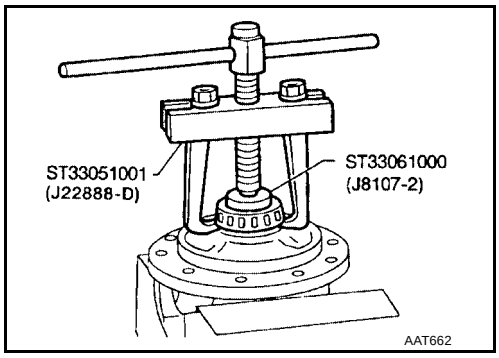


DISASSEMBLY

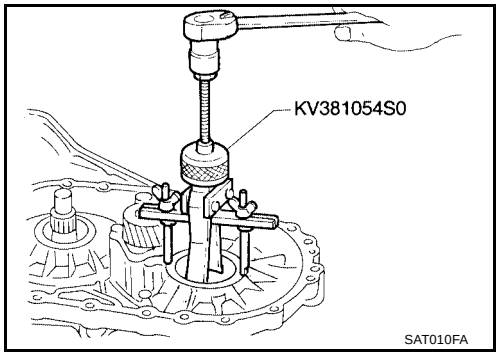
1. Remove final gear.



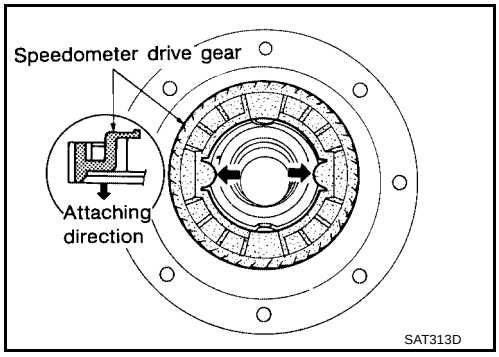
2. Press out differential side bearings.
   - **Be careful not to mix up the right and left bearings.**



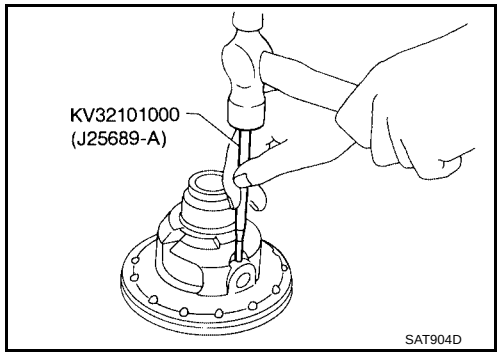
3. Remove differential side bearing outer race and side bearing adjusting shim from transaxle case.



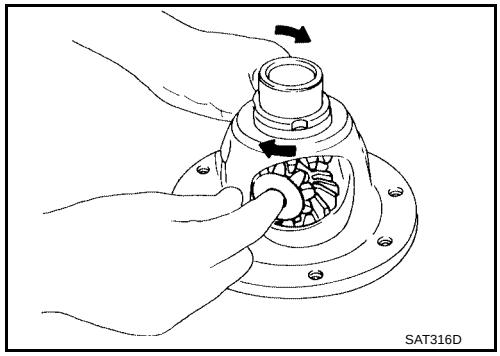
4. Remove speedometer drive gear.



5. Drive out pinion mate shaft lock pin.



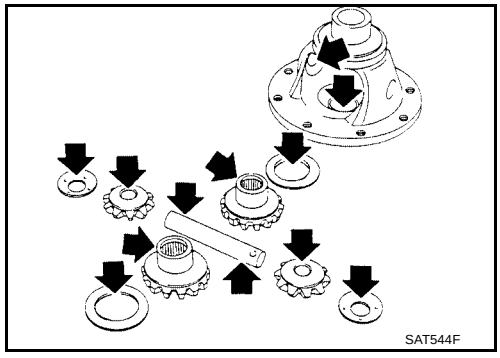
6. Draw out pinion mate shaft lock pin.
7. Remove pinion mate gears and side gears.



INSPECTION

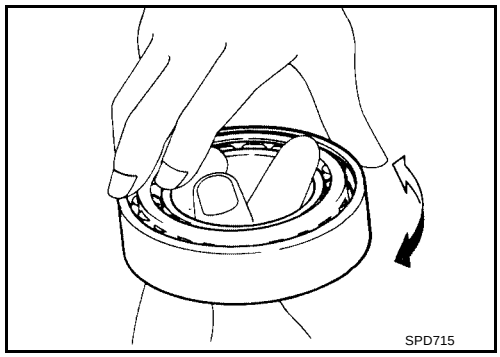
Gear, Washer, Shaft and Case

- Check mating surfaces of differential case, side gears and pinion mate gears.
- Check washers for wear.



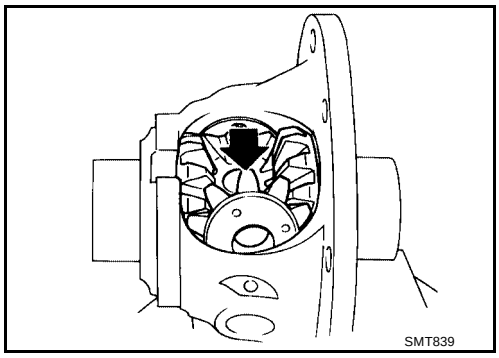
Bearings

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**

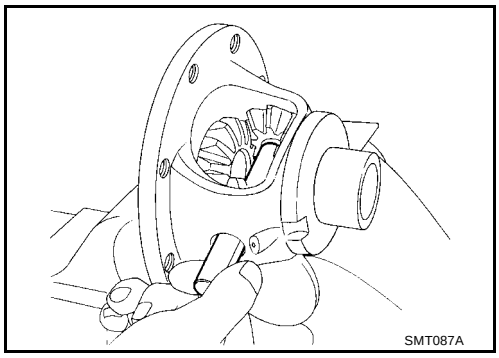


ASSEMBLY

1. Attach side gear thrust washers to side gears, then install pinion mate thrust washers and pinion mate gears in place.
   - **Apply ATF to any parts.**

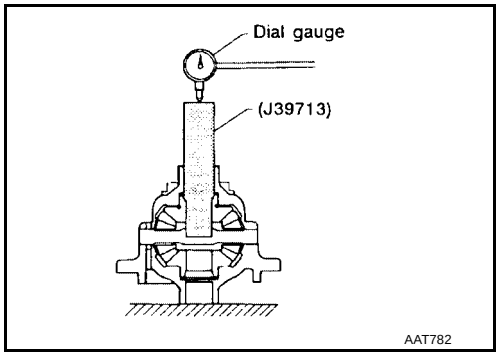


2. Insert pinion mate shaft.
   - **When inserting, be careful not to damage pinion mate thrust washers.**



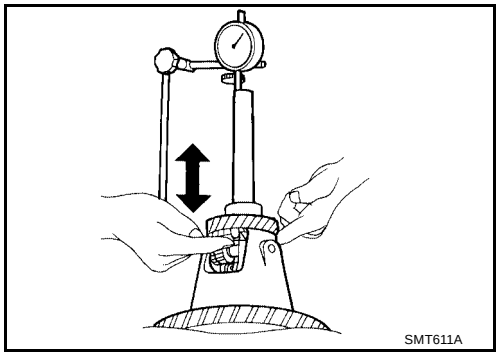
3. Measure clearance between side gear and differential case with washers following the procedure below:

a. Set Tool and dial indicator on side gear.



b. Move side gear up and down to measure dial indicator deflection. Always measure indicator deflection on both side gears.

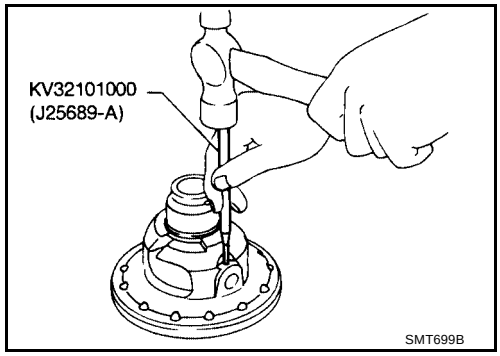
Clearance between side gear and differential case with washer	**: 0.1 - 0.2 mm (0.004 - 0.008 in)**



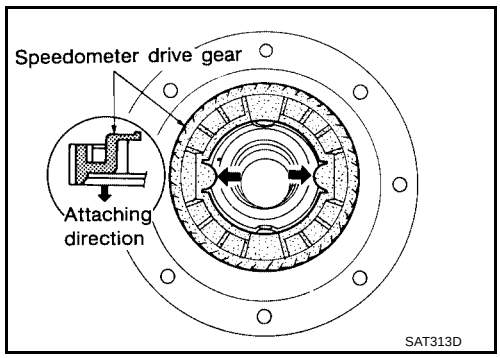
c. If not within specification, adjust clearance by changing thickness of differential side gear thrust washers.

Differential side gear thrust washers	**: Refer to AT-751, "DIFFERENTIAL SIDE GEAR THRUST WASHERS" .**

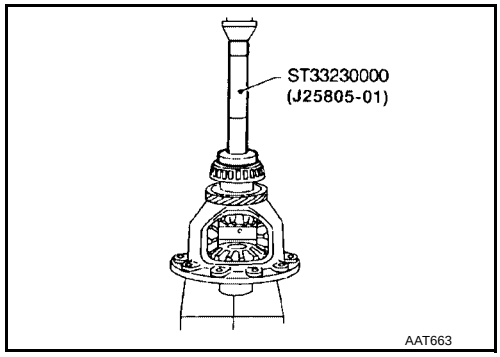
4. Install lock pin.
   - **Make sure that lock pin is flush with case.**



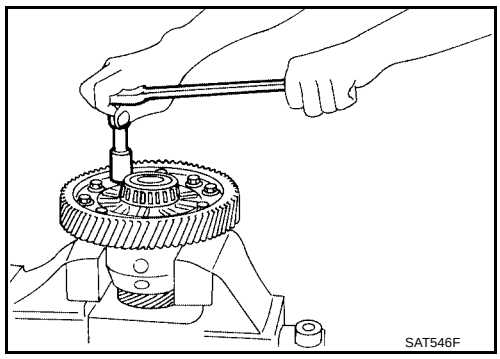
5. Install speedometer drive gear on differential case.
   - **Align the projection of speedometer drive gear with the groove of differential case.**



6. Press on differential side bearings.



7. Install final gear and tighten fixing bolts in a crisscross pattern. Tighten final gear bolts to the specified torque. Refer to AT-719, "COMPONENTS" .



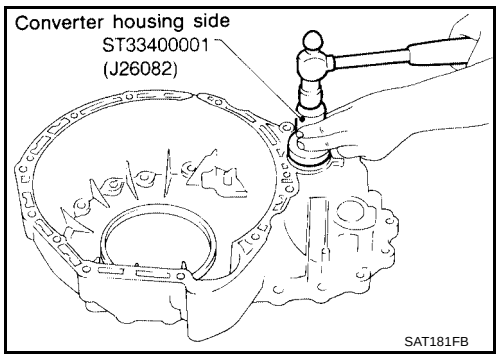
ASSEMBLY

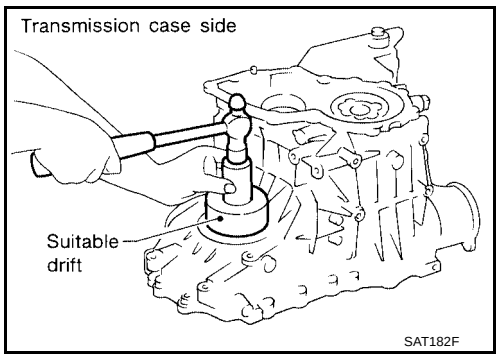
PFP:00000

Assembly (1)

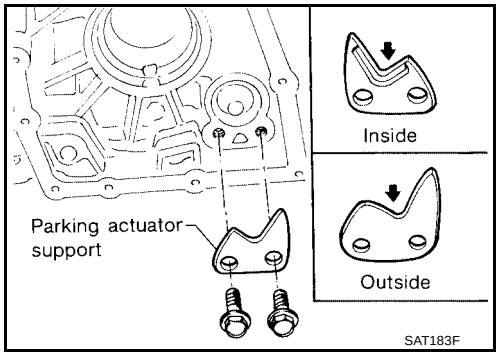
ECS0067R

1. Install differential side oil seals on transmission case and converter housing.

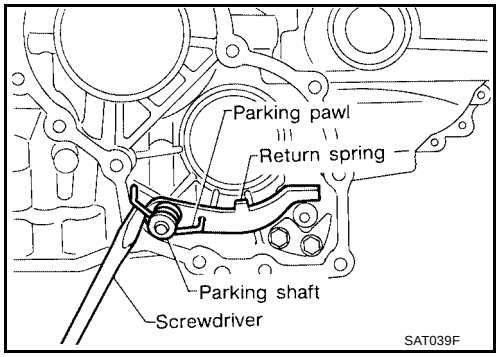




2. Install parking actuator support to transmission case. Tighten parking actuator support bolts to the specified torque. Refer to AT-647, "OVERHAUL" .
   - **Pay attention to direction of parking actuator support.**



3. Install parking pawl on transmission case and fix it with parking shaft.
4. Install return spring.

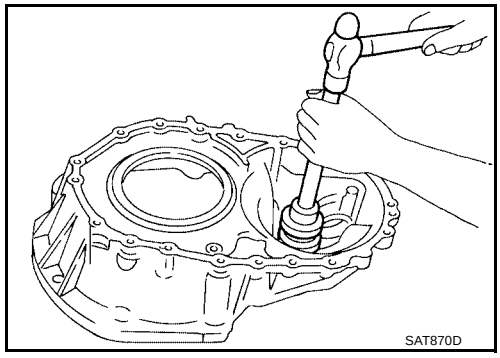


Adjustment (1)

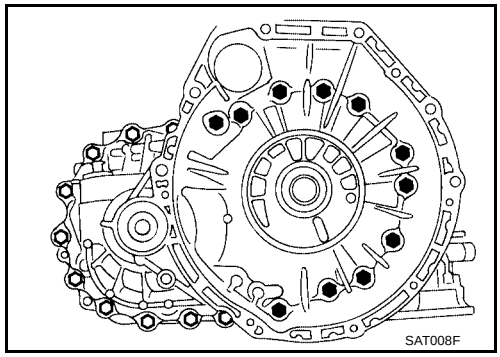
ECS0067S

DIFFERENTIAL SIDE BEARING PRELOAD

1. Install differential side bearing outer race without adjusting shim on transmission case.
2. Install differential side bearing outer race on converter housing.

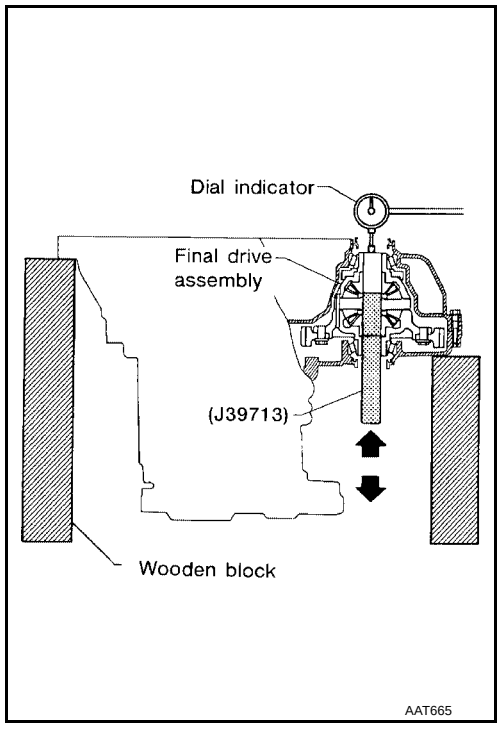


3. Place final drive assembly on transmission case.
4. Install transmission case on converter housing. Tighten transmission case fixing bolts to the specified torque. Refer to AT-647, "OVERHAUL" .

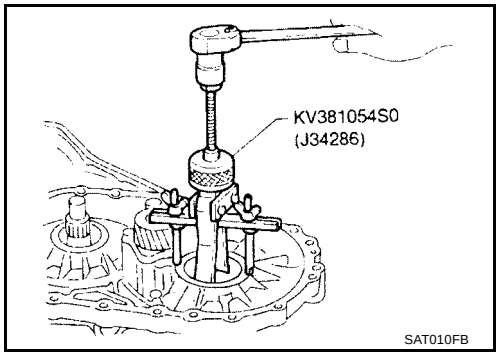


5. Attach dial indicator on differential case at converter housing side.
6. Insert Tool into differential side gear from transmission case side.
7. Move Tool up and down and measure dial indicator deflection.
8. Select proper thickness of differential side bearing adjusting shim(s).
   Suitable shim thickness = Dial indicator deflection + Specified bearing preload

Differential side bearing preload adjusting shim	**: Refer to AT-751, "DIFFERENTIAL SIDE BEARING PRELOAD ADJUSTING SHIMS" .**
Bearing preload	**: 0.05 - 0.09 mm (0.0020 - 0.0035 in)**



9. Remove converter housing from transmission case.
10. Remove final drive assembly from transmission case.
11. Remove differential side bearing outer race from transmission case.
12. Reinstall differential side bearing outer race and shim(s) selected from SDS table on transmission case.
13. Reinstall converter housing on transmission case and tighten transmission case fixing bolts to the specified torque. Refer to AT-647, "OVERHAUL" .

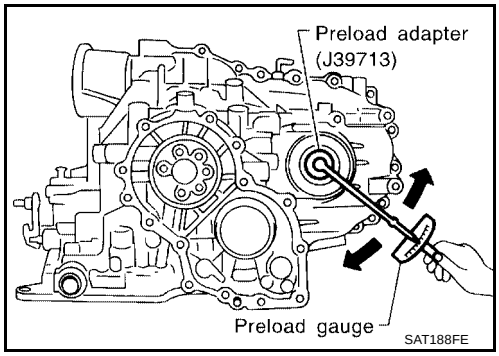


14. Insert Tool and measure turning torque of final drive assembly.
    - **Turn final drive assembly in both directions several times to seat bearing rollers correctly.**

      Turning torque of final drive assembly (New bearing) : 0.78 - 1.37 N·m (8.0 - 14.0 kg-cm, 6.9 - 12.2 in-lb)

    - **When old bearing is used again, turning torque will be slightly less than the above.**
    - **Make sure torque is close to the specified range.**

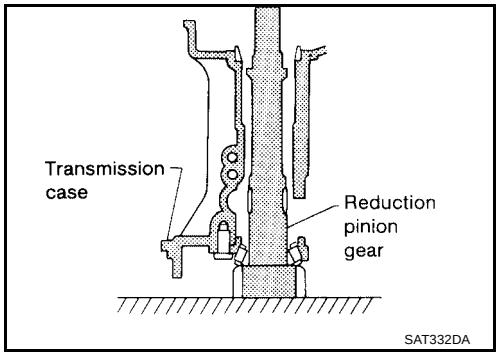
      Preload adapter : J39713



REDUCTION PINION GEAR BEARING PRELOAD

1. Remove transmission case and final drive assembly from converter housing.
2. Select proper thickness of reduction pinion gear bearing adjusting shim using the following procedures.

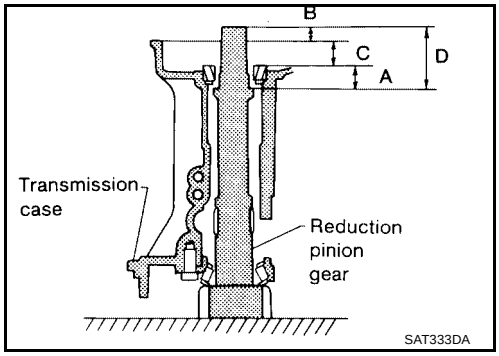
a. Place reduction pinion gear on transmission case as shown.



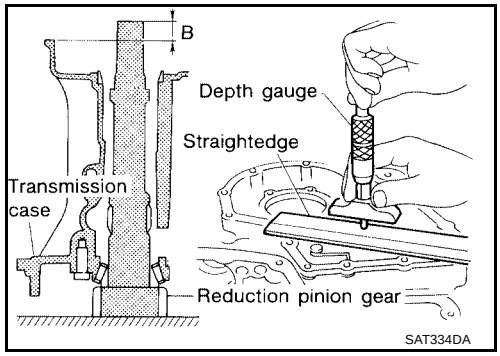
b. Place idler gear bearing on transmission case.
c. Measure dimensions “B” “C” and “D” and calculate dimension “A”.

A = D – (B + C)

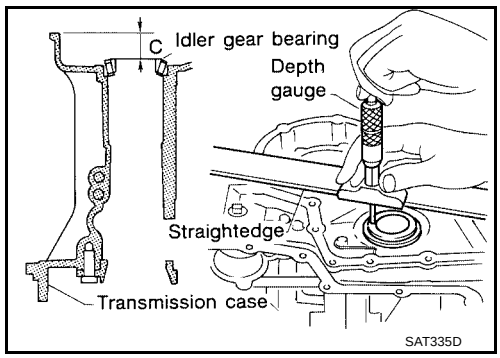
“A” : Distance between the surface of idler gear bearing inner race and the adjusting shim mating surface of reduction pinion gear.



- Measure dimension “B” between the end of reduction pinion gear and the surface of transmission case.
- **Measure dimension “B” in at least two places.**

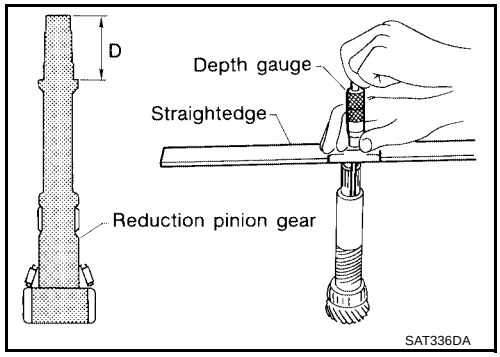


- Measure dimension “C” between the surface of idler gear bearing inner race and the surface of transmission case.
- **Measure dimension “C” in at least two places.**



- Measure dimension “D” between the end of reduction pinion gear and the adjusting shim mating surface of reduction pinion gear.
- **Measure dimension “D” in at least two places.**
- Calculate dimension “A”.

A = D – (B + C)



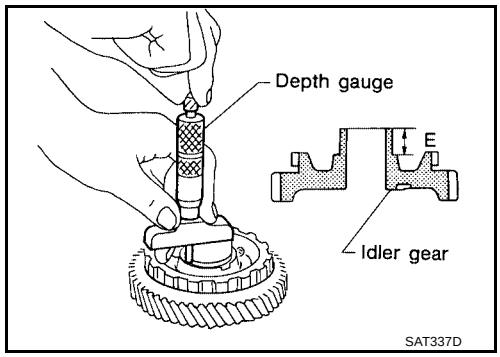
d. Measure dimension “E” between the end of idler gear and the idler gear bearing inner race mating surface of idler gear.
   - **Measure dimension “E” in at least two places.**

e. Select proper thickness of reduction pinion gear bearing adjusting shim.

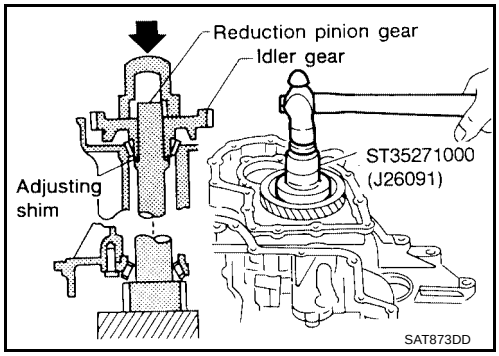
Proper shim thickness = A – E – 0.05 mm (0.0020 in)*

(*: Bearing preload)

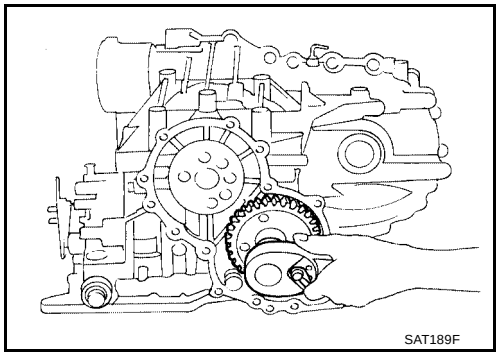
Reduction pinion gear bearing adjusting shim **: Refer to AT-752, "REDUCTION PINION GEAR BEARING ADJUSTING SHIMS" .**



3. Install reduction gear and reduction gear bearing adjusting shim selected in step 2-e on transmission case.
4. Press idler gear bearing inner race on idler gear.
5. Press idler gear on reduction gear.
   - **Press idler gear until idler gear fully contacts adjusting shim.**



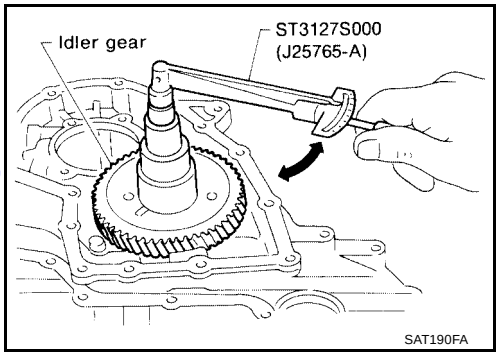
6. Tighten idler gear lock nut to the specified torque. Refer to AT-647, "OVERHAUL" .
   - **Lock idler gear with parking pawl when tightening lock nut.**



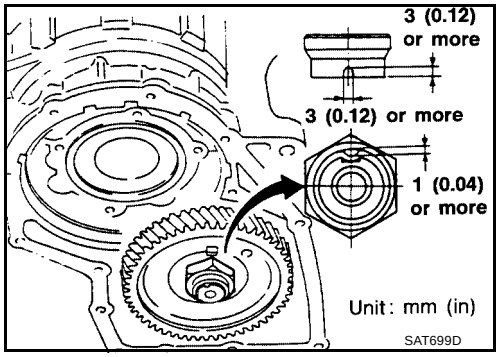
7. Measure turning torque of reduction pinion gear.
   - **When measuring turning torque, turn reduction pinion gear in both directions several times to seat bearing rollers correctly.**

     Turning torque of reduction pinion gear : 0.05 - 0.39 N·m (0.5 - 4.0 kg-cm, 0.43 - 3.47 in-lb)

   - **If turning torque is out of specification, decrease or increase thickness of reduction pinion gear bearing adjusting shim.**

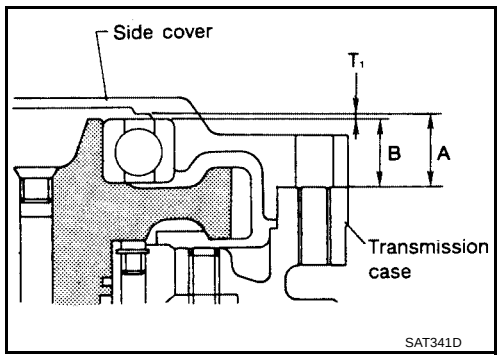


8. After properly adjusting turning torque, clinch idler gear lock nut as shown.

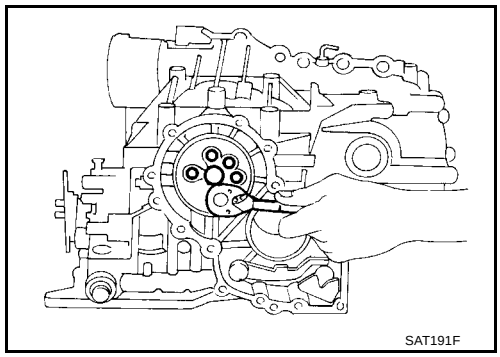


OUTPUT SHAFT END PLAY

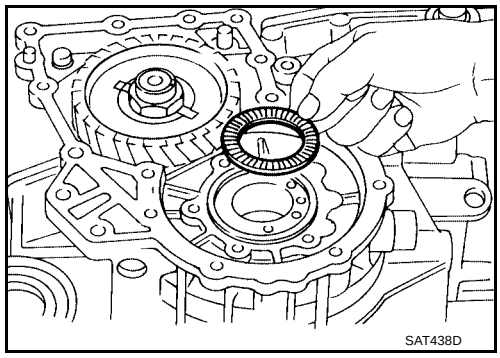
- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.



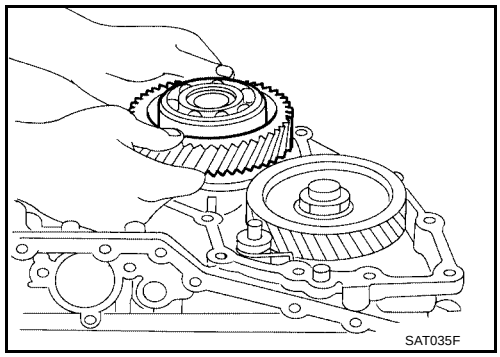
1. Install bearing retainer for output shaft.



2. Install output shaft thrust needle bearing on bearing retainer.



3. Install output shaft on transmission case.

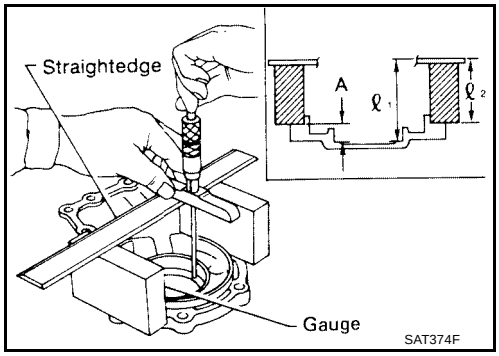


4. Measure dimensions "$\ell 1$" and "$\ell 2$" at side cover and then calculate dimension "A".
   - Measure dimension "**$\ell 1$**" **and "$\ell 2$" in at least two places.**

   "A" : **Distance between transmission case fitting surface and adjusting shim mating surface.**

   $A = \ell 1 - \ell 2$

   $\ell 2$: **Height of gauge**

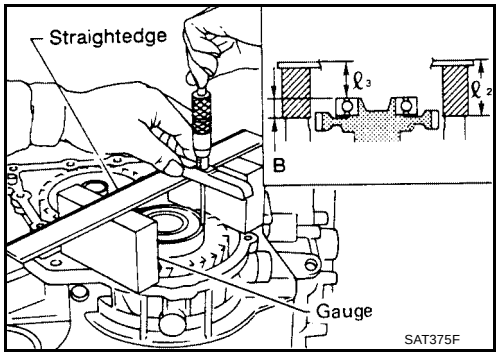


5. Measure dimensions "$\ell 2$" and "$\ell 3$" and then calculate dimension "B".
   - Measure "**$\ell 2$**" **and "$\ell 3$" in at least two places.**

   "B" : **Distance between the end of output shaft bearing outer race and the side cover fitting surface of transmission case.**

   $B = \ell 2 - \ell 3$

   $\ell 2$: **Height of gauge**

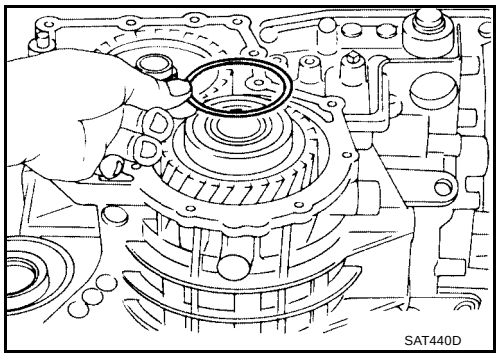


6. Select proper thickness of adjusting shim so that output shaft end play (clearance between side cover and output shaft bearing) is within specifications.

   Output shaft end play (A – B) : **0 - 0.15 mm (0 - 0.0059 in)**

   Output shaft end play adjusting shims : **Refer to AT-754, "OUTPUT SHAFT ADJUSTING SHIMS" .**

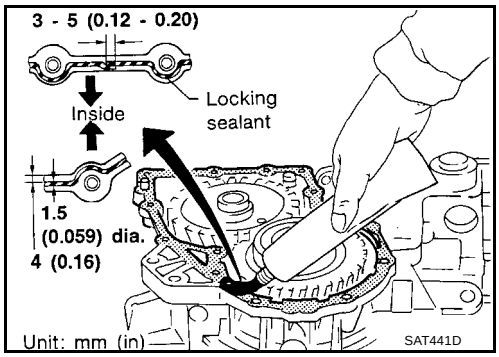
7. Install adjusting shim on output shaft bearing.



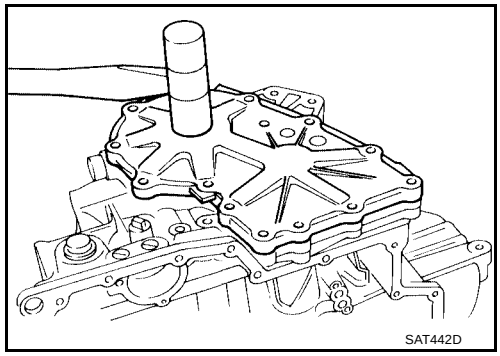
Assembly (2)

ECS0067T

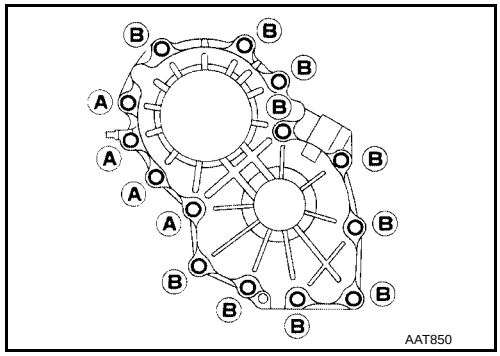
1. Apply anaerobic liquid gasket to transmission case as shown in illustration. Refer to GI-45, "Recommended Chemical Products and Sealants"



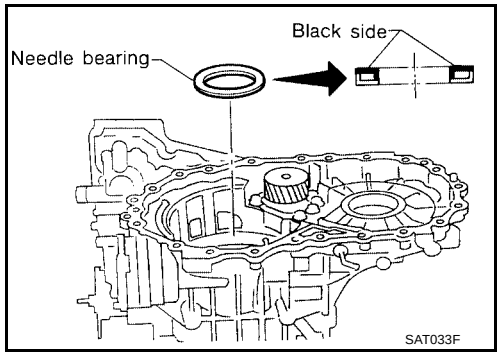
2. Set side cover on transmission case.
   - **Apply locking sealant to the mating surface of transmission case.**



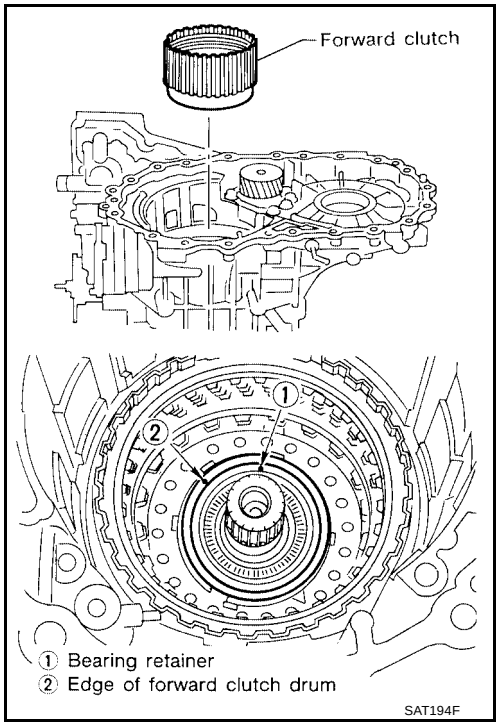
3. Tighten side cover fixing bolts to specified torque. Refer to AT-647, "OVERHAUL" .
   - **Do not mix bolts A and B.**
   - **Always replace bolts A as they are self-sealing bolts.**



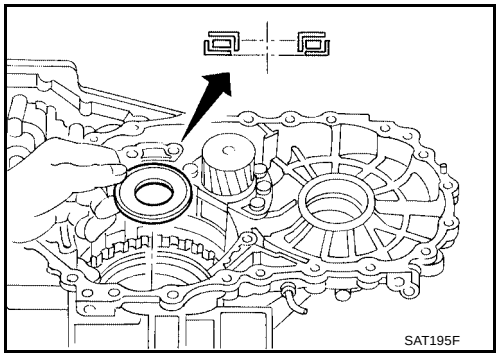
4. Remove paper rolled around bearing retainer.
5. Install thrust washer on bearing retainer.
   - **Apply petroleum jelly to thrust washer.**



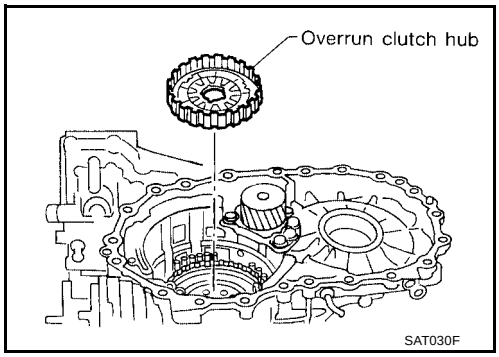
6. Install forward clutch assembly.
   - **Align teeth of low & reverse brake drive plates before installing.**
   - **Make sure that bearing retainer seal rings are not spread.**
   - **If forward clutch assembly is correctly seated, points 1 and 2 are at almost same level.**



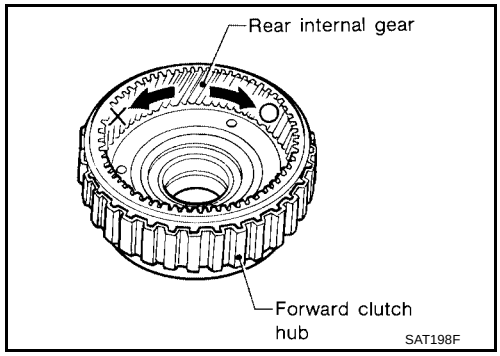
7. Install thrust needle bearing on bearing retainer.
   - **Apply petroleum jelly to thrust needle bearing.**
   - **Pay attention to direction of thrust needle bearing.**



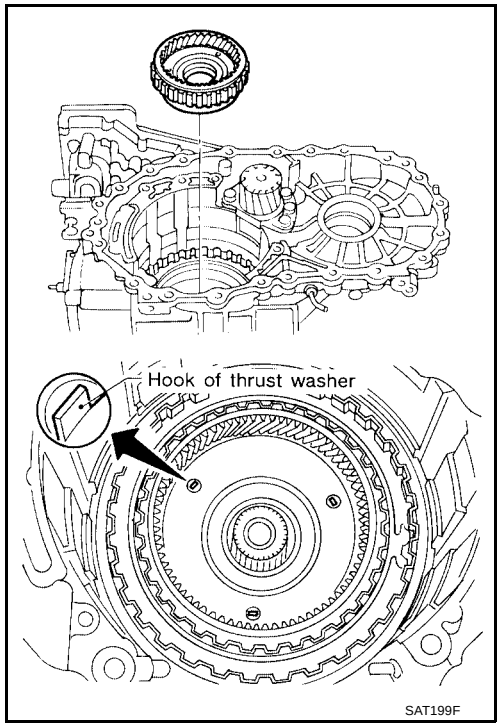
8. Install overrun clutch hub.
   - **Apply petroleum jelly to thrust washers.**
   - **Align teeth of overrun clutch drive plates before installing.**



9. Hold forward clutch hub and turn rear internal gear.
Check overrun clutch hub for correct directions of lock and unlock.
   - **If not shown as illustrated, check installed direction of forward one-way clutch.**

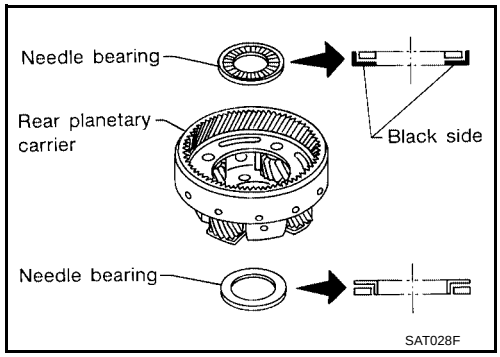


10. Install forward clutch hub and rear internal gear assembly.
   - **Align teeth of forward clutch drive plates before installing.**
   - **Check that three hooks of thrust washer are correctly aligned after installing.**

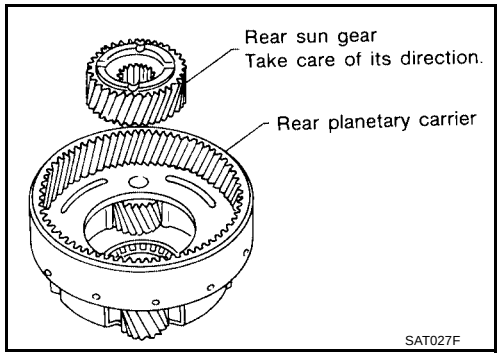


11. Install rear planetary carrier assembly and rear sun gear according to the following procedures.

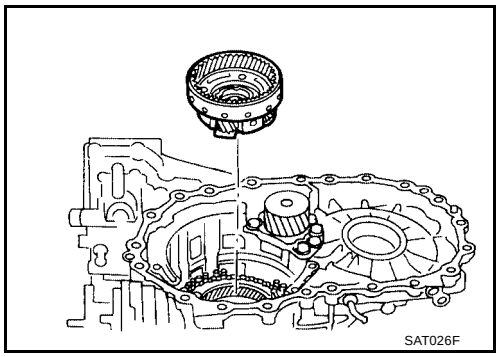
a. Install needle bearings on rear planetary carrier.
   - **Apply petroleum jelly to needle bearings.**
   - **Pay attention to direction of needle bearings.**



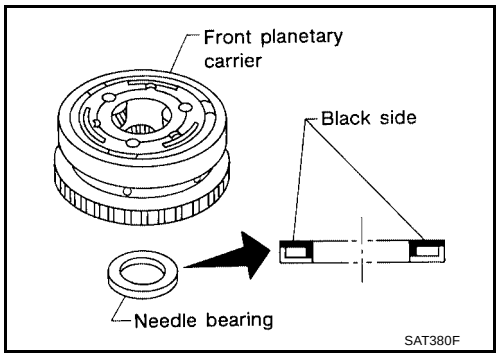
b. Install rear sun gear on rear planetary carrier.
   - **Pay attention to direction of rear sun gear.**



c. Install rear planetary carrier on transmission case.

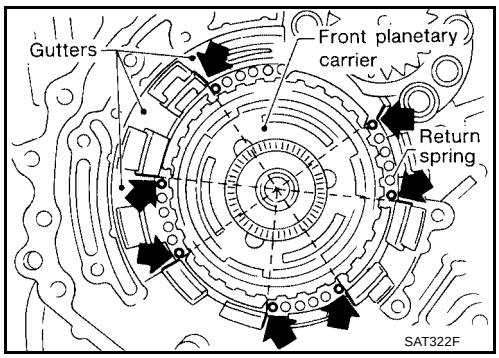


12. Install thrust needle bearing on front planetary carrier, then install them together on transmission case.
    - **Apply petroleum jelly to thrust needle bearing.**
    - **Pay attention to direction of thrust needle bearing.**

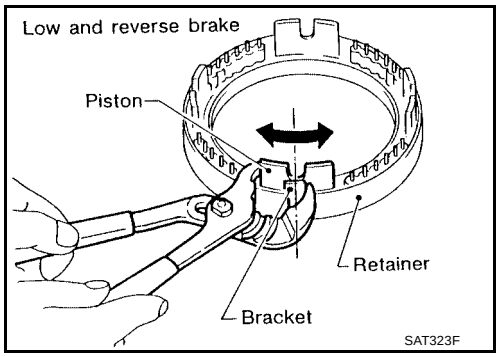


13. Install low and reverse brake piston according to the following procedures.

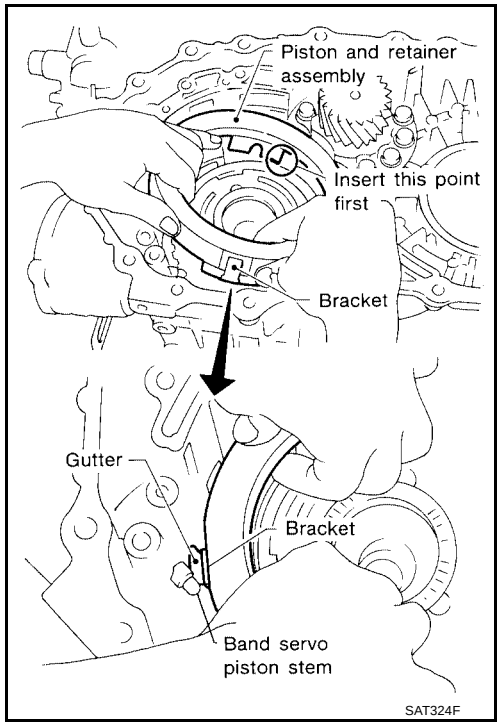
a. Set and align return springs to transmission case gutters as shown in illustration.



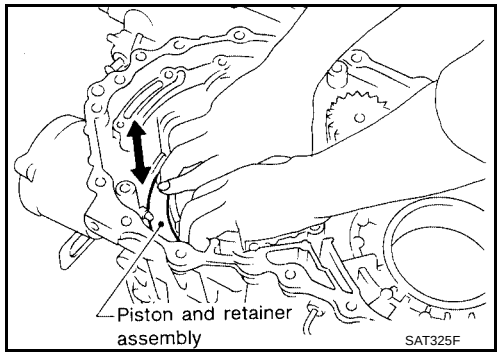
b. Set and align piston with retainer.



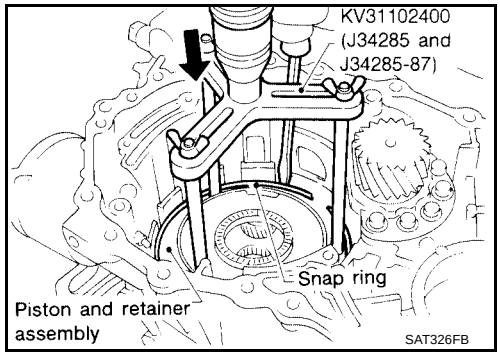
c. Install piston and retainer assembly on the transmission case.
   - **Align bracket to specified gutter as indicated in illustration.**



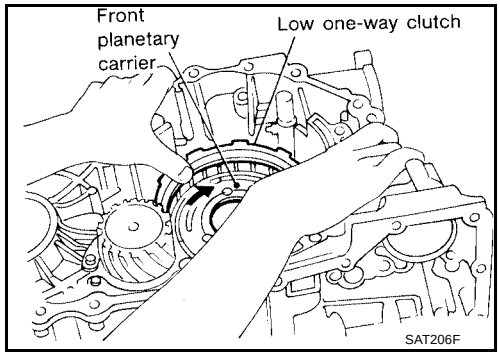
d. Check that each protrusion of piston is correctly set to corresponding return spring as follows.
   - **Push piston and retainer assembly evenly and confirm they move smoothly.**
   - **If they can not move smoothly, remove piston and retainer assembly and align return spring correctly as instructed in step "a".**



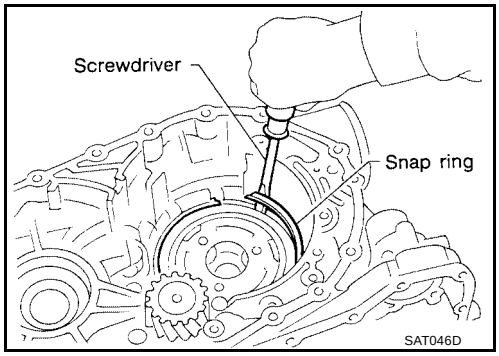
e. Push down piston and retainer assembly and install snap ring.



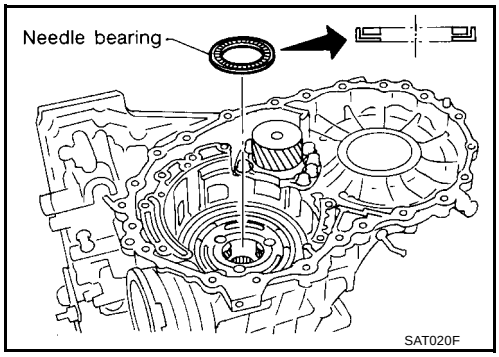
14. Install low one-way clutch to front planetary carrier by turning carrier in the direction of the arrow shown.



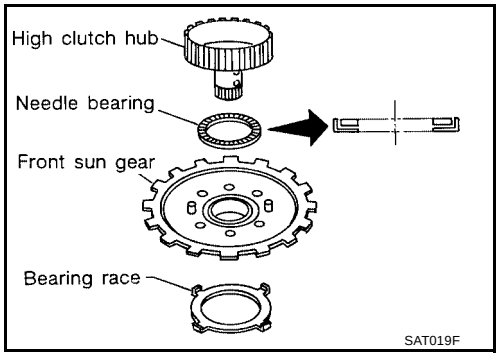
15. Install snap ring with screwdriver.
    - **Forward clutch and bearing must be correctly installed for snap ring to fit into groove of transmission case.**



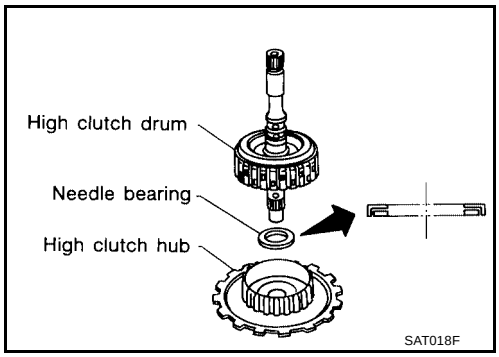
16. Install needle bearing on transmission case.
    - **Apply petroleum jelly to needle bearing.**
    - **Pay attention to direction of needle bearing.**



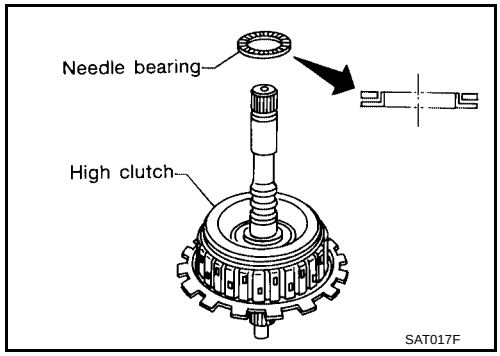
17. Install bearing race, needle bearing and high clutch hub on front sun gear.
    - **Apply petroleum jelly to needle bearing.**
    - **Pay attention to direction of needle bearing.**



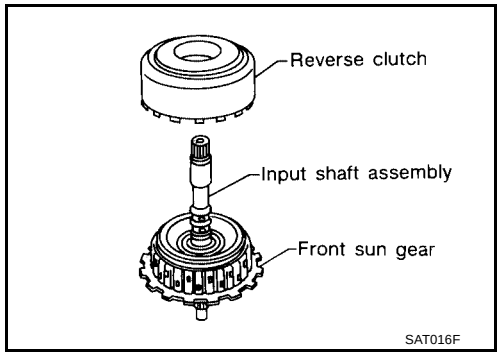
18. Install needle bearing and high clutch drum on high clutch hub.



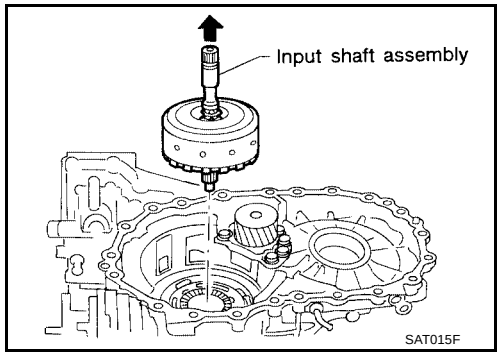
19. Install needle bearing on high clutch drum.
    - **Apply petroleum jelly to needle bearing.**
    - **Pay attention to direction of needle bearing.**



20. Remove paper rolled around input shaft.
21. Install input shaft assembly in reverse clutch.
    - **Align teeth of reverse clutch drive plates before installing.**



22. Install reverse clutch assembly on transmission case.
    - **Align teeth of high clutch drive plates before installing.**



Adjustment (2)

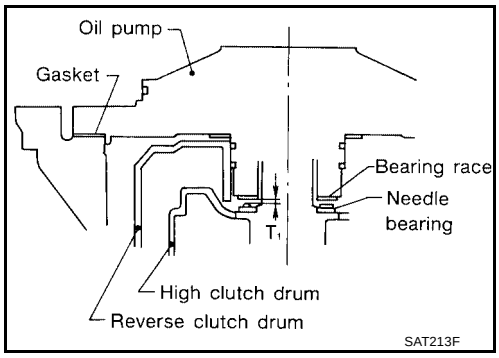
ECS0067U

When any parts listed below are replaced, adjust total end play and reverse clutch end play.

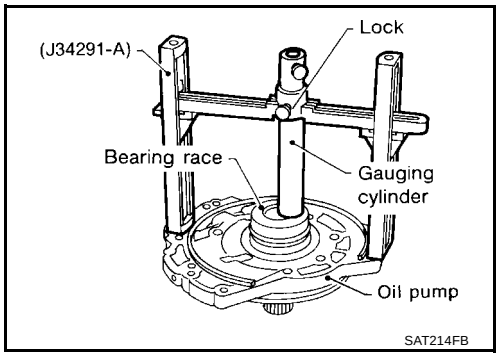
Part name	Total end play	Reverse clutch end play
Transmission case	●	●
Overrun clutch hub	●	●
Rear internal gear	●	●
Rear planetary carrier	●	●
Rear sun gear	●	●
Front planetary carrier	●	●
Front sun gear	●	●
High clutch hub	●	●
High clutch drum	●	●
Oil pump cover	●	●
Reverse clutch drum	—	●

TOTAL END PLAY

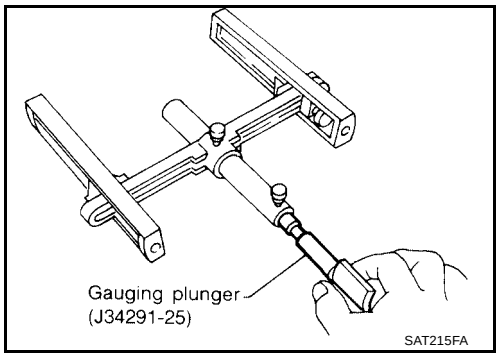
1. Adjust total end play "T_1 ".



a. With original bearing race installed, place Tool onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly. The gauging cylinder should rest on top of bearing race. Lock gauging cylinder in place with set screw.



b. Install gauging plunger into cylinder.



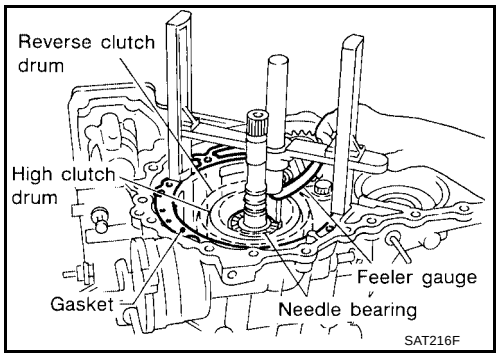
c. With needle bearing installed on high clutch drum, place Tool legs on machined surface of transmission case (with gasket). Then allow plunger to rest on needle bearing.

d. Measure gap between cylinder and plunger. This measurement should give exact total end play.

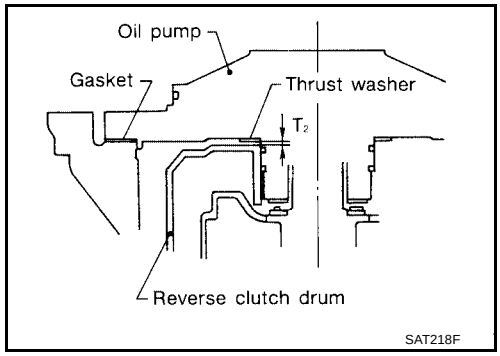
Total end play "T_1 " **: 0.25 - 0.55 mm (0.0098 - 0.0217 in)**

- If end play is out of specification, decrease or increase thickness of bearing race as necessary.

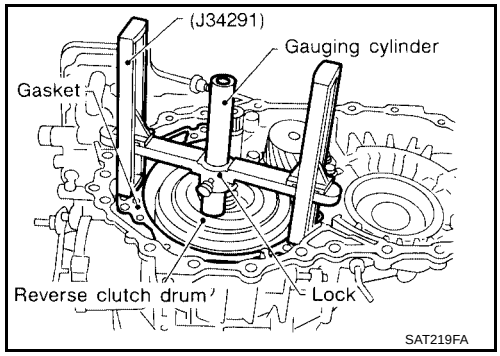
Available bearing race for adjusting total end play **: Refer to AT-754, "BEARING RACE FOR ADJUSTING TOTAL END PLAY" .**



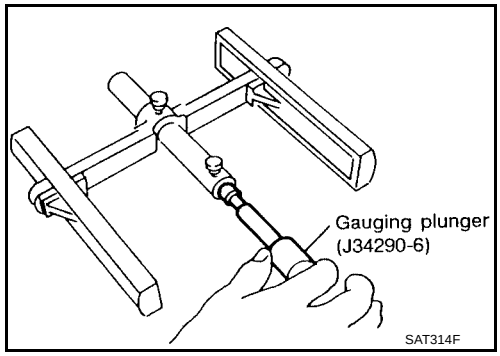
2. Adjust reverse clutch drum end play "T_2 ".

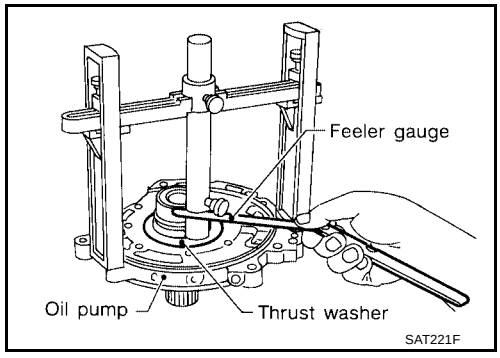


a. Place Tool on machined surface of transmission case (with gasket). Then allow gauging cylinder to rest on reverse clutch drum. Lock cylinder in place with set screw.



b. Install gauging plunger into cylinder.





c. With original thrust washer installed on oil pump, place Tool legs onto machined surface of oil pump assembly. Then allow plunger to rest on thrust washer.

d. Measure gap between cylinder and plunger with feeler gauge. This measurement should give exact reverse clutch drum end play.

Reverse clutch drum end play "T_2 " **: 0.55 - 0.90 mm (0.0217 - 0.0354 in)**

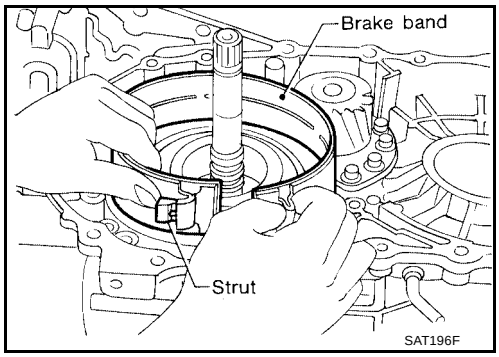
- If end play is out of specification, decrease or increase thickness of thrust washer as necessary.

Available thrust washer for adjusting reverse clutch drum end play	**: Refer to AT-754, "THRUST WASHERS FOR ADJUSTING REVERSE CLUTCH DRUM END PLAY" .**

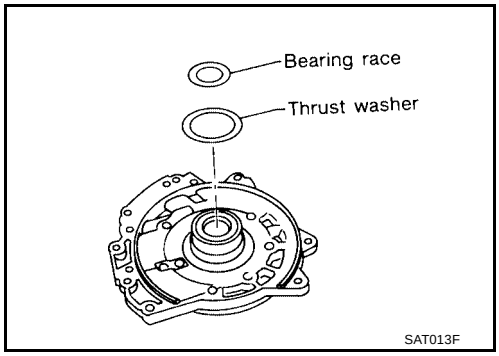
Assembly (3)

ECS0067V

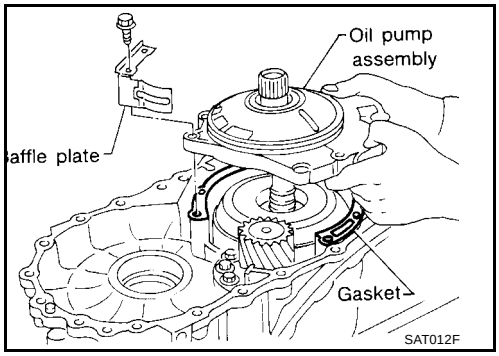
1. Install anchor end pin and lock nut on transmission case.
2. Place brake band on outside of reverse clutch drum. Tighten anchor end pin just enough so that brake band is evenly fitted on reverse clutch drum.



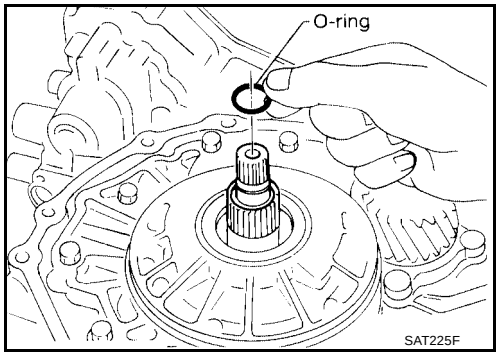
3. Place bearing race selected in total end play adjustment step on oil pump cover.
   - **Apply petroleum jelly to bearing race.**
4. Place thrust washer selected in reverse clutch end play step on reverse clutch drum.
   - **Apply petroleum jelly to thrust washer.**



5. Install oil pump assembly, baffle plate and gasket on transmission case.
6. Tighten oil pump fixing bolts to the specified torque.



7. Install O-ring to input shaft.
   - **Apply ATF to O-ring.**



8. Adjust brake band.

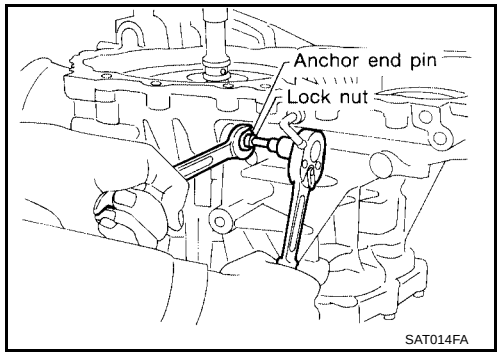
a. Tighten anchor end pin to the specified torque.

Anchor end pin **: Refer to AT-751, "BRAKE BAND" .**

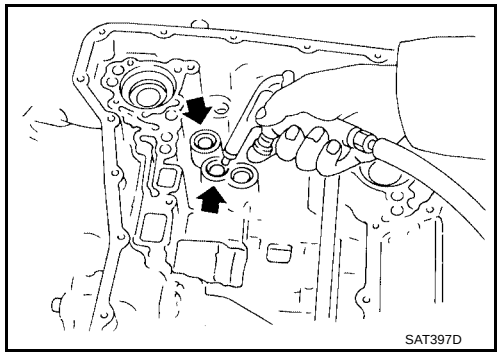
b. Back off anchor end pin two and a half turns.

c. While holding anchor end pin, tighten lock nut.

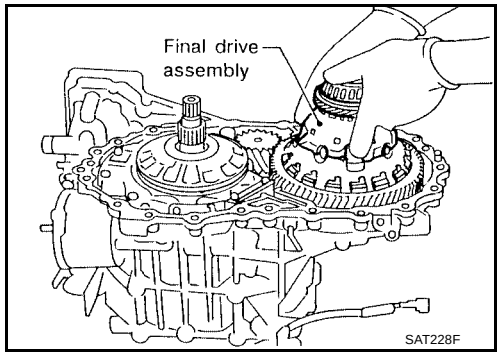
Lock nut **: Refer to AT-751, "BRAKE BAND" .**



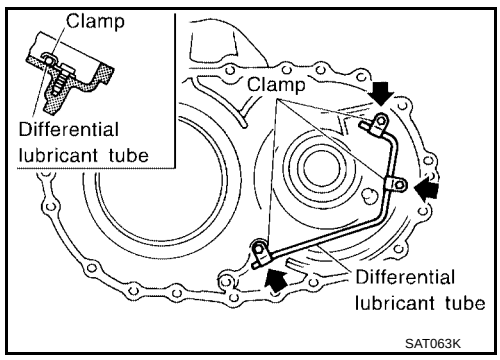
9. Apply compressed air to oil holes of transmission case and check operation of brake band.



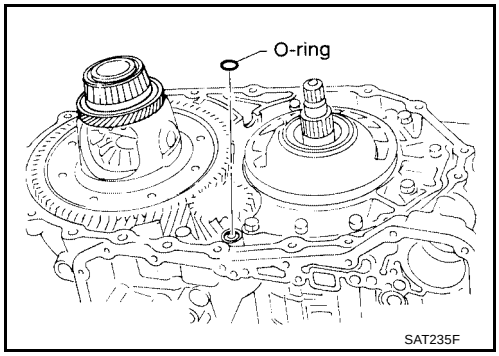
10. Install final drive assembly on transmission case.



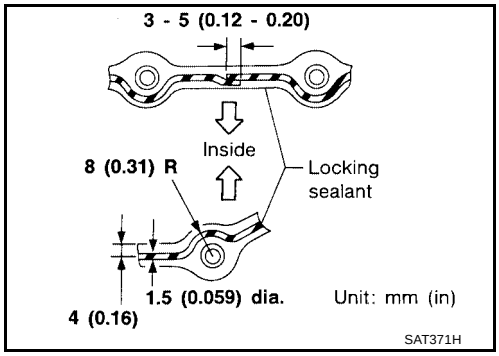
11. Install differential lubricant tube on converter housing. Tighten differential lubricant tube bolts to the specified torque. Refer to AT-647, "OVERHAUL" .



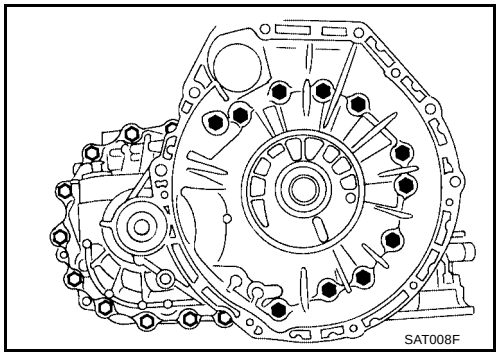
12. Install O-ring on differential oil port of transmission case.



13. Install converter housing on transmission case.
    - **Apply locking sealant to mating surface of converter housing.**

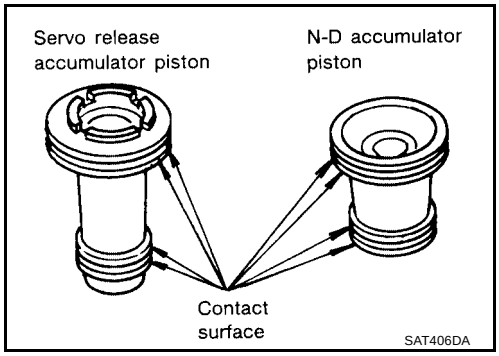


    - **Tighten converter housing bolts to the specified torque. Refer to AT-647, "OVERHAUL" .**



14. Install accumulator piston.

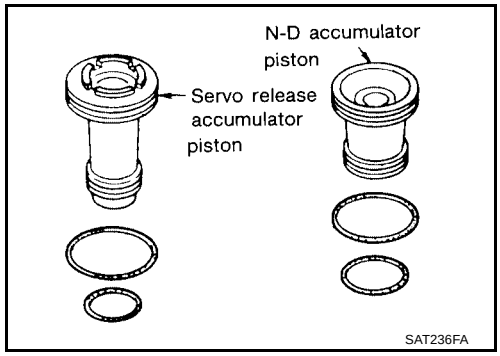
a. Check contact surface of accumulator piston for damage.



b. Install O-rings on accumulator piston.

- **Apply ATF to O-rings.**

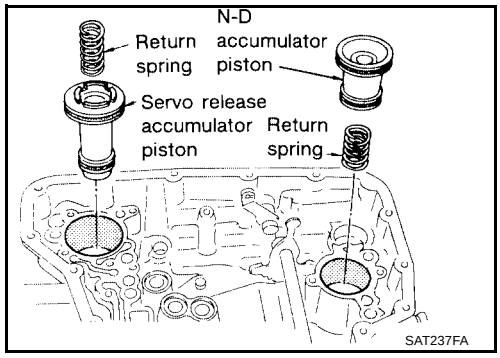
Accumulator piston O-rings : Refer to AT-748, "O-RING"



c. Install accumulator pistons and return springs on transmission case.

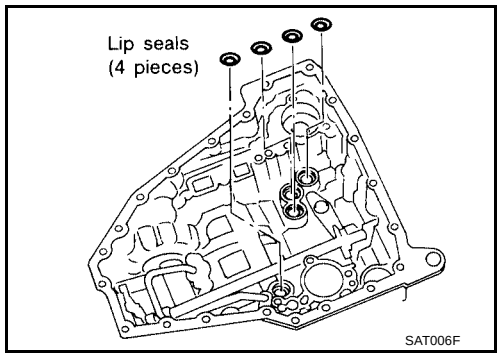
- **Apply ATF to inner surface of transmission case.**

Return springs : Refer to AT-749, "RETURN SPRING" .

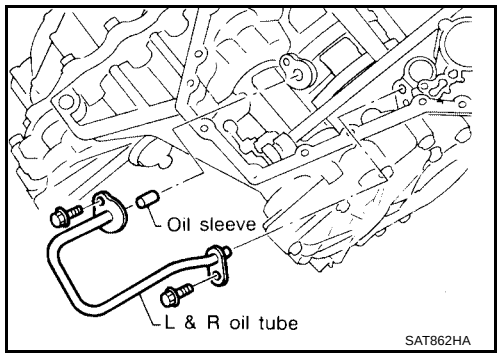


15. Install lip seals for band servo oil holes on transmission case.

- **Apply petroleum jelly to lip seals.**

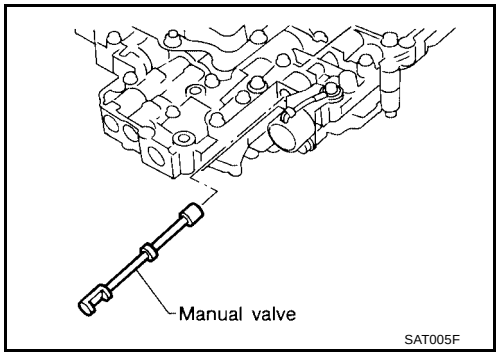


16. Install L & R oil tube and oil sleeve. Tighten L & R oil tube bolts to the specified torque. Refer to AT-647, "OVERHAUL" .



17. Install control valve assembly.

a. Insert manual valve into control valve assembly.
   - **Apply ATF to manual valve.**

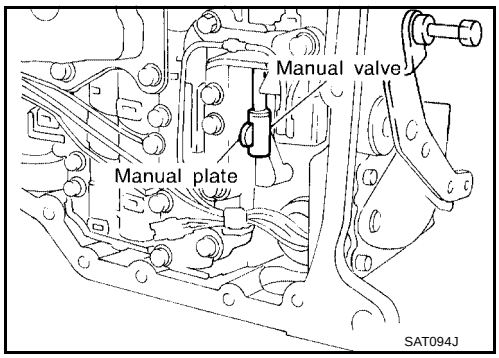


b. Set manual shaft in Neutral position.

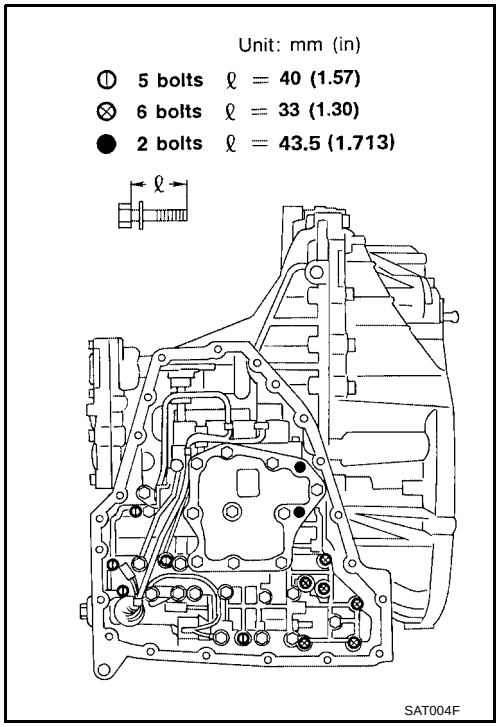
c. Install control valve assembly on transmission case while aligning manual valve with manual plate.

d. Pass terminal cord assembly connector through transmission case and install terminal body on transmission case by pushing it.

e. Install snap ring to terminal cord assembly connector.



f. Tighten bolts **I** , **X** and ●.



Bolt length, number and location:

Bolt	I	X	●
Bolt length " ℓ " mm (in)	40 (1.57)	33 (1.30)	43.5 (1.713)
Number of bolts	5	6	2

18. Install oil pan.

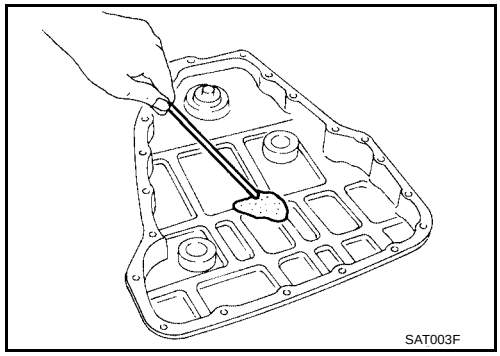
a. Attach a magnet to oil pan.

b. Install new oil pan gasket on transmission case.

c. Install oil pan on transmission case.

- **Always replace oil pan bolts as they are self-sealing bolts.**
- **Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.**

d. Tighten oil pan bolts and drain plug to the specified torque. Refer to AT-647, "OVERHAUL" .

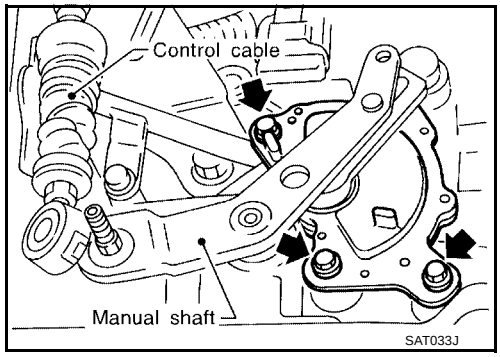


19. Install park/neutral position (PNP) switch.

a. Set manual shaft in P position.

b. Temporarily install park/neutral position (PNP) switch on manual shaft.

c. Move selector lever to N position.



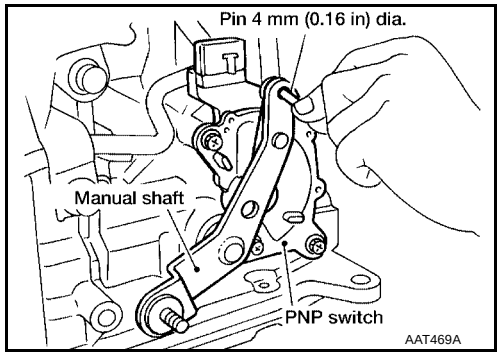
d. Use a 4 mm (0.16 in) pin for this adjustment.

i. Insert the pin straight into the manual shaft adjustment hole.

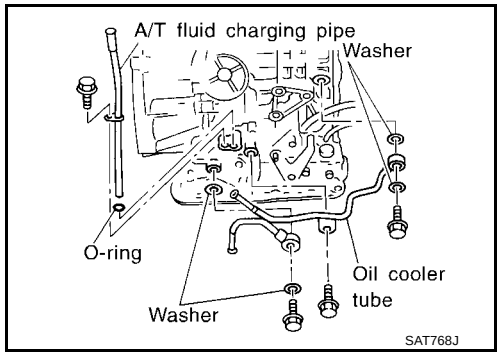
ii. Rotate park/neutral position (PNP) switch until the pin can also be inserted straight into hole in park/neutral position (PNP) switch.

e. Tighten park/neutral position (PNP) switch fixing bolts. Refer to AT-647, "OVERHAUL" .

f. Remove pin from adjustment hole after adjusting park/neutral position (PNP) switch.



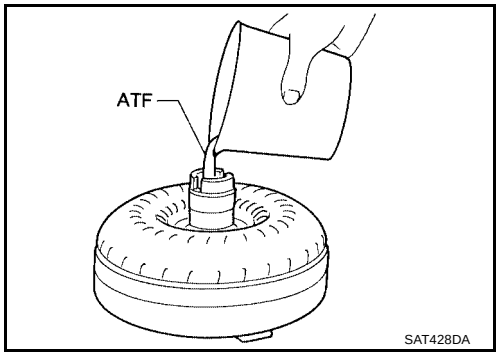
20. Install A/T fluid charging pipe and fluid cooler tube to transmission case. Tighten A/T fluid charging pipe and fluid cooler tube bolts to the specified torque. Refer to AT-647, "OVERHAUL" .



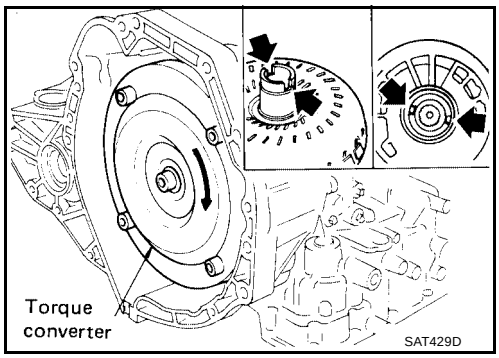
21. Install torque converter.

a. Pour ATF into torque converter.

- **Approximately 1 liter (1-1/8 US qt, 7/8 Imp qt) of fluid is required for a new torque converter.**
- **When reusing old torque converter, add the same amount of fluid as was drained.**

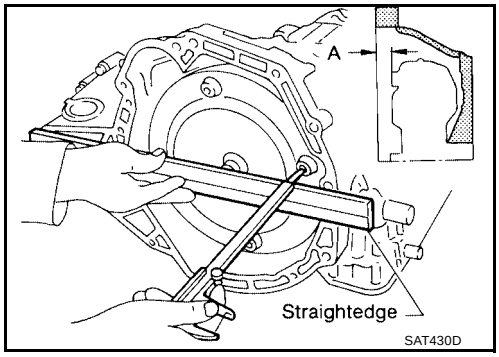


b. Install torque converter while aligning notches of torque converter with notches of oil pump.



c. Measure distance “A” to check that torque converter is in proper position.

Distance A : 14 mm (0.55 in) or more



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

ECS0067W

Engine		QR25DE
Automatic transaxle model		RE4F04B
Automatic transaxle assembly	Model code number	85X63
Transaxle gear ratio	1st	2.785
	2nd	1.545
	3rd	1.000
	4th	0.694
	Reverse	2.272
	Final drive	4.087
Recommended fluid		Nissan Matic “D” (Continental U.S. and Alaska) or Canada Nissan Automatic Transmission Fluid*
Fluid capacity ℓ (US qt, Imp qt)		8.5 (9, 7.5)

*: Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .

Shift Schedule

ECS0067X

VEHICLE SPEED WHEN SHIFTING GEARS THROTTLE POSITION

Throttle position	Shift pattern	Vehicle speed km/h (MPH)					
		$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$
Full throttle	Comfort	52 - 60 (32 - 37)	97 - 105 (60 - 66)	153 - 161 (95 - 100)	149 - 157 (93 - 98)	87 - 95 (41 - 54)	41 - 49 (25 - 30)
	Auto power	52 - 60 (32 - 37)	97 - 105 (60 - 66)	153 - 161 (95 - 100)	149 - 157 (93 - 98)	87 - 95 (41 - 54)	41 - 49 (25 - 30)
Half throttle	Comfort	37 - 45 (23 - 28)	67 - 75 (42 - 47)	119 - 127 (74 - 79)	90 - 98 (56 - 61)	39 - 47 (24 - 27)	24 - 32 (15 - 20)
	Auto power	39 - 47 (24 - 29)	73 - 81 (45 - 50)	119 - 127 (74 - 79)	90 - 98 (56 - 61)	46 - 54 (26 - 34)	24 - 32 (15 - 20)

VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

Unit: km/h (MPH)

Selector lever position	D_4 (O/D ON) position		D_3 (O/D OFF) position	
Shift pattern	Comfort	Auto power	Comfort	Auto power
Lock-up "ON"	62 - 70 (38 - 43)	62 - 70 (38 - 43)	86 - 94 (53 - 58)	86 - 94 (53 - 58)
Lock-up "OFF"	51 - 59 (31 - 36)	51 - 59 (31 - 36)	83 - 91 (52 - 57)	83 - 91 (52 - 57)

NOTE:

- Lock-up vehicle speed indicates the speed in D_4 (O/D ON) position.
- Perform lock-up inspection after warming up engine.
- Lock-up vehicle speed may vary depending on the driving conditions and circumstances.

Stall Revolution

ECS0067Y

Engine	Stall revolution rpm
QR25DE	2,350 - 2,800

Line Pressure

ECS0067Z

Engine speed rpm	Line pressure kPa (kg/cm^2 , psi)	
	D, 2 and 1 positions	R position
Idle	500 (5.1, 73)	778 (7.9, 113)
Stall	1,223 (12.6, 179)	1,918 (19.6, 278)

Control Valves

ECS00680

CONTROL VALVE AND PLUG RETURN SPRINGS

Unit: mm (in)

Parts			Item		
			Part No.*	Free length	Outer diameter
Upper body	23	Pilot valve spring	31742-80L13	38.98 (1.535)	8.9 (0.350)
	7	1-2 accumulator valve spring	31742-80L15	20.5 (0.807)	6.95 (0.274)
	28	1-2 accumulator piston spring	31742-80L14	55.26 (2.176)	19.6 (0.772)
	33	1st reducing valve spring	31742-80L08	27.0 (1.063)	7.0 (0.276)
	35	3-2 timing valve spring	31736-01X00	23.0 (0.906)	6.65 (0.262)
	18	Overrun clutch reducing valve spring	31742-80L09	37.5 (1.476)	6.9 (0.272)
	16	Torque converter relief valve spring	31742-80L10	31.0 (1.220)	9.0 (0.354)
	11	Torque converter clutch control valve	31742-80L16	56.98 (2.243)	6.5 (0.256)
	3	Cooler check valve spring	31742-85X01	29.4 (1.157)	6.0 (0.236)
Lower body	15	Pressure regulator valve spring	31742-80L01	45.0 (1.772)	15.0 (0.591)
	20	Overrun clutch control valve spring	31762-80L00	21.7 (0.854)	7.0 (0.276)
	24	Accumulator control valve spring	31742-80L02	22.0 (0.866)	6.5 (0.256)
	29	Shift valve A spring	31762-80L00	21.7 (0.854)	7.0 (0.276)
	32	Shuttle valve spring	31762-41X04	51.0 (2.008)	5.65 (0.222)
	12	Shift valve B spring	31762-80L00	21.7 (0.854)	7.0 (0.276)
	7	Pressure modifier valve spring	31742-80L13	30.5 (1.201)	9.8 (0.386)
	3		31742-80L04	32.0 (1.260)	6.9 (0.272)
	—	Oil cooler relief valve spring	31742-80L12	17.02 (0.670)	8.0 (0.315)

*: Always check with the Parts Department for the latest parts information.

Accumulator

ECS00681

O-RING

Unit: mm (in)

Accumulator	Part No.*	Inner diameter (Small)	Part No.*	Inner diameter (Large)
Servo release accumulator	31526-41X03	26.9 (1.059)	31526-41X02	44.2 (1.740)
N-D accumulator	31526-31X08	34.6 (1.362)	31672-21X00	39.4 (1.551)

*: Always check with the Parts Department for the latest parts information.

RETURN SPRING

Unit: mm (in)

Accumulator	Part number*	Free length	Outer diameter
Servo release accumulator	31605-85X00	62.8 (2.473)	21 (0.827)
N-D accumulator	31605-80L03	43.5 (1.713)	28.0 (1.102)

*: Always check with the Parts Department for the latest parts information.

Clutch and Brakes

ECS00682

REVERSE CLUTCH

Model code number		85X63	
Number of drive plates		2	
Number of driven plates		2	
Drive plate thickness mm (in)	Standard	1.6 (0.063)	
	Allowable limit	1.4 (0.055)	
Driven plate thickness mm (in)	Standard	1.8 (0.070)	
Clearance mm (in)	Standard	0.5 - 0.8 (0.020 - 0.031)	
	Allowable limit	1.2 (0.047)	
Thickness of retaining plates		Thickness mm (in)	Part number*
		6.6 (0.260) 6.8 (0.268) 7.0 (0.276) 7.2 (0.283) 7.4 (0.291) 7.6 (0.299) 7.8 (0.307)	31537-80L00 31537-80L01 31537-80L02 31537-80L03 31537-80L04 31537-80L05 31537-80L06

*: Always check with the Parts Department for the latest parts information.

HIGH CLUTCH

Model code number		85X63	
Number of drive plates		3	
Number of driven plates		7*2 + 1*3	
Drive plate thickness mm (in)	Standard	1.6 (0.063)	
	Allowable limit	1.4 (0.055)	
Driven plate thickness mm (in)	Standard	*2	*3
		1.4 (0.055)	2.0 (0.079)
Clearance mm (in)	Standard	1.8 - 2.2 (0.071 - 0.087)	
	Allowable limit	2.8 (0.110)	
Thickness of retaining plates		Thickness mm (in)	Part number*
		3.2 (0.126) 3.4 (0.134) 3.6 (0.142) 3.8 (0.150) 4.0 (0.157)	31537-80L20 31537-80L21 31537-80L22 31537-80L23 31537-80L24

*: Always check with the Parts Department for the latest parts information.

FORWARD CLUTCH

Model code number		85X63
Number of drive plates		5
Number of driven plates		5
Drive plate thickness mm (in)	Standard	1.6 (0.063)
	Allowable limit	1.4 (0.055)

Driven plate thickness mm (in)	Standard	1.8 (0.071)	
Clearance mm (in)	Standard	0.45 - 0.85 (0.0177 - 0.0335)	
	Allowable limit	1.85 (0.0728)	
Thickness of retaining plates		Thickness mm (in)	Part number*
		3.2 (0.126)	31537-80L18
		3.4 (0.134)	31537-80L17
		3.6 (0.142)	31537-80L12
		3.8 (0.150)	31537-80L13
		4.0 (0.157)	31537-80L14
		4.2 (0.165)	31537-80L15
		4.4 (0.173)	31537-80L16

*: Always check with the Parts Department for the latest parts information.

OVERRUN CLUTCH

Model code number		85X63	
Number of drive plates		3	
Number of driven plates		5	
Drive plate thickness mm (in)	Standard	1.6 (0.063)	
	Allowable limit	1.4 (0.055)	
Driven plate thickness mm (in)	Standard	1.8 (0.071)	
Clearance mm (in)	Standard	0.7 - 1.1 (0.028 - 0.043)	
	Allowable limit	1.7 (0.067)	
Thickness of retaining plates		Thickness mm (in)	Part number*
		3.0 (0.118)	31537-80L07
		3.2 (0.126)	31537-80L08
		3.4 (0.134)	31537-80L09
		3.6 (0.142)	31537-80L10
		3.8 (0.150)	31537-80L11

*: Always check with the Parts Department for the latest parts information.

LOW & REVERSE BRAKE

Model code number		85X63	
Number of drive plates		6	
Number of driven plates		6	
Drive plate thickness mm (in)	Standard	1.8 (0.071)	
	Allowable limit	1.6 (0.063)	
Driven plate thickness mm (in)	Standard	1.8 (0.071)	
Clearance mm (in)	Standard	1.7 - 2.1 (0.067 - 0.083)	
	Allowable limit	3.3 (0.130)	
Thickness of retaining plates		Thickness mm (in)	Part number*
		2.0 (0.079)	31667-80L00
		2.2 (0.087)	31667-80L01
		2.4 (0.094)	31667-80L02
		2.6 (0.102)	31667-80L03
		2.8 (0.110)	31667-80L04
		3.0 (0.118)	31667-80L05
		3.2 (0.126)	31667-80L06
		3.4 (0.134)	31667-80L07

*: Always check with the Parts Department for the latest parts information.

CLUTCH AND BRAKE RETURN SPRINGS

Unit: mm (in)

Parts	Part number*	Free length	Outer diameter
Forward clutch (Overrun clutch) (22 pcs)	31505-80L00	21.4 (0.843)	10.3 (0.406)
High clutch (10 pcs)	31505-80L02	22.5 (0.886)	10.8 (0.425)
Low & reverse brake (24 pcs)	31505-80L01	24.1 (0.949)	6.6 (0.260)

*: Always check with the Parts Department for the latest parts information.

BRAKE BAND

Anchor end pin tightening torque N-m (kg-m, in-lb)	4.0 - 5.8 (0.4 - 0.6, 36 - 52)
Number of returning revolutions for anchor end pin	2.5
Lock nut tightening torque N-m (kg-m, ft-lb)	31 - 36 (3.2 - 3.7, 23 - 27)

Final Drive

ECS00683

DIFFERENTIAL SIDE GEAR CLEARANCE

Clearance between side gear and differential case with washer mm (in)	0.1 - 0.2 (0.004 - 0.008)

DIFFERENTIAL SIDE GEAR THRUST WASHERS

Thickness mm (in)	Part number*
0.75 (0.0295)	38424-81X00
0.80 (0.0315)	38424-81X01
0.85 (0.0335)	38424-81X02
0.90 (0.0354)	38424-81X03
0.95 (0.0374)	38424-81X04

*: Always check with the Parts Department for the latest parts information.

DIFFERENTIAL SIDE BEARING PRELOAD ADJUSTING SHIMS

Thickness mm (in)	Part number*
0.48 (0.0189)	31438-80X00
0.52 (0.0205)	31438-80X01
0.56 (0.0220)	31438-80X02
0.60 (0.0236)	31438-80X03
0.64 (0.0252)	31438-80X04
0.68 (0.0268)	31438-80X05
0.72 (0.0283)	31438-80X06
0.76 (0.0299)	31438-80X07
0.80 (0.0315)	31438-80X08
0.84 (0.0331)	31438-80X09
0.88 (0.0346)	31438-80X10
0.92 (0.0362)	31438-80X11

*: Always check with the Parts Department for the latest parts information.

BEARING PRELOAD

Differential side bearing preload mm (in)	0.05 - 0.09 (0.0020 - 0.0035)

TURNING TORQUE

Turning torque of final drive assembly N-m (kg-cm, in-lb)	0.78 - 1.37 (8.0 - 14.0, 6.9 - 12.2)

Planetary Carrier and Oil Pump

ECS00684

PLANETARY CARRIER

Clearance between planetary carrier and pinion washer mm (in)	Standard	0.20 - 0.70 (0.0079 - 0.0276)
	Allowable limit	0.80 (0.0315)

OIL PUMP

Oil pump side clearance mm (in)		0.030 - 0.050 (0.0012 - 0.0020)	
Thickness of inner gears and outer gears		Inner gear	
		Thickness mm (in)	Part number*
		11.99 - 12.0 (0.4720 - 0.4724) 11.98 - 11.99 (0.4717 - 0.4720) 11.97 - 11.98 (0.4713 - 0.4717)	31346-80L00 31346-80L01 31346-80L02
		Outer gear	
		Thickness mm (in)	Part number*
		11.99 - 12.0 (0.4720 - 0.4724) 11.98 - 11.99 (0.4717 - 0.4720) 11.97 - 11.98 (0.4713 - 0.4717)	31347-80L00 31347-80L01 31347-80L02
Clearance between oil pump housing and outer gear mm (in)	Standard	0.111 - 0.181 (0.0044 - 0.0071)	
	Allowable limit	0.181 (0.0071)	
Oil pump cover seal ring clearance mm (in)	Standard	0.1 - 0.25 (0.0039 - 0.0098)	
	Allowable limit	0.25 (0.0098)	

*: Always check with the Parts Department for the latest parts information.

Input Shaft

ECS00685

SEAL RING CLEARANCE

Input shaft seal ring clearance mm (in)	Standard	0.08 - 0.23 (0.0031 - 0.0091)
	Allowable limit	0.23 (0.0091)

SEAL RING

Outer diameter mm (in)	Inner diameter mm (in)	Width mm (in)	Part number*
26 (1.024)	22.4 (0.882)	1.971 (0.078)	31525-80X02

*: Always check with the Parts Department for the latest parts information.

Reduction Pinion Gear

ECS00686

TURNING TORQUE

Turning torque of reduction pinion gear N-m (kg-cm, in-lb)	0.05 - 0.39 (0.5 - 4.0, 0.43 - 3.47)

REDUCTION PINION GEAR BEARING ADJUSTING SHIMS

NO.	Thickness mm (in)	Part number	NO.	Thickness mm (in)	Part number*
1	5.00 (0.1969)	31439-81X00	18	5.34 (0.2102)	31439-81X17
2	5.02 (0.1976)	31439-81X01	19	5.36 (0.2110)	31439-81X18
3	5.04 (0.1984)	31439-81X02	20	5.38 (0.2118)	31439-81X19
4	5.06 (0.1992)	31439-81X03	21	5.40 (0.2126)	31439-81X20
5	5.08 (0.2000)	31439-81X04	22	5.42 (0.2134)	31439-81X21
6	5.10 (0.2008)	31439-81X05	23	5.44 (0.2142)	31439-81X22
7	5.12 (0.2016)	31439-81X06	24	5.46 (0.2150)	31439-81X23
8	5.14 (0.2024)	31439-81X07	25	5.48 (0.2157)	31439-81X24
9	5.16 (0.2031)	31439-81X08	26	5.50 (0.2165)	31439-81X46
10	5.18 (0.2039)	31439-81X09	27	5.52 (0.2173)	31439-81X47
11	5.20 (0.2047)	31439-81X10	28	5.54 (0.2181)	31439-81X48
12	5.22 (0.2055)	31439-81X11	29	5.56 (0.2189)	31439-81X49
13	5.24 (0.2063)	31439-81X12	30	5.58 (0.2197)	31439-81X60
14	5.26 (0.2071)	31439-81X13	31	5.60 (0.2205)	31439-81X61
15	5.28 (0.2079)	31439-81X14	32	5.62 (0.2213)	31439-81X62

NO.	Thickness mm (in)	Part number	NO.	Thickness mm (in)	Part number*
16	5.30 (0.2087)	31439-81X15	33	5.64 (0.2220)	31439-81X63
17	5.32 (0.2094)	31439-81X16	34	5.66 (0.2228)	31439-81X64
35	5.68 (0.2236)	31439-81X65	50	4.70 (0.1850)	31439-83X10
36	5.70 (0.2244)	31439-81X66	51	4.72 (0.1858)	31439-83X11
37	5.72 (0.2252)	31439-81X67	52	4.74 (0.1866)	31439-83X12
38	5.74 (0.2260)	31439-81X68	53	4.76 (0.1874)	31439-83X13
39	5.76 (0.2268)	31439-81X69	54	4.78 (0.1882)	31439-83X14
40	5.78 (0.2276)	31439-81X70	55	4.80 (0.1890)	31439-83X15
41	5.80 (0.2283)	31439-81X71	56	4.82 (0.1898)	31439-83X16
42	5.82 (0.2291)	31439-81X72	57	4.84 (0.1906)	31439-83X17
43	5.84 (0.2299)	31439-81X73	58	4.86 (0.1913)	31439-83X18
44	5.86 (0.2307)	31439-81X74	59	4.88 (0.1921)	31439-83X19
45	4.60 (0.1811)	31439-85X05	60	4.90 (0.1929)	31439-83X20
46	4.62 (0.1819)	31439-85X06	61	4.92 (0.1937)	31439-83X21
47	4.64 (0.1827)	31439-85X07	62	4.94 (0.1945)	31439-83X22
48	4.66 (0.1835)	31439-85X08	63	4.96 (0.1953)	31439-83X23
49	4.68 (0.1843)	31439-85X09	64	4.98 (0.1961)	31439-83X24

*: Always check with the Parts Department for the latest parts information.

Band Servo

ECS00687

RETURN SPRING

Unit: mm (in)

Return spring	Part number*	Free length	Outer diameter
2nd servo return spring	31605-80L05	32.5 (1.280)	25.9 (1.020)
OD servo return spring	31605-80L06	62.6 (2.465)	21.7 (0.854)

*: Always check with the Parts Department for the latest parts information.

Output Shaft

ECS00688

SEAL RING CLEARANCE

Output shaft seal ring clearance mm (in)	Standard	0.10 - 0.25 (0.0039 - 0.0098)
	Allowable limit	0.25 (0.0098)

SEAL RING

Outer diameter mm (in)	Inner diameter mm (in)	Width mm (in)	Part number*
33.71 (1.327)	30.25 (1.191)	1.95 (0.077)	31525-80809

*: Always check with the Parts Department for the latest parts information.

END PLAY

Output shaft end play mm (in)	0 - 0.15 (0 - 0.0059)

OUTPUT SHAFT ADJUSTING SHIMS

Thickness mm (in)	Part number*
0.80 (0.0315)	31438-80X60
0.84 (0.0331)	31438-80X61
0.88 (0.0346)	31438-80X62
0.92 (0.0362)	31438-80X63
0.96 (0.0378)	31438-80X64
1.00 (0.0394)	31438-80X65
1.04 (0.0409)	31438-80X66
1.08 (0.0425)	31438-80X67
1.12 (0.0441)	31438-80X68
1.16 (0.0457)	31438-80X69
1.20 (0.0472)	31438-80X70

*: Always check with the Parts Department for the latest parts information.

Bearing Retainer

ECS00689

SEAL RING CLEARANCE

Bearing retainer seal ring clearance mm (in)	Standard	0.10 - 0.30 (0.0039 - 0.0118)
	Allowable limit	0.30 (0.0118)

Total End Play

ECS0068A

Total end play mm (in)	0.25 - 0.55 (0.0098 - 0.0217)

BEARING RACE FOR ADJUSTING TOTAL END PLAY

Thickness mm (in)	Part number*
0.8 (0.031)	31435-80X00
1.0 (0.039)	31435-80X01
1.2 (0.047)	31435-80X02
1.4 (0.055)	31435-80X03
1.6 (0.063)	31435-80X04
1.8 (0.071)	31435-80X05
2.0 (0.079)	31435-80X06
0.9 (0.035)	31435-80X09
1.1 (0.043)	31435-80X10
1.3 (0.051)	31435-80X11
1.5 (0.059)	31435-80X12
1.7 (0.067)	31435-80X13
1.9 (0.075)	31435-80X14

*: Always check with the Parts Department for the latest parts information.

Reverse Clutch End Play

ECS0068B

Reverse clutch end play mm (in)	0.55 - 0.90 (0.0217 - 0.0354)

THRUST WASHERS FOR ADJUSTING REVERSE CLUTCH DRUM END PLAY

Thickness mm (in)	Part number*
0.80 (0.0315)	31508-80X13
0.95 (0.0374)	31508-80X14
1.10 (0.0433)	31508-80X15
1.25 (0.0492)	31508-80X16
1.40 (0.0551)	31508-80X17
1.55 (0.0610)	31508-80X18
1.70 (0.0669)	31508-80X19
1.85 (0.0728)	31508-80X20

*: Always check with the Parts Department for the latest parts information.

Removal and Installation

ECS0068C

Unit: mm (in)

Distance between end of converter housing and torque converter	14 (0.55)

Shift Solenoid Valves

ECS0068D

Gear position	1	2	3	4
Shift solenoid valve A	ON (Closed)	OFF (Open)	OFF (Open)	ON (Closed)
Shift solenoid valve B	ON (Closed)	ON (Closed)	OFF (Open)	OFF (Open)

Solenoid Valves

ECS0068E

Solenoid valves	Resistance (Approx.) Ω	Terminal No.
Shift solenoid valve A	20 - 30	2
Shift solenoid valve B	5 - 20	1
Overrun clutch solenoid valve	20 - 30	3
Line pressure solenoid valve	2.5 - 5	4
Torque converter clutch solenoid valve	5 - 20	5

A/T Fluid Temperature Sensor

ECS0068F

Remarks: Specification data are reference values.

Monitor item	Condition	Specification (Approximately)	
A/T fluid temperature sensor	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]	1.5V ↓ 0.5V	2.5 kΩ ↓ 0.3 kΩ

Revolution Sensor

ECS0068G

Condition	Judgement standard
When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function.*1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	450 Hz (Approx.)
When vehicle is parked.	Under 1.3V or over 4.5V

Dropping Resistor

ECS0068H

Resistance	Approx. 12Ω

Turbine Revolution Sensor

ECS0068I

Condition	Judgement standard
When moving at 20 km/h (12 MPH), use the CONSULT-II pulse frequency measuring function.*1 **CAUTION:** **Connect the diagnosis data link cable to the vehicle diagnosis connector.** *1: A circuit tester cannot be used to test this item.	240 Hz (Approx.)
When vehicle is parked.	Under 1.3V or over 4.5V

SECTION FAX

FRONT AXLE

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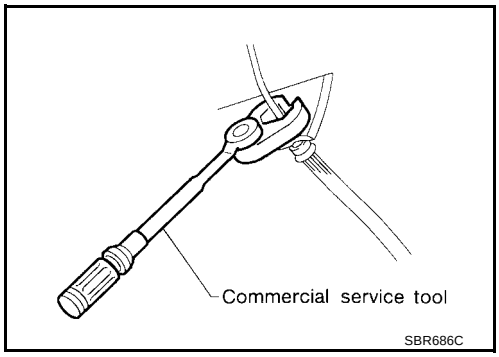
PRECAUTIONS

PFP:00001

Precautions

EDS000Q6

- **When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.**
  ***: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**
- **After installing removed suspension parts, check wheel alignment and adjust if necessary.**
- **Use flare nut wrench when removing or installing brake tubes.**
- **Always torque brake lines when installing.**



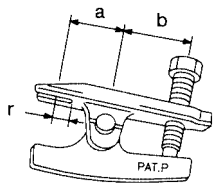
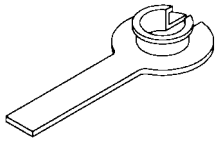
PREPARATION

PFP:00002

Special Service Tools

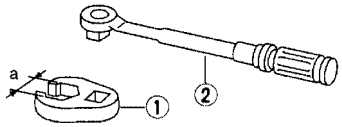
EDS000Q7

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
HT72520000 (J25730-B) Ball joint remover  NT546	Removing tie-rod outer end and lower ball joint **a: 33 mm (1.30 in)** **b: 50 mm (1.97 in)** **r: R11.5 mm (0.453 in)**
KV38106800 (J34297-1) Differential side oil seal protector  NT147	Installing drive shaft

Commercial Service Tools

EDS000Q8

Tool name	Description
1 Flare nut crowfoot 2 Torque wrench  NT360	Removing and installing each brake piping **a: 10 mm (0.39 in)**

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

EDS000Q9

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

Reference page			—	FAX-18, "Inspection"	Refer to MA-39, "WHEEL BALANCE"	FAX-8, "Installation"	FAX-5, "Front Wheel Bearing"	FAX-5, "Front Wheel Bearing"	Refer to DRIVE SHAFT in this chart.	Refer to AXLE in this chart.	Refer to FSU-4, "NVH Troubleshooting Chart"	Refer to WT-2, "NVH Troubleshooting Chart"	Refer to WT-2, "NVH Troubleshooting Chart"	Refer to BR-5, "NVH Troubleshooting Chart"	Refer to PS-6, "NVH Troubleshooting Chart"
Possible cause and SUSPECTED PARTS			Excessive joint angle	Joint sliding resistance	Imbalance	Improper installation, looseness	Parts interference	Wheel bearing damage	DRIVE SHAFT	AXLE	SUSPENSION	TIRES	ROAD WHEEL	BRAKES	STEERING
Symptom	DRIVE SHAFT	Noise, Vibration	×	×						×	×	×	×	×	×
		Shake	×		×					×	×	×	×	×	×
	AXLE	Noise				×	×		×		×	×	×	×	×
		Shake				×	×		×		×	×	×	×	×
		Vibration				×	×		×		×	×			×
		Shimmy				×	×				×	×	×	×	×
		Judder				×					×	×	×	×	×
		Poor quality ride or handling				×	×	×			×	×	×		

×: Applicable

ON-VEHICLE SERVICE

PFP:00000

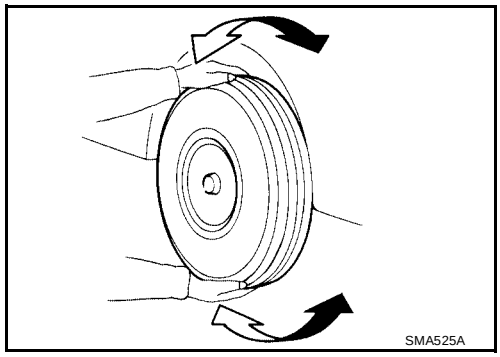
Front Axle Parts

EDS000QA

Check front axle and front suspension parts for excessive play, cracks, wear or other damage.

- Shake each front wheel to check for excessive play.
- Make sure that the cotter pin is properly installed.
- Retighten all axle and suspension nuts and bolts to the specified torque.

Tightening torque : Refer to FSU-5, "Components" .


SMA525A

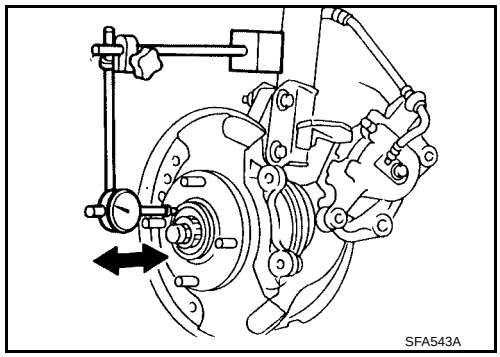
Front Wheel Bearing

EDS000QB

- Rotate wheel hub to check that wheel bearings operate smoothly.
- Check axial end play.

Axial end play : 0.05 mm (0.0020 in) or less

If out of specification or wheel bearing does not turn smoothly, replace wheel bearing assembly.
Refer to FAX-6, "WHEEL HUB AND KNUCKLE" .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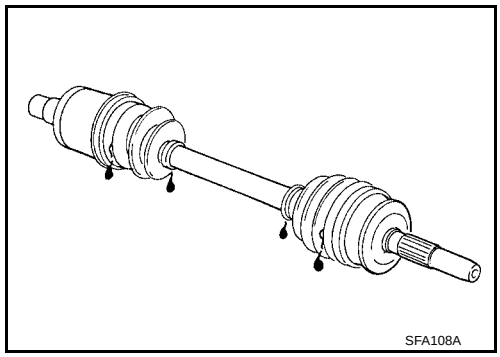
Drive Shaft

EDS000QC

Check for grease leakage or other damage.

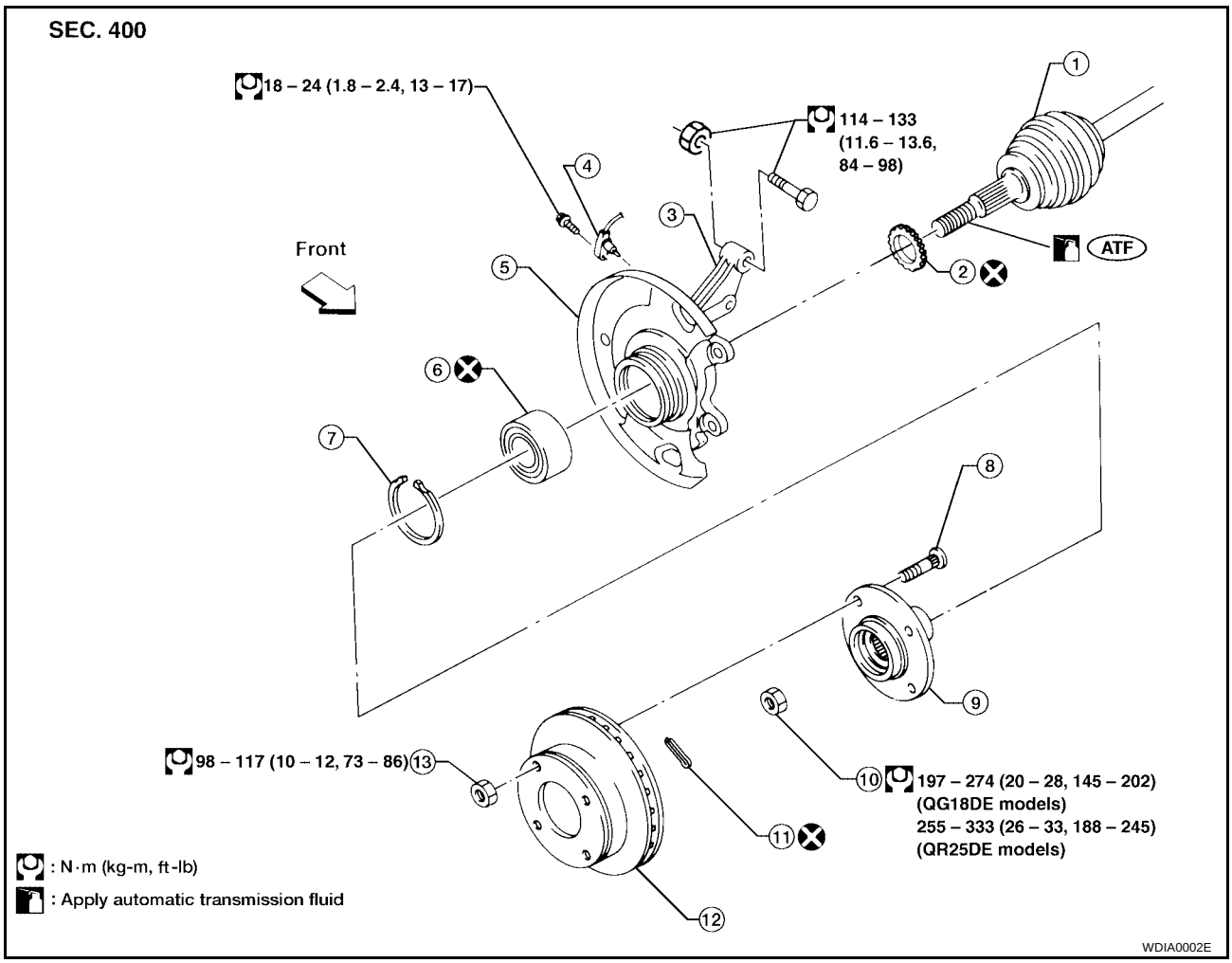

SFA108A

WHEEL HUB AND KNUCKLE

PFP:40202

Components

EDS000QD



1. Drive shaft
2. Sensor rotor (if equipped)
3. Knuckle
4. Wheel sensor (if equipped)
5. Baffle plate
6. Wheel bearing assembly
7. Snap ring
8. Wheel bolt
9. Wheel hub
10. Wheel bearing lock nut
11. Cotter pin
12. Disc rotor
13. Wheel nut

Removal

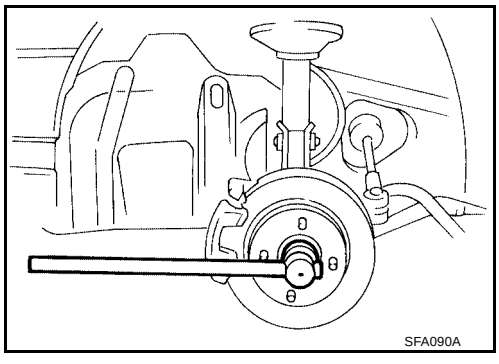
EDS000QE

CAUTION:

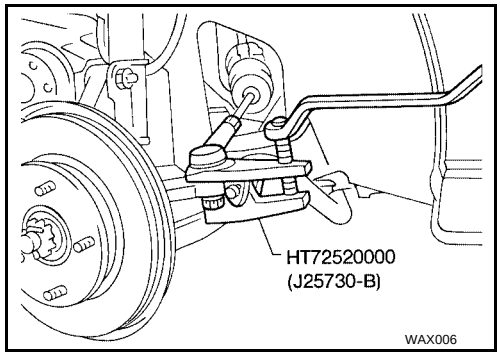
Before removing the front axle assembly, disconnect the wheel sensor from the assembly. Then move it away from the front axle assembly area.

Failure to do so may result in damage to the sensor wires and the wheel sensor becoming inoperative.

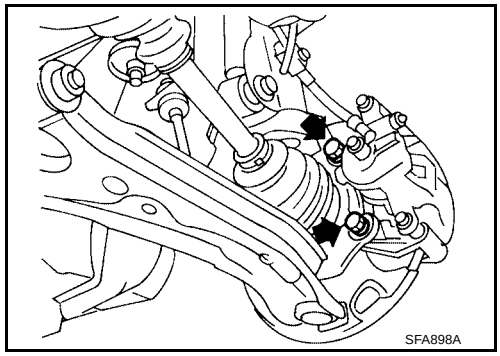
1. Remove cotter pin and wheel bearing lock nut.



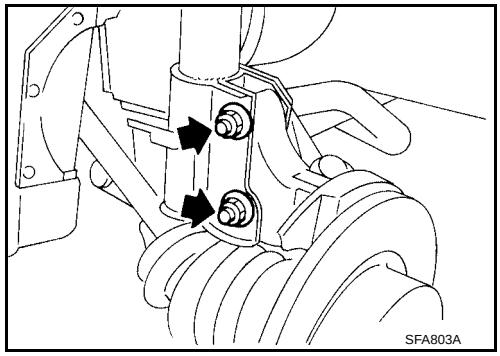
2. Separate tie-rod from knuckle with Tool.
   - **Install stud nut on stud bolt to prevent damage to stud bolt.**



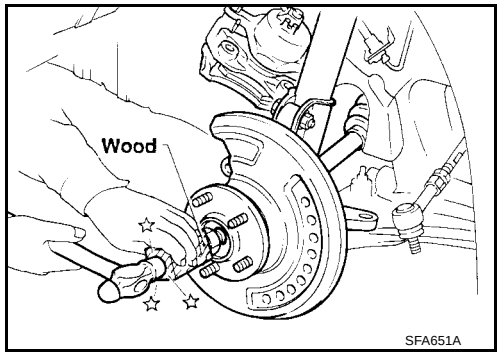
3. Remove brake caliper assembly, torque member and rotor.
   - **Brake hose need not be disconnected from brake caliper. In this case, suspend caliper assembly with wire so as not to stretch brake hose. Be careful not to depress brake pedal, or piston will pop out.**
     Make sure brake hose is not twisted.



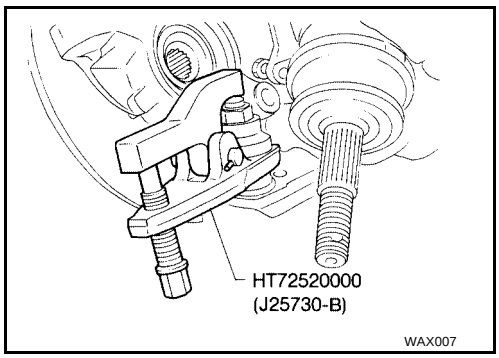
4. Remove strut lower mounting nuts and bolts.



5. Separate drive shaft from knuckle by lightly tapping it. If it is hard to remove, use a puller.
   - **Cover boots with shop towel so as not to damage them when removing drive shaft.**



6. Loosen lower ball joint nut.
7. Remove knuckle from lower ball joint stud with Tool.



Installation

EDS000QF

1. Install in reverse order of removal.
   - Install knuckle with wheel hub.
     When installing knuckle to strut, be sure to hold bolts and tighten nuts.

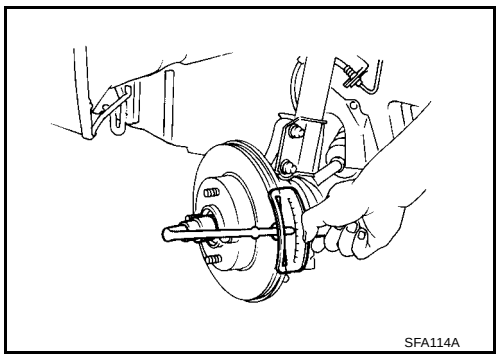
     : 114 - 133 N·m (11.6 - 13.6 kg-m, 84 - 98 ft-lb)

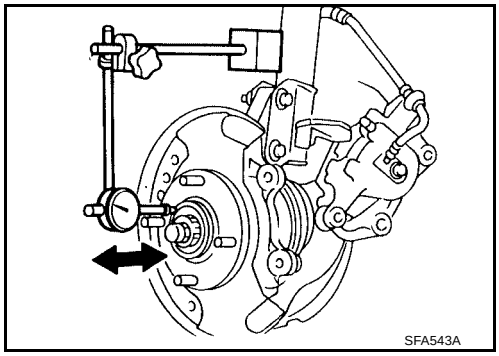
     Before tightening, apply oil to threaded portion of drive shaft.
   - Tighten wheel bearing lock nut.

     : 197 - 274 N·m (20 - 28 kg-m, 145 - 202 ft-lb) (QG18DE models)

     : 255 - 333 N·m (26 - 33 kg-m, 188 - 245 ft-lb) (QR25DE models)
   - Rotate wheel hub to check that wheel bearings operate smoothly.
   - Rotate wheel hub to check wheel bearing axial end play.

     Axial end play : 0.05 mm (0.0020 in) or less





Disassembly

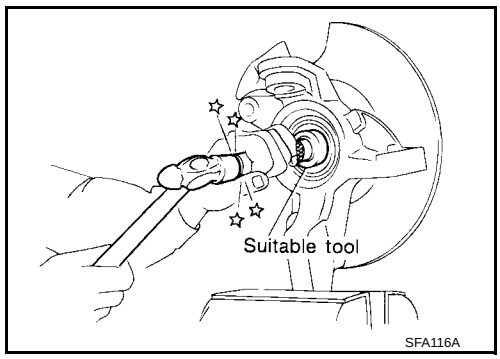
EDS000QG

CAUTION:
When removing wheel hub or wheel bearing from knuckle, replace wheel bearing assembly (outer race and inner race) with a new one.
Wheel bearing does not require maintenance. If any of the following symptoms are noted, replace wheel bearing assembly.

- **Growling noise is emitted from wheel bearing during operation.**
- **Wheel bearing drags or turns roughly. This occurs when turning hub by hand after bearing lock nut is tightened to specified torque.**

WHEEL HUB

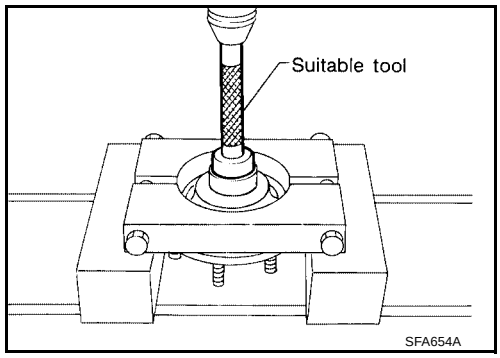
Drive out hub and inner race from knuckle with a suitable tool.



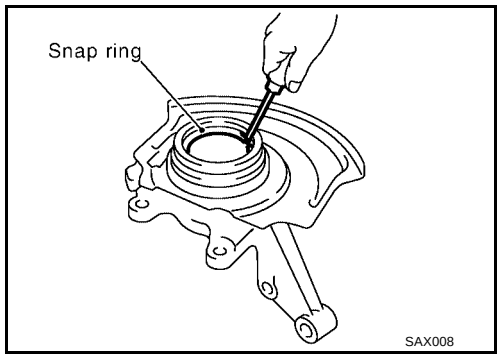
WHEEL BEARING

When replacing wheel bearing, replace complete wheel bearing assembly (inner race and outer race).

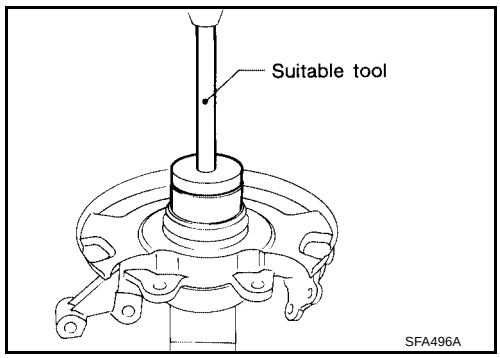
1. Remove bearing inner race.



2. Remove snap rings.



3. Press out bearing outer race.
4. Remove baffle plate, if required.



Inspection

EDS000QH

WHEEL HUB AND KNUCKLE

Check wheel hub and knuckle for cracks by using a magnetic exploration or dyeing test.

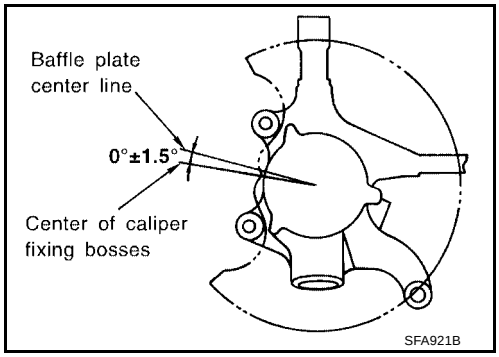
SNAP RING

Check snap ring for wear or cracks. Replace if necessary.

Assembly

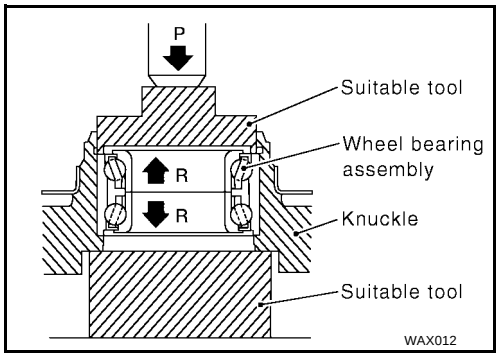
EDS000QI

- If baffle plate has been removed, replace it with a new one.
- When installing the baffle plate, press new plate so that it is in contact with knuckle wall. Refer to figure at right.



1. Press new wheel bearing assembly into knuckle until it seats against knuckle shoulder.

Maximum load P : 29.4 kN
(3.0 ton, 3.3 US ton, 2.95 Imp ton)



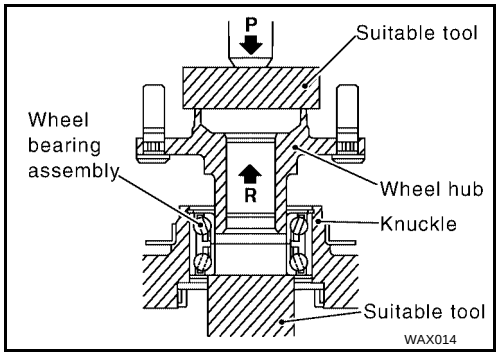
CAUTION:

- **Do not apply disassembly force in direction “R”. There is a possibility of breaking the seal. In case of separation (except range of initial clearance) and disassembling of inner race, the wheel bearing must be replaced with a new part.**
- **Do not press inner race of wheel bearing assembly or seal.**
- **Do not apply oil or grease to mating surfaces of wheel bearing outer race and knuckle.**

2. Install outer snap ring into groove of knuckle.
3. Press wheel hub into knuckle until it stops when the end of the wheel bearing is hit.

Maximum load P : 49.0 kN
(5.0 ton, 5.5 US ton, 4.9 Imp ton)

- Do not move wheel hub in direction “R”.



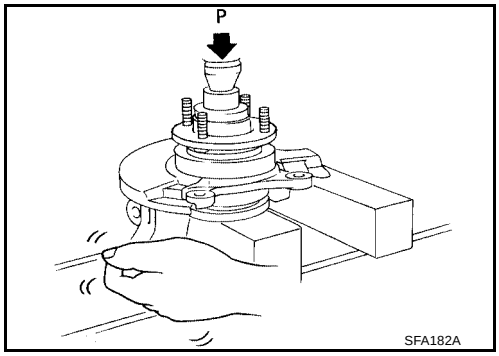
4. Check bearing operation.

a. Add load P with press.

Load P : 34.3 - 49.0 kN
(3.5 - 5.0 ton, 3.9 - 5.5 US ton,
3.44 - 4.92 Imp ton)

b. Spin knuckle several turns in both directions.

c. Make sure that wheel bearings operate smoothly.



DRIVE SHAFT

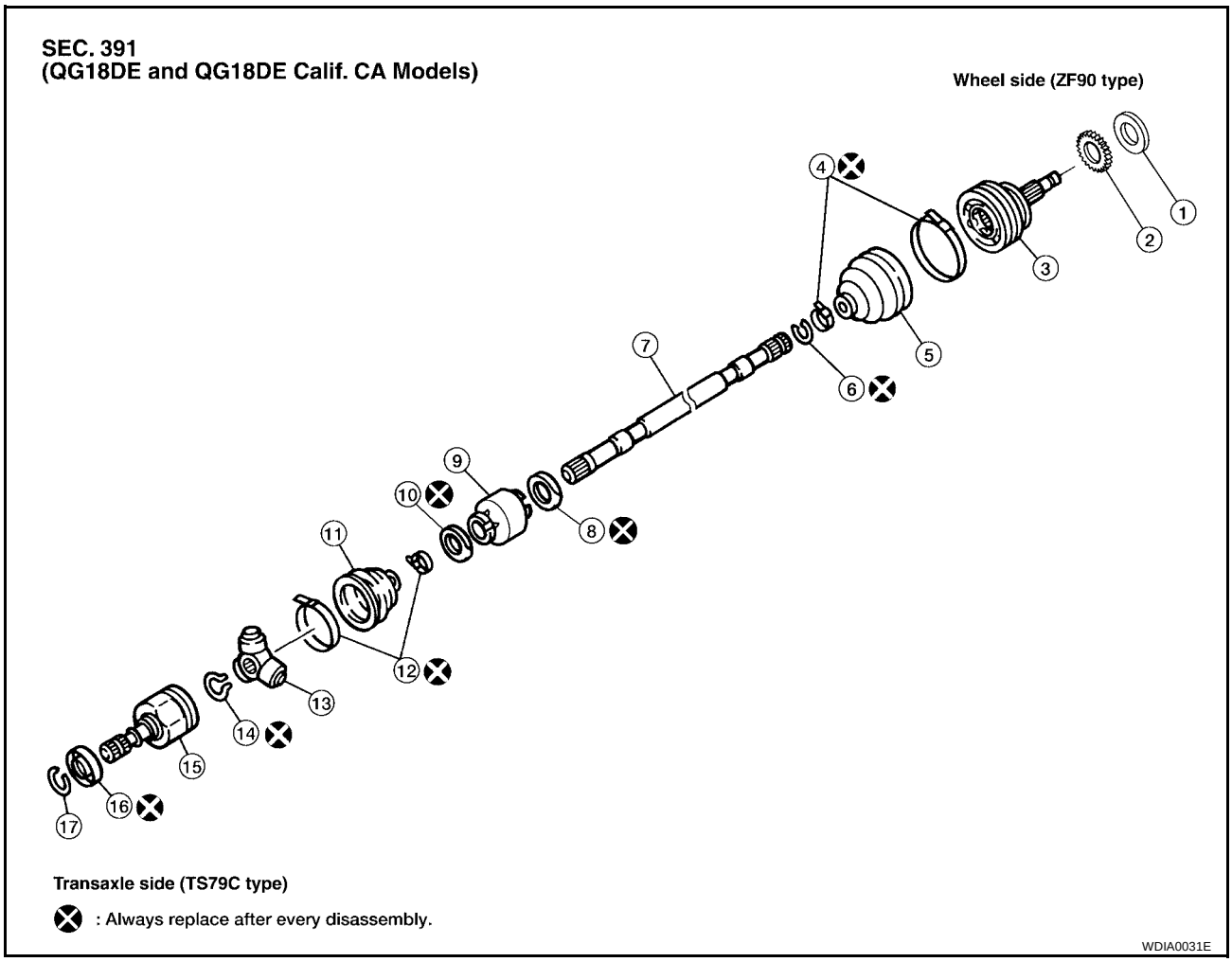
PFP:39100

Components

EDS000QJ

CAUTION:

- **Circular clips should be properly meshed with differential side gear (transaxle side) and with joint assembly (wheel side). Make sure they will not come out.**
- **Be careful not to damage boots. Use suitable protector or cloth during removal and installation.**

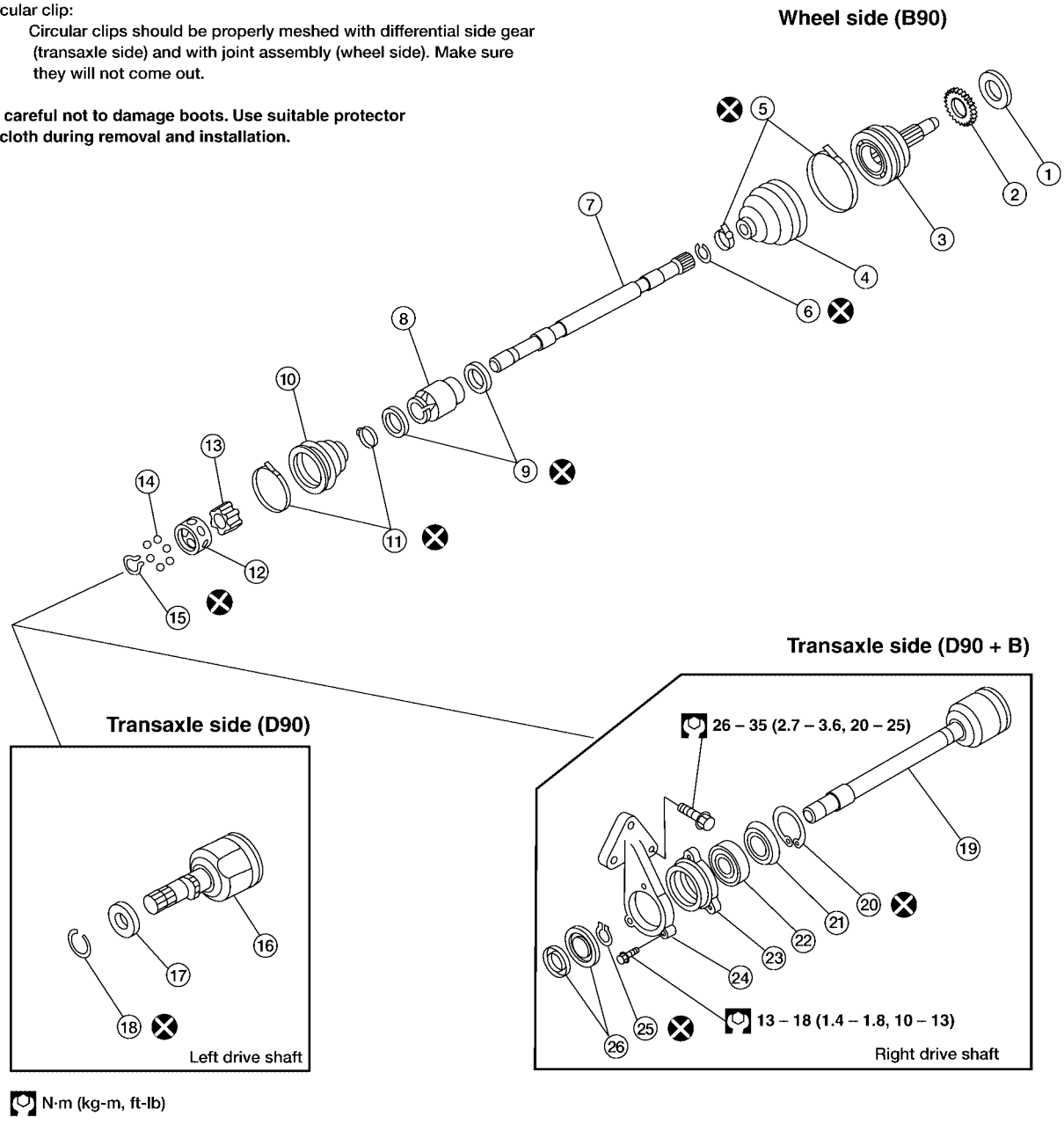


1.	Dust shield	2.	Sensor rotor, if equipped	3.	Joint assembly
4.	Boot band	5.	Boot	6.	Circular clip
7.	Drive shaft	8.	Dynamic damper band, outboard (if equipped)	9.	Dynamic damper
10.	Dynamic damper band, inboard	11.	Boot	12.	Boot band
13.	Spider assembly	14.	Snap ring	15.	Slide joint housing
16.	Dust shield	17.	Circular clip		

SEC. 391
(QR25DE Models)

Circular clip:
Circular clips should be properly meshed with differential side gear (transaxle side) and with joint assembly (wheel side). Make sure they will not come out.

Be careful not to damage boots. Use suitable protector or cloth during removal and installation.

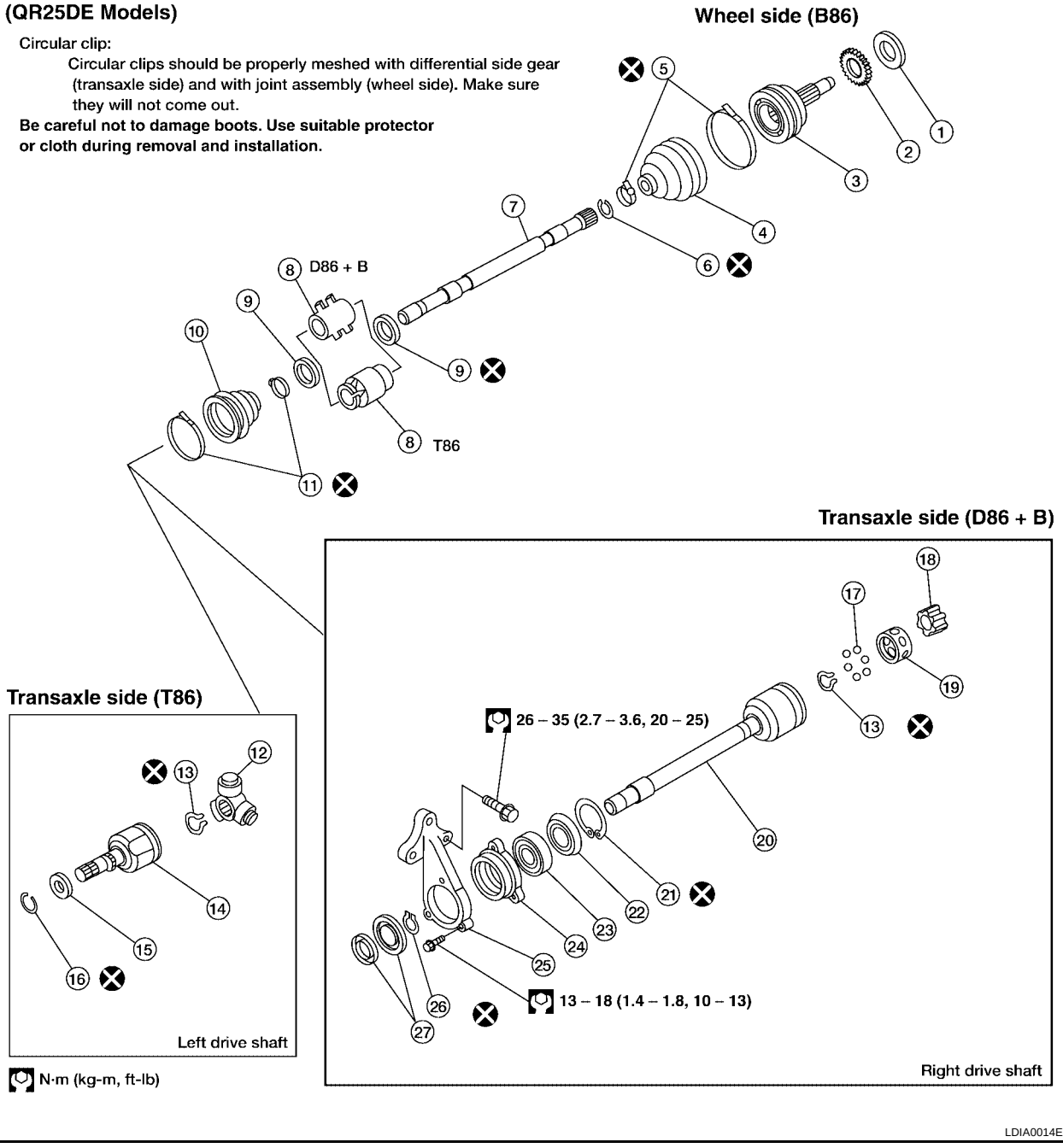


1.	Dust shield	2.	Sensor rotor, if equipped	3.	Joint assembly
4.	Boot	5.	Boot band	6.	Circular clip
7.	Drive shaft	8.	Dynamic damper	9.	Dynamic damper band
10.	Boot	11.	Boot band	12.	Cage
13.	Inner race	14.	Ball	15.	Snap ring
16.	Slide joint assembly	17.	Dust shield	18.	Circular clip
19.	Slide joint housing with extension shaft	20.	Snap ring	21.	Dust shield
22.	Support bearing	23.	Support bearing retainer	24.	Bracket
25.	Snap ring	26.	Dust shield		

SEC. 391
(QR25DE Models)

Circular clip:
Circular clips should be properly meshed with differential side gear (transaxle side) and with joint assembly (wheel side). Make sure they will not come out.

Be careful not to damage boots. Use suitable protector or cloth during removal and installation.

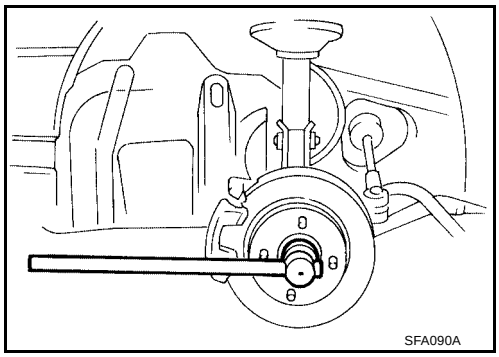


1.	Dust shield	2.	Sensor rotor, if equipped	3.	Joint assembly
4.	Boot	5.	Boot band	6.	Circular clip
7.	Drive shaft	8.	Dynamic damper	9.	Dynamic damper band
10.	Boot	11.	Boot band	12.	Spider assembly
13.	Snap ring	14.	Slide joint assembly	15.	Dust shield
16.	Circular clip	17.	Ball	18.	Inner race
19.	Cage	20.	Slide joint housing with extension shaft	21.	Snap ring
22.	Dust shield	23.	Support bearing	24.	Support bearing retainer
25.	Bracket	26.	Snap ring	27.	Dust shield

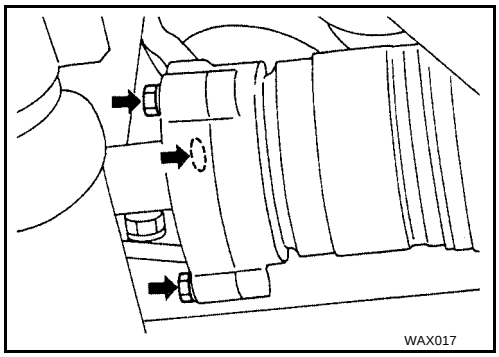
Removal

EDS000QK

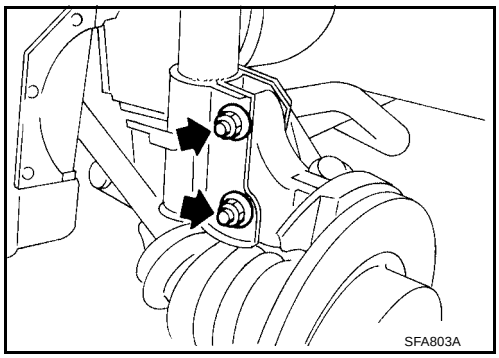
1. Remove cotter pin and wheel bearing lock nut.



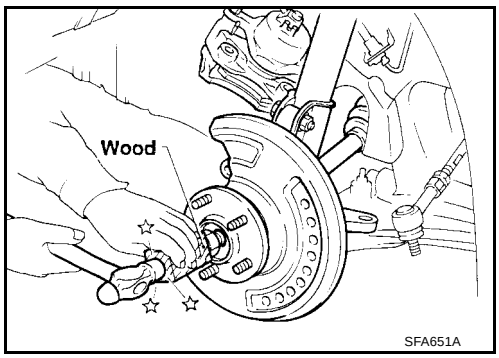
2. Remove drive shaft center support bearing bolts.



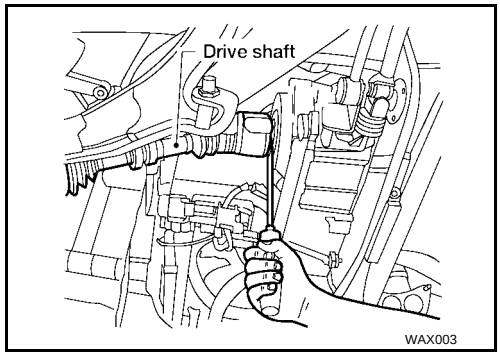
3. Remove strut lower mounting nuts and bolts.
4. Remove brake hose clip.



5. Separate drive shaft from knuckle by lightly tapping it. If it is hard to remove, use a puller.
   - **Cover boots with shop towel so as not to damage them when removing drive shaft.**



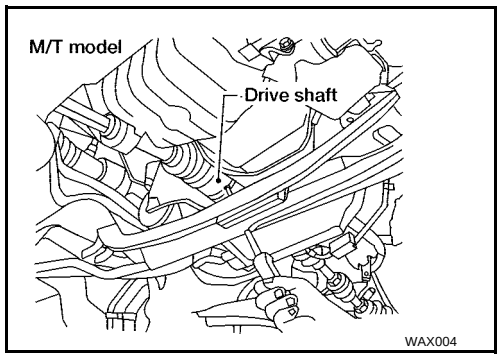
6. Remove left drive shaft from transaxle.



7. Remove right drive shaft from transaxle.

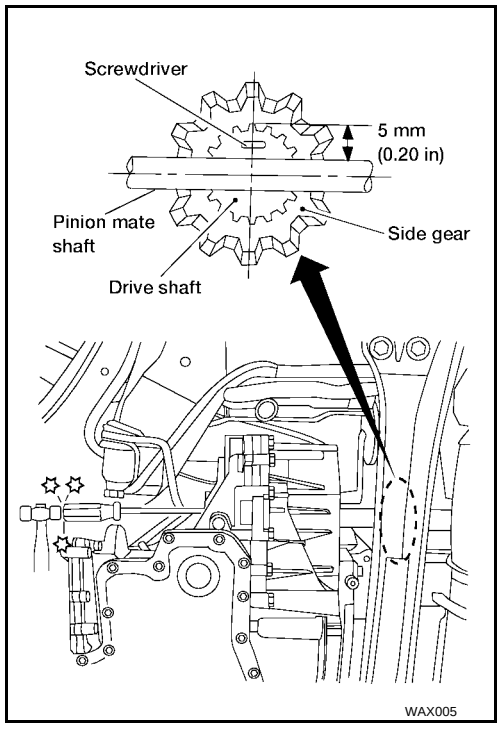
— For M/T models —

- Pry off drive shaft from transaxle as shown at right.



— For A/T models —

- Insert screwdriver into transaxle opening for right drive shaft and strike with a hammer.
- **Be careful not to damage pinion mate shaft and side gear.**

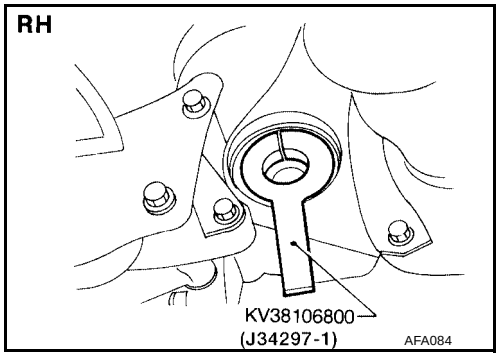


Installation

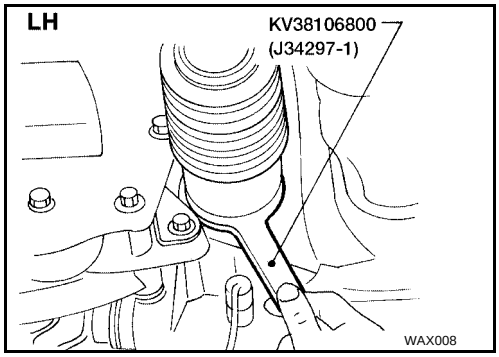
EDS000QL

TRANSAXLE SIDE

1. Drive a new oil seal to transaxle. Refer to MT-11, "SIDE OIL SEAL" , MT-74, "SIDE OIL SEAL" , MT-74, "SIDE OIL SEAL"AT-263, "Differential Side Oil Seal Replacement" , or AT-642, "Differential Side Oil Seal Replacement" .
2. Set Tool along the inner circumference of oil seal.



3. Insert drive shaft into transaxle. Be sure to properly align the serrations and then withdraw Tool.
4. Push drive shaft, then press-fit circular clip on the drive shaft into circular clip groove of side gear.
5. After its insertion, try to pull the flange out of the slide joint by hand. If it pulls out, the circular clip is not properly meshed with the side gear.



WHEEL SIDE

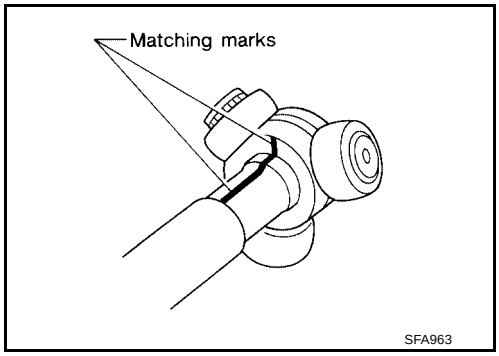
1. Install drive shaft into knuckle.
2. Tighten strut lower mounting nuts and wheel bearing lock nut.

Disassembly

EDS000QM

TRANSAXLE SIDE (TS79C AND T86 TYPE)

1. Remove boot bands.
2. Put matching marks on slide joint housing and drive shaft before separating joint assembly.
3. Put matching marks on spider assembly and drive shaft.



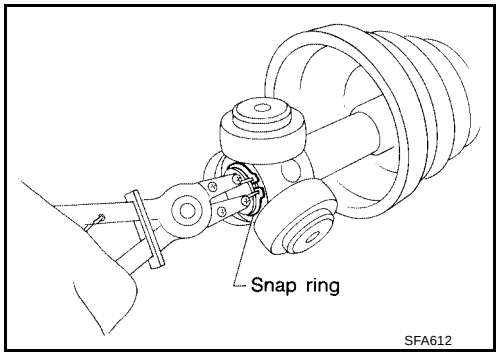
4. Remove snap ring, then remove spider assembly.

CAUTION:

Do not disassemble spider assembly.

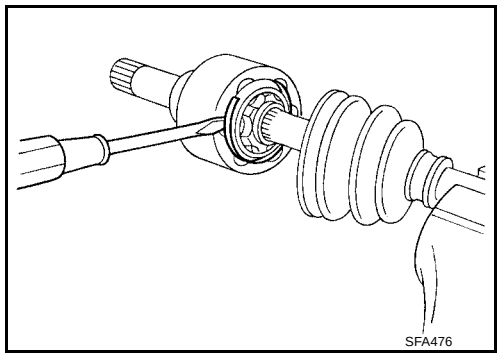
5. Draw out boot.

- **Cover drive shaft serrations with tape so as not to damage the boot.**



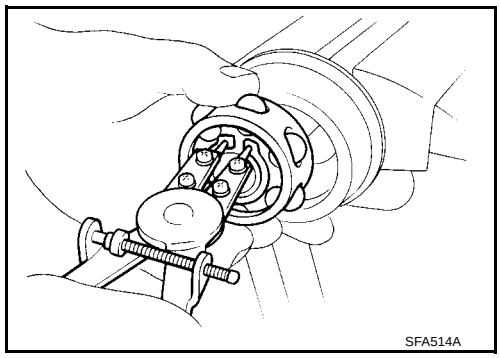
TRANSAXLE SIDE (D90,D90+B AND D86+B TYPE)

1. Remove boot bands.
2. Put matching marks on slide joint housing and drive shaft before separating joint assembly.
3. Pry off snap ring with a screwdriver, and pull out slide joint housing.



4. Put matching marks on inner race and drive shaft.
5. Remove snap ring, then remove ball cage, inner race and balls as a unit.
6. Draw out boot.

- **Cover drive shaft serrations with tape so as not to damage the boot.**



WHEEL SIDE (ZF90, B90 AND B86 TYPE)

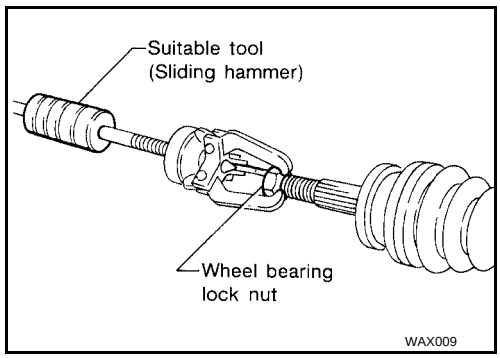
CAUTION:

The joint on the wheel side cannot be disassembled.

1. Before separating joint assembly, put matching marks on drive shaft and joint assembly.
2. Separate joint assembly with a suitable tool.

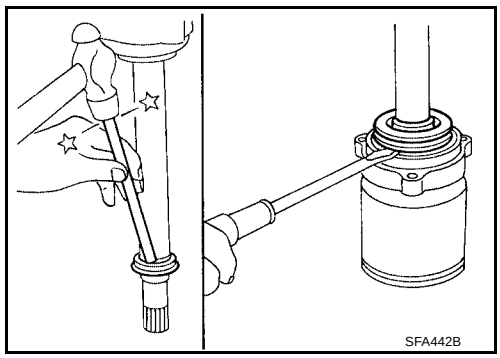
- **Be careful not to damage threads on drive shaft.**

3. Remove boot bands.

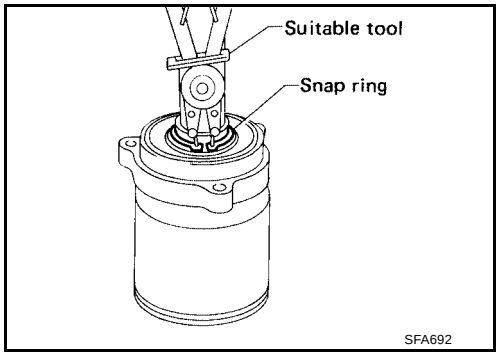


SUPPORT BEARING

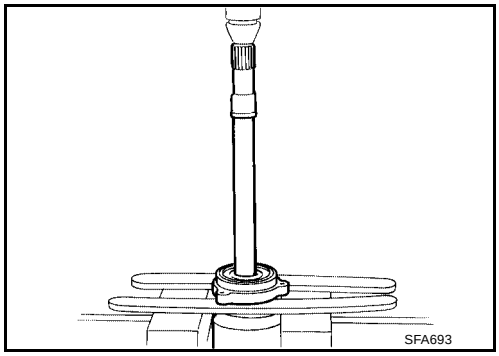
1. Remove dust shield.



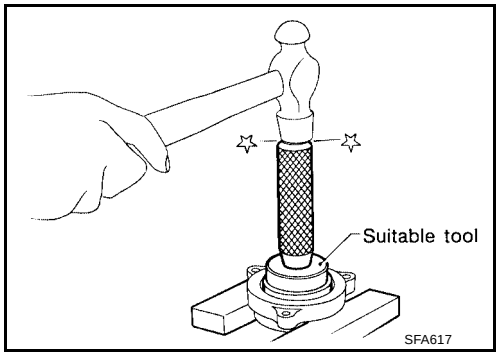
2. Remove snap ring.



3. Press support bearing assembly off drive shaft.



4. Remove snap ring.
5. Remove dust shield.
6. Separate support bearing from retainer.



Inspection

EDS000QN

Thoroughly clean all parts in cleaning solvent, then dry with compressed air. Check parts for evidence of deformation and other damage.

DRIVE SHAFT

Replace drive shaft if it is twisted or cracked.

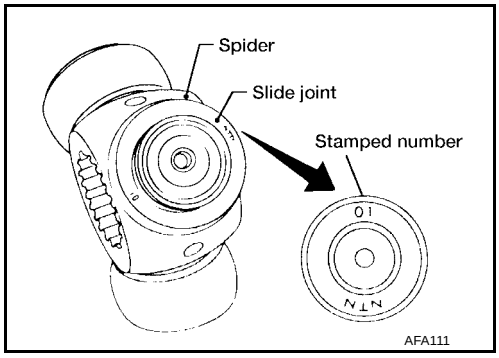
BOOT

Check boot for fatigue, cracks or wear. Replace with new boot and boot bands.

JOINT ASSEMBLY (TRANSAXLE SIDE)

TS79C AND T86 TYPE

- Check spider assembly for needle bearing and washer damage. Replace if necessary.
- Check roller surfaces for scratches, wear and other damage. Replace if necessary.
- Check serration for deformation. Replace if necessary.
- Check slide joint housing for any damage. Replace if necessary.
- When replacing only spider assembly, select a new spider assembly from among those listed in table below. Ensure that the number stamped on slide joint is the same as that stamped on new part.



Housing alone cannot be replaced. It must be replaced together with spider assembly.

Stamped number	Part No.*
01	39720-61E01
02	39720-61E02
03	39720-61E03
04	39720-61E04
05	39720-61E05
06	39720-61E06
07	39720-61E07

*: Always check with the Parts Department for the latest parts information.

D90+B TYPE

- Replace any parts of double offset joint which show signs of scorching, rust, wear or excessive play.
- Check serration for deformation. Replace if necessary.
- Check slide joint housing for any damage. Replace if necessary.

JOINT ASSEMBLY (WHEEL SIDE)

Replace joint assembly if it is deformed or damaged.

SUPPORT BEARING

Make sure support bearing rolls freely and is free from noise, cracks, pitting and wear.

SUPPORT BEARING BRACKET

Check support bearing bracket for cracks with a magnetic exploration or dyeing test.

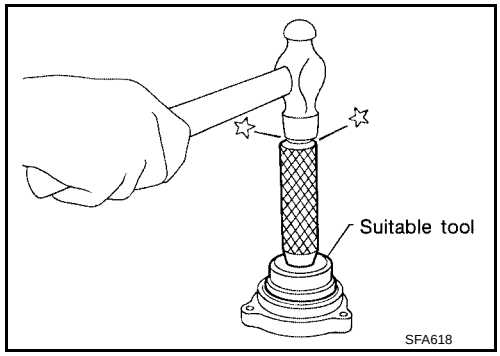
Assembly

EDS000QO

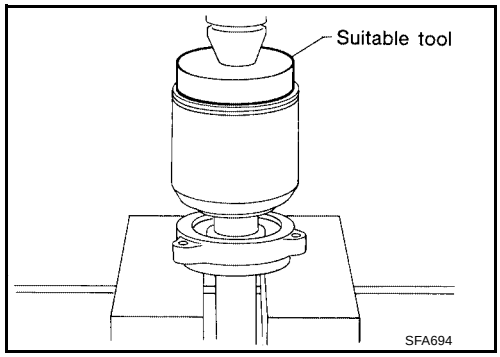
- **After drive shaft has been assembled, ensure that it moves smoothly over its entire range without binding.**
- **Use Genuine NISSAN grease or equivalent after every overhaul.**

SUPPORT BEARING

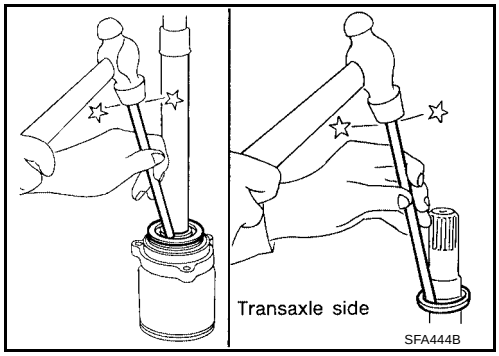
1. Install bearing into retainer.



2. Install dust shield.
3. Install snap ring.
4. Press drive shaft into bearing.



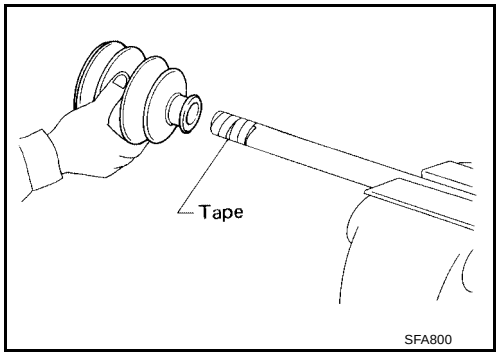
5. Install snap ring.
6. Install new dust shield.



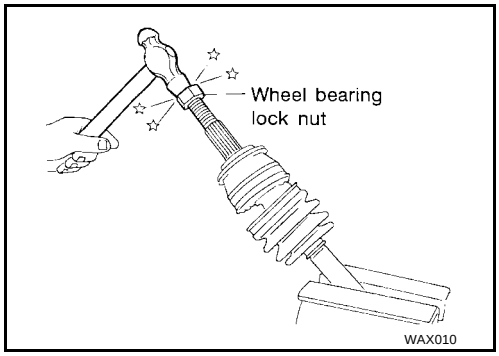
WHEEL SIDE (ZF90, B90 AND B86 TYPE)

1. Install boot and new small boot band on drive shaft.

- **Cover drive shaft serration with tape to prevent damage to boot during installation.**



2. Set joint assembly onto drive shaft by lightly tapping it.
   - **Ensure that marks which were made during disassembly are properly aligned.**

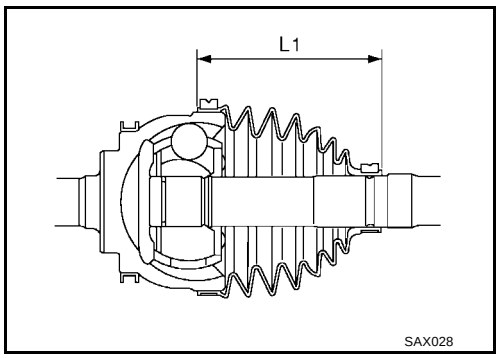


3. Pack drive shaft with specified amount of grease.

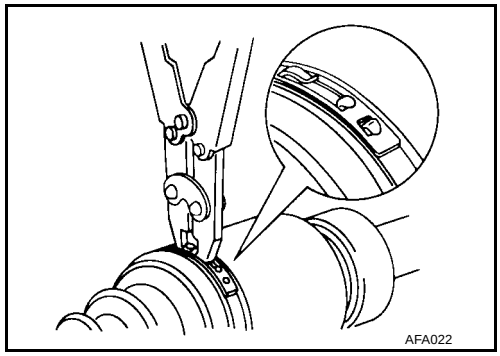
Specified amount of grease	**: QG18DE 122 - 126 g (4.30 - 4.44 oz)**
	: QR25DE A/T 120 - 140 g (4.23 - 4.94 oz)
	: QR25DE M/T 115 - 135 g (4.06 - 4.76 oz)

4. Make sure that boot is properly installed on the drive shaft groove.
   Set boot so that it does not swell and deform when its length is "L_1 ".

Length "L_1 "	
QG18DE	**: 97 mm (3.82 in)**
QR25DE A/T	**: 115.7 mm (4.56 in)**
QR25DE M/T	**: 124.2 mm (4.89 in)**

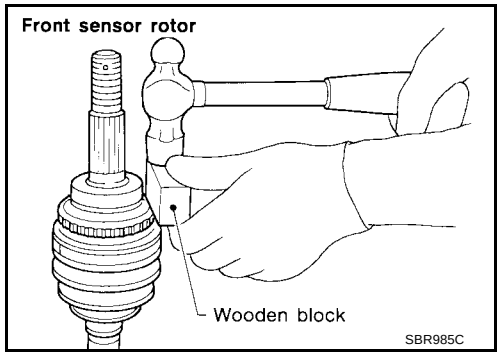


5. Lock new large and small boot bands securely with a suitable tool.



6. Install the sensor rotor, if equipped. For front sensor rotor, use a hammer and wooden block. For rear sensor rotor, use a suitable drift and press.

- Always replace sensor rotor with a new one.

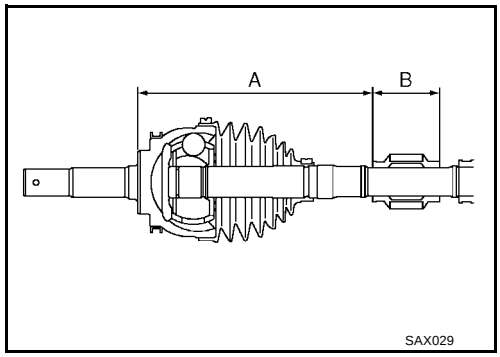


DYNAMIC DAMPER

1. Use a new damper band when reinstalling.
2. Install dynamic damper from stationary-joint side while holding it securely:

Unit: mm (in)

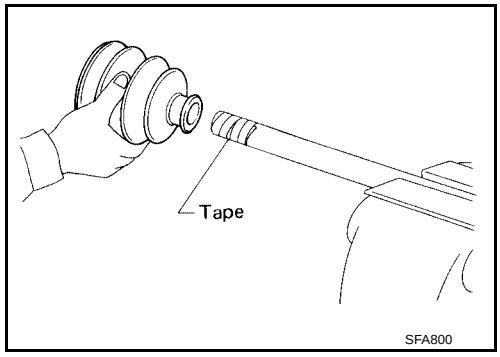
Applied model	QG18DE	
	LH	RH
"A"	175-185 (6.89 - 7.28)	420-430 (16.54 - 16.93)
"B"	70 (2.76)	64 (2.52)
	QR25DE	
"A"	173 - 179 (6.81 - 7.05)	200 - 206 (7.87 - 8.11)
"B"	50 (1.97)	68 (2.68)



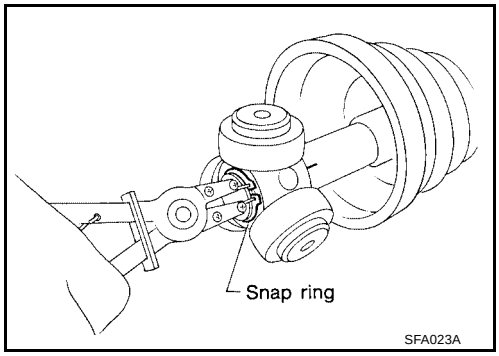
TRANSAXLE SIDE (TS79C AND T86)

1. Install boot and new small boot band on drive shaft.

- **Cover drive shaft serration with tape to prevent damage to boot during installation.**



2. Install spider assembly securely, making sure the matching marks which were made during disassembly are properly aligned.
3. Install new snap ring.



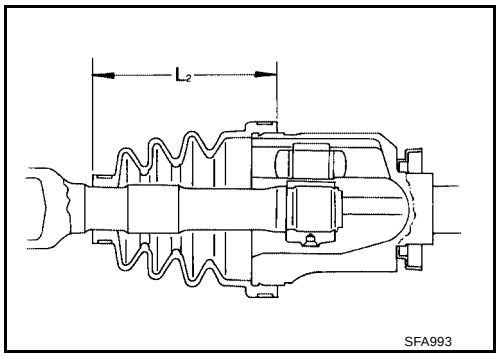
4. Pack drive shaft with specified amount of grease.

Specified amount of grease	**: QG18DE 154 - 164 g (5.43 - 5.78 oz)**
	: QR25DE A/T 145 - 165 g (5.11 - 5.82 oz)
	: QR25DE M/T D86+B 135 - 155 g (4.76 - 5.47 oz)
	: QR25DE M/T T86 140 - 160 g (4.94 - 5.64 oz)

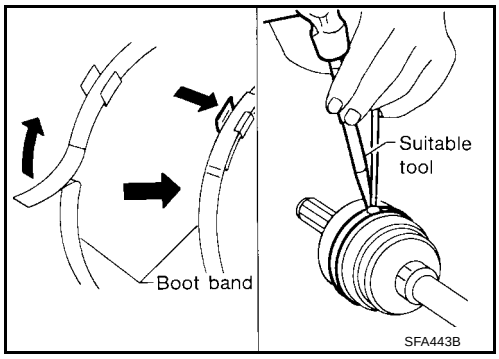
5. Install slide joint housing.
6. Set boot so that it does not swell and deform when its length is "L_2 ".

Length "L_2 "	
QG18DE	**: 102.5 mm (4.035 in)**
QR25DE A/T	**: 98 mm (3.86 in)**
QR25DE M/T D86+B	**: 98 mm (3.86 in)**
QR25DE M/T T86	**: 98.5 mm (3.88 in)**

- **Make sure the boot is properly installed on the drive shaft groove.**



7. Lock new large and small boot bands securely with a suitable tool.



SERVICE DATA AND SPECIFICATIONS (SDS)

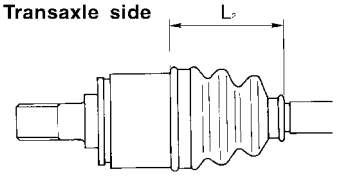
PFP:00030

Drive Shaft

EDS000QP

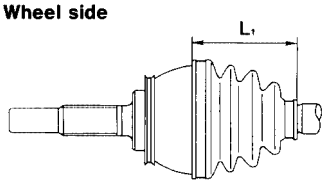
Applied model			QG18DE	QR25DE
Joint type	Transaxle side		TS79C	D90+B, D90, D86+B and T86
	Wheel side		ZF90	B90 and B86
Grease	Quality		Genuine NISSAN grease or equivalent	
	Capacity g (oz)	Transaxle side	TS79C 154 - 164 (5.43 - 5.78)	D90+B and D90 145 - 165 (5.11- -5.82)
				D86+B 135 - 155 (4.76 - 5.47)
				T86 140 - 160 (4.94 - 5.64)
		Wheel side	ZF90 122 - 126 (4.30 - 4.44)	B90 120 - 140 (4.23 - 4.94)
				B86 115- -135 (4.06 - 4.76)
Boot length mm (in)	Transaxle side "L_2"		TS79C 102.5 (4.035)	D90+B and D90 98 (3.86)
				D86+B 98 (3.86)
				T86 98.5 (3.88)
	Wheel side "L_1"		ZF90 97 (3.82)	B90 115.7 (4.56)
				B86 124.2 (4.89)

Transaxle side



SFA961AA

Wheel side



SFA962A

Wheel Bearing (Front)

EDS000QQ

Wheel bearing axial end play limit mm (in)	0.05 (0.0020 in) or less
Wheel bearing lock nut tightening torque N·m (kg-m, ft-lb)	197 - 274 (20 - 28, 145 - 202)
Knuckle to strut tightening torque N·m (kg-m, ft-lb)	114 - 133 (11.6 - 13.6, 84 - 98)

SECTION RAX
REAR AXLE

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Wheel Bearing (Rear) 9

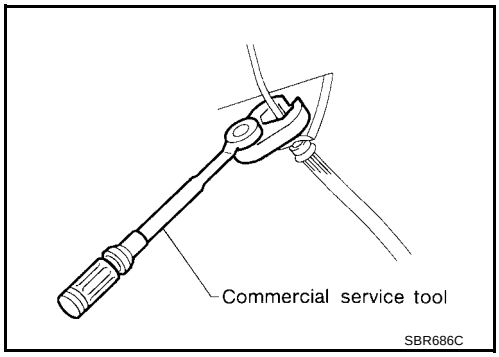
PRECAUTIONS

PFP:00001

Precautions

EDS000QR

- **When installing each rubber part, final tightening must be carried out under unladen condition* with tires on ground.**
  ***: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**
- **Use flare nut wrench when removing or installing brake tubes.**
- **After installing removed suspension parts, check wheel alignment.**
- **Do not jack up at the trailing arm and lateral link.**
- **Always torque brake lines when installing.**



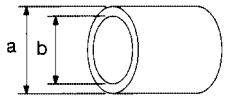
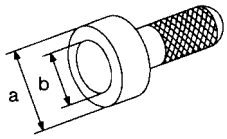
PREPARATION

PFP:00002

Special Service Tools

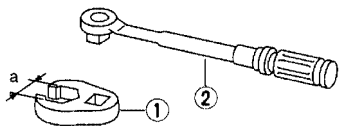
EDS000QS

The actual shapes of the Kent-Moore tools may differ from those of the special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV40104710 (—) Drift  NT474	Install sensor rotor **a: 76.3 mm (3.004 in) dia.** **b: 67.9 mm (2.673 in) dia.**
ST30720000 (—) Drift  NT115	Install sensor rotor **a: 77 mm (3.03 in) dia.** **b: 55.5 mm (2.185 in) dia.**

Commercial Service Tools

EDS000QT

Tool name	Description
1. Flare nut crowfoot 2. Torque wrench  NT360	Removing and installing brake piping **a: 10 mm (0.39 in)**

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

EDS000QU

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

		RSU-8, "Removal and Installation"	RSU-8, "Removal and Installation"	RAX-5, "Rear Wheel Bearing"	WT-2, "NVH Troubleshooting Chart"	WT-2, "NVH Troubleshooting Chart"
Reference page						
Possible cause and SUSPECTED PARTS		Improper installation, looseness	Parts interference	Wheel bearing damage	TIRES	ROAD WHEEL
Symptom	Noise	×	×		×	×
	Shake	×	×		×	×
	Vibration	×	×		×	
	Shimmy	×	×		×	×
	Shudder	×			×	×
	Poor quality ride or handling	×	×	×	×	×

×: Applicable

ON-VEHICLE SERVICE

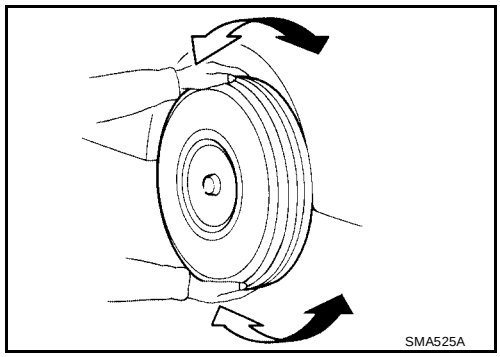
PFP:00000

Rear Axle Parts

EDS000QV

- Check axle and suspension parts for excessive play, wear or damage.
- Shake each rear wheel to check for excessive play.
- Retighten all axle and suspension nuts and bolts to the specified torque.

Tightening torque : Refer to RSU-5, "Components" .



Rear Wheel Bearing

EDS000QW

- Check axial end play.

Axial end play : 0.05 mm (0.0020 in) or less

- Check that wheel hub bearings operate smoothly.
- Check tightening torque of wheel bearing lock nut.

Wheel bearing lock nut : 187 - 255 N·m (19 - 26 kg-m, 138 - 188 ft-lb)

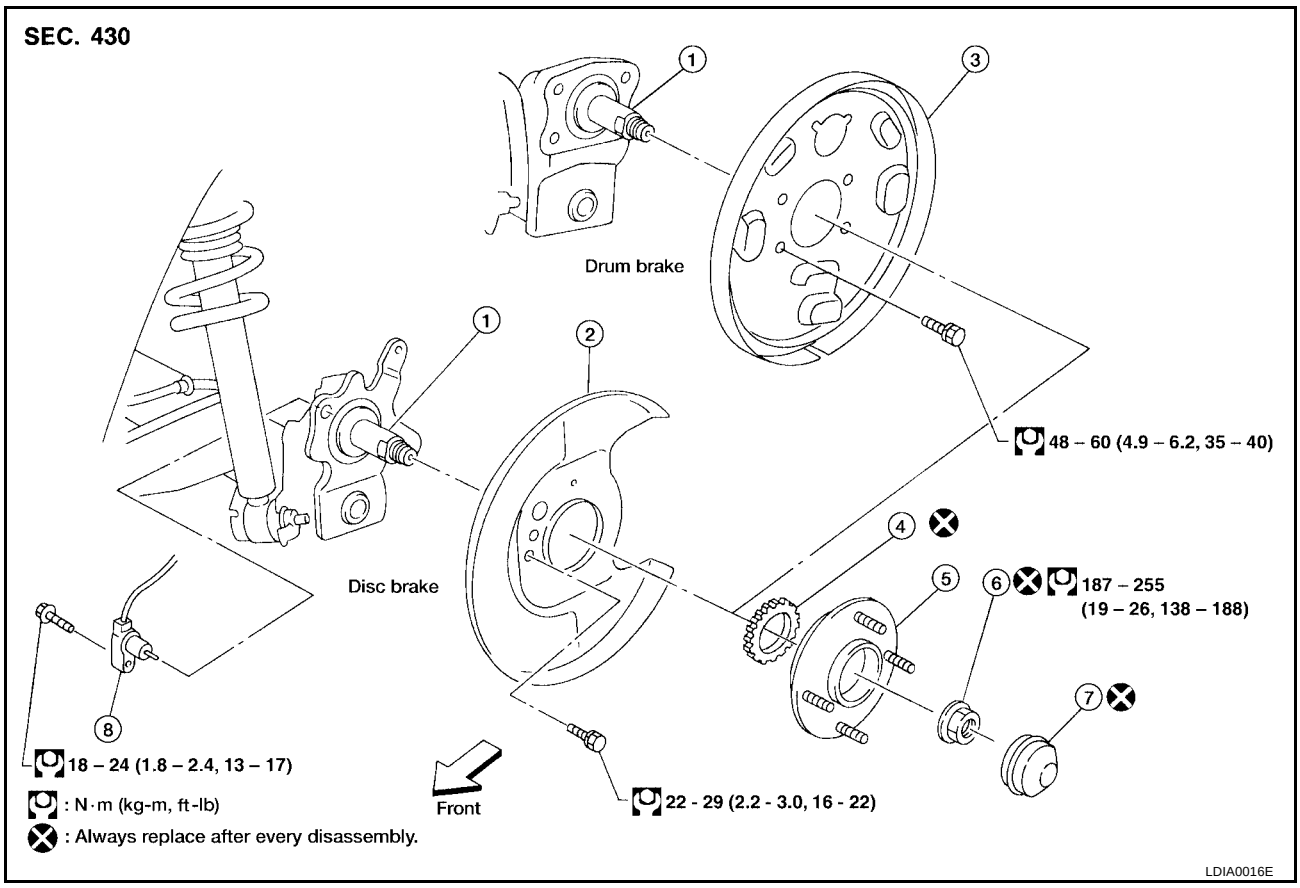
- If out of specification or if wheel bearing does not turn smoothly, replace wheel hub assembly. Refer to RAX-6, "WHEEL HUB" .

WHEEL HUB

PFP:43200

Components

EDS000QX



1. Spindle
2. Baffle plate
3. Back plate
4. Sensor rotor (if equipped)
5. Wheel hub
6. Wheel bearing lock nut
7. Hub cap
8. Wheel sensor (if equipped)

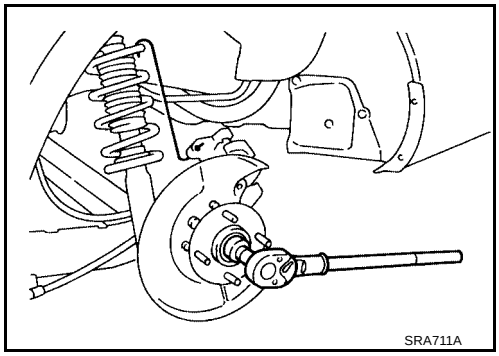
Removal

EDS000QY

CAUTION:

- **Before removing the rear wheel hub assembly, disconnect the wheel sensor from the assembly. Then move it away from the hub assembly. Failure to do so may result in damage to the sensor wires and the wheel sensor becoming inoperative.**
- **Wheel hub bearing does not require maintenance. If any of the following symptoms are noted, replace wheel hub bearing assembly.**
  - **Growling noise is emitted from wheel hub bearing during operation.**
  - **Wheel hub bearing drags or turns roughly. This occurs when turning hub by hand after bearing lock nut is tightened to specified torque.**

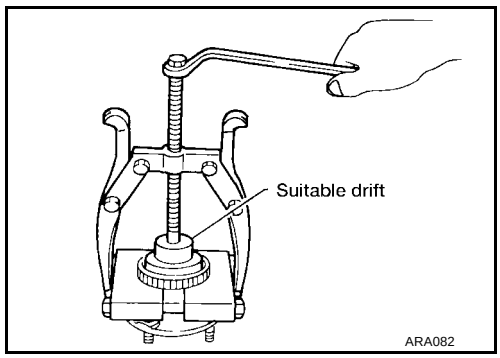
1. Remove brake caliper assembly.
2. Remove wheel bearing lock nut.
3. Remove brake rotor.
4. Remove wheel hub bearing from spindle.



CAUTION:

- **Brake hose does not need to be disconnected from brake caliper.**
- **Suspend caliper assembly with wire so as not to stretch brake hose.**
- **Be careful not to depress brake pedal, or piston will pop out.**
- **Make sure brake hose is not twisted.**

5. Remove the sensor rotor, if equipped, using suitable puller, drift and bearing replacer.



Installation

EDS000QZ

Installation is in the reverse order of removal.

- With vehicles equipped with ABS, press-fit sensor rotor into wheel hub bearing using a drift.

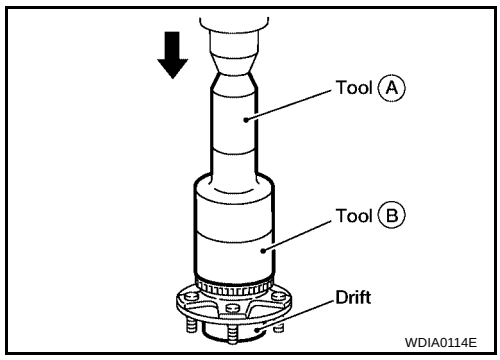
Tool number

A: ST30720000

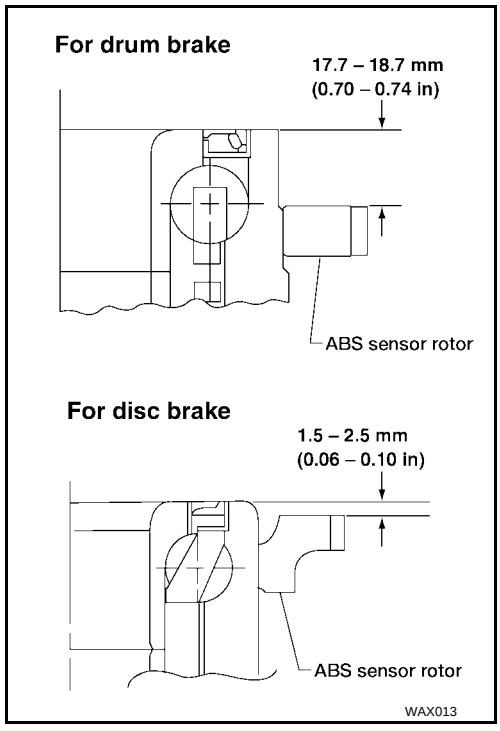
B: KV40104710

CAUTION:

Do not reuse sensor rotor. When installing, replace it with a new one.



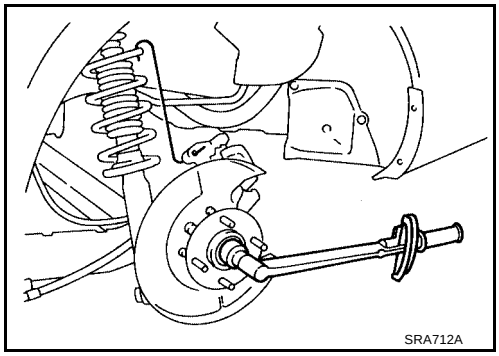
- Press-fit sensor rotor as far as the location shown in figure.
- Install wheel hub bearing.



- Tighten wheel bearing lock nut.
  Before tightening, apply oil to threaded portion of rear spindle.

  CAUTION:
  Do not reuse wheel bearing lock nut. When installing, replace it with a new one.

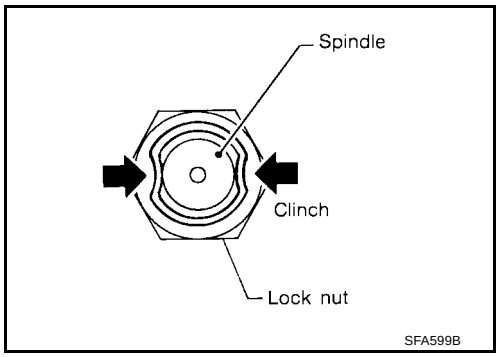
  Wheel bearing lock nut : 187 - 255 N·m (19 - 26 kg-m, 138 - 188 ft-lb)



- Check that wheel bearings operate smoothly.
- Check wheel hub bearing axial end play.

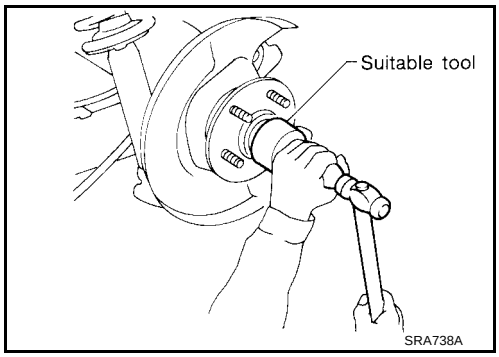
  Axial end play : 0.05 mm (0.0020 in) or less

- Clinch two places of lock nut.



- Install hub cap using a suitable tool.

  CAUTION:
  Do not reuse hub cap. When installing, replace it with a new one.



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Wheel Bearing (Rear)

EDS000R0

Unit: mm (in)

Rear wheel bearing axial end play limit	0.05 (0.0020) or less

SECTION FSU
FRONT SUSPENSION

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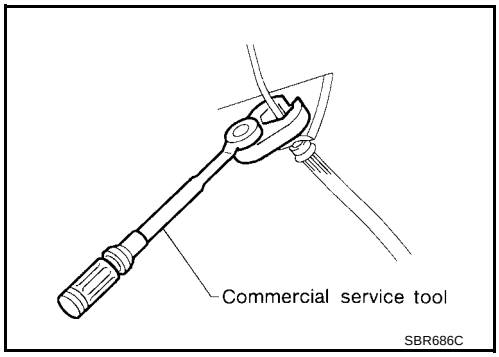
PRECAUTIONS

PFP:00001

Precautions

EES000IB

- **When installing rubber parts, final tightening must be carried out under unladen condition* with tires on ground.**
  Oil will shorten the life of rubber bushings. Be sure to wipe off any spilled oil.
  ***: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.**
- **After installing removed suspension parts, check wheel alignment and adjust if necessary.**
- **Use flare nut wrench when removing or installing brake tubes.**
- **Always torque brake lines when installing.**
- **Lock nuts are unreusable parts; always use new ones.**
  When replacing, do not wipe the oil off the new lock nut before tightening.



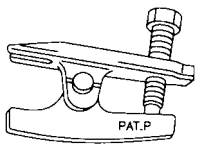
PREPARATION

PFP:00002

Special Service Tools

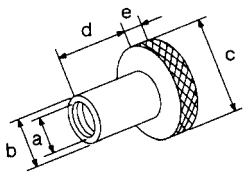
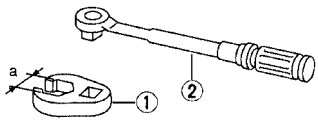
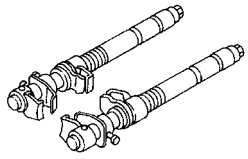
EES000IC

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
HT72520000 (J25730-B) Ball joint remover  NT146	Removing tie-rod outer end and lower ball joint

Commercial Service Tools

EES000ID

Tool name	Description
Attachment wheel alignment  NT148	Measure wheel alignment **a: Screw M24 x 1.5 pitch** **b: 35 mm (1.38 in) dia.** **c: 65 mm (2.56 in) dia.** **d: 56 mm (2.20 in)** **e: 12 mm (0.47 in)**
Equivalent to GG94310000 1 Flare nut crowfoot 2 Torque wrench  S-NT360	Removing and installing brake piping **a: 10 mm (0.39 in)**
Spring compressor  NT717	Removing and installing coil spring

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

EES000IE

Use the following chart to help you find the cause of the symptom. If necessary, repair or replace these parts.

Reference page		FSU-5	FSU-5	FSU-5	—	FSU-16	FSU-5, FSU-6	FSU-6	FSU-11	FAX-4, "NVH Troubleshooting Chart"	FAX-4, "NVH Troubleshooting Chart"	WT-2, "NVH Troubleshooting Chart"	WT-2, "NVH Troubleshooting Chart"	BR-5, "NVH Troubleshooting Chart"	PS-6, "NVH Troubleshooting Chart"
Possible Cause and SUSPECTED PARTS		Improper installation, looseness	Shock absorber deformation, damage or deflection	Bushing or mounting deterioration	Parts interference	Spring fatigue	Suspension looseness	Incorrect wheel alignment	Stabilizer bar fatigue	DRIVE SHAFT	AXLE	TIRES	ROAD WHEEL	BRAKES	STEERING
Symptom	Noise	×	×	×	×	×	×			×	×	×	×	×	×
	Shake	×	×	×	×		×			×	×	×	×	×	×
	Vibration	×	×	×	×	×				×	×	×			×
	Shimmy	×	×	×	×			×			×	×	×	×	×
	Judder	×	×	×							×	×	×	×	×
	Poor quality ride or handling	×	×	×	×	×		×	×		×	×	×		

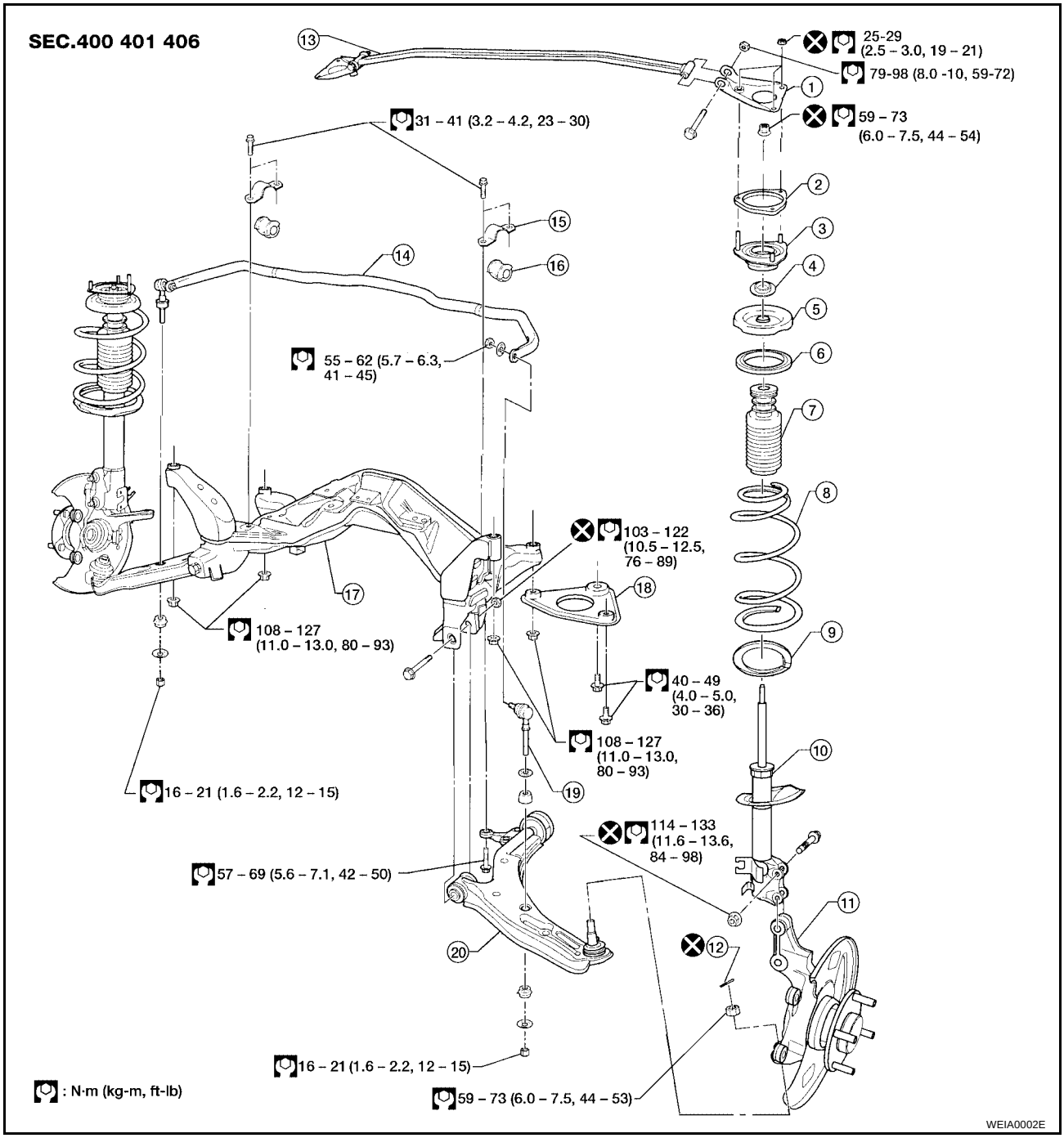
×: Applicable

FRONT SUSPENSION ASSEMBLY

PFP:54010

Components

EES000IF



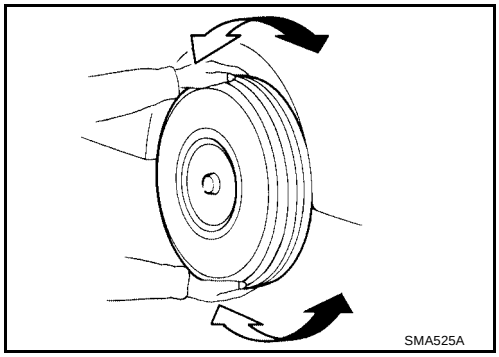
1. Strut tower bar bracket (if equipped)
2. Strut spacer
3. Strut mount bracket
4. Strut mount bearing
5. Spring upper seat
6. Upper spring rubber seat
7. Bound bumper rubber
8. Coil spring
9. Lower spring rubber seat
10. Shock absorber
11. Wheel hub and steering knuckle
12. Cotter pin
13. Strut tower bar (if equipped)
14. Stabilizer
15. Stabilizer clamp
16. Bushing
17. Suspension member
18. Rebound stopper
19. Connecting rod
20. Transverse link

On-Vehicle Service

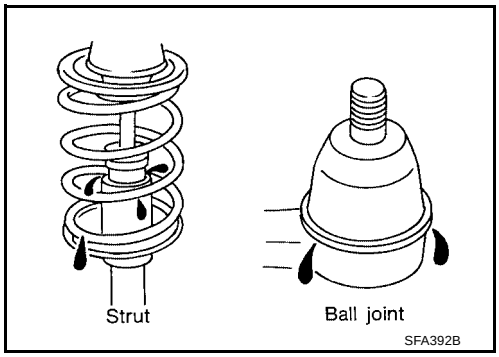
EES000IG

Check front axle and front suspension parts for excessive play, cracks, wear or other damage.

- Shake each front wheel to check for excessive play.
- Make sure that cotter pin is inserted.
- Retighten all axle and suspension nuts and bolts to the specified torque. Refer to FSU-5, "Components" .



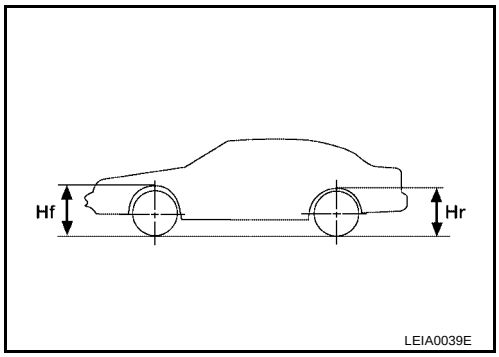
- Check strut (shock absorber) for oil leakage or other damage.
- Check suspension ball joint for grease leakage and ball joint dust cover for cracks or other damage.
  If ball joint dust cover is cracked or damaged, replace transverse link.



- Check spring height from top of wheelarch to the ground.
  - Vehicle must be unladen*, parked on a level surface, and tires checked for proper inflation and wear (tread wear indicator must not be showing).
    *: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
  - Bounce vehicle up and down several times before measuring.

Standard height : Refer to FSU-16, "Wheelarch Height (Unladen*)" .

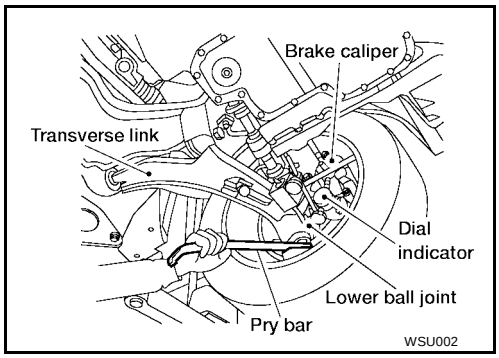
  - Spring height is not adjustable. If out of specification, check for worn springs or suspension parts.



- Check suspension ball joint end play.
  - Jack up front of vehicle and set the stands.
  - Clamp dial indicator onto transverse link and place indicator tip on lower edge of brake caliper.
  - Make sure front wheels are straight and brake pedal is depressed.
  - Place a pry bar between transverse link and inner rim of road wheel.
  - While raising and releasing pry bar, observe maximum dial indicator value.

Vertical end play : 0 mm (0 in)

  - If ball joint movement is beyond specifications, remove and replace it.



Front Wheel Alignment

EES000IH

Before checking front wheel alignment, be sure to make a preliminary inspection (unladen*).
*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

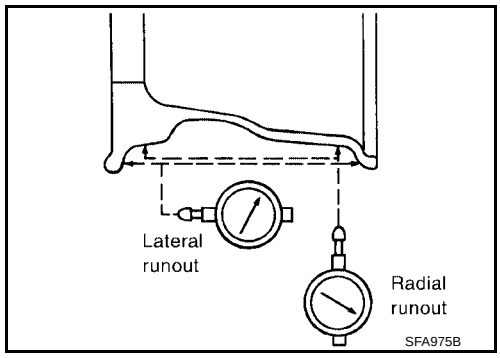
PRELIMINARY INSPECTION

1. Check tires for wear and improper inflation.
2. Check wheels for deformation, cracks and other damage.
   If deformed, remove wheel and check wheel runout.

a. Remove tire from wheel and mount wheel on a tire balance machine.

b. Set dial indicator as shown in the illustration.

Wheel runout (Dial indicator value) : **Refer to WT-3, "ROAD WHEEL" .**



3. Check front wheel bearings for looseness.
4. Check front suspension for looseness.
5. Check steering linkage for looseness.
6. Check that front shock absorbers work properly.
7. Check vehicle wheelarch height (unladen*). Refer to FSU-16, "Wheelarch Height (Unladen*)" .

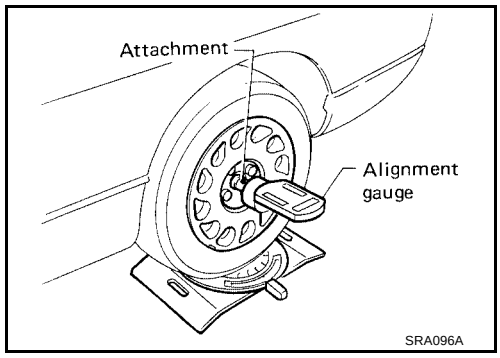
- *: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

CAMBER, CASTER AND KINGPIN INCLINATION

Camber, caster and kingpin inclination are preset at factory and cannot be adjusted.

1. Measure camber, caster and kingpin inclination of both right and left wheels with a suitable alignment gauge.

Camber, caster and kingpin inclination : **Refer to FSU-15, "Front Wheel Alignment (Unladen*1)" .**



2. If camber, caster or kingpin inclination is not within specification, inspect front suspension parts. Replace damaged or worn out parts.

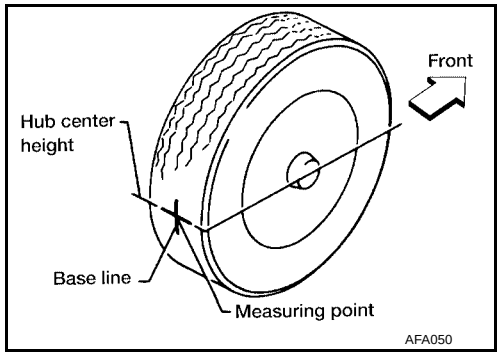
TOE-IN

Measure toe-in using the following procedure.

WARNING:

- **Always perform the following procedure on a flat surface.**
- **Make sure that no person is in front of the vehicle before pushing it.**

1. Bounce front of vehicle up and down to stabilize the posture.
2. Push the vehicle straight ahead about 5 m (16 ft).
3. Put a mark on base line of tread (rear side) of both tires at the same height as hub center. These are measuring points.

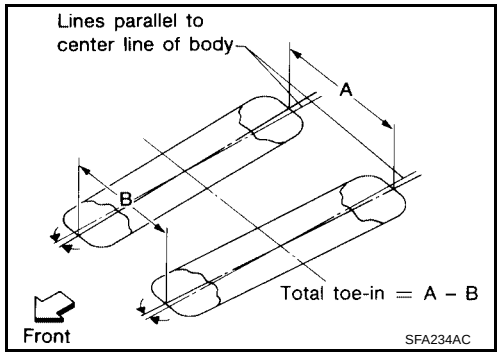


4. Measure distance “A” (rear side).
5. Push the vehicle slowly ahead to rotate the wheels 180 degrees (1/2 turn).

If the wheels have rotated more than 180 degrees (1/2 turn), try the above procedure again from the beginning. Never push vehicle backward.

6. Measure distance “B” (front side).

Total toe-in : **Refer to FSU-15, "Front Wheel Alignment (Unladen*1)" .**



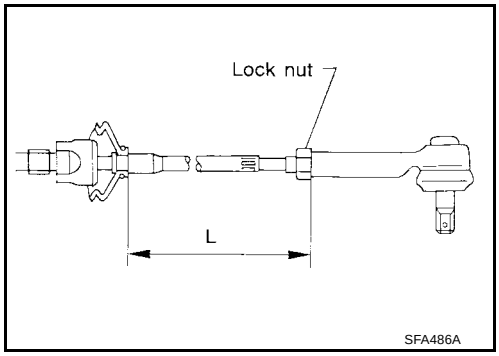
7. Adjust toe-in by varying the length of steering tie-rods.

a. Loosen lock nuts.

b. Adjust toe-in by screwing tie-rods in and out.

Standard length "L" **: Refer to FSU-15, "Front Wheel Alignment (Unladen*1)" .**

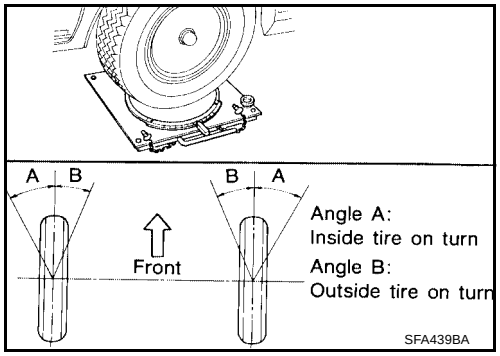
c. Tighten lock nuts to specified torque. Refer to FSU-5, "Components" .



FRONT WHEEL TURNING ANGLE

1. Set wheels in straight-ahead position. Then move vehicle forward until front wheels rest on turning radius gauge properly.
2. Rotate steering wheel all the way right and left; measure turning angle.
   Do not hold the steering wheel on full lock for more than 15 seconds.

Wheel turning angle (Full turn) **: Refer to FSU-15, "Front Wheel Alignment (Unladen*1)" .**



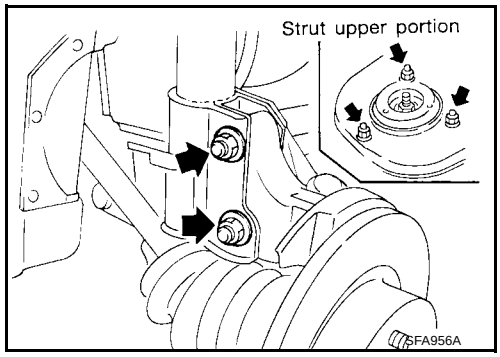
COIL SPRING AND SHOCK ABSORBER

PFP:56210

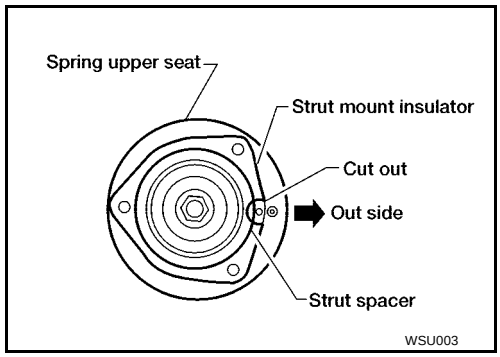
Removal and Installation

EES000II

- Remove shock absorber fixing bolt and nut (to hoodledge).
- **Do not remove piston rod lock nut on vehicle.**



- When installing strut spacer, it must be positioned as shown.



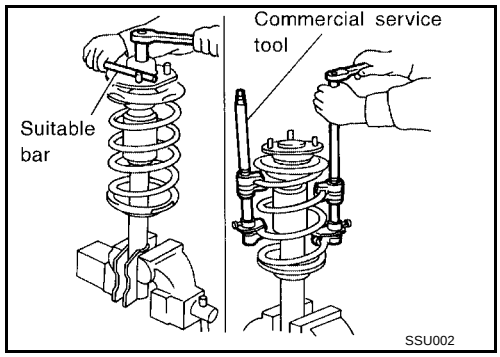
Disassembly

EES000IJ

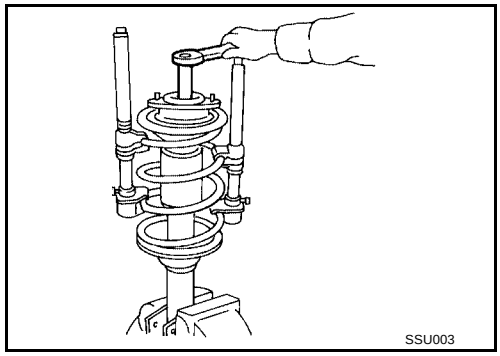
1. Set shock absorber on vise, then **loosen** piston rod lock nut.
   - **Do not remove piston rod lock nut at this time.**
2. Compress spring with Tool so that shock absorber mounting insulator can be turned by hand.

   WARNING:

   Make sure that the pawls of the two spring compressors are firmly hooked on the spring. The spring compressors must be tightened alternately so as not to tilt the spring.



3. Remove piston rod lock nut.



Inspection

EES000IK

SHOCK ABSORBER ASSEMBLY

- Check for smooth operation through a full stroke, both compression and extension.
- Check for oil leakage on welded or gland packing portions.
- Check piston rod for cracks, deformation or other damage and replace if necessary.

MOUNTING INSULATOR AND RUBBER PARTS

- Check cemented rubber-to-metal portion for separation or cracks. Check rubber parts for deterioration and replace if necessary.

THRUST BEARING

- Check thrust bearing parts for abnormal noise or excessive rattle in axial direction and replace if necessary.

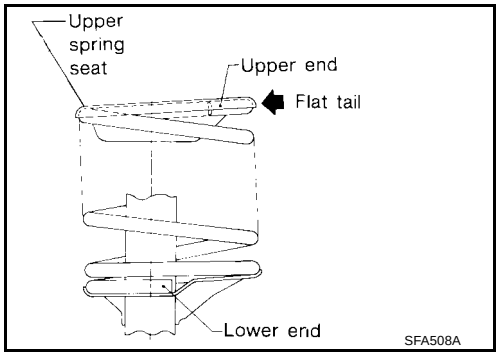
COIL SPRING

- Check for cracks, deformation or other damage and replace if necessary.

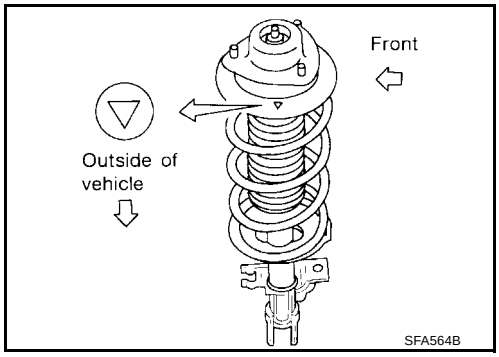
Assembly

EES000IL

- When installing coil spring on strut, it must be positioned as shown.



- Install upper spring seat with alignment mark facing the outer side of vehicle, in line with strut-to-knuckle attachment points.
- **Replace strut lower mounting nuts.**
- **When installing strut to knuckle, be sure to hold bolts and tighten nuts.**



Strut to knuckle tightening torque	**: 114 - 133 N·m (11.6 - 13.6 kg-m, 84 - 98 ft-lb)**

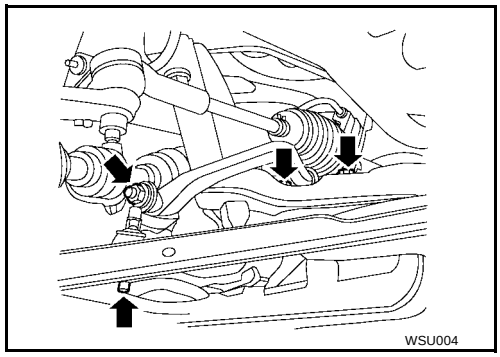
STABILIZER BAR

PFP:54611

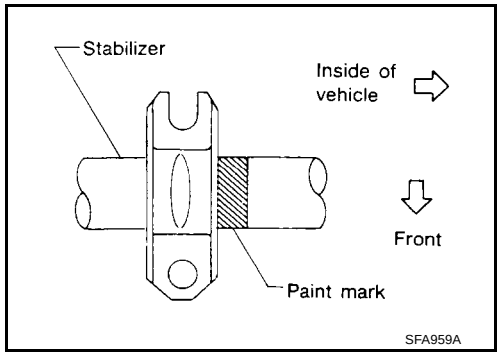
Removal and Installation

EES000IM

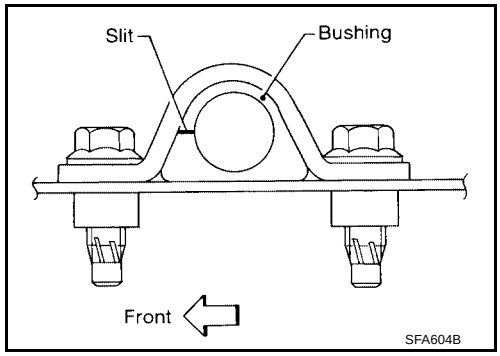
- Remove four stabilizer bar mounting nuts from each side.



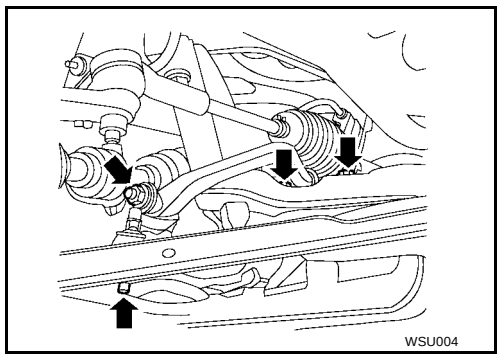
- When installing stabilizer, make sure the paint mark and clamp face in their correct directions.



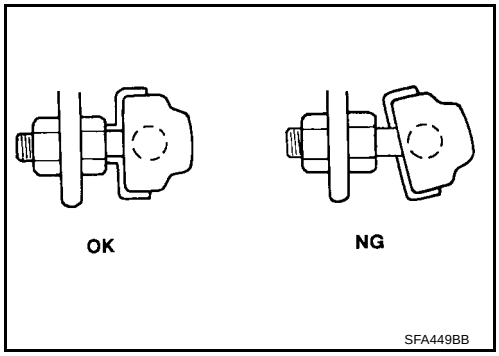
- Make sure that the slit in the bushing is in the position shown.



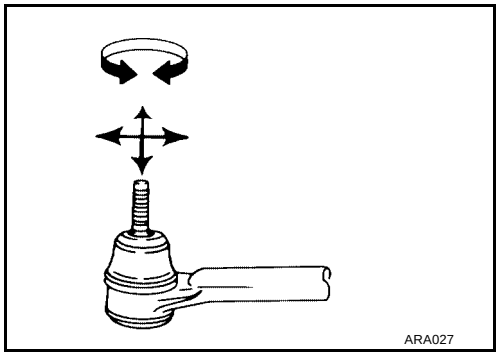
- Install four stabilizer bar mounting nuts at each side.



- Install stabilizer bar with ball joint socket properly placed.



- Check stabilizer for deformation or cracks and replace if necessary.
- Check rubber bushings for deterioration or cracks and replace if necessary.
- Check ball joint can rotate in all directions. If movement is not smooth and free, replace stabilizer bar connecting rod.



TRANSVERSE LINK AND LOWER BALL JOINT

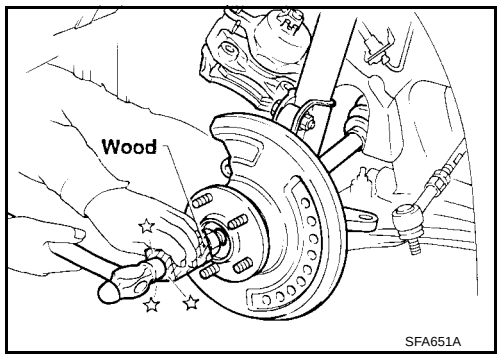
PFP:54500

Removal and Installation

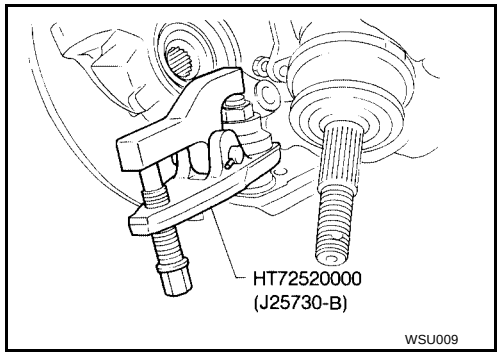
EES000IN

1. Remove wheel bearing lock nut.
2. Remove tie-rod ball joint.
3. Remove strut lower bracket fixing bolts and nuts.
4. Separate drive shaft from knuckle by slightly tapping drive shaft end.

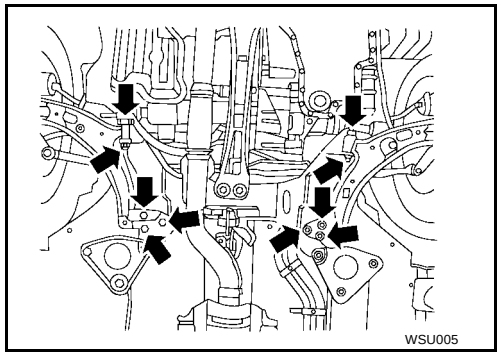
Cover boots with shop towel so as not to damage them when removing drive shaft.



5. Separate lower ball joint stud from knuckle with suitable tool.



6. Remove fixing bolts.
7. Remove transverse link and lower ball joint.
8. During installation, final tightening must be carried out at curb weight with tires on the ground. Refer to FSU-5, "Components" .
9. After installation, check wheel alignment. Refer to FSU-6, "Front Wheel Alignment" .



Inspection

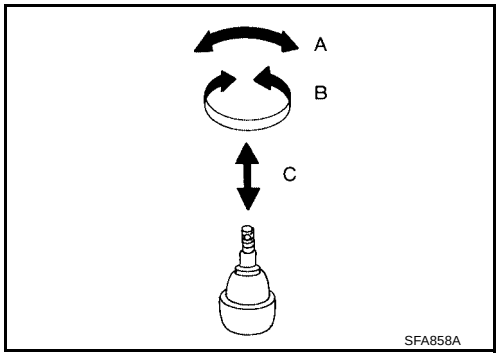
EES000IO

TRANSVERSE LINK

- Check transverse link for damage, cracks or deformation and replace if necessary.
- Check rubber bushing for damage, cracks and deformation and replace if necessary.

LOWER BALL JOINT

- Check ball joint for play. Replace transverse link assembly if any of the following cases occur: Ball stud is worn, play in axial direction is excessive or joint is hard to swing.
  Before checking, turn ball joint at least 10 revolutions so that ball joint is properly broken in.



Swinging force “A” (measuring point cotter pin hole of ball stud)	**: 7.8 - 77.5 N (0.8 - 7.9 kg, 1.8 - 17.4 lb)**
Turning torque “B”	**: 0.50 - 4.90 N·m (5.1 - 50 kg-cm, 4.4 - 43.4 in-lb)**
Vertical end play “C”	**: 0 mm (0 in)**

- Check dust cover for damage. Replace it and cover clamp if necessary.

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications (Front)

EES000IP

Suspension type	Independent MacPherson strut
Shock absorber type	Double-acting hydraulic
Stabilizer bar	Standard equipment

Front Wheel Alignment (Unladen*1)

EES000IQ

Engine			QG18DE	QR25DE
Camber Degree minute (Decimal degree)		Minimum	–1°05' (–1.08°)	–1°12' (–1.2°)
		Nominal	–0°20' (–0.33°)	–0°27' (–0.45°)
		Maximum	0°25′ (0.42°)	0°18′ (0.3°)
		Left and right difference	45′ (0.75°) or less	45′ (0.75°) or less
Caster Degree minute (Decimal degree)		Minimum	0°50′ (0.83°)	0°58′ (0.97°)
		Nominal	1°35′ (1.58°)	1°43′ (1.72°)
		Maximum	2°20′ (2.33°)	2°28′ (2.47°)
		Left and right difference	45′ (0.75°) or less	45′ (0.75°) or less
Kingpin inclination Degree minute (Decimal degree)		Minimum	13°52′ (13.87°)	14°03′ (14.05°)
		Nominal	14°37′ (14.62°)	14°46′ (14.77°)
		Maximum	15°22′ (15.37°)	15°31′ (15.52°)
Total toe-in	Distance (A – B) mm (in)	Minimum	1 (0.039”)	1 (0.039”)
		Nominal	2 (0.079”)	2 (0.079”)
		Maximum	3 (0.118”)	3 (0.118”)
	Angle (left plus right) Degree minute (Decimal degree)	Minimum	5.5′ (0.08°)	5.5′ (0.08°)
		Nominal	11′ (0.18°)	11′ (0.18°)
		Maximum	16′ (0.27°)	16′ (0.27°)
Wheel turning angle Full turn*2	Inside Degree minute (Decimal degree)	Minimum	34° (34.0°)	29° (29.0°)
		Nominal	37° (37.0°)	32° (32.0°)
		Maximum	38° (38.0°)	33° (33.0°)
	Outside Degree minute (Decimal degree)	Nominal	31° (31.0°)	27° (27.0°)

*1: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.
*2: On power steering models, wheel turning force (at circumference of steering wheel) of 98 to 147 N (10 to 15 kg, 22 to 33 lb) with engine idle.

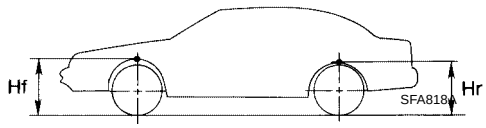
Lower Ball Joint

EES000IR

Swinging force “A” (Measuring point: cotter pin hole of ball stud) N (kg, lb)	7.8 - 77.5 (0.8 - 7.9, 1.8 - 17.4)
Turning torque “B” N-m (kg-cm, in-lb)	0.50 - 4.90 (5.1 - 50.0, 4.4 - 43.4)
Vertical end play “C” mm (in)	0 (0)

Wheelarch Height (Unladen*)

EES0012V



Engine Model	QG18DE		QR25DE	
	1.8	1.8S	SE-R	SPEC-V
Tire Size	195/60HR15	195/55HR16	195/55HR16	215/45ZR17
Front (Hf) mm (in)	664 (26.14)	666 (26.22)	660 (25.98)	664 (26.14)
Rear (Hr) mm (in)	658 (25.91)	659 (25.94)	652 (25.67)	655 (25.79)

*: Fuel, radiator coolant and engine oil full. Spare tire, jack, hand tools and mats in designated positions.

SECTION WT
ROAD WHEELS & TIRES

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NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

EES000JB

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

Reference page			Refer to WT-3	Refer to WT-4	Refer to WT-6	—	—	—	Refer to WT-6	—	FAX-4, "NVH Troubleshooting Chart", FSU-4, "NVH Troubleshooting Chart"	RAX-4, "NVH Troubleshooting Chart", RSU-4, "NVH Troubleshooting Chart"	Refer to TIRES in this chart.	Refer to ROAD WHEEL in this chart.	FAX-4, "NVH Troubleshooting Chart"	BR-5, "NVH Troubleshooting Chart"	PS-6, "NVH Troubleshooting Chart"
Possible cause and SUSPECTED PARTS			Out-of-round	Imbalance	Incorrect tire pressure	Uneven tire wear	Deformation or damage	Non-uniformity	Incorrect tire size	DIFFERENTIAL	FRONT AXLE AND FRONT SUSPENSION	REAR AXLE AND REAR SUSPENSION	TIRES	ROAD WHEEL	DRIVE SHAFT	BRAKE	STEERING
Symp-tom	TIRES	Noise	×	×	×	×	×	×		×	×	×		×	×	×	×
		Shake	×	×	×	×	×		×		×	×		×	×	×	×
		Vibration			×				×		×	×			×		×
		Shimmy	×	×	×	×	×	×	×		×	×		×		×	×
		Judder	×	×	×	×	×		×		×	×		×		×	×
		Poor quality ride or handling	×	×	×	×	×		×		×	×		×			
	ROAD WHEEL	Noise	×	×			×			×	×	×	×		×	×	×
		Shake	×	×			×				×	×	×		×	×	×
		Shimmy, judder	×	×			×				×	×	×			×	×
		Poor quality ride or handling	×	×			×				×	×	×				

×: Applicable

ROAD WHEEL

PFP:40300

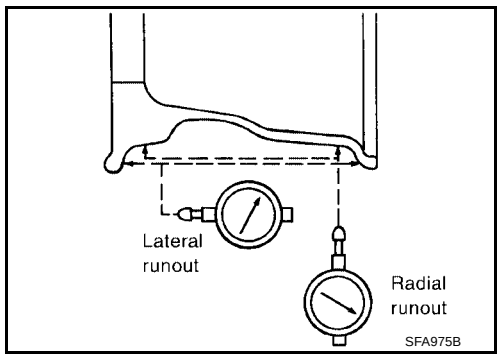
Inspection

EES000JC

1. Check tires for wear and improper inflation.
2. Check wheels for deformation, cracks and other damage. If deformed, remove wheel and check wheel runout.

a. Remove tire from wheel and mount wheel on a tire balance machine.

b. Set dial indicator as shown in the illustration.



Wheel runout (Dial indicator value):

Refer to WT-6, "Road Wheel" .

3. Check front wheel bearings for looseness.
4. Check front suspension for looseness.

WHEEL AND TIRE ASSEMBLY

PFP:40300

Balancing Wheels

EES000KI

REMOVAL

1. Remove inner and outer balance weights from the wheel.

   CAUTION:
   - **Be careful not to scratch the wheel during removal procedures.**

2. Using releasing agent, remove double-faced adhesive tape from the wheel.

   CAUTION:
   - **Be careful not to scratch the wheel during removal.**
   - **After removing double-faced adhesive tape, wipe clean traces of releasing agent from the wheel.**

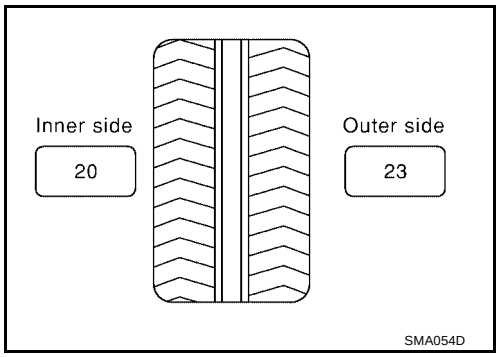
WHEEL BALANCE ADJUSTMENT

- If a tire balance machine has adhesion balance weight mode settings and drive-in weight mode setting, select and adjust a drive-in weight mode suitable for wheels.

1. Set wheel on wheel balancer using the center hole as a guide. Start the tire balance machine.
2. When inner and outer unbalance values are shown on the wheel balancer indicator, multiply outer unbalance value by 1.6 to determine balance weight that should be used. Select the outer balance weight with a value closest to the calculated value and install it to the designated outer position of, or at the designated angle in relation to the road wheel.

   CAUTION:
   - **Do not install the inner balance weight before installing the outer balance weight.**
   - **Before installing the balance weight, be sure to clean the mating surface of the wheel.**

   Indicated unbalance value × 5/3 = balance weight to be installed
   Calculation example:
   23 g (0.81 oz.) × 5/3 = 38.33 g (1.35 oz.) = 40 g (1.41 oz.) balance weight (closer to calculated balance weight value)
   Note that balance weight value must be closer to the calculated balance weight value.
   Example:
   37.4 g = 35 g (1.23 oz.)
   37.5 g = 40 g (1.41 oz.)

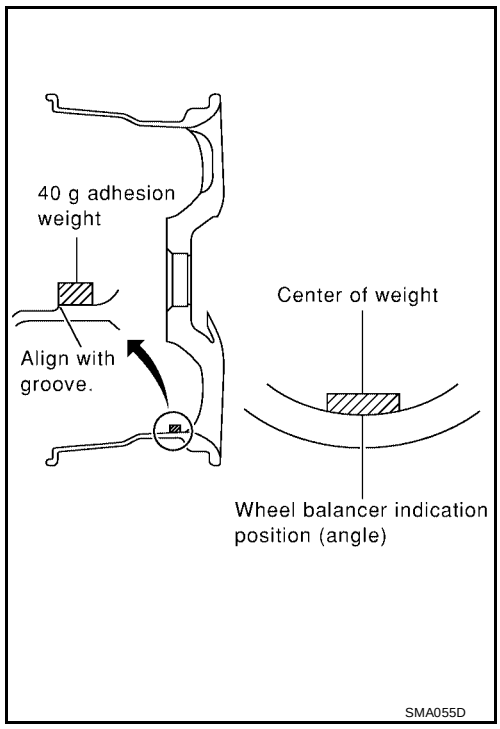


a. Install balance weight in the position shown.

b. When installing balance weight to wheels, set it into the grooved area on the inner wall of the wheel as shown so that the balance weight center is aligned with the wheel balancer indication position (angle).

CAUTION:

- **Always use genuine Nissan adhesion balance weights.**
- **Balance weights are not reusable; always replace with new ones.**
- **Do not install more than three sheets of balance weight.**



c. If calculated balance weight value exceeds 50 g (1.76 oz.), install two balance weight sheets in line with each other as shown.

CAUTION:

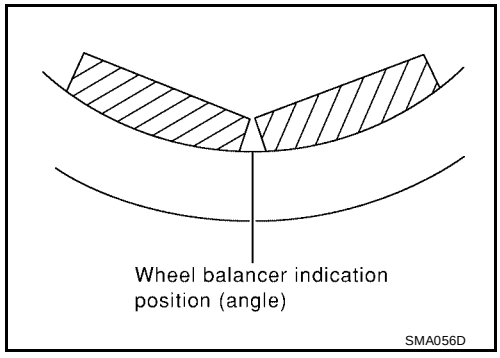
Do not install one balance weight sheet on top of another.

3. Start wheel balancer again.

4. Install drive-in balance weight on inner side of road wheel in the wheel balancer indication position (angle).

CAUTION:

Do not install more than two balance weights.



5. Start wheel balancer. Make sure that inner and outer residual unbalance values are 10 g (0.35 oz.) each or below.

- If either residual unbalance value exceeds 10 g (0.35 oz.), repeat installation procedures.

Wheel balance (Maximum allowable unbalance):

Maximum allowable unbalance	Dynamic (At rim flange)	10 g (0.35 oz.) (one side)
	Static	20 g (0.71 oz.)

Rotation

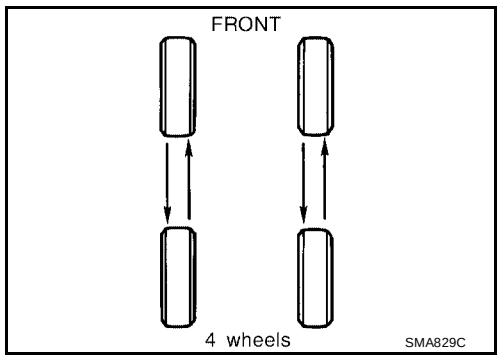
EES000KJ

- Follow the maintenance schedule for tire rotation service intervals. Refer to MA-32, "Tire Rotation" .
- Do not include the T-type spare tire when rotating the tires.

CAUTION:

When installing wheels, tighten them diagonally by dividing the work two to three times in order to prevent the wheels from developing any distortion.

Tightening torque of wheel nut : 98 - 117 N-m (10 - 12 kg-m, 73 - 86 ft-lb)



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Road Wheel

EES000JF

Wheel type		Aluminum	Steel	
			Inside	Outside
Maximum radial runout limit	Lateral mm (in)	0.3 (0.012) or less	1.0 (0.039) or less	0.9 (0.035) or less
	Radial mm (in)	0.3 (0.012) or less	0.8 (0.031) or less	0.4 (0.016) or less
Allowable quantity of residual unbalance	Dynamic (On the ear part)	Less than 10 g (0.35 oz.) (per side)		
	Static (On the ear part)	Less than 20 g (0.70 oz.)		

Tire

EES000JG

Unit: kPa (kg/cm^2 , psi)

Tire size	Air pressure	
	Conventional tire	Spare tire
T125/70*15 T135/90*15 T135/70*17	—	420 (4.2, 60)
P195/60HR15 P195/55HR16	Front: 227.6 (2.322, 33) Rear: 207 (2.11, 30)	—
P215/45ZR17	227.6 (2.322, 33)	—

* D or R depending on manufacturer.

Tightening Torque

EES000PT

Wheel nut	98 – 117 N·m (10 – 12 kg-m, 73 – 86 ft-lb)

SECTION BR
BRAKE SYSTEM

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EFS0022M

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

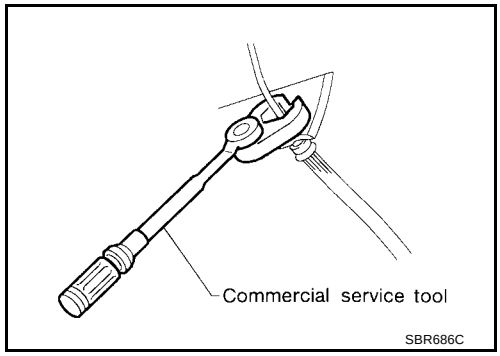
WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**

Precautions for Brake System

EFS0022N

- **Recommended fluid is brake fluid “DOT 3”.**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas.**
- **To clean or wash all parts of master cylinder, disc brake caliper and wheel cylinder, use clean brake fluid.**
- **Never use mineral oils such as gasoline or kerosene. They will ruin rubber parts of the hydraulic system.**
- **Use flare nut wrench when removing and installing brake tube.**
- **Always torque brake lines when installing.**
- **Burnish the brake contact surfaces after refinishing or replacing drums or rotors, after replacing pads or linings, or if a soft pedal occurs at very low mileage.**
  Refer to BR-7, "Brake Burnishing Procedure".



WARNING:

- **Clean brake pads and shoes with a waste cloth, then wipe with a dust collector.**

Wiring Diagrams and Trouble Diagnosis

EFS0022O

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams"
- PG-3, "POWER SUPPLY ROUTING"

When you perform trouble diagnosis, refer to the following:

- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident"

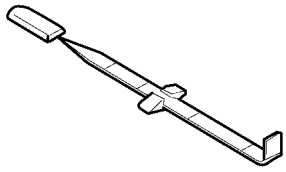
PREPARATION

PFP:00002

Special Service Tool

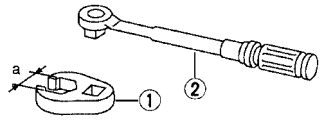
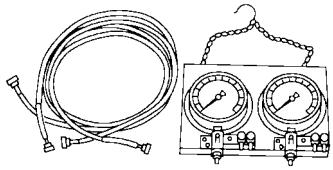
EFS004YO

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
— (J-46532) Brake and clutch pedal height measurement tool  LFIA0227E	Measuring brake pedal height

Commercial Service Tools

EFS0022P

Tool name	Description
1 Flare nut crowfoot 2 Torque wrench  S-NT360	Removing and installing brake piping **a: 10 mm (0.39 in)**
Brake fluid pressure gauge  NT151	Measuring brake fluid pressure

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

EFS0022Q

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

Reference page			BR-19, BR-24, BR-30	BR-19, BR-24, BR-30	BR-19, BR-23, BR-29	BR-22, BR-27, BR-34	BR-22, BR-27, BR-34	BR-22, BR-27, BR-34	BR-22, BR-27, BR-34	BR-22, BR-27, BR-34	BR-7	BR-22, BR-27, BR-34	FAX-4, "NVH Troubleshooting Chart"	FAX-4, "NVH Troubleshooting Chart"	FSU-4, "NVH Troubleshooting Chart"	FSU-4, "NVH Troubleshooting Chart"	FSU-4, "NVH Troubleshooting Chart"	PS-6, "NVH Troubleshooting Chart"
Possible cause and SUSPECTED PARTS			Pads - damaged	Pads - uneven wear	Shims damaged	Rotor imbalance	Rotor damage	Rotor runout	Rotor deformation	Rotor deflection	Rotor rust	Rotor thickness variation	DRIVE SHAFT	AXLE	SUSPENSION	TIRES	ROAD WHEEL	STEERING
Symptom	BRAKE	Noise	X	X	X								X	X	X	X	X	X
		Shake				X							X	X	X	X	X	X
		Shimmy, Judder				X	X	X	X	X	X	X		X	X	X	X	X

X: Applicable

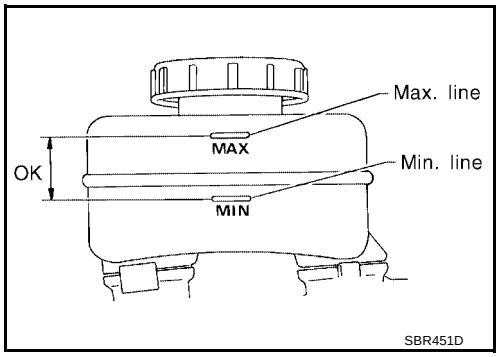
ON-VEHICLE SERVICE

PFP:00000

Checking Brake Fluid Level

EFS0022R

- Check fluid level in reservoir tank. It should be between the "Max" and "Min" lines on reservoir tank.
- If fluid level is extremely low, check brake system for leaks.
- Release parking brake lever and see if brake warning lamp goes off. If not, check brake system for leaks.



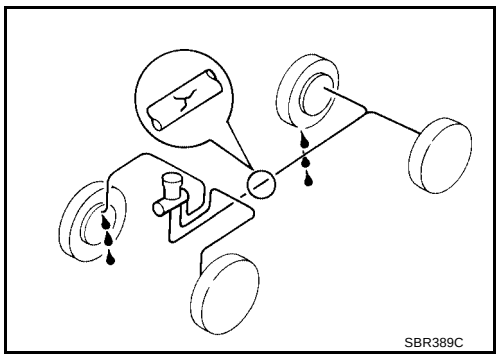
Checking Brake Line

EFS0022S

CAUTION:

If leakage occurs around joints, retighten or, if necessary, replace damaged parts.

1. Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts.
2. Check for oil leakage by fully depressing brake pedal while engine is running.



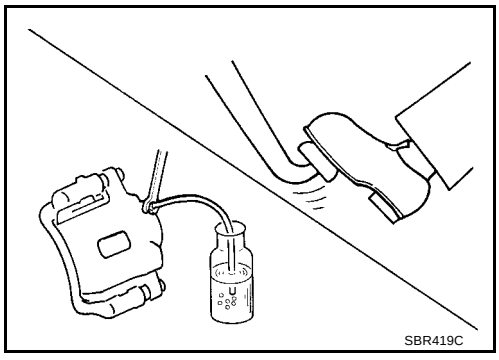
Changing Brake Fluid

EFS0022T

CAUTION:

- **Refill with new brake fluid “DOT 3”.**
- **Always keep fluid level higher than minimum line on reservoir tank.**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**

1. Clean inside of reservoir tank, and refill with new brake fluid.
2. Connect a vinyl tube to each air bleeder valve.
3. Drain brake fluid from each air bleeder valve by depressing brake pedal.
4. Refill brake fluid reservoir until brake fluid comes out of each air bleeder valve.
5. Use same procedure as in bleeding hydraulic system to refill brake fluid. Refer to BR-7, "Bleeding Brake System" .

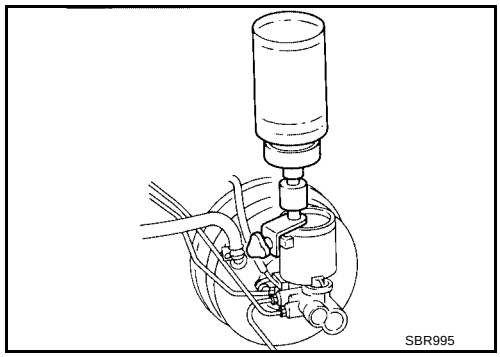


Bleeding Brake System

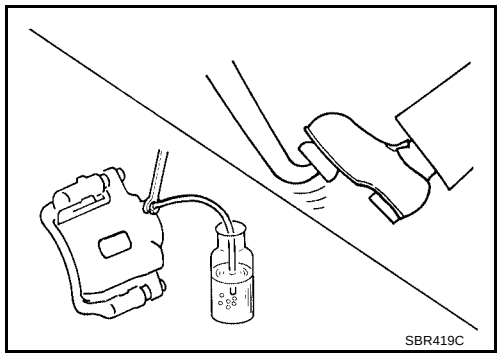
EFS0022V

CAUTION:

- **Carefully monitor brake fluid level at master cylinder during bleeding operation.**
- **Fill reservoir with new brake fluid "DOT 3". Make sure it is full at all times while bleeding air out of system.**
- **Place a container under master cylinder to avoid spillage of brake fluid.**
- **For models with ABS, turn ignition switch OFF and disconnect ABS actuator and electric unit connectors or battery ground cable.**
- **Bleed air in the following order.**
  Right rear brake → Left front brake → Left rear brake → Right front brake



1. Connect a transparent vinyl tube to air bleeder valve.
2. Fully depress brake pedal several times.
3. With brake pedal depressed, open air bleeder valve to release air.
4. Close air bleeder valve.
5. Release brake pedal slowly.
6. Repeat steps 2 through 5 until clear brake fluid comes out of air bleeder valve.
7. Tighten air bleeder valve to specification.



Air bleeder valve	
Front and rear disc brake (CL25VA/ CL25VB/CL9HC type)	**: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)**
Front disc brake (OPB27VA type)	**: 12 - 15 N·m (1.3 - 1.5 kg-m, 9 - 11 ft-lb)**
Rear drum brake	**: 6.9 - 8.8 N·m (0.71 - 0.89 kg-m, 61 - 77 in-lb)**

Brake Burnishing Procedure

EFS0022U

Burnish the brake contact surfaces according to the following procedure after refinishing or replacing drums or rotors, after replacing pads or linings, or if a soft pedal occurs at very low mileage.

CAUTION:

Only perform this procedure under safe road and traffic conditions. Use extreme caution.

1. Drive the vehicle on a straight smooth road at 50 km/h (31 MPH).
2. Use medium brake pedal/foot effort to bring the vehicle to a complete stop from 50 km/h (31 MPH). Adjust brake pedal/foot pressure so that vehicle stopping time equals 3 to 5 seconds.
3. To cool the brake system, drive the vehicle at 50 km/h (31 MPH) for 1 minute without stopping.
4. Repeat steps 1 to 3, 10 times or more to complete the burnishing procedure.

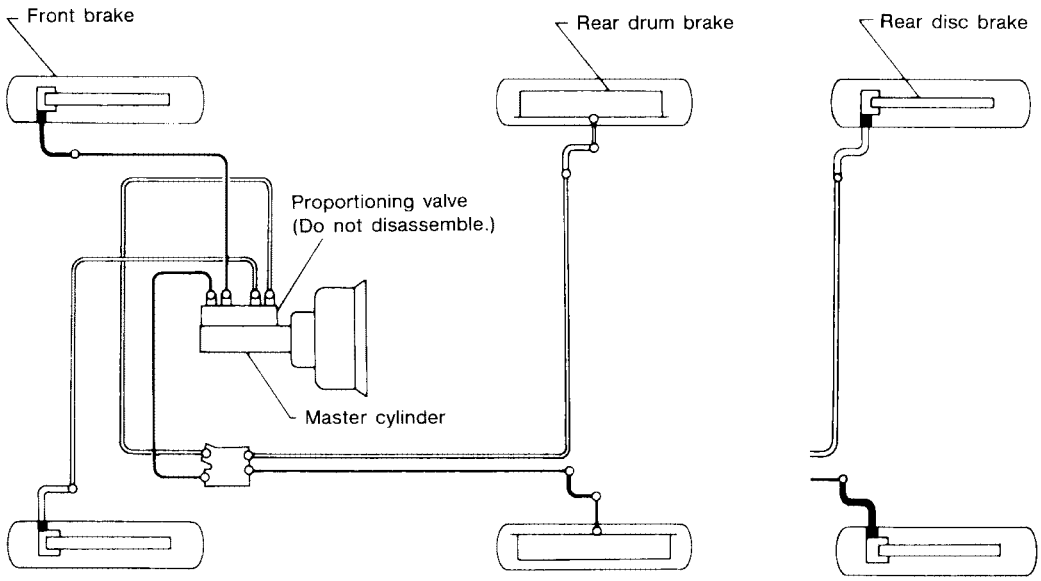
BRAKE HYDRAULIC LINE

PFP:46210

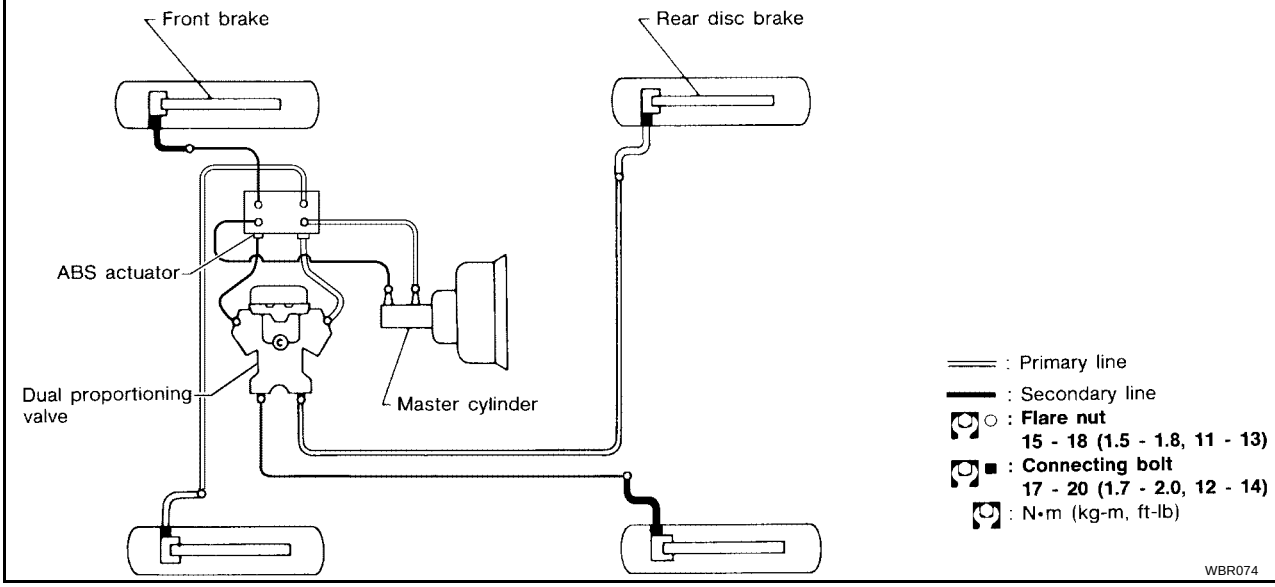
Hydraulic Circuit

EFS0022W

Without anti-lock brake system
(Models with dual proportioning valve built into master cylinder)
(built-in type)



With anti-lock brake system



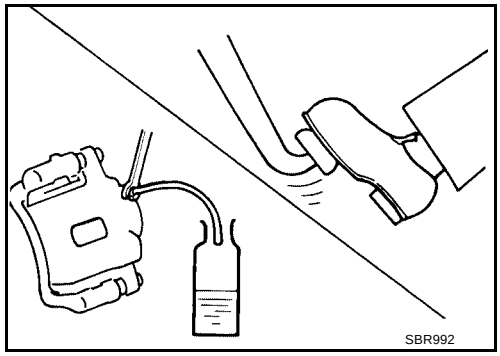
Removal

EFS0022X

CAUTION:

- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**
- **All hoses must be free from excessive bending, twisting and pulling.**

1. Connect vinyl tube to air bleeder valve.
2. Drain brake fluid from each air bleeder valve by depressing brake pedal.
3. Remove flare nut connecting brake tube and hose, then withdraw lock spring.
4. Cover openings to prevent entrance of dirt whenever disconnecting brake line.



Inspection

EFS0022Y

Check brake lines (tubes and hoses) for cracks, deterioration or other damage. Replace any damaged parts.

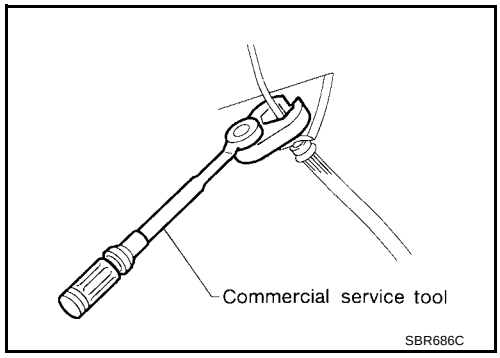
Installation

EFS0022Z

1. Tighten all flare nuts and connecting bolts.

Specification

Flare nut	**: 15 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)**
Connecting bolt	**: 17 - 20 N·m (1.7 - 2.0 kg-m, 12 - 14 ft-lb)**



2. Refill until new brake fluid comes out of each air bleeder valve.

CAUTION:

- **Refill with new brake fluid “DOT 3”.**
- **Never reuse drained brake fluid.**

3. Bleed air from brake system. Refer to BR-7, "Bleeding Brake System" .

DUAL PROPORTIONING VALVE

PFP:46400

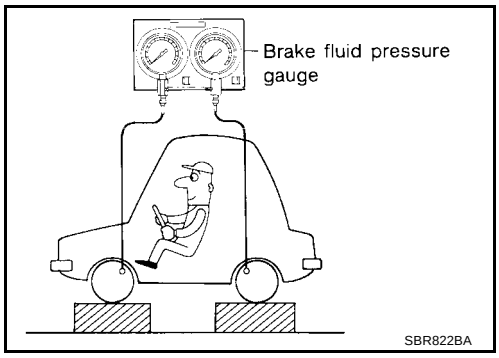
Inspection

EFS00230

CAUTION:

- **Carefully monitor brake fluid level at master cylinder.**
- **Use new brake fluid “DOT 3”.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on paint areas, wash it away with water immediately.**

1. Connect Tool to air bleeders of front and rear brakes on either LH and RH side.
2. Bleed air from the Tool.
3. Check fluid pressure by depressing brake pedal.

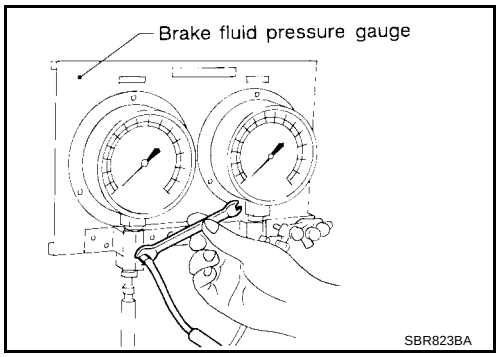


Unit: kPa (kg/cm^2 , psi)

Applied model	All QG18DE	QR25DE without ABS	QR25DE with ABS
Applied pressure (Front brake)	7,355 (75, 1,067)	6,374 (65, 924)	6,374 (65, 924)
Output pressure (Rear brake)	5,099 - 5,492 (52 - 56, 740 - 796)	3,775 - 4,168 (38 - 42, 548 - 604)	4,119 - 4,511 (42 - 46, 597 - 654)

- If output pressure is out of specification, replace dual proportioning valve.

4. Bleed air after disconnecting the Tool. Refer to BR-7, "Bleeding Brake System" .

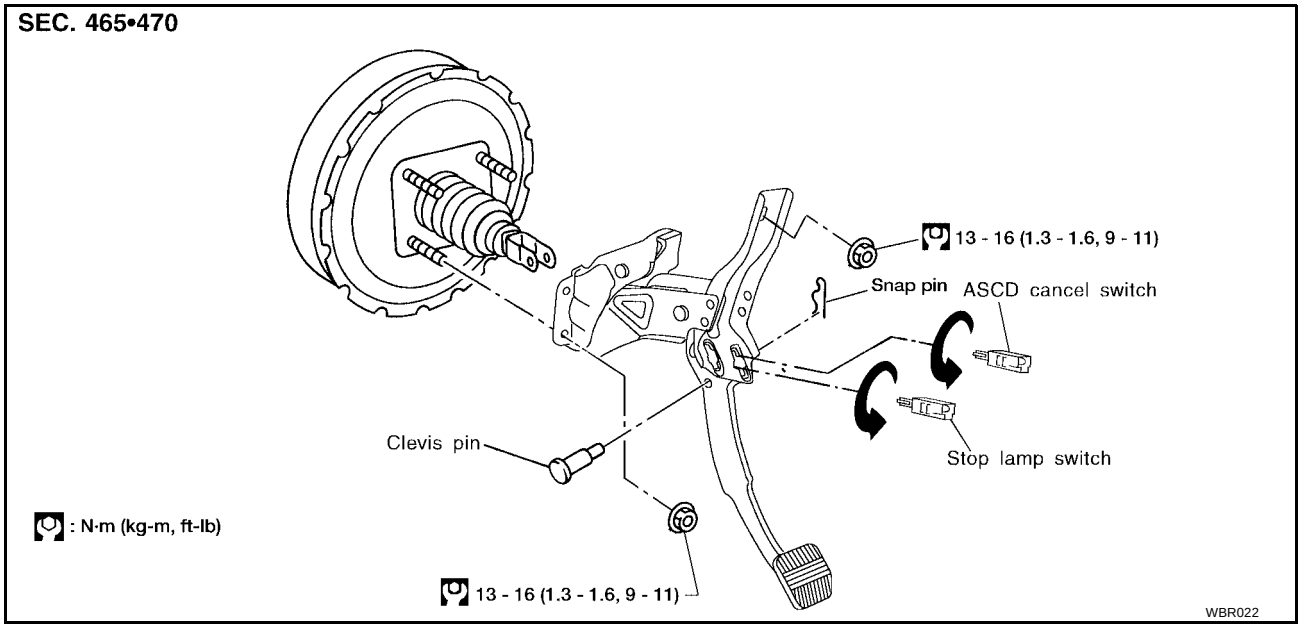


BRAKE PEDAL AND BRACKET

PFP:46501

Removal and Installation

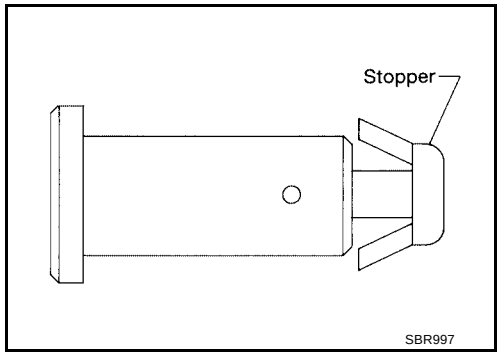
EFS00231



Inspection

EFS00232

- Check brake pedal for following items:
  - Brake pedal bend
  - Clevis pin deformation
  - Crack of any welded portion
  - Crack or deformation of clevis pin stopper



Adjustment

EFS00233

BRAKE PEDAL HEIGHT

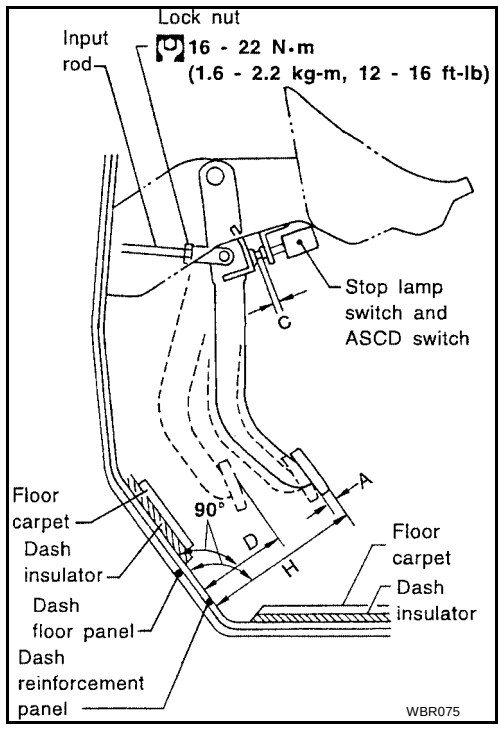
- Check brake pedal free height using Tool, and adjust if necessary.

Tool number : – (J-46532)

H : Free height
Refer to BR-42, "Brake Pedal" .

D : Depressed height
90 mm (3.54 in)
Under force of 490 N (50 kg, 110 lb)
with engine running

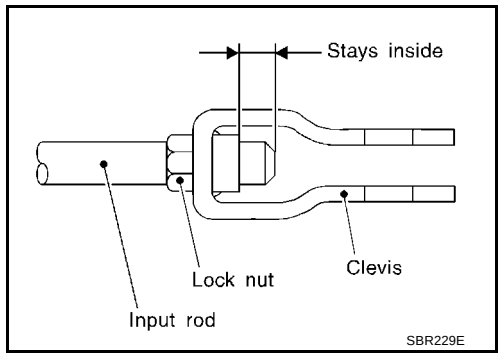
A : Pedal free play at pedal pad
1.0 - 3.0 mm (0.039 - 0.118 in)



1. Loosen lock nut and adjust pedal free height by turning brake booster input rod. Then tighten lock nut.
2. Check pedal free play.

CAUTION:
Make sure that stop lamps go off when pedal is released.

3. Check brake pedal's depressed height while engine is running. If lower than specification, check brake system for leaks, accumulation of air or any damage to components (master cylinder, wheel cylinder, etc.); then make necessary repairs.



STOP LAMP SWITCH AND ASCD CANCEL SWITCH CLEARANCE

1. Twist and pull to remove switch.
2. Pull up on brake pedal pad and hold.
3. Insert switch into retainer until switch plunger is completely depressed.
4. Turn the switch until it locks into place in the brake pedal bracket.

NOTE:
When turning the switch to lock into place, the switch backs off the stopper to the correct clearance automatically.

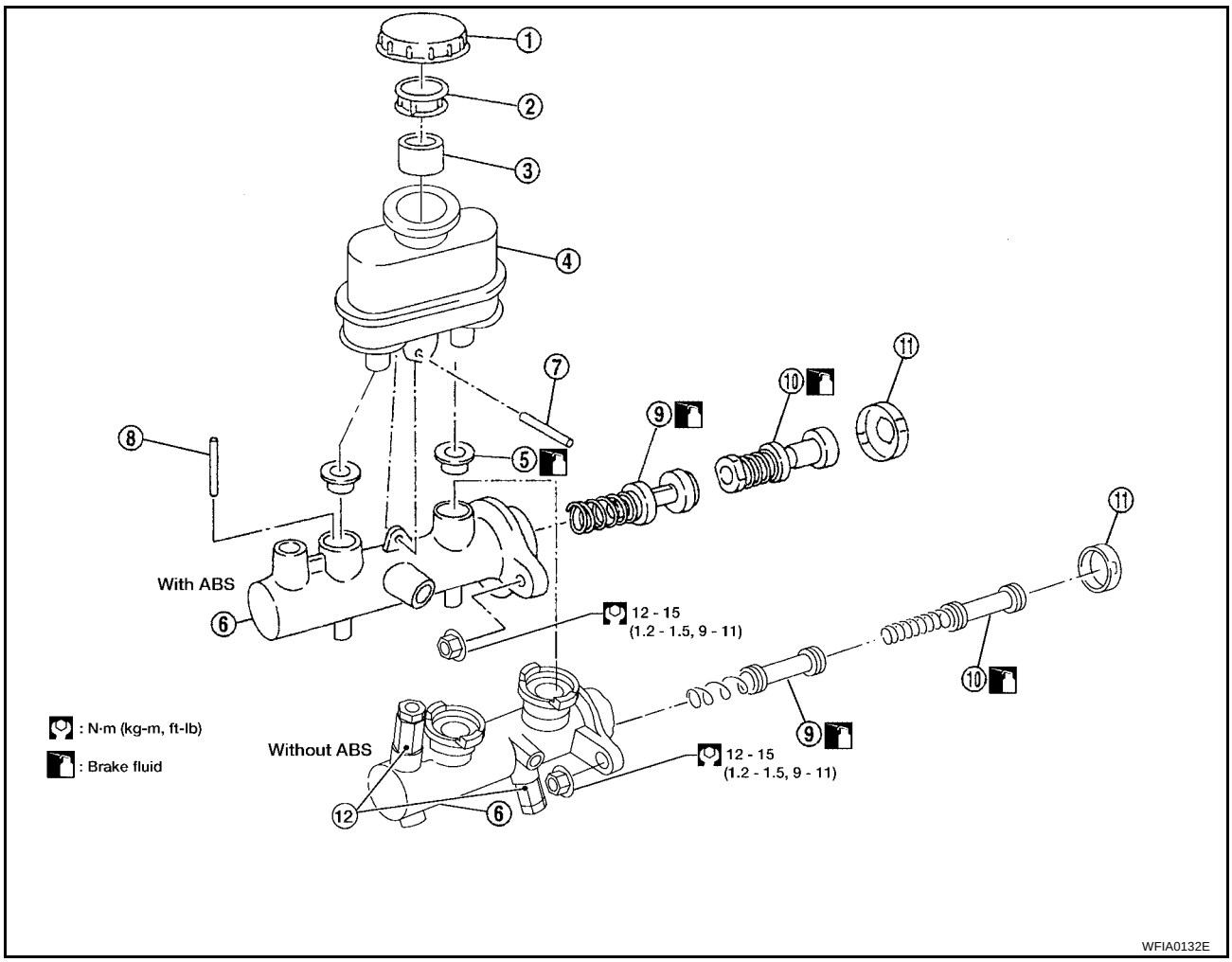
5. Release the brake pedal pad.

MASTER CYLINDER

PFP:46010

Removal

EFS00234



1. Reservoir cap	2. Oil filter	3. Float
4. Reservoir tank	5. Seal	6. Cylinder body
7. Spring pin (with ABS)	8. Piston stopper pin (with ABS)	9. Secondary piston assembly
10. Primary piston assembly	11. Stopper cap	12. Proportioning valve (without ABS)

CAUTION:

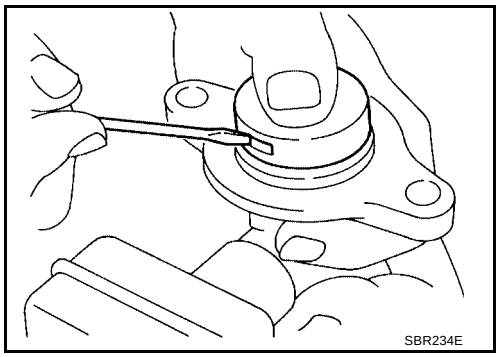
Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.

1. Connect a vinyl tube to air bleeder valve.
2. Drain brake fluid from each air bleeder valve, depressing brake pedal to empty fluid from master cylinder.
3. Remove brake line flare nuts from master cylinder.
4. Remove master cylinder mounting nuts.

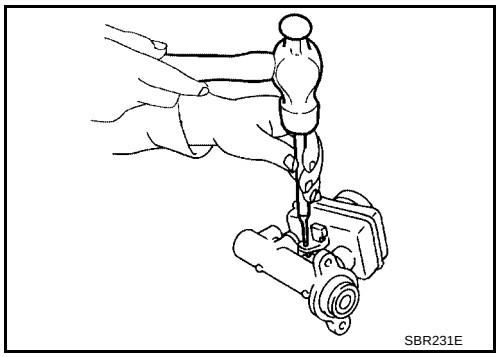
Disassembly

EFS00235

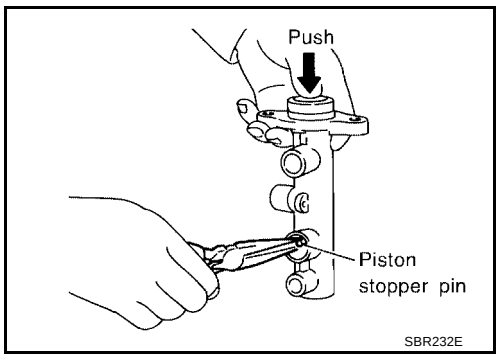
1. Bend claws of stopper cap outward and remove stopper cap.



2. Drive out spring pin from cylinder body (with ABS).
3. Draw out reservoir tank and seals.



4. Remove piston stopper pin while piston is pushed into cylinder (with ABS).
5. Remove piston assemblies.
   - **If it is difficult to remove secondary piston assembly, gradually apply compressed air through fluid outlet.**



Inspection

EFS00236

Check for the following items.
Replace any part if damaged.
Master cylinder:

- Pin holes or scratches on inner wall.

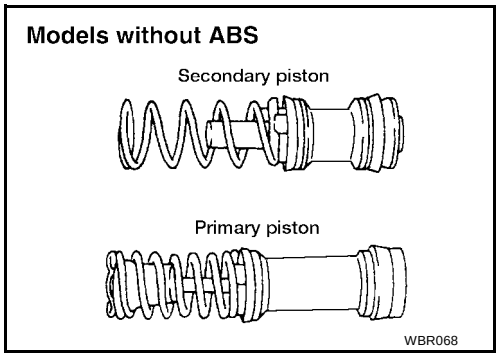
Piston:

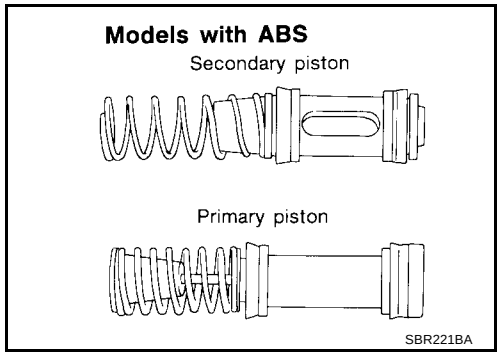
- Deformation of or scratches on piston cups.

Assembly

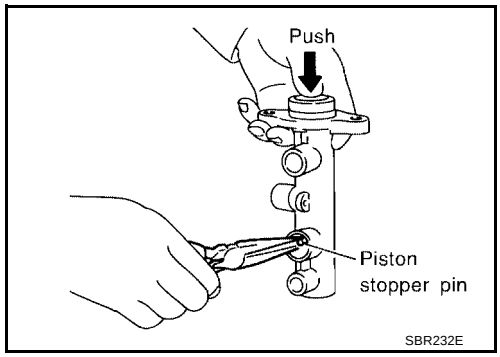
EFS00237

1. Insert secondary piston assembly. Then insert primary piston assembly.
   - Lubricate with brake fluid.
   - Pay attention to alignment of secondary piston slit with valve stopper mounting hole of cylinder body (with ABS).



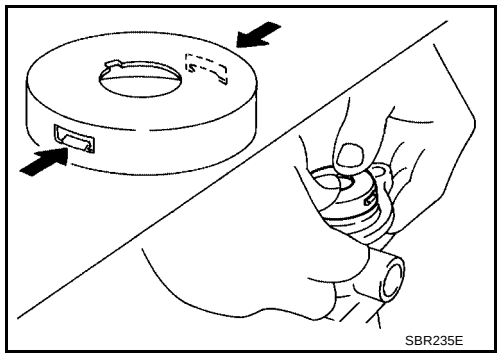


2. Install piston stopper pin while piston is pushed into cylinder (with ABS).
3. Push reservoir tank seals and reservoir tank into cylinder body.
   - Lubricate with brake fluid.
4. Install spring pin (with ABS).



5. Install stopper cap.

- **Before installing stopper cap, ensure that claws are bent inward.**



Installation

EFS00238

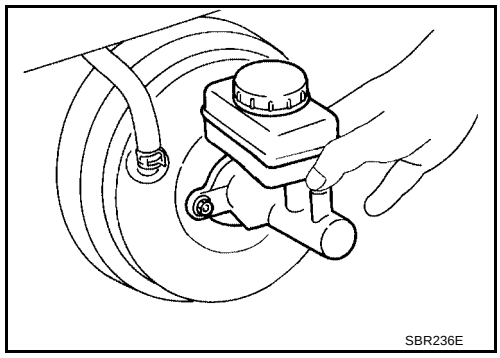
1. Place master cylinder onto brake booster and secure mounting nuts lightly.
2. Tighten master cylinder mounting nuts.

   Master cylinder : 12 - 15 N·m (1.2 - 1.5 kg-m, 9 - 11 ft-lb)

3. Fill reservoir tank with new brake fluid.

   CAUTION:
   - **Refill with new brake fluid “DOT 3”.**
   - **Never reuse drained brake fluid.**
4. Plug all ports on master cylinder with fingers to prevent air suction while releasing brake pedal.
5. Have driver depress brake pedal slowly several times until no air comes out of master cylinder.
6. Fit brake lines to master cylinder.
7. Tighten flare nuts.

   Flare nuts : 15 - 18 N·m (1.5 - 1.8 kg-m, 11 - 13 ft-lb)
8. Bleed air from brake system. Refer to BR-7, "Bleeding Brake System" .



BRAKE BOOSTER

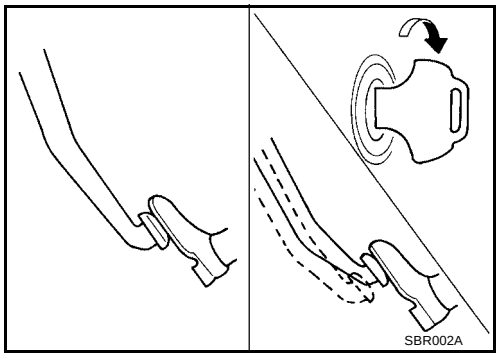
PFP:47200

On-vehicle Service

EFS00239

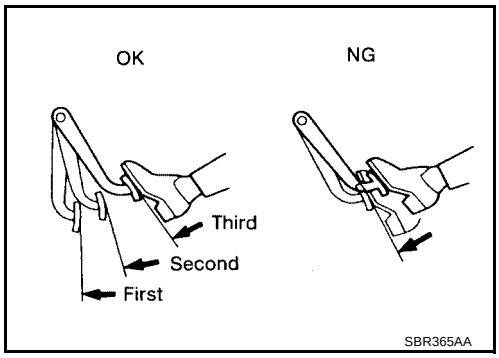
OPERATING CHECK

1. Stop engine and depress brake pedal several times. Check that pedal stroke does not change.
2. Depress brake pedal, then start engine. If pedal goes down slightly, operation is normal.



AIRTIGHT CHECK

1. Start engine, and stop it after one or two minutes. Depress brake pedal several times slowly. The pedal should go further down the first time, and then it should gradually rise thereafter.
2. Depress brake pedal while engine is running, and stop engine with pedal depressed. The pedal stroke should not change after holding pedal down for **30 seconds.**

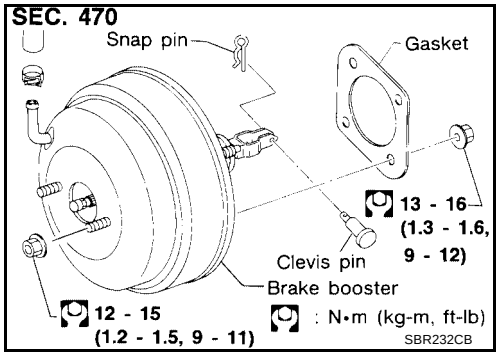


Removal

EFS0023A

CAUTION:

- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**
- **Be careful not to deform or bend brake lines, during removal of booster.**
- **Replace clevis pin if it is damaged.**
- **Be careful not to damage brake booster stud bolt threads. If brake booster is tilted or inclined during installation, the dash panel may damage the threads.**
- **Attach the check valve in the correct orientation.**



1. Remove strut tower bar, if equipped. Refer to FSU-5, "Components" .
2. Remove air cleaner and inlet duct. Refer to EM-106, "Removal and Installation" .
3. Remove the brake master cylinder. Refer to BR-13, "Removal" .
4. Remove vacuum hose from the brake booster. Refer to BR-18, "Removal and Installation" .
5. Remove lower driver instrument panel. Refer to IP-10, "Removal and Installation" .
6. Remove the brake pedal attachment snap pin and clevis pin from inside the vehicle.
7. Remove the nuts on the brake booster and brake pedal assembly.
8. Remove brake booster assembly from the engine compartment side.

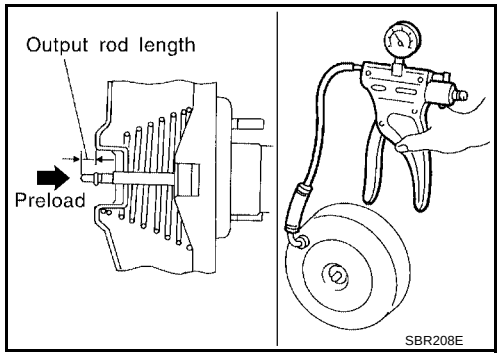
Inspection

EFS0023B

OUTPUT ROD LENGTH CHECK

1. Apply vacuum of –66.7 kPa (–500 mmHg, –19.69 inHg) to brake booster with a hand vacuum pump.
2. Add preload of 19.6 N (2 kg, 4.4 lb) to output rod.
3. Check output rod length.

Specified length : 10.275 - 10.525 mm (0.4045 - 0.4144 in)



Installation

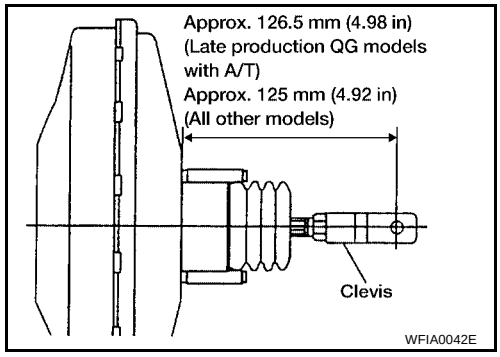
EFS0023C

CAUTION:

- **Be careful not to deform or bend brake lines, during installation of booster.**
- **Replace clevis pin if damaged.**
- **Refill with new brake fluid “DOT 3”.**
- **Never reuse drained brake fluid.**
- **Take care not to damage brake booster mounting bolt thread when installing. Due to the acute angle of installation, the threads can be damaged with the dash panel.**

1. Before fitting booster, temporarily adjust clevis to dimension shown.
2. Fit booster, then secure mounting nuts (brake pedal bracket to master cylinder) lightly.
3. Connect brake pedal and booster input rod with clevis pin.
4. Install and tighten brake booster mounting nuts to specification.

Brake booster : 13 - 16 N·m (1.3 - 1.6 kg-m, 9 - 12 ft-lb)



5. Install master cylinder. Refer to BR-15, "Installation" .
6. Connect brake booster vacuum hose.
7. Adjust brake pedal height. Refer to BR-12, "BRAKE PEDAL HEIGHT" .
8. Bleed air from brake system. Refer to BR-7, "Bleeding Brake System" .

VACUUM HOSE

PFP:41920

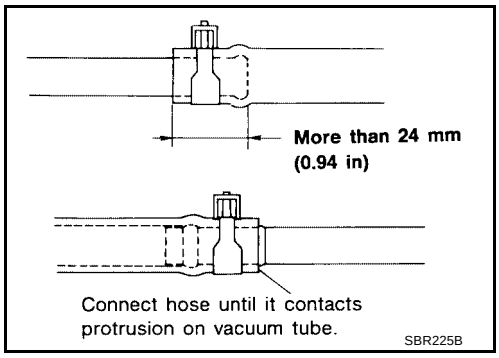
Removal and Installation

EFS0023D

CAUTION:

When installing vacuum hoses, pay attention to the following points:

- **Do not apply any oil or lubricants to vacuum hose with check valve.**
- **Insert vacuum tube into vacuum hose as shown.**
- **Install vacuum hose with the internal check valve oriented in the correct direction. The arrow on the hose should point to the engine connection.**



Inspection

EFS0023E

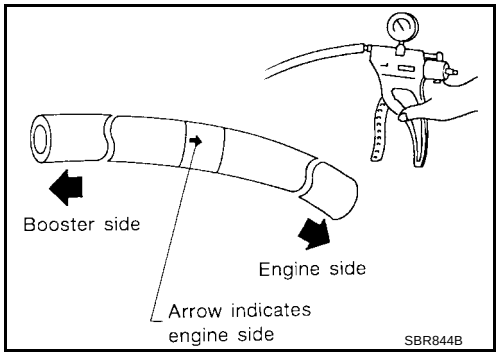
HOSES AND CONNECTORS

Check vacuum lines and connections for airtightness, improper attachment, chafing and deterioration.

CHECK VALVE

Check vacuum with a vacuum pump.

Connect to booster side	Vacuum should exist
Connect to engine side	Vacuum should not exist



FRONT DISC BRAKE (CL25VA/CL25VB TYPE)

PFP:41000

On-board Inspection

EFS00321

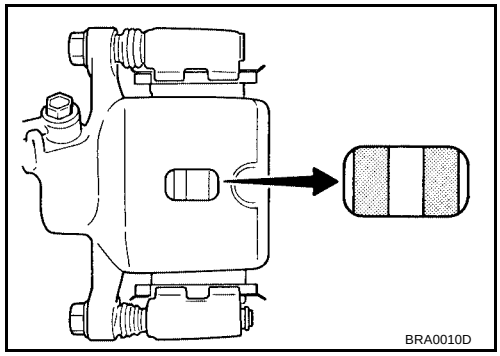
PAD WEAR INSPECTION

- Inspect the thickness of the pad through the caliper inspection hole. Use a ruler or caliper for inspection if necessary.

Standard

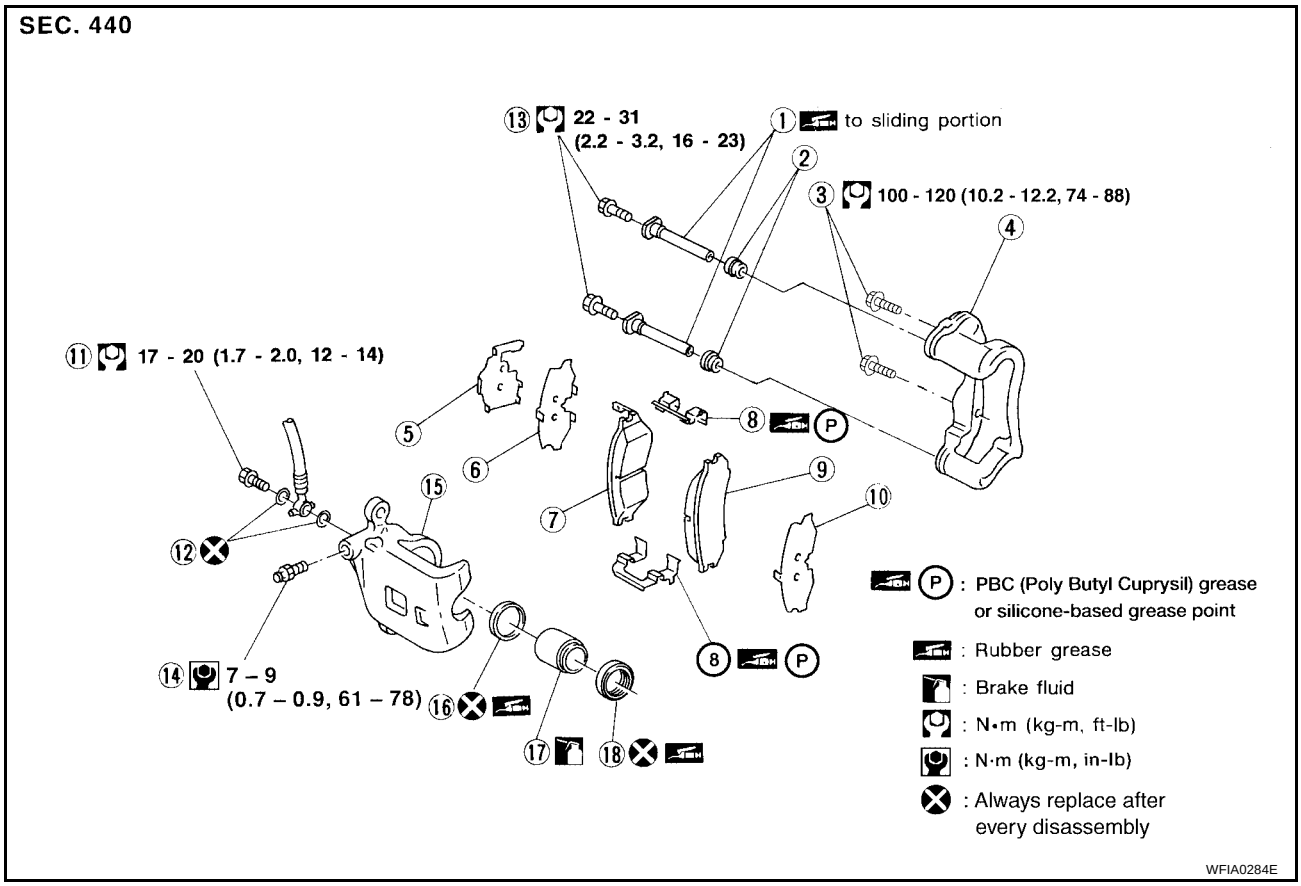
Standard thickness : 11 mm (0.433 in)

Repair limit thickness : 2.0 mm (0.079 in)



Component

EFS0031R



1.	Main pin	2.	Pin boot	3.	Torque member fixing bolt
4.	Torque member	5.	Shim cover	6.	Inner shim
7.	Inner pad	8.	Pad retainer	9.	Outer pad
10.	Outer shim	11.	Connecting bolt	12.	Copper washer
13.	Main pin bolt	14.	Air bleeder valve	15.	Cylinder body
16.	Piston seal	17.	Piston	18.	Piston boot

Pad Replacement

EFS0031S

WARNING:

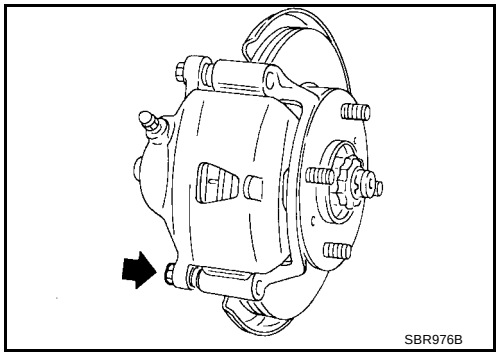
Clean brake pads with a vacuum dust collector to minimize the hazard of airborne particles or other materials.

CAUTION:

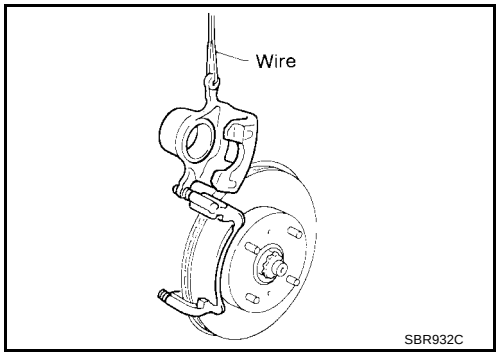
- **When cylinder body is open, do not depress brake pedal because piston will pop out.**

- **Be careful not to damage piston boot or get oil on rotor. Always replace shims when replacing pads.**
- **If shims are rusted or show peeling of the rubber coat, replace them with new shims.**

1. Remove master cylinder reservoir cap.
2. Remove wheel and tire. Refer to MA-32, "Tire Rotation" .
3. Remove pin bolt.


SBR976B

4. Open cylinder body upward. Then remove pad with retainers, inner and outer shims.
   - It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend cylinder body with wire so as not to stretch brake hose.
5. Reverse the removal procedure to install.
   - **Burnish the brake contact surfaces after refinishing or replacing drums or rotors, after replacing pads or linings, or if a soft pedal occurs at very low mileage.**
     Refer to BR-7, "Brake Burnishing Procedure" .



SBR932C

NOTE:
Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.

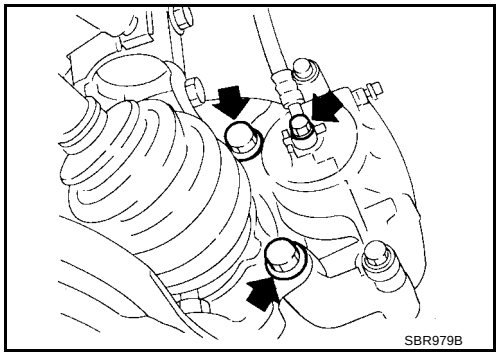
Removal and Installation of Caliper Assembly and Disc Rotor

EFS00322

REMOVAL

1. Remove wheel and tire. Refer to MA-32, "Tire Rotation" .
2. Drain brake fluid. Refer to BR-6, "Changing Brake Fluid" .
3. Remove torque member fixing bolts and brake hose connecting bolt.

   WARNING:
   Clean brake pads with a vacuum dust collector to minimize the hazard of airborne particles or other materials.
   - **It is not necessary to remove brake hose connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend caliper assembly with wire so as not to stretch brake hose.**
4. Remove disc rotor.


SBR979B

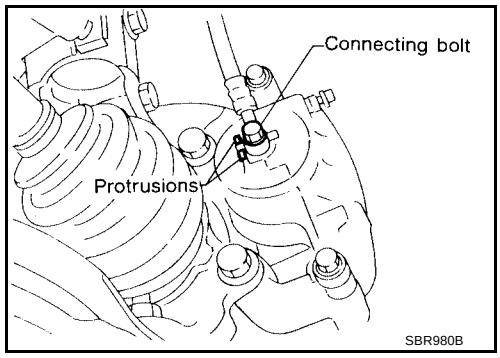
INSTALLATION

CAUTION:

- **Refill with new brake fluid “DOT 3”.**
- **Never reuse drained brake fluid.**

1. Install disc rotor.
2. Install brake hose to caliper and tighten connecting bolt to specification. Refer to BR-19, "Component" .

   CAUTION:
   Install new copper washers.
3. Install all parts and tighten all bolts. Refer to BR-19, "Component" .
4. Bleed air from brake system. Refer to BR-7, "Bleeding Brake System" .



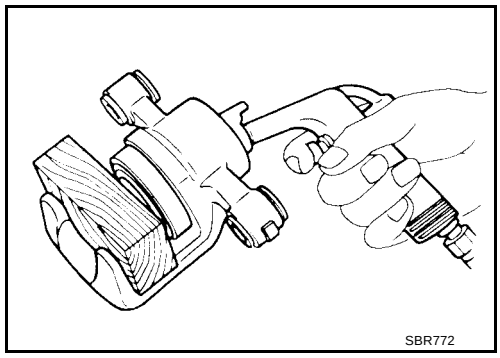
Disassembly and Assembly of Caliper Assembly

EFS00323

DISASSEMBLY

1. Push out piston with piston boot with compressed air.

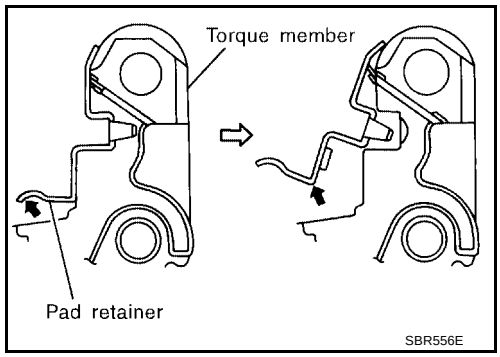
   WARNING:
   Do not place your fingers in front of piston.



2. Remove piston seal with a suitable tool.

   CAUTION:
   Do not scratch or score cylinder wall.
3. Remove the pad retainer.

   CAUTION:
   When removing the pad retainer from the torque member, lift it up and out in the direction of the arrows in the figure.



CALIPER INSPECTION

Cylinder Body

CAUTION:

- **Check inside surface of cylinder for score, rust, wear, damage or presence of foreign materials. If any of the above conditions are observed, replace cylinder body.**
- **Minor damage from rust or foreign materials may be eliminated by polishing surface with a fine emery paper. Replace cylinder body if necessary.**

Use brake fluid to clean. Never use mineral oil.

Piston

CAUTION:

Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign materials are stuck to sliding surface.

- Check piston for score, rust, wear, damage or presence of foreign materials. Replace if any of the above conditions are observed.

Slide Pin, Pin Bolt and Pin Boot

Check for wear, cracks or other damage. Replace if any of the above conditions are observed.

DISC ROTOR INSPECTION

Rubbing Surface

Check rotor for roughness, cracks or chips.

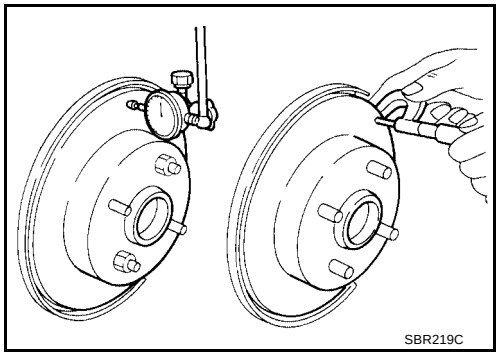
Runout

1. Secure rotor to wheel hub with at least two nuts (M12 x 1.25).
2. Check runout using a dial indicator.

   CAUTION:

   Make sure that wheel bearing axial end play is within the specifications before measuring. Refer to FAX-5, "Front Wheel Bearing"

   Maximum runout : 0.07 mm (0.0028 in)



3. If the runout is out of specification, find minimum runout mounting position as follows:

a. Remove nuts and rotor from wheel hub.

b. Shift the rotor one hole and secure rotor to wheel hub with nuts.

c. Measure runout.

d. Repeat steps a. to c. so that minimum runout position can be found.

4. If the runout is still out of specification, turn rotor with on-car brake lathe (“MAD, DL-8700”, “AMMCO 700 and 705” or equivalent).

Thickness

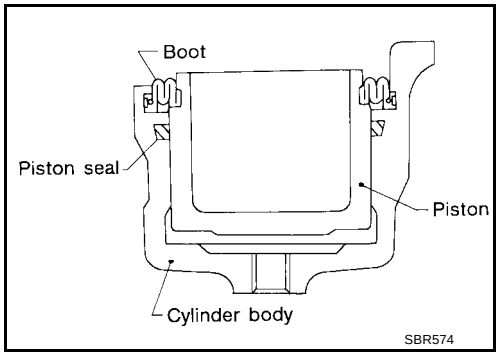
Thickness variation (At least 8 positions) :Maximum 0.01 mm (0.0004 in)

- If rotor thickness variation exceeds the specification, turn rotor with on-car brake lathe.

Rotor thickness repair limit : 20 mm (0.79 in)

ASSEMBLY

1. Insert piston seal into groove in cylinder body.
2. With piston boot fitted to piston, insert piston boot into groove on cylinder body and install piston.
3. Properly secure piston boot.



FRONT DISC BRAKE (OPB27VA TYPE)

PFP:41000

On-board Inspection

EFS0031J

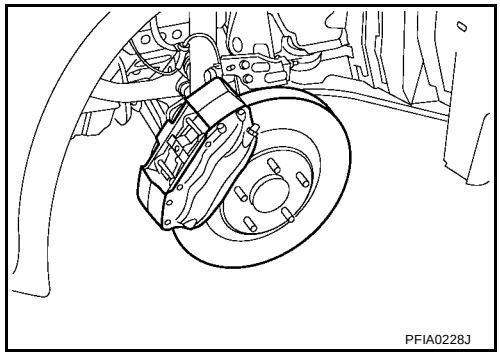
PAD WEAR INSPECTION

- Inspect the thickness of the pad through the caliper inspection hole. Use a ruler or caliper for inspection if necessary.

Standard

Standard thickness : 9.3 mm (0.366 in)

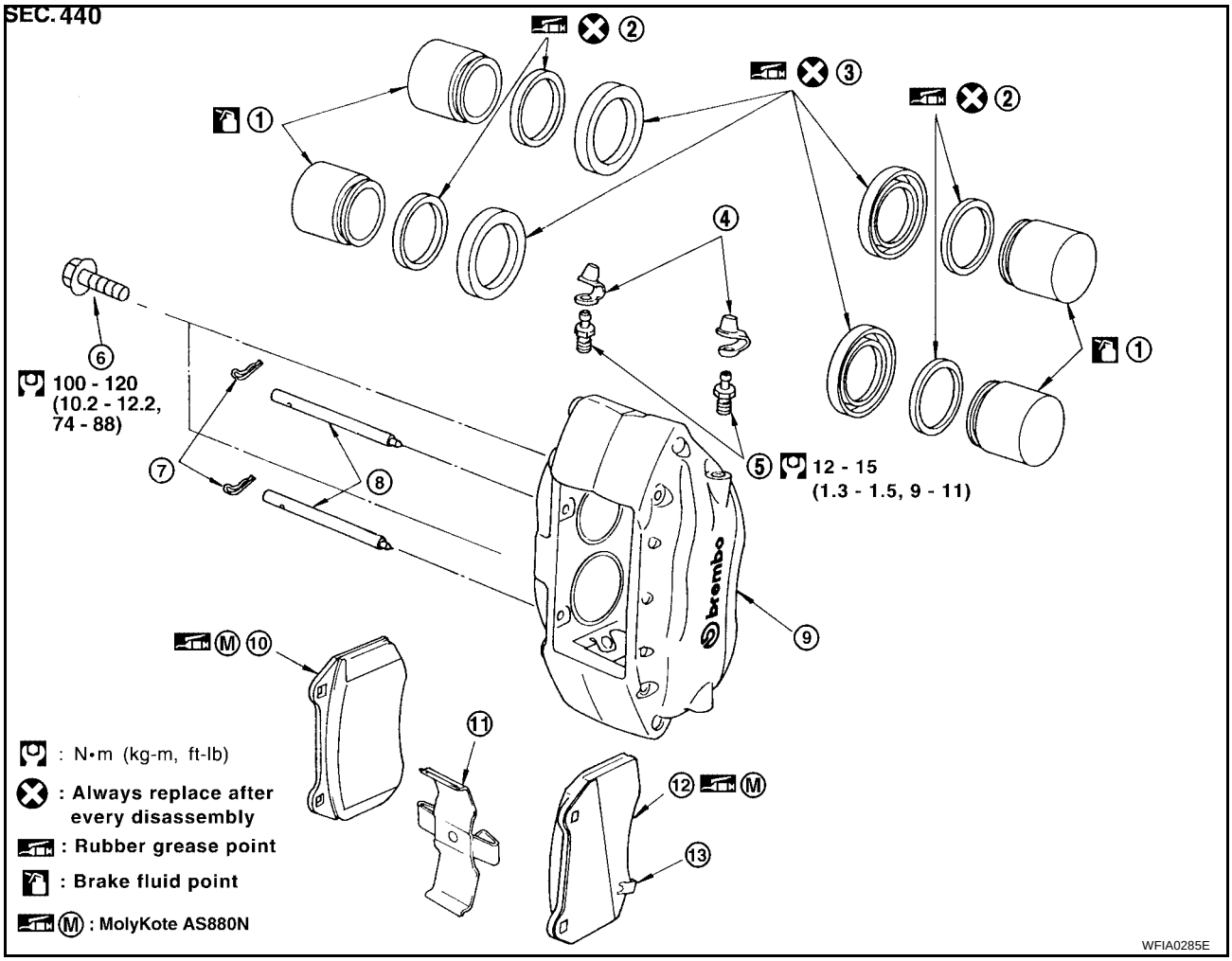
Repair limit thickness : 2.0 mm (0.079 in)



Component

EFS0031K

NOTE:
Refer to BR-25, "HOW TO APPLY GREASE TO THE BRAKE PAD" for how to apply grease to brake pads.



1. Piston	2. Piston seal	3. Piston boot
4. Cap	5. Air bleeder	6. Bolt
7. Clips	8. Pad pins	9. Caliper
10. Inner pad	11. Cross spring	12. Outer pad
13. Pad wear sensor	14. Pad wear sensor	

CAUTION:

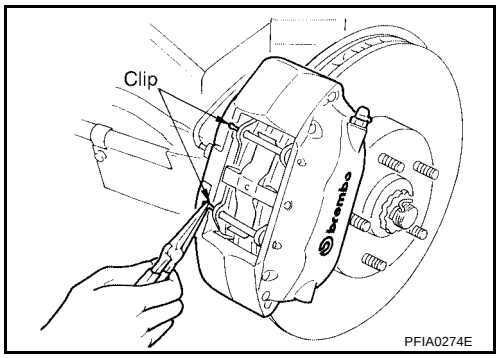
- **Clean dust on caliper and brake pad with a vacuum dust collector. Do not blow with compressed air.**
- **While the brake pad and cylinder body are separated, the piston may suddenly jump out, so do not depress the brake pedal.**
- **Apart from caliper assembly, disassembly or replacement, there is no need to remove caliper bolts or brake hose or tube.**
- **Do not damage piston boot.**
- **Keep the rotor clean of brake fluid.**

Pad Replacement

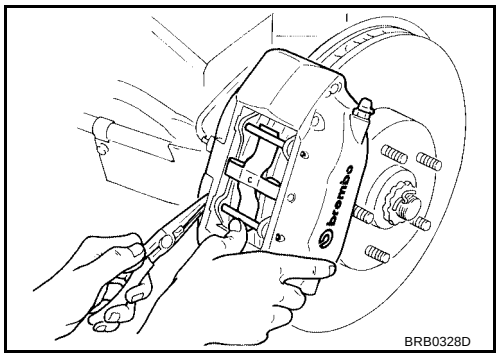
EFS0031L

REMOVAL

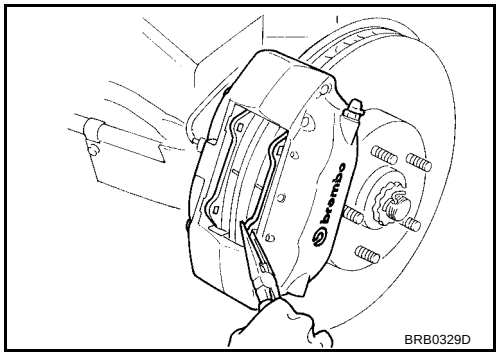
1. Remove wheels and tires from vehicle. Refer to WT-5, "Rotation" .
2. Remove the clips from the pad pins using a suitable tool.



3. Remove the pad pins while holding down the cross spring, then remove the cross spring from the caliper.



4. Remove the pad from the caliper.



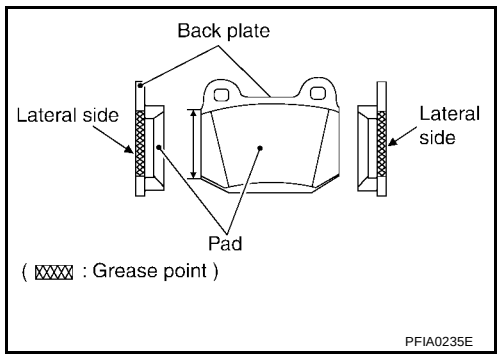
HOW TO APPLY GREASE TO THE BRAKE PAD

Pad Side

Apply Molykote AS880N grease or silicone-based grease about 0.5 g (0.018 oz) per surface equally to back plate side of Inner Pad and Outer Pad as shown.

CAUTION:

Make sure no foreign material contaminates the grease.



INSTALLATION

1. Insert the piston to the position where the pad is attached.

   CAUTION:

   By pushing in the piston, the brake fluid returns to the master cylinder reservoir tank. Watch the level of the surface of the reservoir tank.

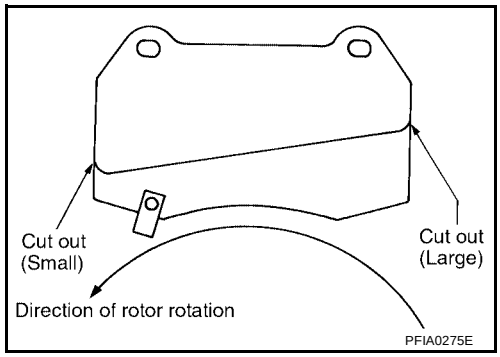
   NOTE:

   Using a disc brake piston tool (commercial service tool), etc., makes it easier to push in the piston.

2. Install pad as shown.

   CAUTION:

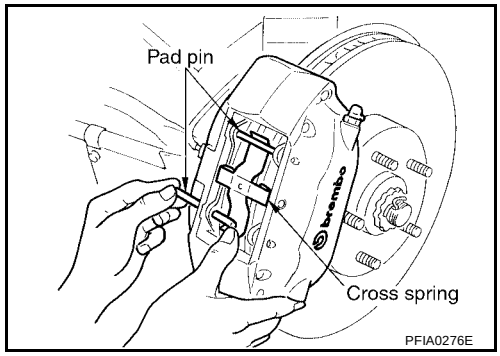
   - **Attach the pad with wear sensor to the outer side.**
   - **The side of the shim with the larger cutouts should be on the entry side of the disc rotor rotation.**



3. Insert the upper pad pin from the inner cylinder side, then insert firmly to the outer cylinder side through the hole in the top of the pad.
4. Place the top of the cross spring over the top pad pin, press in the cross spring, push the lower pad pin from the inner cylinder side to the outer cylinder side, and secure the cross spring as shown.
5. Insert the clips in the small hole at the end of the pad pins.

   CAUTION:

   If the clip is not fully attached, the pad pin or the pad could fall out while the vehicle is in motion.



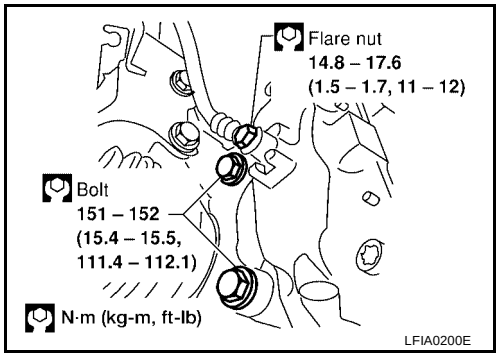
6. Install the wheels and tires to the vehicle. Refer to WT-5, "Rotation" .

Removal and Installation of Caliper Assembly and Disc Rotor

EFS0031M

REMOVAL

1. Remove wheels and tires from vehicle. Refer to WT-5, "Rotation" .
2. Drain brake fluid. Refer to BR-6, "Changing Brake Fluid" .
3. Remove the brake pad. Refer to BR-24, "Pad Replacement" .
4. Remove the brake tube flare nut using a flare wrench.



5. Remove the caliper bolt and remove the caliper assembly from the vehicle.
6. Remove disc rotor.

INSTALLATION

CAUTION:

- **Refill with new brake fluid “DOT3”**
- **Never reuse drained brake fluid.**

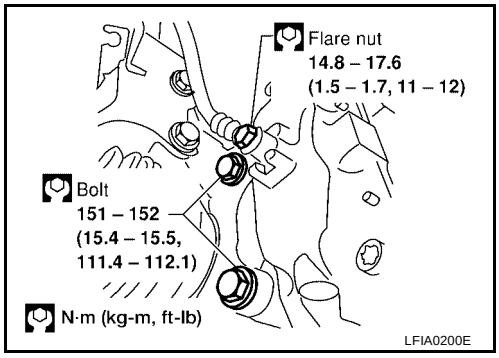
1. Install disc rotor.

   CAUTION:
   Install new copper washers.

2. Install caliper assembly to the vehicle, and tighten bolts to the specified torque.

   CAUTION:
   When attaching the caliper assembly to the vehicle, wipe any oil off the knuckle spindle washers and caliper assembly attachment surfaces.

3. Attach the brake tube to the caliper assembly and partially tighten the flare nut.
4. Using a flare nut torque wrench, tighten the caliper assembly and brake tube connection flare nut to the specified torque.
5. Attach brake pad. Refer to BR-24, "Pad Replacement" .
6. Refill new brake fluid and bleed air. Refer to BR-7, "Bleeding Brake System" .
7. Install the wheels and tires to the vehicle. Refer to WT-5, "Rotation" .



Disassembly and Assembly of Caliper Assembly

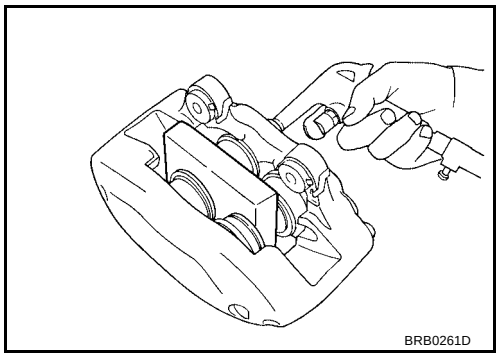
EFS0031N

DISASSEMBLY

1. Insert a piece of wood as shown, blow air in through the flare nut mounting hole, and remove the piston and piston boot. If the four pistons do not all come out at the same time, press the piston(s) that have come out a ways into the cylinder body and blow air in again.

   WARNING:
   Do not get your fingers caught in the piston.

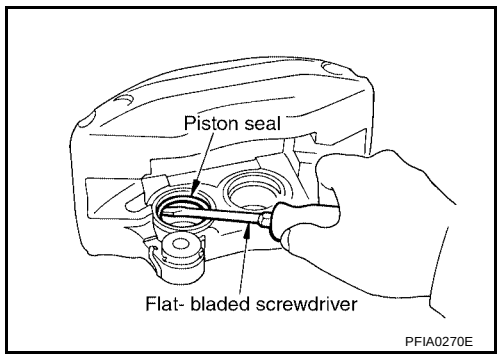
2. Remove the piston boot from the piston.



3. Using a screwdriver, remove the piston seal.

CAUTION:

- **Be careful not to damage cylinder inner wall.**
- **Never remove the four bolts from the inner and outer sides of the caliper and do not tighten them further.**



CALIPER INSPECTION

Caliper

CAUTION:

- **Use new brake fluid to clean the caliper. Never use mineral oils such as gasoline or kerosene.**
- **Check for corrosion, wear, or damage to the cylinder inner wall, and replace the caliper as necessary.**

Piston

CAUTION:

- **The piston surface is plated, do not repair the piston using sandpaper.**
- **Check piston surface for corrosion, wear, and damage, and replace the caliper as necessary.**

DISC ROTOR INSPECTION

Visual Inspection

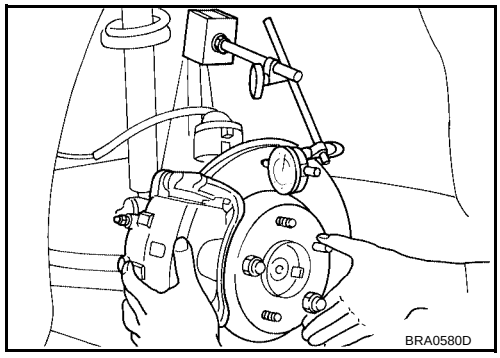
Check surface of the disc rotor for uneven wear, cracks, and serious damage. If any non-standard condition is detected, replace applicable part.

Runout Inspection

1. Using wheel nuts, attach disc rotor to the wheel hub using at least two wheel nuts.
2. Inspect runout using a dial gauge.

Standard value
(measured at 10 mm (0.39 in) inside the disc edge)

Runout limit (with it attached to the vehicle)	**: 0.050 mm (0.0020 in) or less**
Runout limit (just the disc rotor)	**: 0.040 mm (0.0016 in) or less**



CAUTION:
Before measuring, make sure the axle endplay is 0 mm (0 in).

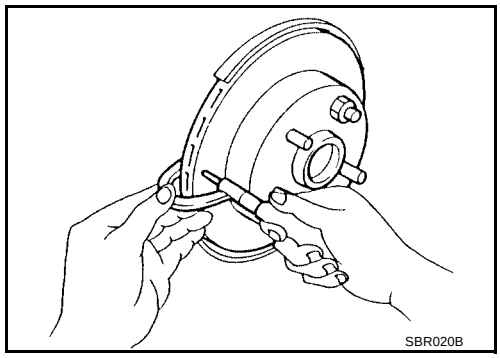
3. If runout is outside the limit, find the minimum runout point by shifting mounting positions of the disc rotor and wheel hub by one hole.

Thickness Inspection

Using a micrometer, check thickness of the disc rotor. If thickness is outside the standard, replace disc rotor.

Standard

Standard thickness	**: 22 mm (0.87 in)**
Wear limit	**: 20 mm (0.79 in)**
Maximum uneven wear (measured at 8 positions)	**: 0.015 mm (0.0006 in) or less**

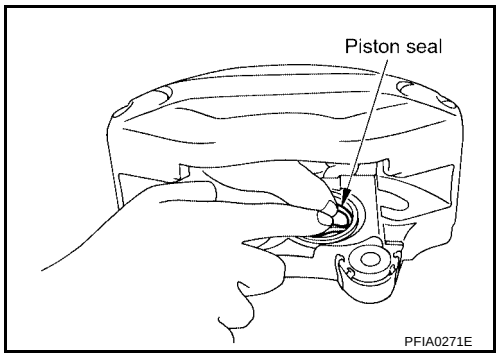


ASSEMBLY

1. Apply a rubber grease to the piston seal and attach to cylinder body. Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .

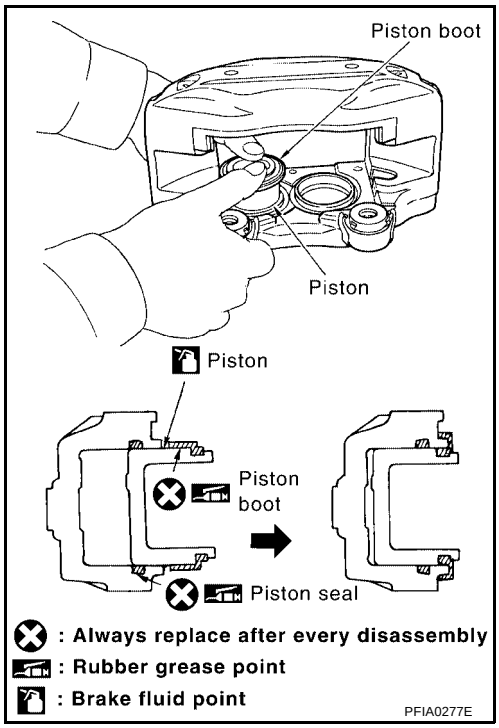
   CAUTION:
   Do not use Nissan Rubber Grease (KRE00 00010, KRE00 00010 01) when assembling.

   CAUTION:
   Do not reuse the piston seals.



2. Apply brake fluid or rubber grease to the piston boot, place it on the piston, and firmly insert the piston boot cylinder-side lip into the cylinder body groove.
3. Insert the piston into the cylinder body by hand and firmly attach the piston boot piston-side lip into the piston groove.

   CAUTION:
   Press the piston evenly and vary the pressing point to prevent cylinder inner wall from being rubbed.



4. Attach the shim and shim cover to the pad and attach to the caliper.

REAR DISC BRAKE

PFP:44000

On-board Inspection

EFS0037T

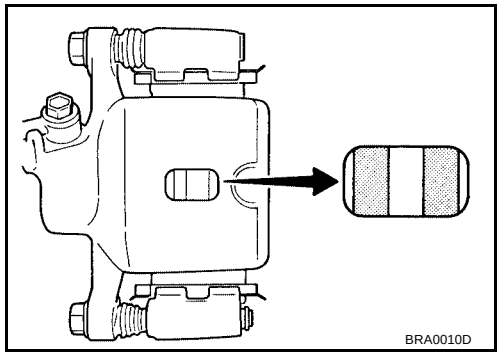
PAD WEAR INSPECTION

- Inspect the thickness of the pad through the caliper inspection hole. Use a ruler or caliper for inspection if necessary.

Standard

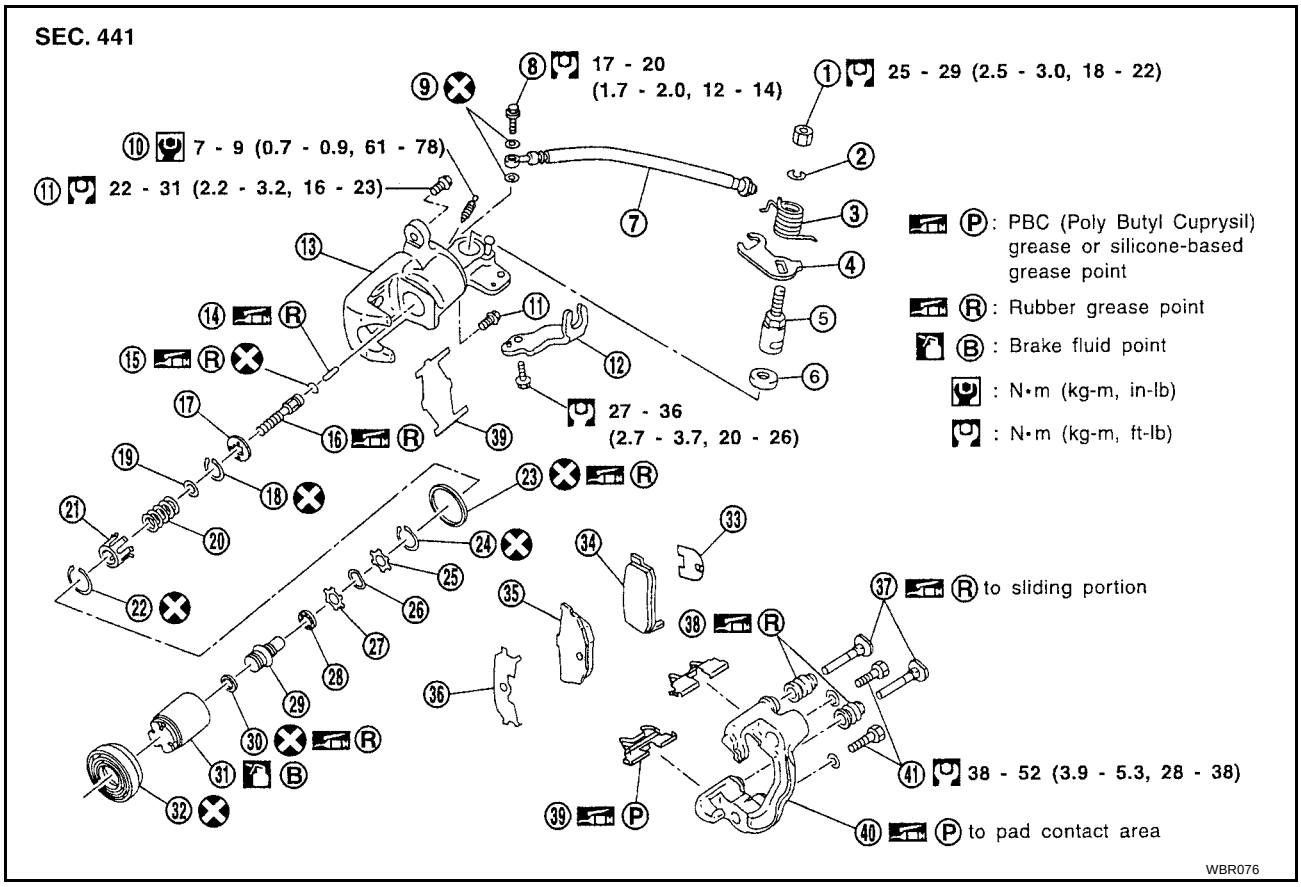
Standard thickness : 10 mm (0.39 in)

Repair limit thickness : 2.0 mm (0.079 in)



Component

EFS0023M



1. Nut	2. Washer	3. Return spring
4. Toggle lever	5. Cam	6. Cam boot
7. Brake hose	8. Connecting bolt	9. Copper washers
10. Air bleeder valve	11. Pin bolt	12. Cable guide
13. Cylinder body	14. Strut	15. O-ring
16. Push rod	17. Key plate	18. Ring C
19. Seat	20. Spring	21. Spring cover
22. Ring B	23. Piston seal	24. Ring A
25. Spacer	26. Wave washer	27. Spacer
28. Ball bearing	29. Adjuster	30. Cup
31. Piston	32. Piston boot	33. Inner shim
34. Inner pad	35. Outer pad	36. Outer shim

37. Pin
38. Pin boot
39. Pad retainer
40. Torque member
41. Torque member fixing bolt

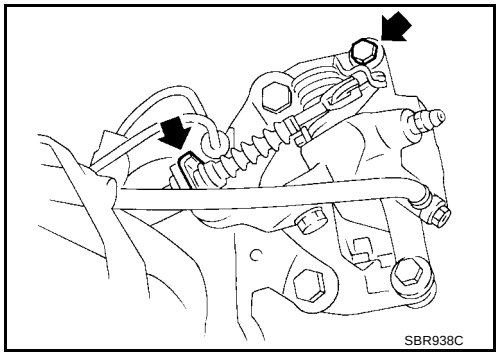
Pad Replacement

EFS0023N

WARNING:
Clean brake pads with a vacuum dust collector to minimize the hazard of airborne particles or other materials.

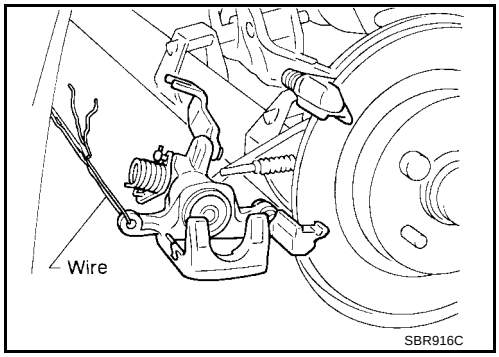
CAUTION:
- **When cylinder body is open, do not depress brake pedal because piston will pop out.**
- **Be careful not to damage piston boot or get oil on rotor. Always replace shims in replacing pads.**
- **If shims are rusted or show peeling of rubber coat, replace them with new shims.**
- **It is not necessary to remove connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend cylinder body with wire so as not to stretch brake hose.**
- **Burnish the brake contact surfaces after refinishing or replacing drums or rotors, after replacing pads or linings, or if a soft pedal occurs at very low mileage.**
  Refer to BR-7, "Brake Burnishing Procedure" .

1. Remove master cylinder reservoir cap.
2. Remove wheel and tire. Refer to MA-32, "Tire Rotation" .
3. Remove brake cable mounting bolt and lock spring.


SBR938C

4. Release parking brake control lever, then disconnect cable from the caliper.
5. Remove upper pin bolt.
6. Open cylinder body downward and secure with wire as shown. Then remove pad retainers, and inner and outer shims.

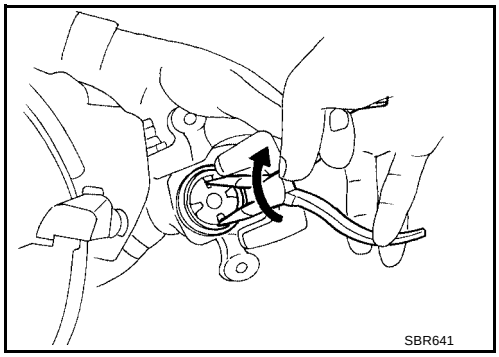
Standard pad thickness : 10 mm (0.39 in)
Pad wear limit : 2.0 mm (0.079 in)

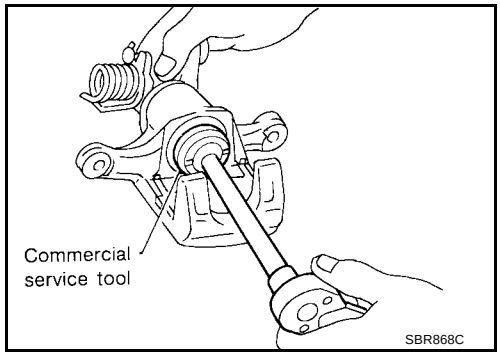


SBR916C

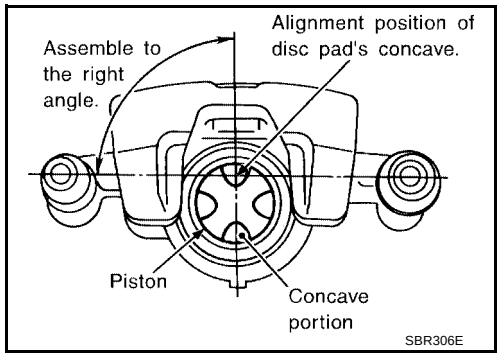
7. When installing new pads, push piston into cylinder body by gently turning piston clockwise using suitable commercial service tool or long nose pliers, as shown.

NOTE:
Carefully monitor brake fluid level because brake fluid will return to reservoir when pushing back piston.

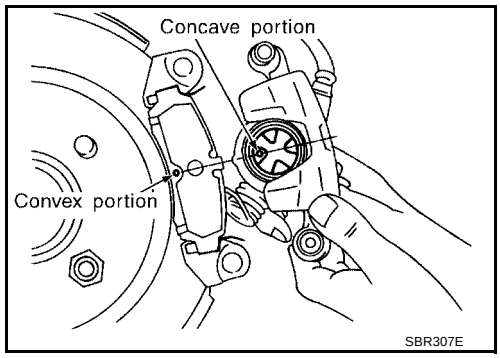

SBR641



8. Adjust the piston to the right angle as shown.



9. Install caliper assembly.
   - As shown in the figure, align the piston's concave to the pad's convex, then install the cylinder body to the torque member.



Removal and Installation of Caliper Assembly and Disc Rotor

EFS0023O

REMOVAL

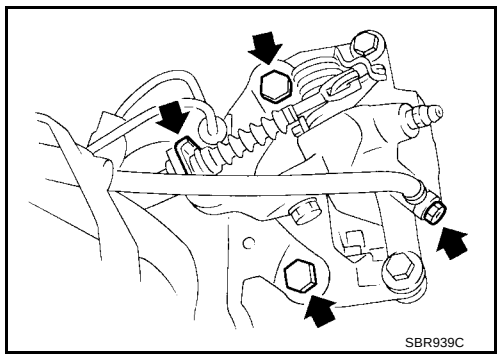
WARNING:

Clean brake pads with a vacuum dust collector to minimize the hazard of airborne particles or other materials.

1. Remove wheel and tire. Refer to MA-32, "Tire Rotation" .
2. Remove brake cable mounting bolt and lock spring.
3. Release parking brake control lever, then disconnect cable from the caliper.
4. Remove torque member fixing bolts and brake hose connecting bolt.

   NOTE:

   It is not necessary to remove brake hose connecting bolt except for disassembly or replacement of caliper assembly. In this case, suspend caliper assembly with wire so as not to stretch brake hose.
5. Remove caliper assembly.
6. Remove disc rotor.

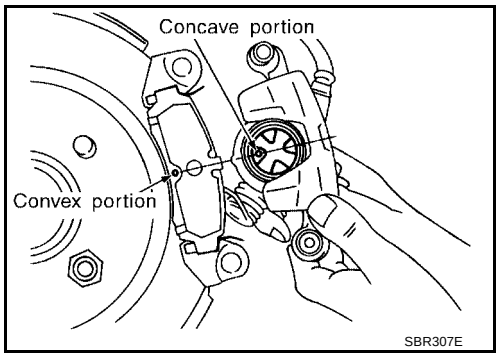


INSTALLATION

1. Install disc rotor.
2. Install brake hose to caliper securely.Tighten connectiong bolt to specification. Refer to BR-29, "Component" .

CAUTION:
Install new copper washers.

3. Install caliper assembly.
   - As shown in the figure, align the piston's concave to the pad's convex, then install the cylinder body to the torque member.
4. Install all parts and tighten all bolts to specification. Refer to BR-29, "Component" .
5. Bleed air from brake system. Refer to BR-7, "Bleeding Brake System" .



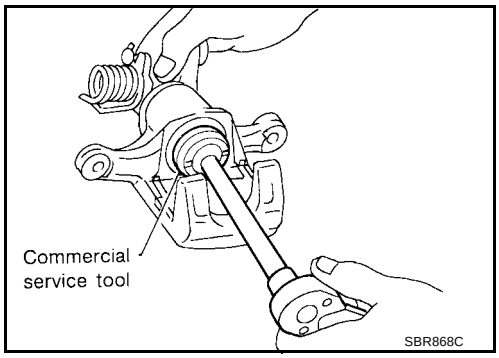
CAUTION:
- **Refill with new brake fluid “DOT 3”.**
- **Never reuse drained brake fluid.**

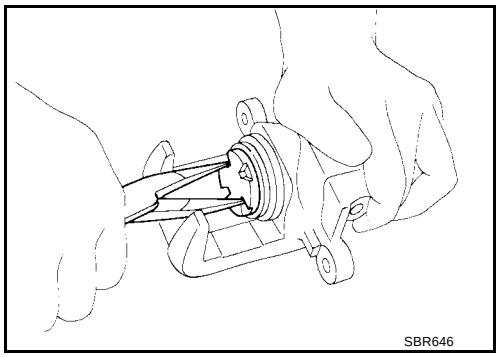
Disassembly and Assembly of Caliper Assembly

EFS0023P

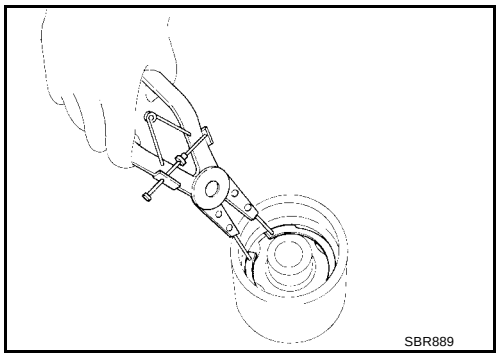
DISASSEMBLY

1. Remove piston by turning it counterclockwise with suitable commercial service tool or long nose pliers.





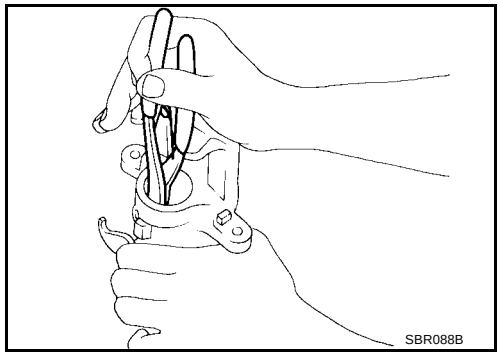
2. Pry off ring A from piston with suitable pliers and remove cup, adjuster, bearing, spacers, and wave washer.



3. Disassemble cylinder body.

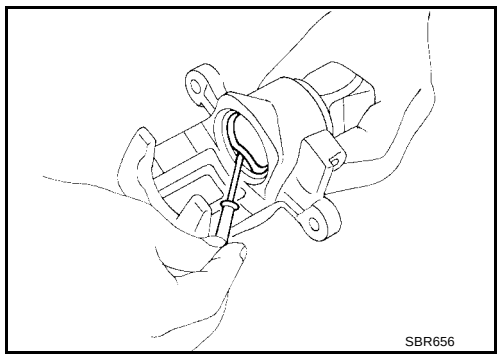
a. Pry off ring B with suitable pliers, then remove spring cover, spring and seat.

b. Pry off ring C, then remove key plate, push rod and rod.

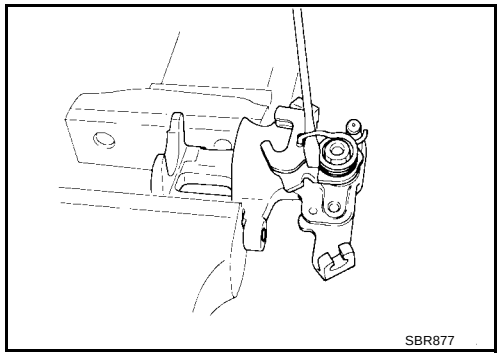


c. Remove piston seal with a suitable tool.

CAUTION:
Be careful not to damage cylinder body.



4. Remove return spring, toggle lever and cable guide.



CALIPER INSPECTION

CAUTION:
Use brake fluid to clean cylinder. Never use mineral oil.

Cylinder Body

- Check inside surface of cylinder for score, rust, wear, damage or presence of foreign materials. If any of the above conditions are observed, replace cylinder body.
- Minor damage from rust or foreign materials may be eliminated by polishing surface with a fine emery paper.
- Replace cylinder body if necessary.

Torque Member

Check for wear, cracks or other damage. Replace if necessary.

Piston

CAUTION:
Piston sliding surface is plated. Do not polish with emery paper even if rust or foreign matter is stuck to sliding surface.
Check piston for score, rust, wear, damage or presence of foreign materials.
Replace if any of the above conditions are observed.

Pin and Pin Boot

Check for wear, cracks or other damage.
Replace if any of the above conditions are observed.

DISC ROTOR INSPECTION

Rubbing Surface

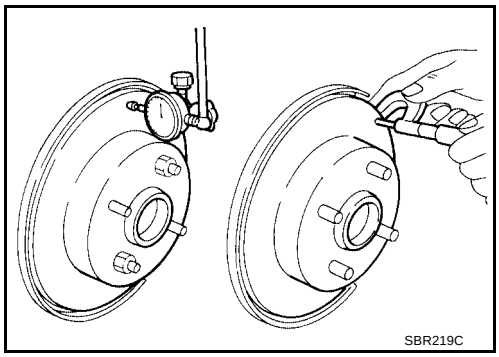
Check rotor for roughness, cracks or chips.

Runout

1. Secure rotor to wheel hub with two nuts (M12 x 1.25).
2. Check runout using a dial indicator.

   CAUTION:
   Make sure that axial end play is within the specifications before measuring. Refer to RAX-5, "Rear Wheel Bearing" .
3. Change relative positions of rotor and wheel hub so that runout is minimized.

Maximum runout : 0.07 mm (0.0028 in)

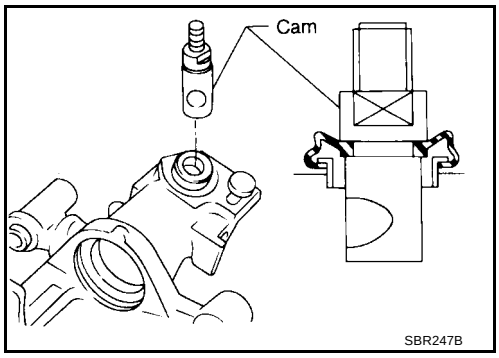


Thickness

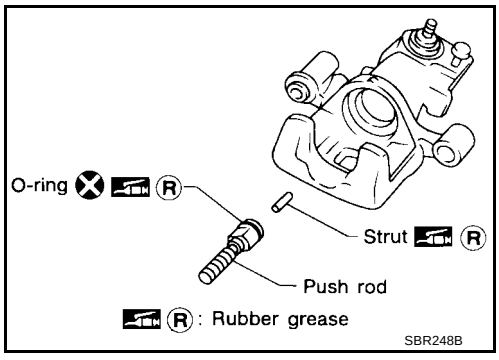
Rotor repair limit	
Standard thickness	**: 9 mm (0.35 in)**
Standard thickness (with Spec V brake package)	**: 7 mm (0.28 in)**
Minimum thickness	**: 8 mm (0.31 in)**
Minimum thickness (with Spec V brake package)	**: 6 mm (0.24 in)**
Maximum thickness variation (At least 8 portions)	**: 0.02 mm (0.0008 in)**

ASSEMBLY

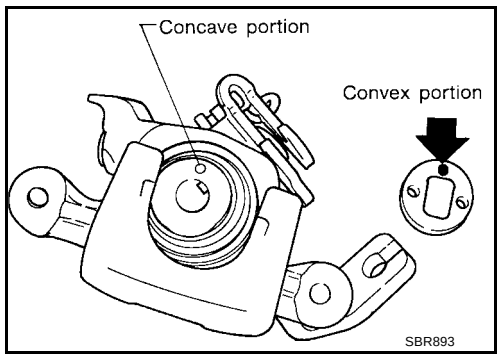
1. Insert cam with depression facing toward open end of cylinder.



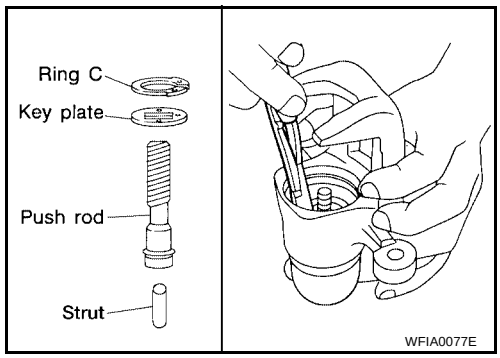
2. Generously apply rubber grease to strut and push rod to make insertion easy.



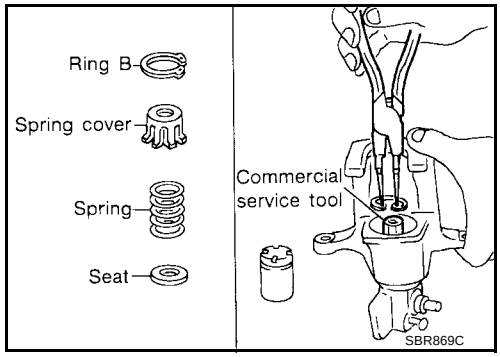
3. Fit push rod into square hole in key plate. Also match convex portion of key plate with concave portion of cylinder.

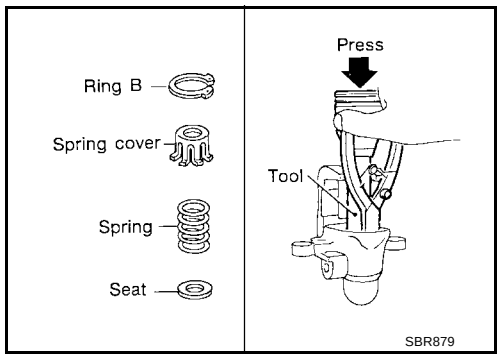


4. Install ring C with a suitable tool.

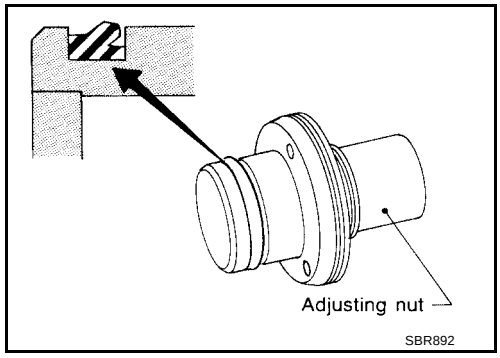


5. Install seat, spring, spring cover and ring B with snap ring pliers and a suitable press and drift.

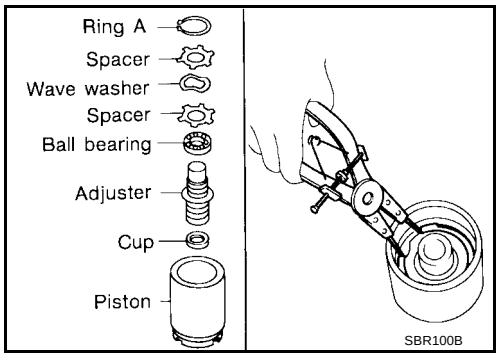




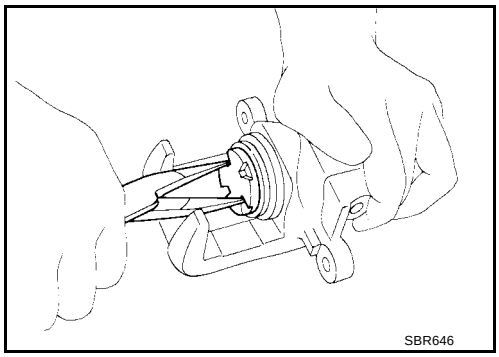
6. Install cup in the specified direction.

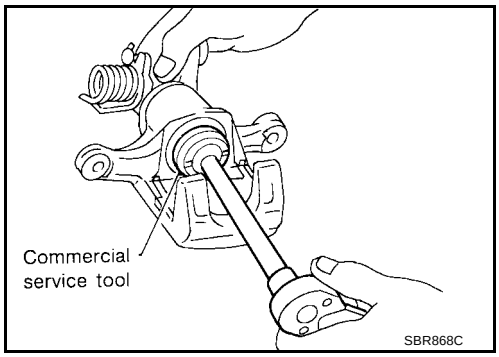


7. Install cup, adjuster, bearing, spacers, washer and ring A with a suitable tool.
8. Insert piston seal into groove on cylinder body.

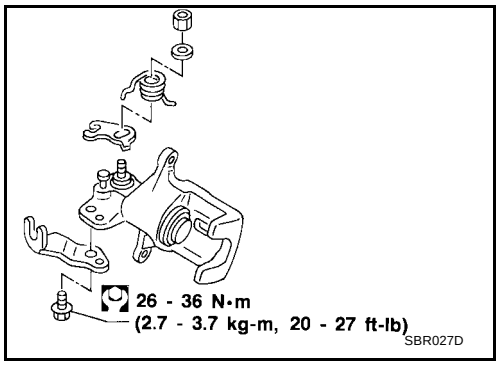


9. With piston boot fitted to piston, insert piston boot into groove on cylinder body and fit piston by turning it clockwise with long nose pliers, or suitable commercial service tool.

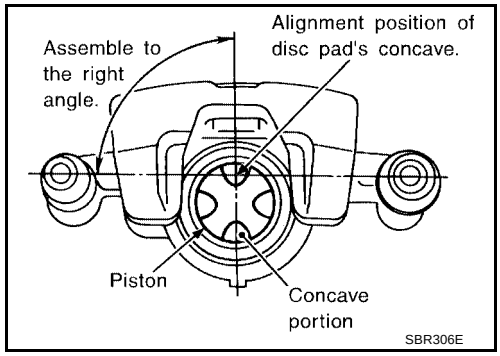




10. Install toggle lever, return spring and cable guide.



11. Adjust the piston to the right angle as shown.

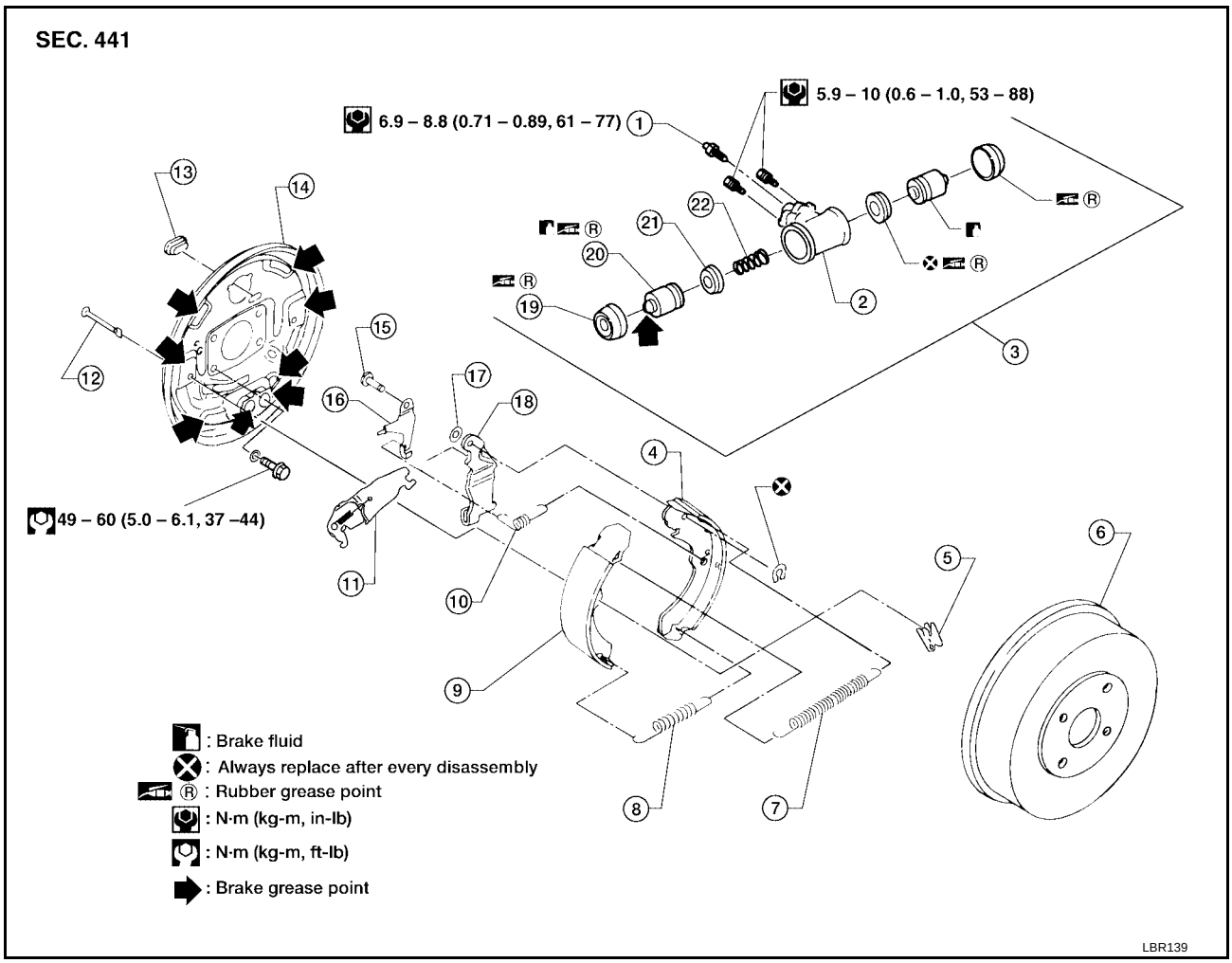


REAR DRUM BRAKE

PFP:43206

Components

EFS0023T



1. Air bleeder valve
2. Cylinder body
3. Wheel cylinder
4. Shoe
5. Shoe hold-down spring
6. Brake drum
7. Return spring
8. Return spring
9. Shoe
10. Adjuster spring
11. Adjuster
12. Shoe hold-down pin
13. Adjuster plug
14. Back plate
15. Retainer
16. Adjusting lever
17. Washer
18. Toggle lever
19. Dust cover
20. Piston
21. Piston cap
22. Spring

Removal

EFS0023U

WARNING:

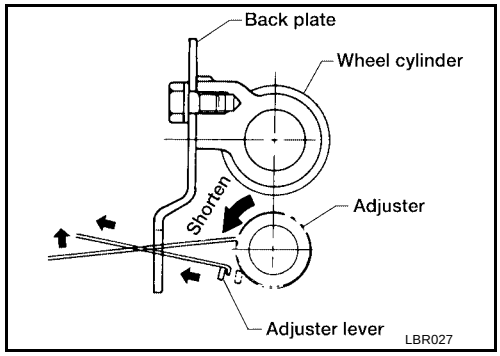
Clean brake lining with a vacuum dust collector to minimize the hazard of airborne materials or other materials.

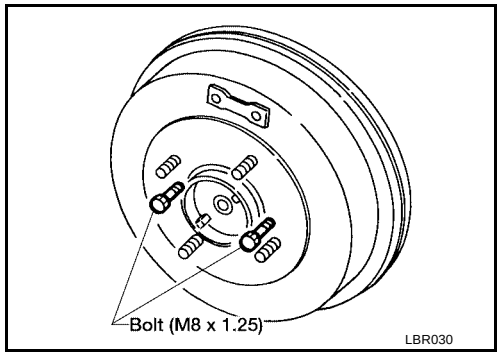
CAUTION:

Make sure parking brake lever is completely released.

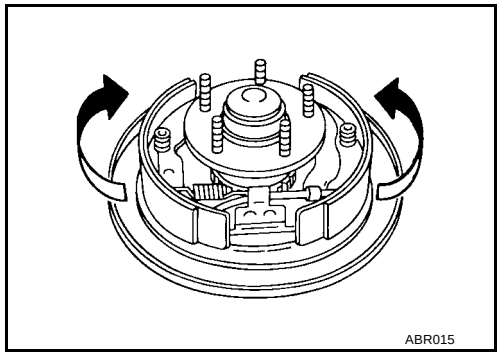
1. Remove wheel and tire. Refer to MA-32, "Tire Rotation" .

2. Release parking brake lever fully, then remove drum.
   - If drum is hard to remove, remove adjuster plug. Shorten adjuster as shown to make clearance between brake shoe and drum. Install two bolts as shown. Tighten the two bolts gradually.

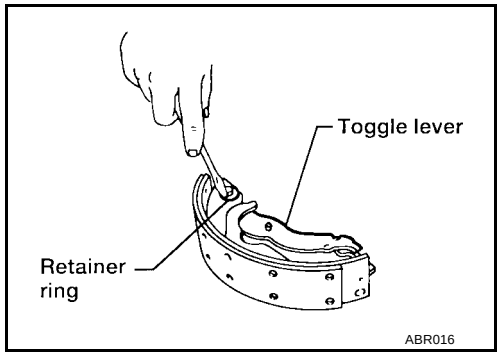




3. After removing retainer, remove spring by rotating shoes.
   NOTE:
   Be careful not to damage parking brake cable when separating it.
4. Remove adjuster.
5. Disconnect parking brake cable from toggle lever.



6. Remove retainer ring with a suitable tool. Then separate toggle lever and adjusting lever from the brake shoe.

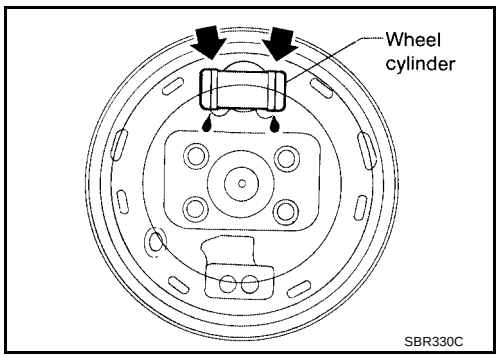


Inspection

EFS0023V

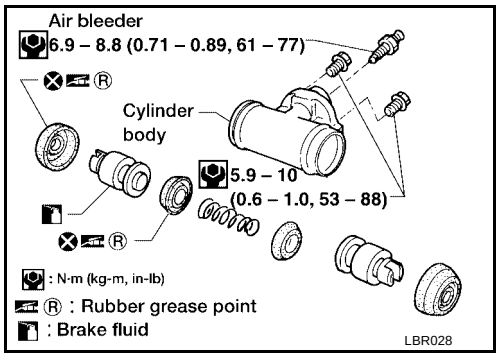
WHEEL CYLINDER

- Check wheel cylinder for leakage.
- Check for wear, damage and loose conditions. Replace if any such condition exists.



WHEEL CYLINDER OVERHAUL

- Check all internal parts for wear, rust and damage. Replace if necessary.
- Be careful not to scratch cylinder body when installing pistons.

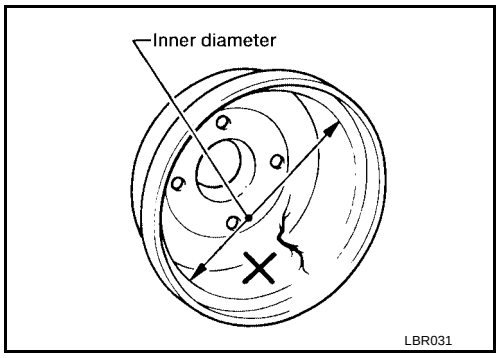


DRUM

Maximum inner diameter : 204.5 mm (8.05 in)

Out-of-roundness : 0.03 mm (0.0012 in) or less

- Contact surface should be fine finished with No. 120 to 150 emery paper.
- Using a drum lathe, resurface brake drum if it shows score, partial wear or stepped wear.
- After brake drum has been completely reconditioned or replaced, check drum and shoes for proper contact pattern.

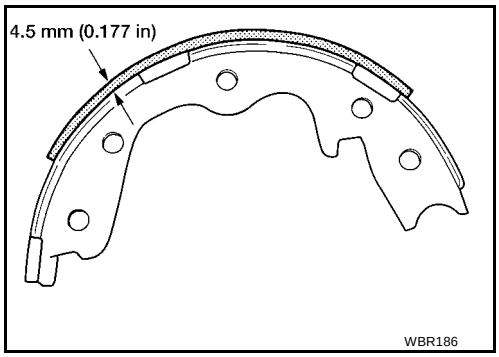


LINING

Check lining thickness.

Standard lining thickness : 4.5 mm (0.177 in)

Lining wear limit : 1.5 mm (0.059 in)

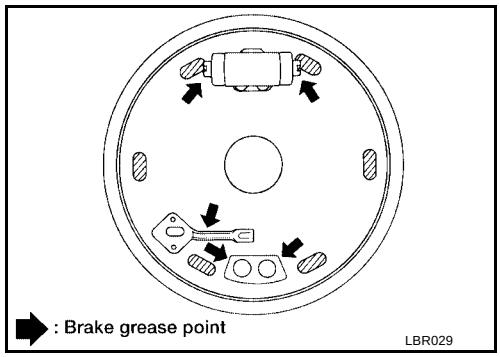


Installation

EFS0023W

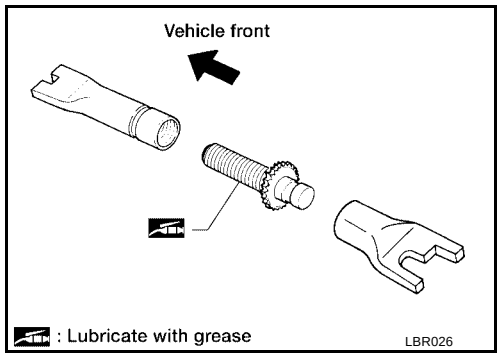
- **Always perform shoe clearance adjustment. Refer to PB-3, "Adjustment" .**
- **Burnish the brake contact surfaces after refinishing or replacing drums, after replacing linings, or if a soft pedal occurs at very low mileage. Refer to BR-7, "Brake Burnishing Procedure" .**

1. Fit toggle lever and adjusting lever to brake shoe with retainer ring.
2. Apply brake grease to the contact areas shown.



3. Shorten adjuster by rotating it.
   - Pay attention to direction of adjuster.

Wheel	Screw
Left	Left-hand thread
Right	Right-hand thread



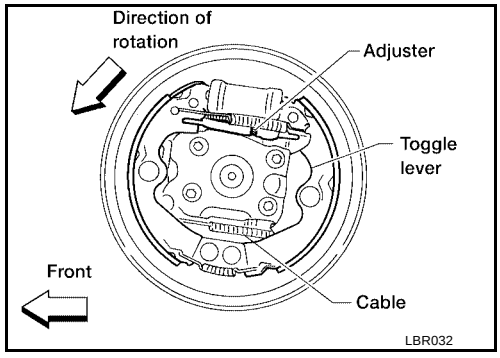
4. Connect parking brake cable to toggle lever.
5. Install all parts.

CAUTION:
Be careful not to damage wheel cylinder piston boots.

6. Check that all parts are installed properly.

CAUTION:
Pay attention to direction of adjuster assembly.

7. Install brake drum.
8. When installing new wheel cylinder or overhauling wheel cylinder, bleed air from brake system. Refer to BR-7, "Bleeding Brake System" .
9. Adjust parking brake. Refer to PB-3, "Adjustment" .
10. Install wheel and tire. Refer to MA-32, "Tire Rotation" .



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

EFS0023X

Unit: mm (in)

Applied Model		QG18DE	QR25DE	
Front brake	Brake model	CL25VA	CL25VB	OPB27VA
	Cylinder bore diameter	57.2 (2.252)		38 (1.50) × 2 + 44 (1.73) × 2
	Pad length × width × thickness	125.6 × 46.0 × 11.0 (4.94 × 1.811 × 0.433)		117.1 × 53.3 × 9.3 (4.61 × 2.098 × 0.366)
	Rotor outer diameter × thickness	257 × 22 (10.12 × 0.87)	280 × 22 (11.02 × 0.87)	305 × 22 (12.01 × 0.87)
Rear brake	Brake model	LT20G	CL9HC	
	Cylinder bore diameter/caliper bore diameter	15.87 (5/8) type a 17.45 (11/16) type b	33.96 (1 11/32)	
	Lining length × width × thickness	219.4 × 35 × 4.5 (8.64 × 1.38 × 0.177)	89.1 × 39.5 × 10 (3.508 × 1.555 × 0.39)	
	Drum inner diameter/Disc diameter × thickness	203.2 (8)	232 × 7 (9.13 × 0.28)	232 × 7 (9.13 × 0.28) or 278 × 9 (10.94 × 0.35)*
Master cylinder	Cylinder bore diameter	23.81 (15/16)		
Control valve	Valve model	Dual proportioning valve		
	Split point [kPa (kg/cm^2 , psi)] × reducing ratio	1,961 (20,284) × 0.2	2,942 (30,427) × 0.2	
Brake booster	Booster model	M215T		
	Diaphragm diameter	Primary: 230 (9.06) Secondary: 205 (8.07)		
Brake fluid	Recommended brake fluid	Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .		

*: With Spec V brake package.

Brake Pedal

EFS00240

Unit: mm (in)

Free height “H”*	M/T	156 - 166 (6.14 - 6.54)
	A/T	164.9 - 174.9 (6.49 - 6.89)
Depressed height "D" [under force of 490 N (50 kg, 110 lb) with engine running]		90 (3.54)
Pedal free play "A"		1.0 - 3.0 (0.039 - 0.118)

*: Measured from surface of dash reinforcement panel.

Front Disc Brake

EFS0023Y

Unit: mm (in)

Brake model	CL25VA/CL25VB	OPB27VA
Pad wear limit Minimum thickness	2.0 (0.079)	2.0 (0.079)
Rotor repair limit Minimum thickness	20 (0.79)	20 (0.79)

Rear Disc Brake

EFS00320

Unit: mm (in)

Brake model	CL9HC
Pad wear limit Minimum thickness	2.0 (0.079)
Rotor repair limit Minimum thickness	8.0 (0.31) or 6.0 (0.24)*

*: With Spec V brake package.

Drum Brake

EFS0023Z

Unit: mm (in)

Brake model		LT20G
Lining wear limit	Minimum thickness	1.5 (0.059)
Drum repair limit	Maximum inner diameter	204.5 (8.05)
	Maximum out-of round	0.03 (0.0012)

SECTION PB
PARKING BRAKE SYSTEM

CONTENTS

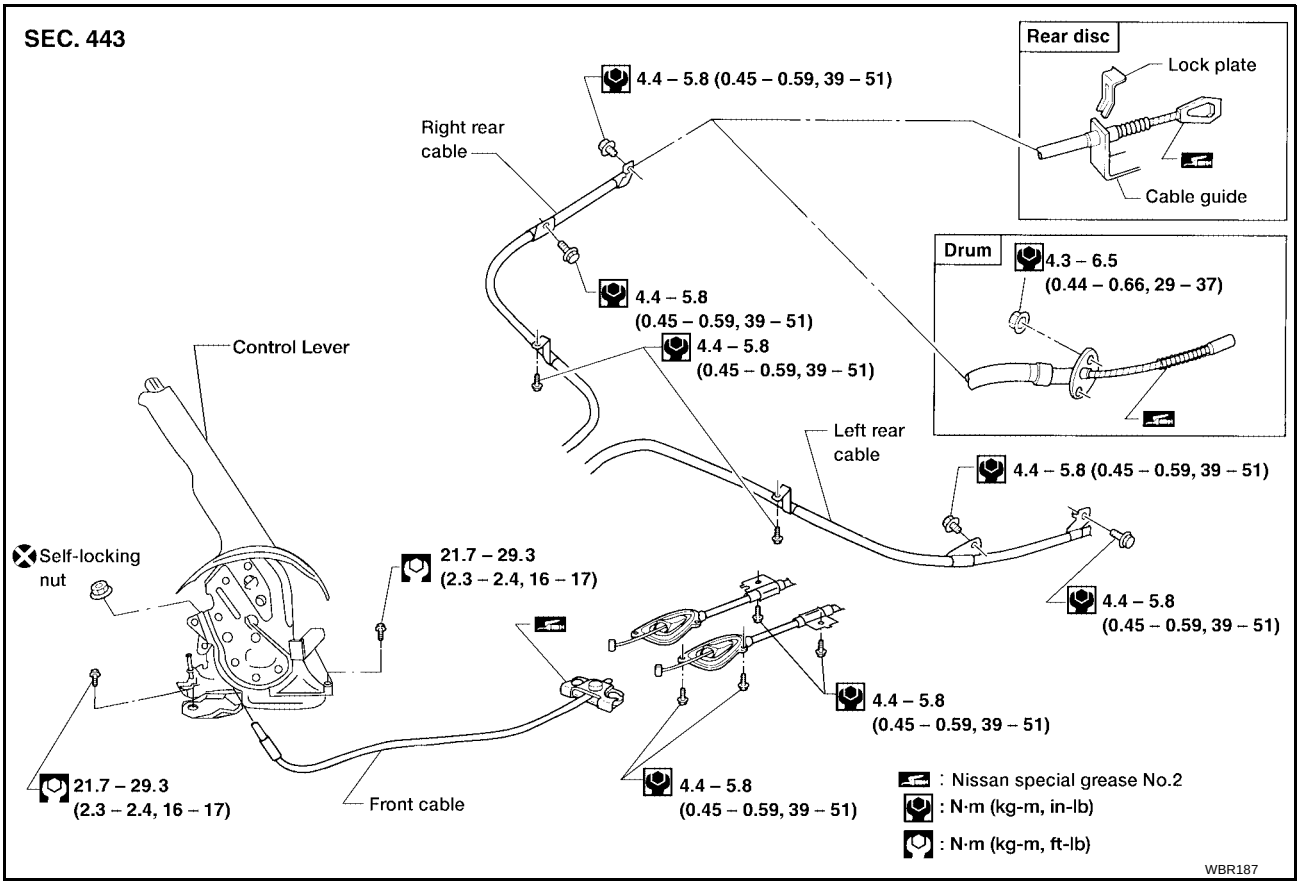
PARKING BRAKE CONTROL 2
Components 2
Removal and Installation 2
Inspection 2
Adjustment 3
SERVICE DATA AND SPECIFICATIONS (SDS) 4
Parking Brake 4

PARKING BRAKE CONTROL

PFP:36010

Components

EFS00241

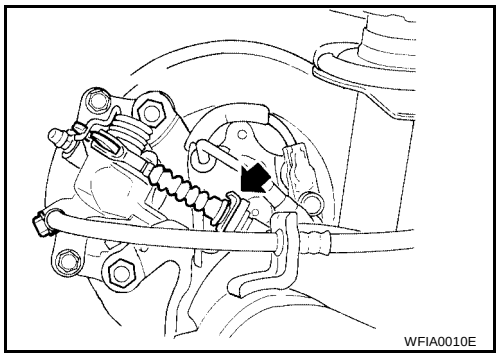


Removal and Installation

EFS00242

1. Remove center console. Refer to IP-10, "Removal and Installation" .
2. Disconnect the parking brake front cable.
3. Remove the control lever.
4. Remove bolts, slacken and remove the front cable.
5. Remove lock plate and disconnect cable.
6. Remove the rear cables.
7. Installation is in the reverse order of removal.

CAUTION:
Do not reuse the self-locking control lever nut.



Inspection

EFS00243

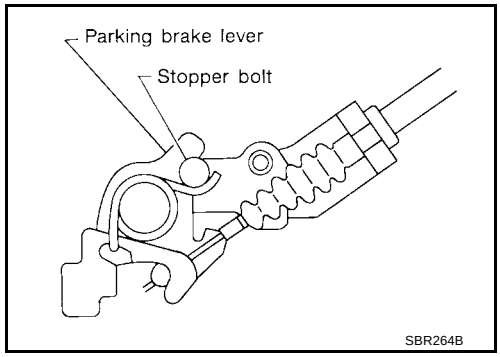
1. Check control lever or parking brake pedal assembly for wear or other damage. Replace if necessary.
2. Check cables for discontinuity or deterioration. Replace if necessary.
3. Check warning lamp and switch. Replace if necessary.
4. Check parts at each connecting portion and, if found deformed or damaged, replace.

Adjustment

EFS00244

Pay attention to the following points after adjustment.

- There is no drag when control lever is being released.
- Be sure that toggle lever returns to stopper when parking brake lever is released.



1. Loosen parking brake cable.
2. Depress brake pedal fully more than five times.
3. Operate control lever 10 times or more with a full stroke [215.2 mm (8.47 in)].
4. Adjust control lever by turning adjusting nut.
5. Pull control lever with specified amount of force. Check lever stroke and ensure smooth operation.

   Number of notches : 6 - 7 [196 N (20 kg, 44 lb)]

6. Bend warning lamp switch plate. Warning lamp should come on when lever is pulled or depressed one notch. It should go off when the lever is fully released.

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Parking Brake

EFS00245

Type	Lever
Number of notches [under force of 196 N (20 kg, 44 lb)]	6 - 7
Number of notches when warning lamp comes on	1

SECTION BRC
BRAKE CONTROL SYSTEM

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ABS

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EFS0037M

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

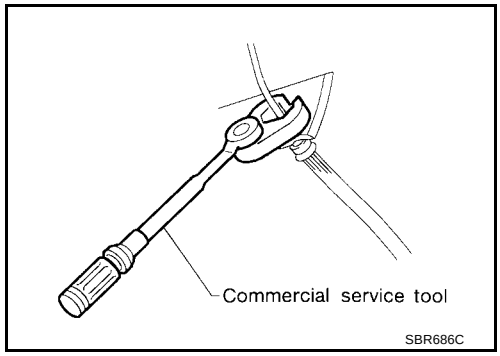
WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precautions for Brake System

EFS0028O

- **Recommended fluid is brake fluid “DOT 3”.**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas.**
- **To clean or wash all parts of master cylinder, disc brake caliper and wheel cylinder, use clean brake fluid.**
- **Never use mineral oils such as gasoline or kerosene. They will ruin rubber parts of the hydraulic system.**
- **Use flare nut wrench when removing and installing brake tube.**
- **Always torque brake lines when installing.**
- **Burnish the brake contact surfaces after refinishing or replacing drums or rotors, after replacing pads or linings, or if a soft pedal occurs at very low mileage.**
  Refer to BR-7, "Brake Burnishing Procedure".



WARNING:

- **Clean brake pads and shoes with a waste cloth, then wipe with a dust collector.**

Wiring Diagrams and Trouble Diagnosis

EFS0028P

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams".
- PG-3, "POWER SUPPLY ROUTING".

When you perform trouble diagnosis, refer to the following:

- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES".
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident".

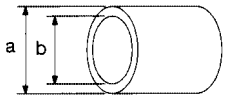
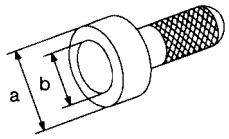
PREPARATION

PFP:00002

Special Service Tools

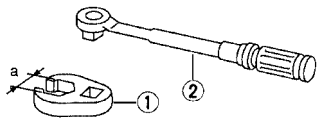
EFS004YP

The actual shapes of the Kent-Moore tools may differ from those of the special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV40104710 (—) Drift  NT474	Install sensor rotor **a: 76.3 mm (3.004 in) dia.** **b: 67.9 mm (2.673 in) dia.**
ST30720000 (—) Drift  NT115	Install sensor rotor **a: 77 mm (3.03 in) dia.** **b: 55.5 mm (2.185 in) dia.**

Commercial Service Tools

EFS0037L

Tool name	Description
1 Flare nut crowfoot 2 Torque wrench  S-NT360	Removing and installing brake piping **a: 10 mm (0.39 in)**

DESCRIPTION

PFP:00000

Purpose

EFS00246

The Anti-Lock Brake System (ABS) consists of electronic and hydraulic components. It allows for control of braking force so locking of the wheels can be avoided.

1. Improves proper tracking performance through steering wheel operation.
2. Eases obstacle avoidance through steering wheel operation.
3. Improves vehicle stability.

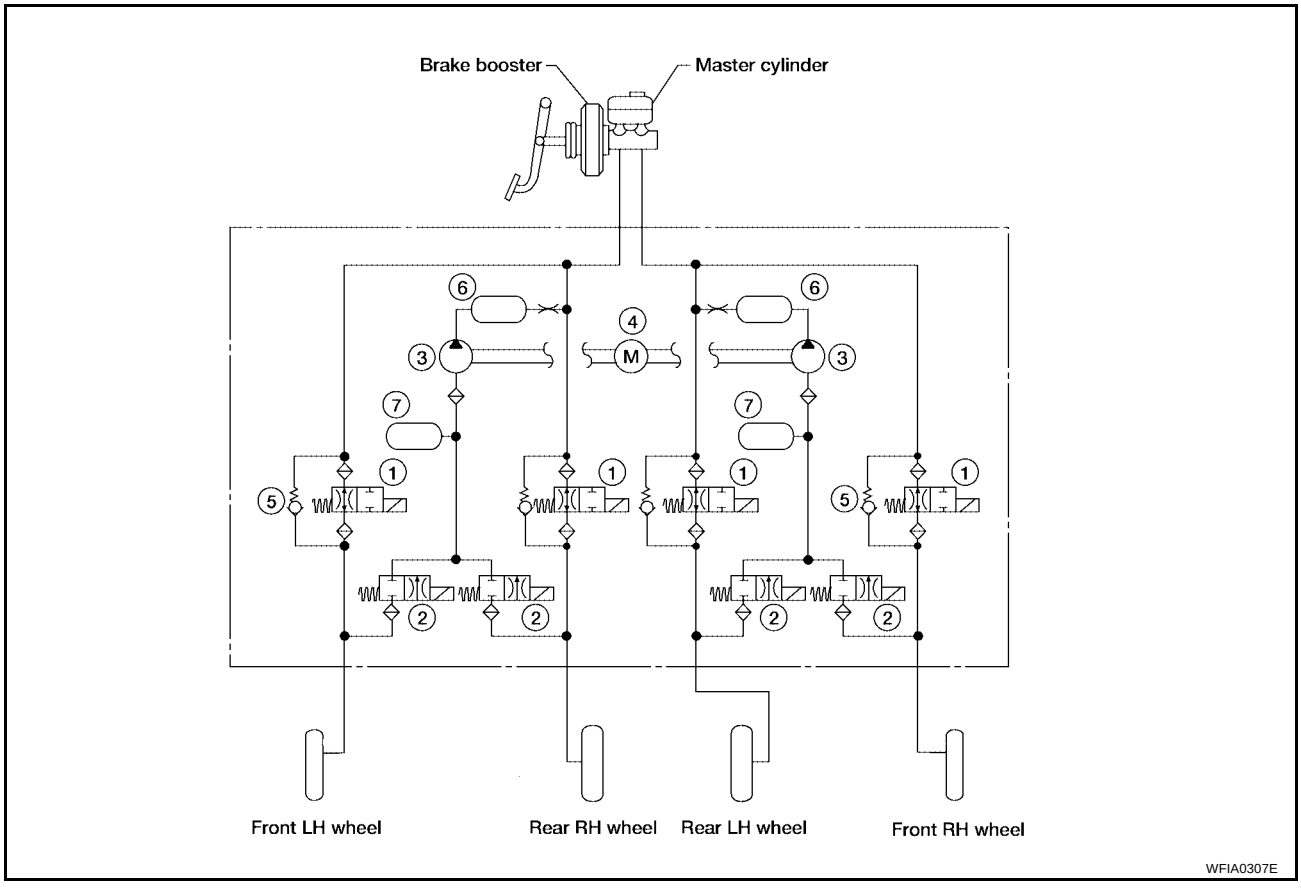
Operation

EFS00247

- When the vehicle speed is less than 10 km/h (6 MPH), this system does not work.
- The Anti-Lock Brake System (ABS) has a self-test function. The system turns on the ABS warning lamp for 1 second each time the ignition switch is turned “ON”. After the engine is started, the ABS warning lamp turns off. The system performs a test the first time the vehicle reaches 6 km/h (4 MPH). A mechanical noise may be heard as the ABS performs this self-test. This is a normal part of the self-test feature. If a malfunction is found during this check, the ABS warning lamp will stay on.
- While driving, a mechanical noise may be heard during ABS operation. This is a normal condition.

ABS Hydraulic Circuit

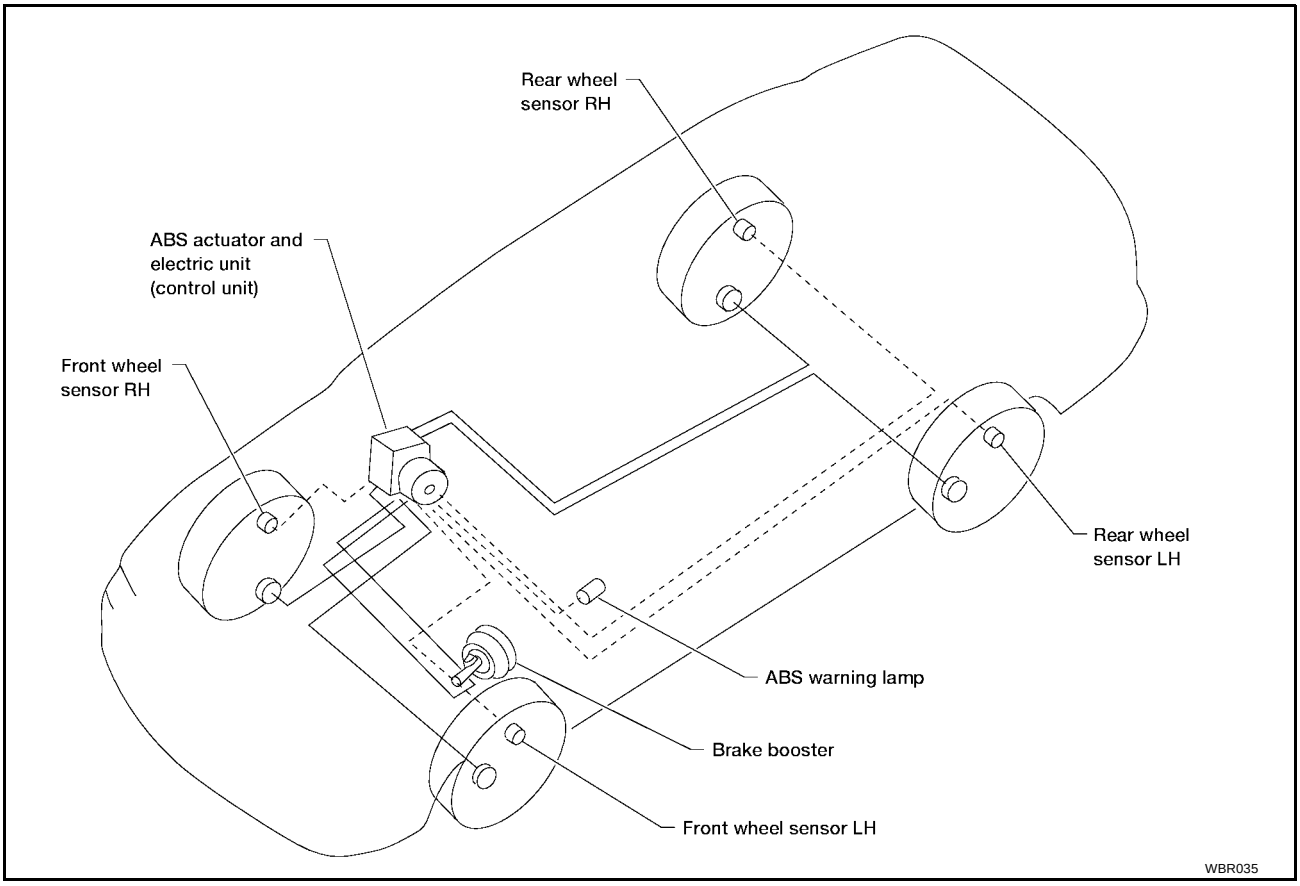
EFS00248



1. Inlet solenoid valve
2. Outlet solenoid valve
3. Pump
4. Motor
5. Bypass check valve
6. Damper
7. Solenoid valve relay actuator

System Components

EFS00249

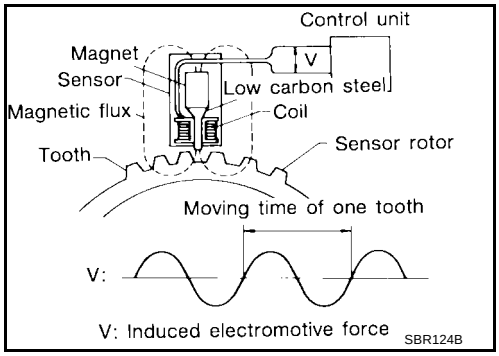


System Description

EFS0024A

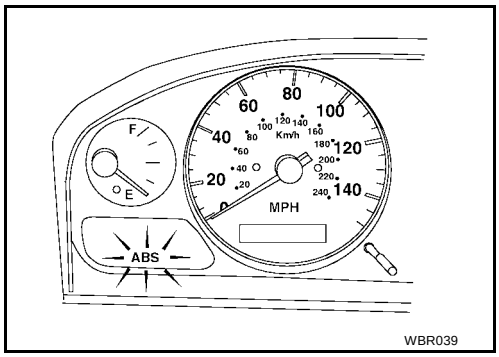
SENSOR

The sensor unit consists of a gear-shaped sensor rotor and a sensor element. The element contains a bar magnet around which a coil is wound. The front sensors are installed on the front spindles and the rear sensors are installed on the rear spindles. As the wheel rotates, the sensor generates a sine-wave pattern. The frequency and voltage increase(s) as the rotating speed increases.



CONTROL UNIT (BUILT-IN ABS ACTUATOR AND ELECTRIC UNIT)

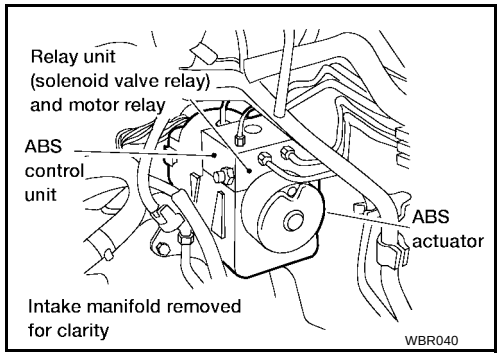
The control unit computes the wheel rotating speed by the signal current sent from the sensor. Then it supplies a DC current to the actuator solenoid valve. It also controls ON-OFF operation of the valve relay and motor relay. If any electrical malfunction should be detected in the system, the control unit causes the warning lamp to light up. In this condition, the ABS will be deactivated by the control unit, and the vehicle's brake system reverts to normal operation. (For control unit layout, refer to BRC-7, "ABS ACTUATOR AND ELECTRIC UNIT" .)



ABS ACTUATOR AND ELECTRIC UNIT

The ABS actuator and electric unit contains:

- An electric motor and pump
- Two relays
- Eight solenoid valves, each inlet and outlet for
  — LH front
  — RH front
  — LH rear
  — RH rear
- ABS control unit



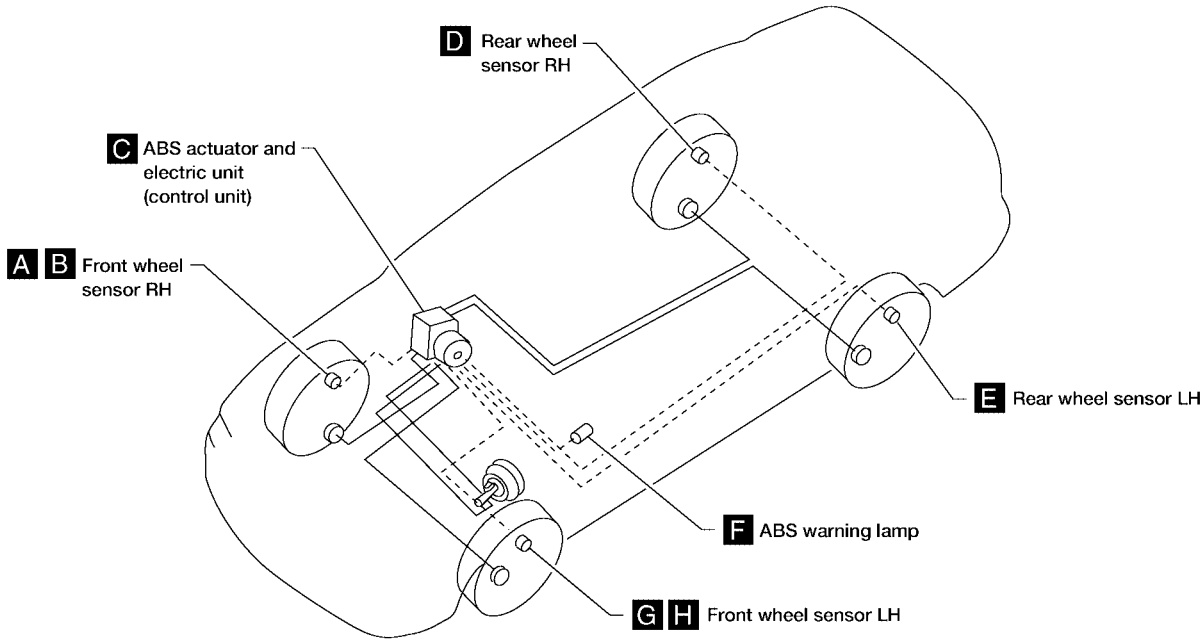
This component controls the hydraulic circuit and increases, holds or decreases hydraulic pressure to all or individual wheels. The ABS actuator and electric unit is serviced as an assembly.

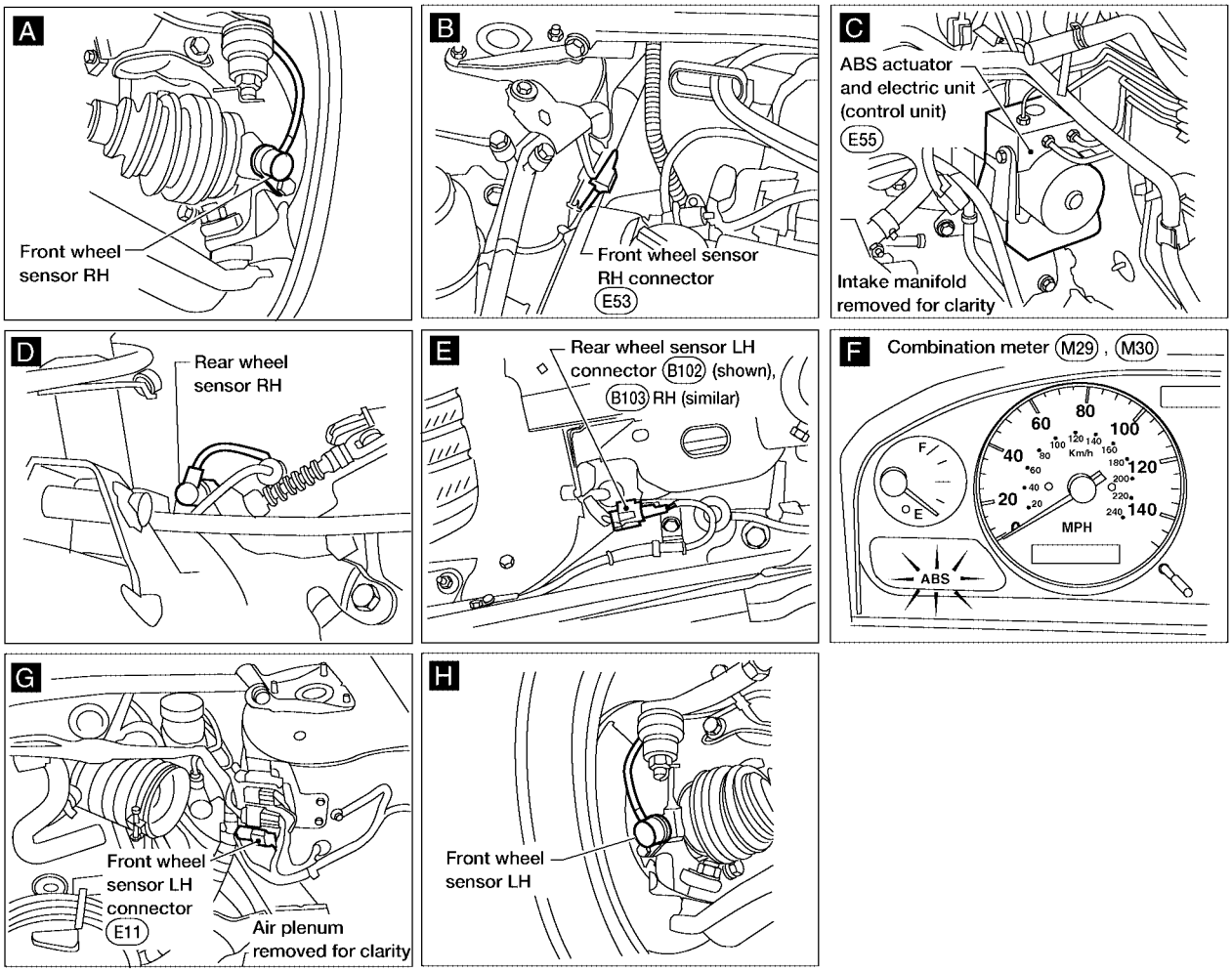
ABS Actuator Operation

		Inlet solenoid valve	Outlet solenoid valve	
Normal brake operation		OFF (Open)	OFF (Closed)	Master cylinder brake fluid pressure is directly transmitted to caliper via the inlet solenoid valve.
ABS operation	Pressure hold	ON (Closed)	OFF (Closed)	Hydraulic circuit is shut off to hold the caliper brake fluid pressure.
	Pressure decrease	ON (Closed)	ON (Open)	Caliper brake fluid is sent to reservoir via the outlet solenoid valve. Then it is pushed up to the master cylinder by pump.
	Pressure increase	OFF (Open)	OFF (Closed)	Master cylinder brake fluid pressure is transmitted to caliper.

Component Parts and Harness Connector Location

EFS0024B

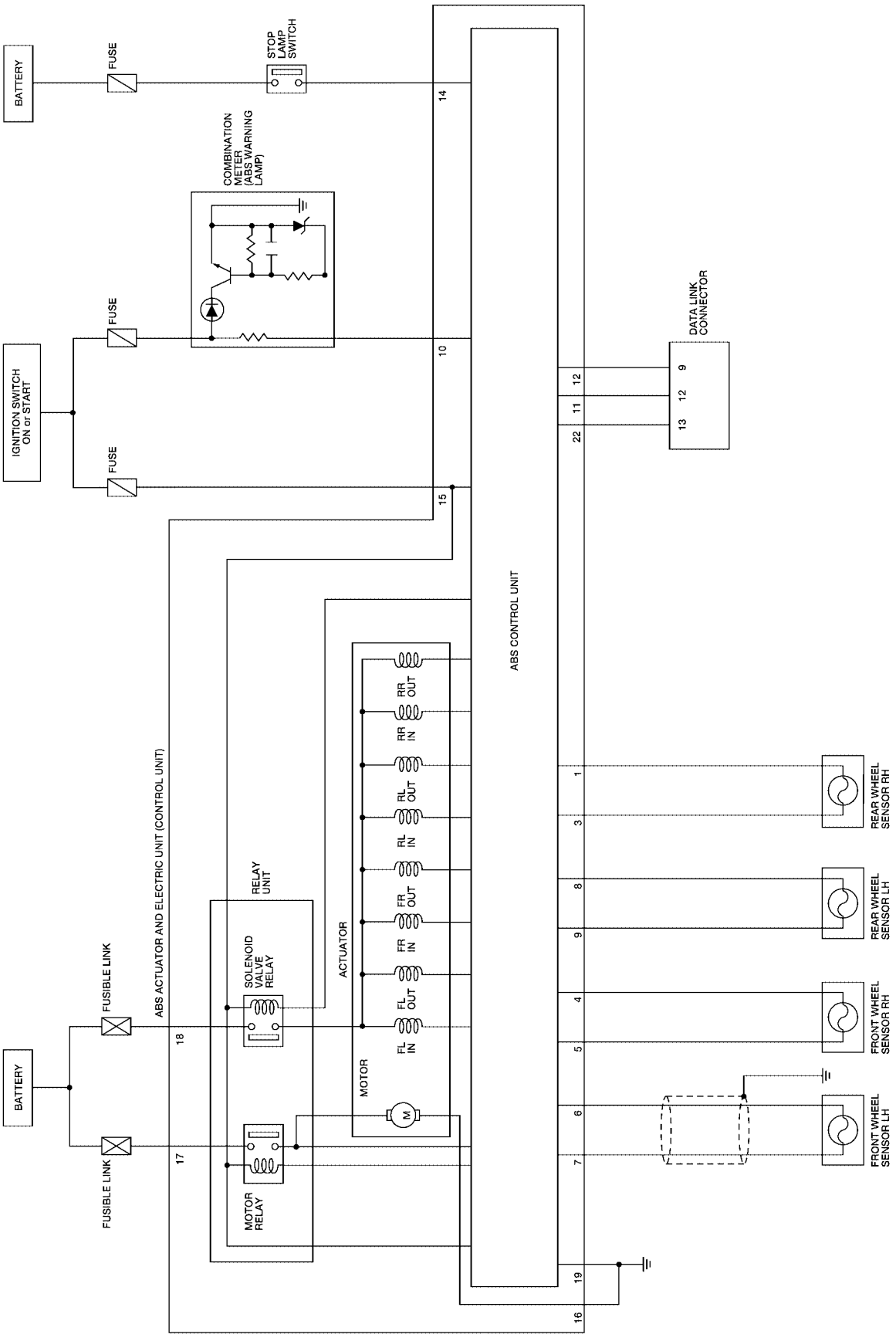




WFIA0294E

Schematic

EFS0024C



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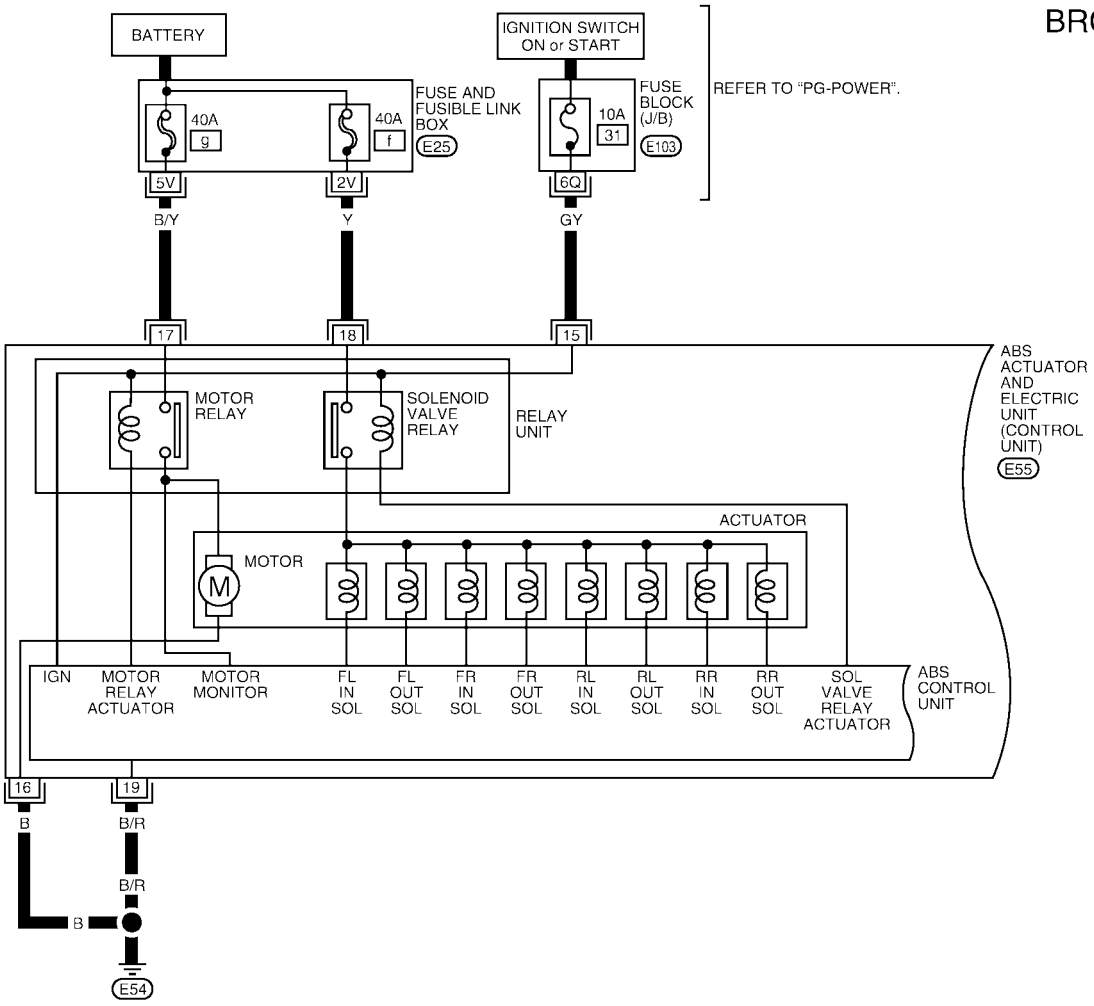
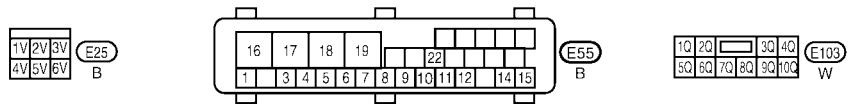
Wiring Diagram — ABS —

EFS0024D





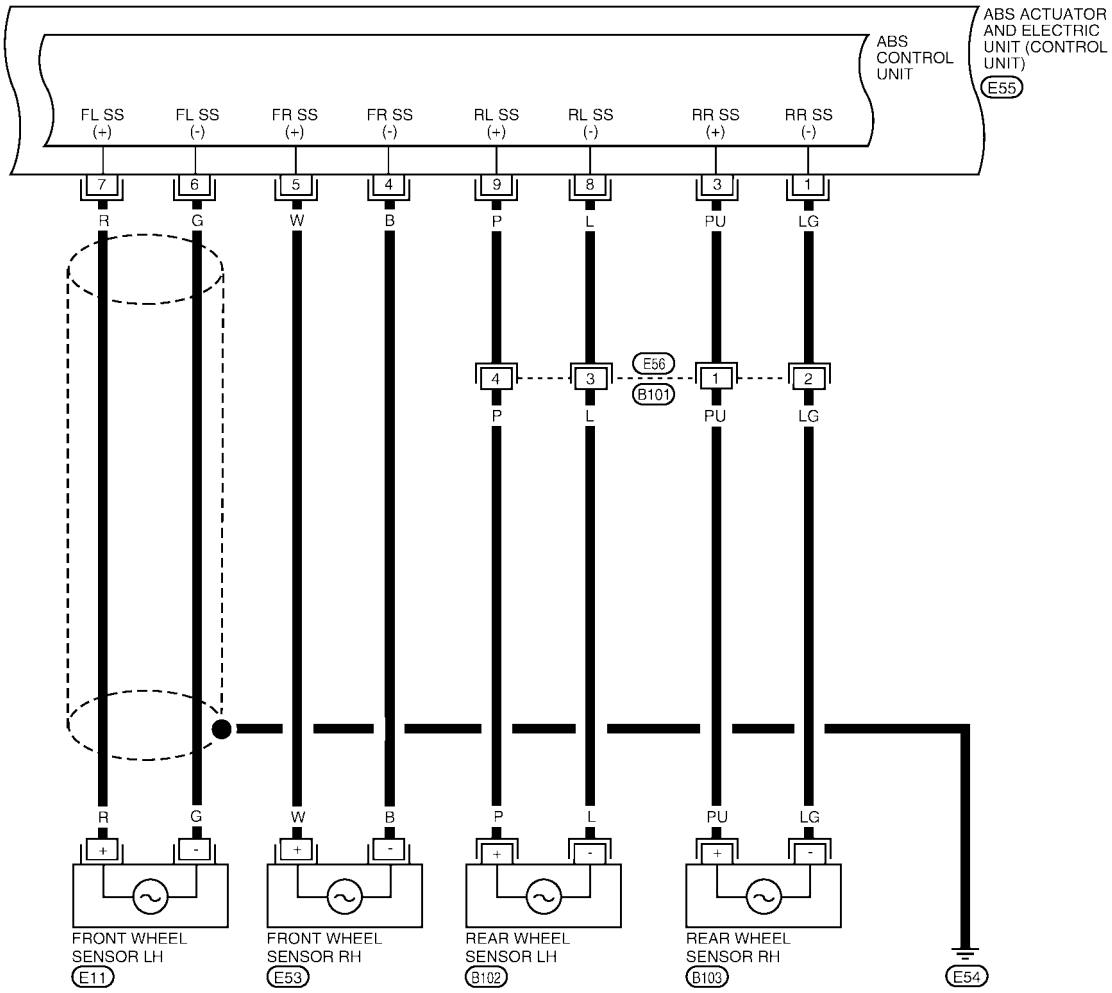
WFWA0002E

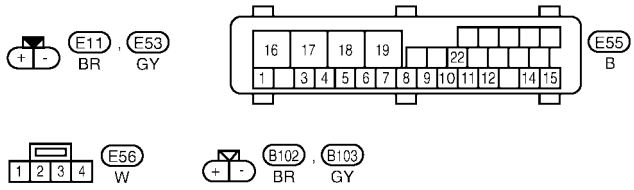
ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)
TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
15	GY	POWER SOURCE (FUSE)	IGNITION ON OR START	BATTERY VOLTAGE
16	B	GROUND	—	—
17	B/Y	POWER SOURCE (FUSE)	BATTERY	BATTERY VOLTAGE
18	Y	POWER SOURCE (FUSE)	BATTERY	BATTERY VOLTAGE
19	B/R	GROUND	—	—

LBR071

BRC-ABS-02





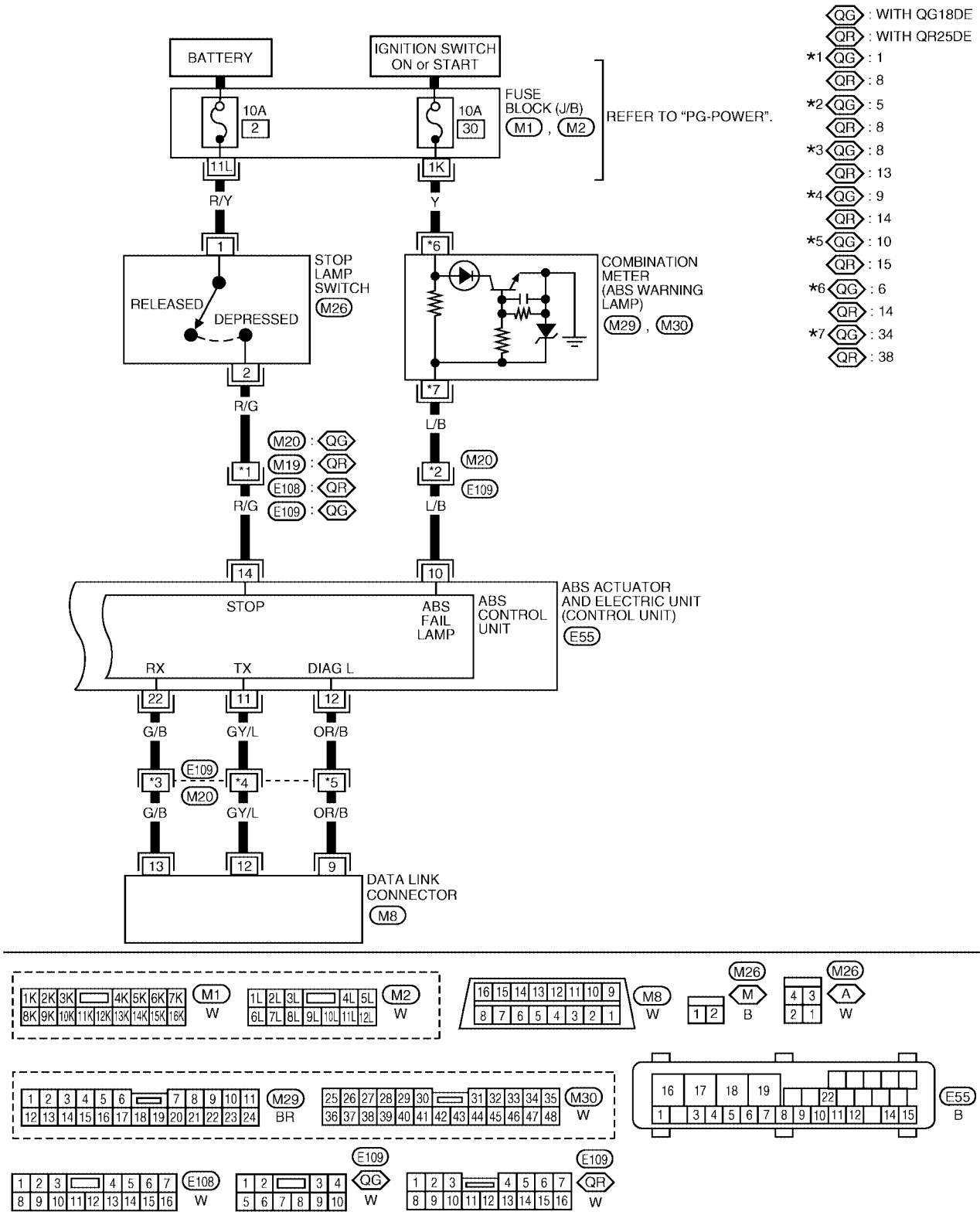
WFWA0004E

ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)
TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	LG	REAR WHEEL SENSOR RH	WHEN VEHICLE CRUISES AT 30 KM/H (19 MPH)	PULSE FRONT: APPROX. 190 HZ REAR: APPROX. 190 HZ
3	PU	REAR WHEEL SENSOR RH		
4	B	FRONT WHEEL SENSOR RH		
5	W	FRONT WHEEL SENSOR RH		
6	G	FRONT WHEEL SENSOR LH		
7	R	FRONT WHEEL SENSOR LH		
8	L	REAR WHEEL SENSOR LH		
9	P	REAR WHEEL SENSOR LH		

LBR072

BRC-ABS-03



WFWA0108E

ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)
TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (APPROX.)
10	L/B	ABS WARNING LAMP IN COMBINATION METER	WHEN ABS LAMP IS ACTIVE	0V
			WHEN ABS LAMP IS NOT ACTIVE	BATTERY VOLTAGE
11	GY/L	DATA LINK CONNECTOR	—	—
12	OR/B	DATA LINK CONNECTOR	—	—
14	R/G	STOP LAMP SWITCH	WHEN BRAKE PEDAL IS DEPRESSED	BATTERY VOLTAGE
			WHEN BRAKE PEDAL IS RELEASED	0V
22	G/B	DATA LINK CONNECTOR	—	—

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

PFP:00000

Self-diagnosis

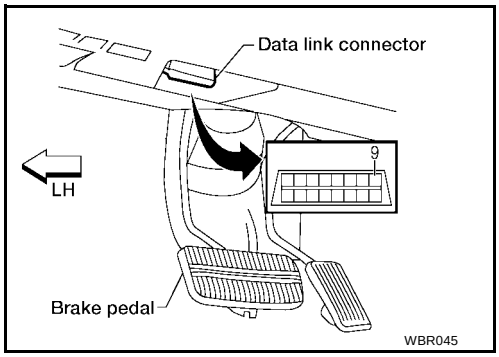
EFS0024E

FUNCTION

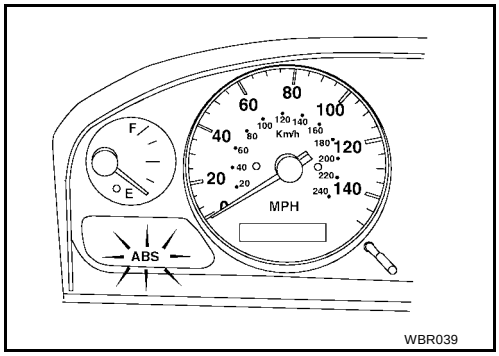
- When a problem occurs in the ABS, the warning lamp on the instrument panel comes on. To start the self-diagnostic results mode, ground the self-diagnostic (check) terminal located on Data Link Connector. The location of the malfunction is indicated by the warning lamp flashing.

SELF-DIAGNOSIS PROCEDURE

1. Drive vehicle over 30 km/h (19 MPH) for at least one minute.
2. Turn ignition switch OFF.
3. Ground terminal 9 of Data Link Connector with a suitable harness.
4. Turn ignition switch ON while grounding terminal 9.
   Do not depress brake pedal.

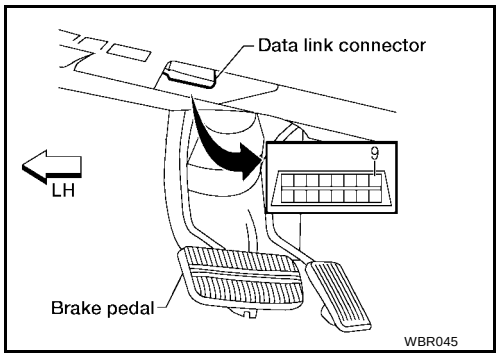


5. After 3.0 seconds, the warning lamp starts flashing to indicate the malfunction code No. (See NOTE.)
6. Verify the location of the malfunction with the malfunction code chart. Refer to BRC-26, "Malfunction Code/Symptom Chart" . Then make the necessary repairs following the diagnostic procedures.
7. After the malfunctions are repaired, erase the malfunction codes stored in the control unit. Refer to BRC-15, "HOW TO ERASE SELF-DIAGNOSTIC RESULTS (MALFUNCTION CODES)" .
8. Repeat the self-diagnostic results mode to verify that the malfunction codes have been erased.



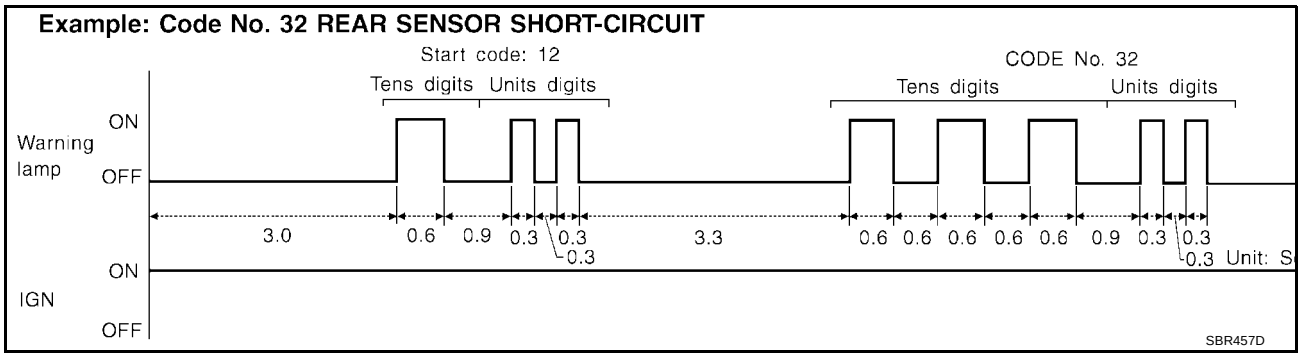
9. Disconnect the check terminal from ground. The self-diagnostic results mode is now complete.
10. Check warning lamp for deactivation after driving vehicle over 30 km/h (19 MPH) for at least one minute.
11. After making certain that warning lamp does not come on, test the ABS in a safe area to verify that it functions properly.

    NOTE:
    The indication terminates after 5 minutes.
    However, when the ignition switch is turned from OFF to ON, the indication starts flashing again.



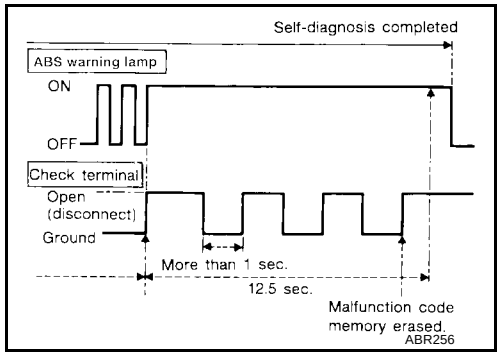
HOW TO READ SELF-DIAGNOSTIC RESULTS (MALFUNCTION CODES)

1. Determine the code No. by counting the number of times the warning lamp flashes on and off.
2. When several malfunctions occur at one time, up to three code numbers can be stored; the latest malfunction will be indicated first.
3. The indication begins with the start code 12. After that a maximum of three code numbers appear in the order of the latest one first. The indication then returns to the start code 12 to repeat (the indication will stay on for five minutes at most).
4. Refer to BRC-26, "Malfunction Code/Symptom Chart" for a list of malfunction codes.



HOW TO ERASE SELF-DIAGNOSTIC RESULTS (MALFUNCTION CODES)

1. Disconnect the check terminal from ground (ABS warning lamp will stay lit).
2. Within 12.5 seconds, ground the check terminal three times. Each terminal ground must last more than 1 second. The ABS warning lamp goes out after the erase operation has been completed.
3. Perform self-diagnosis again. Refer to BRC-14, "SELF-DIAGNOSIS PROCEDURE" . Only the start code should appear, no malfunction codes.



CONSULT-II Function (ABS)

EFS0024F

CONSULT-II can display each diagnostic item using the diagnostic test modes shown following.

ABS diagnostic mode	Description
WORK SUPPORT	Supports inspection and adjustments. Commands are transmitted to the ABS actuator and electric unit (control unit) for setting the status suitable for required operation, input/output signals are received from the ABS actuator and electric unit (control unit) and received data is displayed.
SELF-DIAG RESULTS	Displays ABS actuator and electric unit (control unit) self-diagnosis results.
DATA MONITOR	Displays ABS actuator and electric unit (control unit) input/output data in real time.
CAN DIAG SUPPORT MNTR	The result of transmit/receive diagnosis of CAN communication can be read.
ACTIVE TEST	Operation of electrical loads can be checked by sending drive signal to them.
FUNCTION TEST	Conducted by CONSULT-II instead of a technician to determine whether each system is "OK" or "NG".
ECU PART NUMBER	ABS actuator and electric unit (control unit) part number can be read.

ECU (ABS CONTROL UNIT) PART NUMBER MODE

Ignore the ECU part number displayed in the ECU PART NUMBER MODE. Refer to Parts Catalog to order the ECU.

CONSULT-II Inspection Procedure

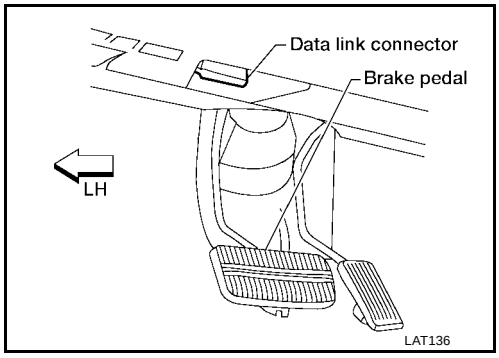
EFS0024G

SELF-DIAGNOSIS PROCEDURE

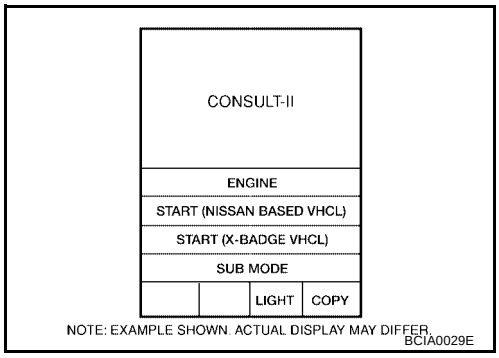
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carries out CAN communication.

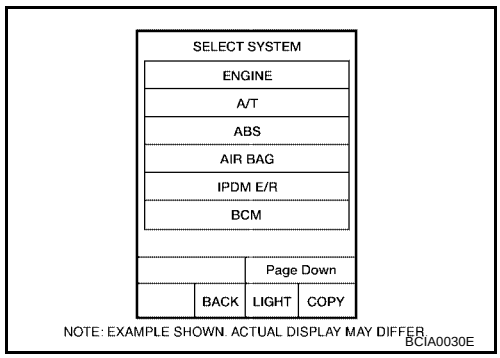
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to the data link connector.
3. Start engine.
4. Drive vehicle over 30 km/h (19 MPH) for at least one minute.



5. Stop vehicle with engine running and touch “START (NISSAN BASED VHCL)” on CONSULT-II screen.



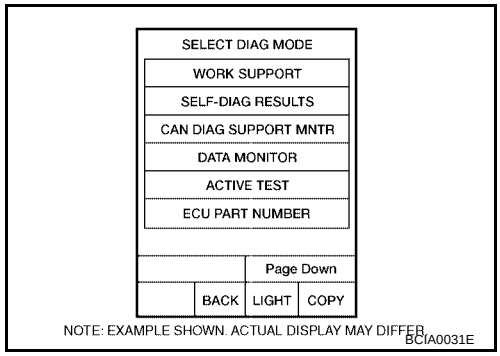
6. Touch “ABS”. If “ABS” is not indicated, go to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



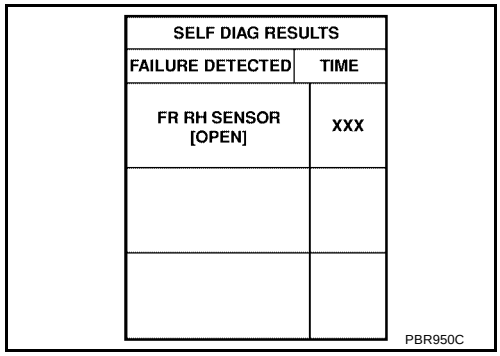
7. Touch “SELF-DIAG RESULTS”.

- The screen shows the detected malfunction and how many times the ignition switch has been turned ON since the malfunction.

8. Make the necessary repairs following the diagnostic procedures.



9. After the malfunctions are repaired, erase the self-diagnostic results stored in the control unit by touching “ERASE”.
10. Check warning lamp for deactivation after driving vehicle over 30 km/h (19 MPH) for at least one minute.
11. Test the ABS in a safe area to verify that it functions properly.



SELF-DIAGNOSTIC RESULTS MODE

Diagnostic item	Diagnostic item is detected when...	Reference Page
FR RH SENSOR[1] [OPEN]	● Circuit for front right wheel sensor is open. (An abnormally high input voltage is entered.)	BRC-27
FR LH SENSOR[1] [OPEN]	● Circuit for front left wheel sensor is open. (An abnormally high input voltage is entered.)	BRC-27
RR RH SENSOR[1] [OPEN]	● Circuit for rear right sensor is open. (An abnormally high input voltage is entered.)	BRC-27
RR LH SENSOR[1] [OPEN]	● Circuit for rear left sensor is open. (An abnormally high input voltage is entered.)	BRC-27
FR RH SENSOR[1] [SHORT]	● Circuit for front right wheel sensor is shorted. (An abnormally low input voltage is entered.)	BRC-27
FR LH SENSOR[1] [SHORT]	● Circuit for front left wheel sensor is shorted. (An abnormally low input voltage is entered.)	BRC-27
RR RH SENSOR[1] [SHORT]	● Circuit for rear right sensor is shorted. (An abnormally low input voltage is entered.)	BRC-27
RR LH SENSOR[1] [SHORT]	● Circuit for rear left sensor is shorted. (An abnormally low input voltage is entered.)	BRC-27

Diagnostic item	Diagnostic item is detected when...	Reference Page
ABS SENSOR[1] [ABNORMAL SIGNAL]	● Tooth damage on sensor rotor or improper installation of wheel sensor. (Abnormal wheel sensor signal is entered.)	BRC-27
FR RH IN ABS SOL [OPEN, SHORT]	● Circuit for front right inlet solenoid valve is open. (An abnormally low output voltage is entered.)	BRC-29
FR LH IN ABS SOL [OPEN, SHORT]	● Circuit for front left inlet solenoid valve is open. (An abnormally low output voltage is entered.)	BRC-29
FR RH OUT ABS SOL [OPEN, SHORT]	● Circuit for front right outlet solenoid valve is open. (An abnormally low output voltage is entered.)	BRC-29
FR LH OUT ABS SOL [OPEN, SHORT]	● Circuit for front left outlet solenoid valve is open. (An abnormally low output voltage is entered.)	BRC-29
RR RH IN ABS SOL [OPEN, SHORT]	● Circuit for rear right inlet solenoid valve is shorted. (An abnormally high output voltage is entered.)	BRC-29
RR LH IN ABS SOL [OPEN, SHORT]	● Circuit for rear left inlet solenoid valve is shorted. (An abnormally high output voltage is entered.)	BRC-29
RR RH OUT ABS SOL [OPEN, SHORT]	● Circuit for rear right outlet solenoid valve is shorted. (An abnormally high output voltage is entered.)	BRC-29
RR LH OUT ABS SOL [OPEN, SHORT]	● Circuit for rear left outlet solenoid valve is shorted. (An abnormally high output voltage is entered.)	BRC-29
ABS ACTUATOR RELAY [ABNORMAL]	● Actuator solenoid valve relay is ON, even if control unit sends off signal. ● Actuator solenoid valve relay is OFF, even if control unit sends on signal.	BRC-29
ABS MOTOR RELAY [ABNORMAL]	● Circuit for ABS motor relay is open or shorted. ● Circuit for actuator motor is open or shorted. ● Actuator motor relay is stuck.	BRC-31
BATTERY VOLT [VB-LOW]	● Power source voltage supplied to ABS control unit is abnormally low.	BRC-33
CONTROL UNIT	● Function of calculation in ABS control unit has failed.	BRC-35

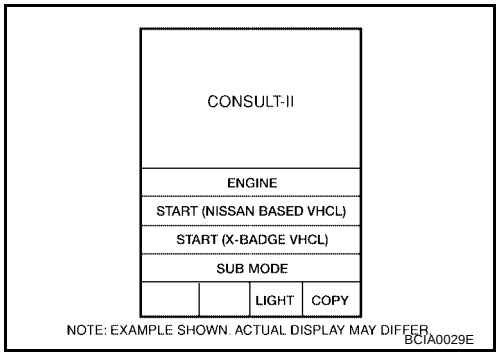
[1]: If one or more wheels spin on a rough or slippery road for 40 seconds or more, the ABS warning lamp will illuminate. This does not indicate a malfunction. Only in the case of the short-circuit (Code Nos. 26, 22, 32 and 36), after repair the ABS warning lamp also illuminates when the ignition switch is turned ON. In this case, drive the vehicle at speeds greater than 30 km/h (19 MPH) for approximately 1 minute as specified in BRC-14, "SELF-DIAGNOSIS PROCEDURE" . Check to ensure that the ABS warning lamp goes out while the vehicle is being driven.

DATA MONITOR PROCEDURE

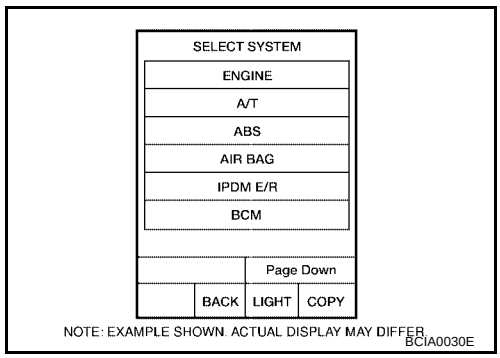
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carries out CAN communication.

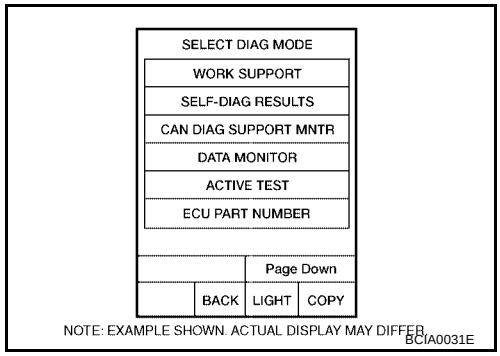
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to the data link connector.
3. Turn ignition switch ON.
4. Touch “START (NISSAN BASED VHCL)” on CONSULT-II screen.



5. Touch “ABS”. If “ABS” is not indicated, go to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Touch “DATA MONITOR”.



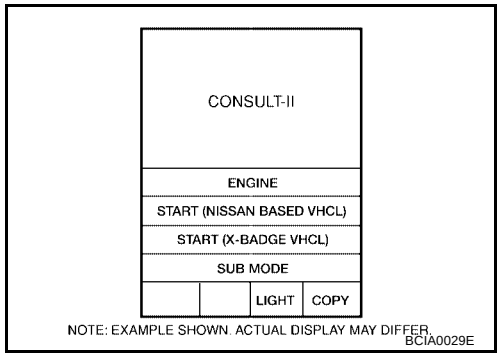
ACTIVE TEST PROCEDURE

- When conducting Active test, vehicle must be stationary.
- When ABS warning lamp stays on, never conduct Active test.

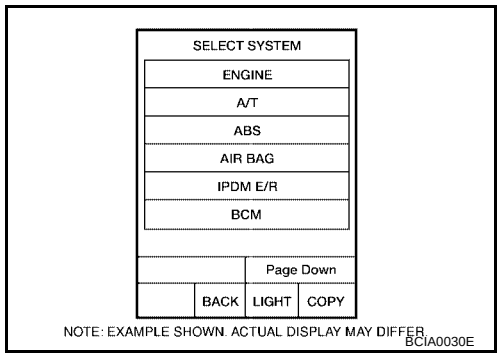
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carries out CAN communication.

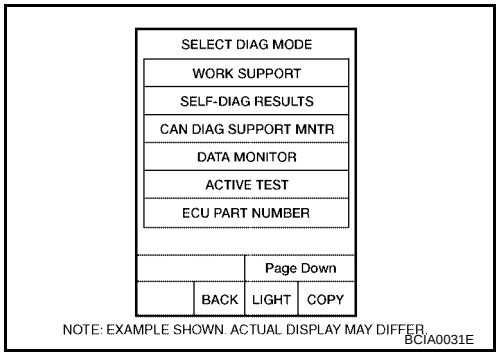
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to the data link connector.
3. Start engine.
4. Touch “START (NISSAN BASED VHCL)” on CONSULT-II screen.



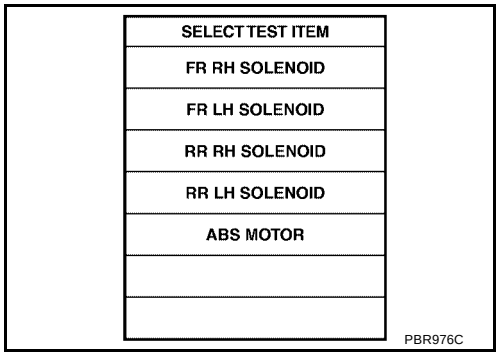
5. Touch “ABS”. If “ABS” is not indicated, go to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



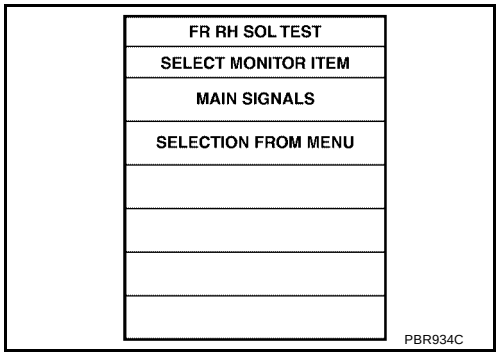
6. Touch “ACTIVE TEST”.



7. Select active test item by touching screen.



8. Touch “START”.
9. Carry out the active test by touching screen key.



DATA MONITOR MODE

MONITOR ITEM	CONDITION	SPECIFICATION
FR LH SENSOR FR RH SENSOR RR LH SENSOR RR RH SENSOR	Drive vehicle. (Each wheel is rotating.)	Wheel speed signal (Almost the same speed as speedometer.)
WARNING LAMP	Ignition switch is ON or engine is running.	ABS warning lamp is turned on: ON ABS warning lamp is turned off: OFF
STOP LAMP SW	Brake is depressed.	Depress the pedal: ON Release the pedal: OFF
MOTOR RELAY	1. Drive vehicle at speeds over 30 km/h (19 MPH) for at least 1 minute. 2. Engine is running.	ABS is not operating: OFF ABS is operating: ON
ACTUATOR RELAY	Ignition switch is ON or engine is running.	Ignition switch ON (Engine stops): OFF Engine running: ON

MONITOR ITEM	CONDITION	SPECIFICATION
FR LH OUT SOL FR LH IN SOL FR RH OUT SOL FR RH IN SOL RR LH OUT SOL RR LH IN SOL RR RH OUT SOL RR RH IN SOL	1. Drive vehicle at speeds over 30 km/h (19 MPH) for at least 1 minute. 2. Engine is running.	Operating conditions for each solenoid valve are indicated. ABS is not operating: OFF
BATTERY VOLT	Ignition switch is ON or engine is running.	Power supply voltage for control unit

ACTIVE TEST MODE

TEST ITEM	CONDITION	JUDGEMENT		
FR RH SOL FR LH SOL RR RH SOL RR LH SOL	Engine is running.	Brake fluid pressure control operation		
			IN SOL	OUT SOL
		UP (Increase):	OFF	OFF
		KEEP (Hold):	ON	OFF
		DOWN (Decrease):	ON	ON
ABS MOTOR		ABS actuator motor ON: Motor runs (ABS motor relay ON) OFF: Motor stops (ABS motor relay OFF)		

NOTE:
Active test will automatically stop ten seconds after the test starts. (TEST IS STOPPED monitor shows ON.)

TROUBLE DIAGNOSIS — INTRODUCTION

PFP:00000

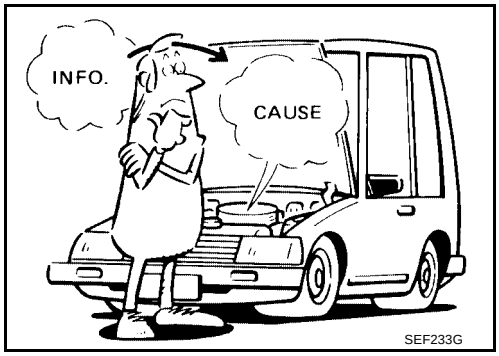
How to Perform Trouble Diagnoses for Quick and Accurate Repair

EFS0024H

INTRODUCTION

The ABS system has an electronic control unit to control major functions. The control unit accepts input signals from sensors and instantly drives the actuators. It is essential that both kinds of signals are proper and stable. It is also important to check for conventional problems: such as air leaks in booster lines, lack of brake fluid, or other problems with the brake system.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or faulty wiring. In this case, careful checking of suspicious circuits may help prevent the replacement of good parts.

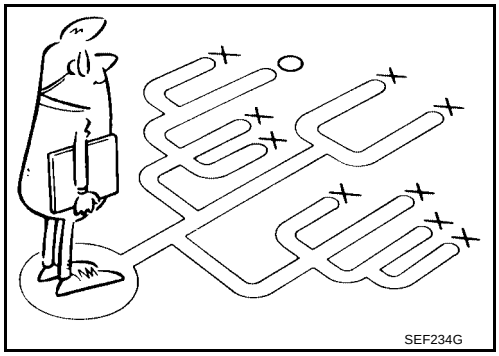


SEF233G

A visual check only may not find the cause of the problems, so a road test should be performed.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with an ABS complaint. The customer is a very good source of information on such problems; especially intermittent ones. By talking to the customer, find out what symptoms are present and under what conditions they occur. Start your diagnosis by looking for “conventional” problems first. This is one of the best ways to troubleshoot brake problems on an ABS controlled vehicle.

Also check related Service bulletins for information.


SEF234G

TROUBLE DIAGNOSIS — BASIC INSPECTION

PFP:00000

Preliminary Check

EFS0024I

1. CHECK BRAKE FLUID

Check brake fluid for contamination.

Has brake fluid been contaminated?

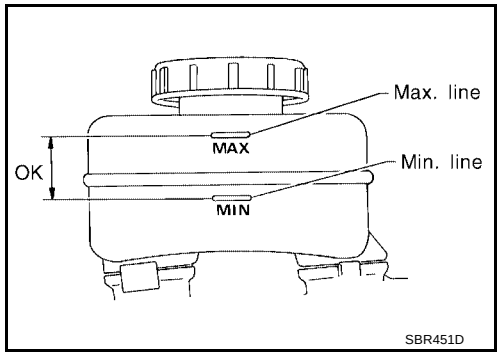
YES >> Replace. GO TO 2.
NO >> GO TO 2.

2. CHECK BRAKE FLUID LEVEL

Check brake fluid level in reservoir tank.
Low fluid level may indicate brake pad wear or leakage from brake line.

Is brake fluid filled between MAX and MIN lines on reservoir tank?

YES >> GO TO 3.
NO >> Fill brake fluid. GO TO 3.

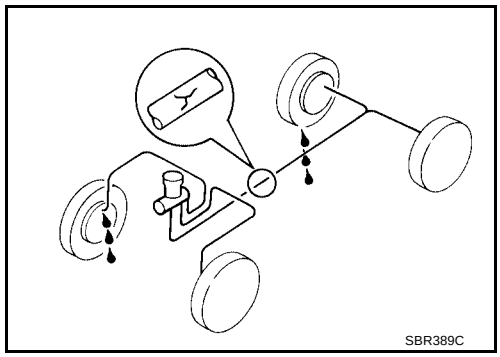


3. CHECK BRAKE LINE

Check brake line for leakage.

Is leakage present at or around brake lines, tubes or hoses or are any of these parts cracked or damaged?

YES >> Repair or replace as required. GO TO 4.
NO >> GO TO 4.

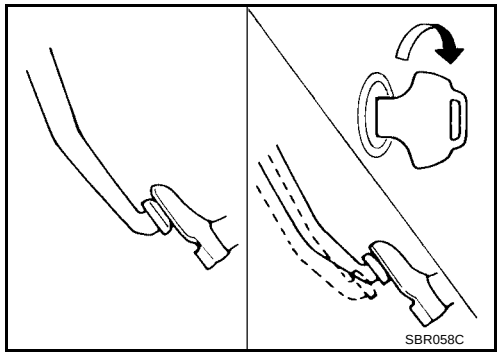


4. CHECK BRAKE BOOSTER OPERATION

Check brake booster for operation. Refer to BR-16, "OPERATING CHECK" . Also, check air tightness. Refer to BR-16, "AIRTIGHT CHECK" .

Is brake booster airtight and functioning properly?

YES >> GO TO 5.
NO >> Replace. GO TO 5.

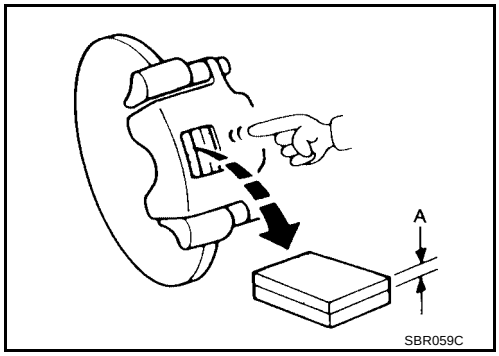


5. CHECK BRAKE PAD, ROTOR, SHOE AND DRUM

Check brake pad, rotor, shoe and drum.
Refer to BR-19, "FRONT DISC BRAKE (CL25VA/CL25VB TYPE)" , BR-23, "FRONT DISC BRAKE (OPB27VA TYPE)" , BR-29, "REAR DISC BRAKE" or BR-38, "REAR DRUM BRAKE" .

Are brake pads, rotors, shoes and drums functioning properly?

YES >> GO TO 6.
NO >> Replace.

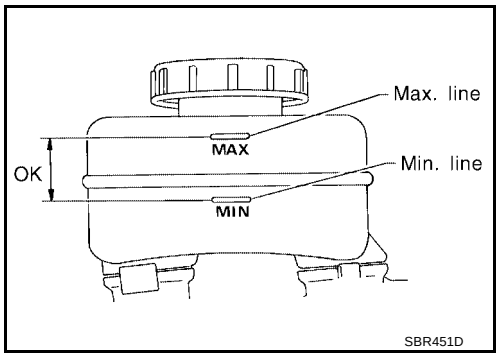


6. RECHECK BRAKE FLUID LEVEL

Check brake fluid level in reservoir tank again.

Is brake fluid filled between MAX and MIN lines on reservoir tank?

YES >> GO TO 7.
NO >> Fill brake fluid reservoir to specification.

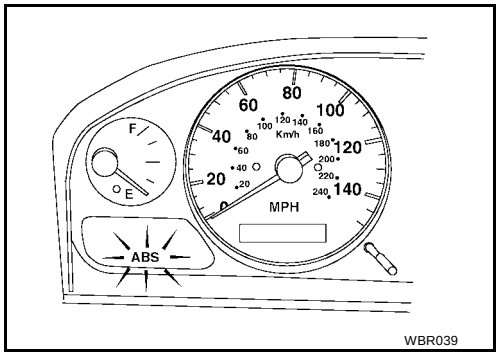


7. CHECK WARNING LAMP ACTIVATION

Check warning lamp activation.

Does warning lamp turn on when ignition switch is turned ON?

YES >> GO TO 8.
NO >> Check fuse, warning lamp bulb and warning lamp circuit.



8. CHECK WARNING LAMP DEACTIVATION

Check warning lamp for deactivation after engine is started.

Does warning lamp turn off when engine is started?

YES >> GO TO 9.
NO (with CONSULT-II)>> Refer to BRC-16, "SELF-DIAGNOSIS PROCEDURE" .
NO (without CONSULT-II)>> Refer to BRC-16, "SELF-DIAGNOSIS PROCEDURE" .

9. DRIVE VEHICLE

Drive vehicle at speeds over 30 km/h (19 MPH) for at least one minute.

Does warning lamp remain off after vehicle has been driven at 30 km/h (19 MPH) for at least one minute?

YES >> Inspection End.
NO (with CONSULT-II)>> Refer to BRC-16, "SELF-DIAGNOSIS PROCEDURE" .
NO (without CONSULT-II)>> Refer to BRC-16, "SELF-DIAGNOSIS PROCEDURE" .

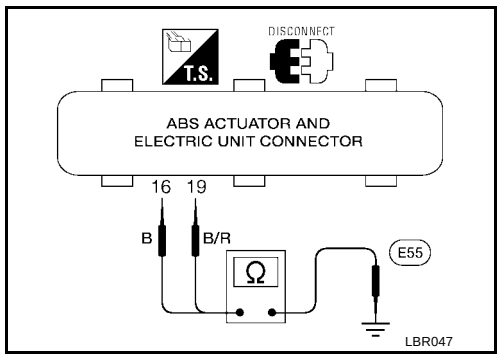
Ground Circuit Check

EFS0024J

ABS ACTUATOR AND ELECTRIC UNIT GROUND

- Check resistance between ABS actuator and electric unit connector terminals and ground.

Resistance : Approximately 0Ω



TROUBLE DIAGNOSIS — GENERAL DESCRIPTION

PFP:00000

Malfunction Code/Symptom Chart

EFS0024K

Code No.	Malfunctioning Part	Reference Page
12	Self-diagnosis could not detect any malfunctions.	—
45	Actuator front left outlet solenoid valve	BRC-29
46	Actuator front left inlet solenoid valve	BRC-29
41	Actuator front right outlet solenoid valve	BRC-29
42	Actuator front right inlet solenoid valve	BRC-29
51	Actuator rear right outlet solenoid valve	BRC-29
52	Actuator rear right inlet solenoid valve	BRC-29
55	Actuator rear left outlet solenoid valve	BRC-29
56	Actuator rear left inlet solenoid valve	BRC-29
25 *1	Front left sensor (open-circuit)	BRC-27
26 *1	Front left sensor (short-circuit)	BRC-27
21 *1	Front right sensor (open-circuit)	BRC-27
22 *1	Front right sensor (short-circuit)	BRC-27
31 *1	Rear right sensor (open-circuit)	BRC-27
32 *1	Rear right sensor (short-circuit)	BRC-27
35 *1	Rear left sensor (open-circuit)	BRC-27
36 *1	Rear left sensor (short-circuit)	BRC-27
18 *1	Sensor rotor	BRC-27
61 *3	Actuator motor or motor relay	BRC-31
63	Solenoid valve relay	BRC-29
57 *2	Power supply (Low voltage)	BRC-33
71	Control unit	BRC-35
Warning lamp stays on when ignition switch is turned ON.	Control unit power supply circuit Warning lamp bulb circuit Control unit or control unit connector Solenoid valve relay stuck Power supply for solenoid valve relay coil	BRC-41
Warning lamp does not come on when ignition switch is turned ON.	Fuse, warning lamp bulb or warning lamp circuit Control unit	BRC-39
Pedal vibration and noise	—	BRC-38
Long stopping distance	—	BRC-37
Unexpected pedal action	—	BRC-36
ABS does not work	—	BRC-38
ABS works frequently	—	BRC-36

- *1: If one or more wheels spin on a rough or slippery road for 40 seconds or more, the ABS warning lamp will illuminate. This does not indicate a malfunction. Only in the case of the short-circuit (Code Nos. 26, 22, 32 and 36), after repair the ABS warning lamp also illuminates when the ignition switch is turned ON. In this case, drive the vehicle at speeds greater than 30 km/h (19 MPH) for approximately 1 minute as specified in BRC-14, "Self-diagnosis" . Check to ensure that the ABS warning lamp goes out while the vehicle is being driven.
- *2: The trouble code “57”, which refers to a low power supply voltage, does not indicate that the ABS control unit is malfunctioning. Do not replace the ABS control unit with a new one.
- *3: The trouble code “61” can sometimes appear when the ABS motor is not properly grounded. If it appears, be sure to check the condition of the ABS motor ground circuit connection.

WHEEL SENSOR OR ROTOR

PFP:47910

Diagnostic Procedure

EFS0024L

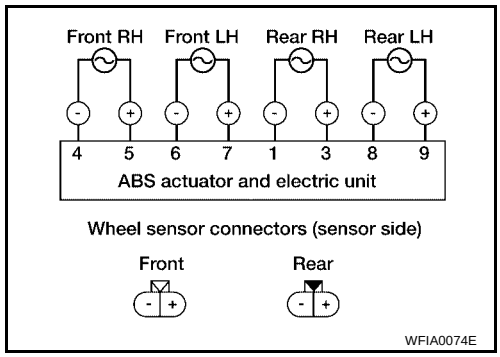
Malfunction code No. 21, 22, 25, 26, 31, 32, 35, 36 or 18

NOTE:
Wheel position should be distinguished by code No. except code No. 18 (sensor rotor).

1. INSPECTION START

Wheel sensor inspection

>> GO TO 2.



2. CHECK CONNECTOR

1. Disconnect connectors from ABS actuator and electric unit and wheel sensor of malfunction code No. Check terminals for damage or loose connection, then reconnect connectors.
2. Carry out self-diagnosis again.

Does warning lamp activate again?

YES >> GO TO 3.
NO >> Inspection End.

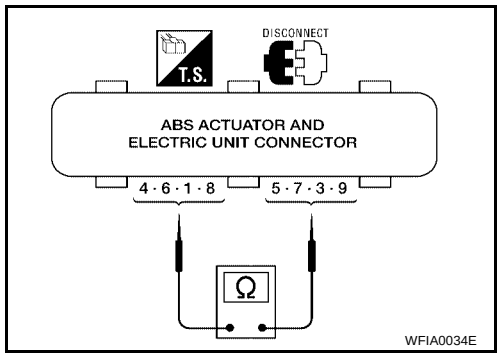
3. CHECK WHEEL SENSOR ELECTRICAL

1. Disconnect ABS actuator and electric unit connector.
2. Check resistance between ABS actuator and electric unit connector E55 terminals.
   Code No. 21 or 22 (Front RH wheel)
   Terminals 4 (B) and 5 (W)
   Code No. 25 or 26 (Front LH wheel)
   Terminals 6 (G) and 7 (R)
   Code No. 31 or 32 (Rear RH wheel)
   Terminals 1 (LG) and 3 (PU)
   Code No. 35 or 36 (Rear LH wheel)
   Terminals 8 (L) and 9 (P)

Resistance

Front : 1.45 - 1.85kΩ

Rear : 1.05 - 1.35kΩ



Is resistance within specification?

YES >> GO TO 5.
NO >> GO TO 4.

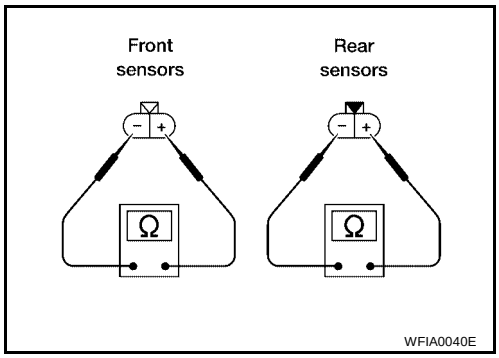
4. CHECK WHEEL SENSOR

Check each sensor for resistance.

Resistance

Front : 1.45 - 1.85kΩ

Rear : 1.05 - 1.35kΩ



Is resistance within specification?

YES >> Check the following.
- If resistance is within specification range, repair harness or connectors.
  - Harness connectors E11, E53, E55, B102, B103
  - Harness for open or short between wheel sensor connectors and ABS actuator and electric unit

NO >> Replace wheel sensor. Refer to BRC-44, "FRONT WHEEL SENSOR" or BRC-44, "REAR WHEEL SENSOR (REAR DRUM)" or BRC-45, "REAR WHEEL SENSOR (REAR DISC)" .

5. CHECK TIRE

Check for inflation pressure, wear and size of each tire. (See NOTE)

Are tire pressure and size correct and is tire wear within specifications?

YES >> GO TO 6.
NO >> Adjust tire pressure or replace tire(s). (See NOTE)

6. CHECK WHEEL BEARING

Check wheel bearing axial end play. Refer to FAX-9, "WHEEL HUB AND KNUCKLE" or RAX-6, "WHEEL HUB" . (See NOTE)

Is wheel bearing axial end play within specifications?

YES >> GO TO 7.
NO >> Repair or replace as necessary. Refer to FAX-6, "WHEEL HUB AND KNUCKLE" or RAX-6, "WHEEL HUB" .

7. CHECK SENSOR ROTOR

Check sensor rotor for tooth damage. (See NOTE)

Is sensor rotor free from damage?

YES >> Check ABS actuator and electric unit pin terminals for damage and the connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest.
NO >> Replace sensor rotor. Refer to BRC-45, "SENSOR ROTOR" . (See NOTE)

ABS ACTUATOR SOLENOID VALVE AND SOLENOID VALVE RELAY

PFP:47600

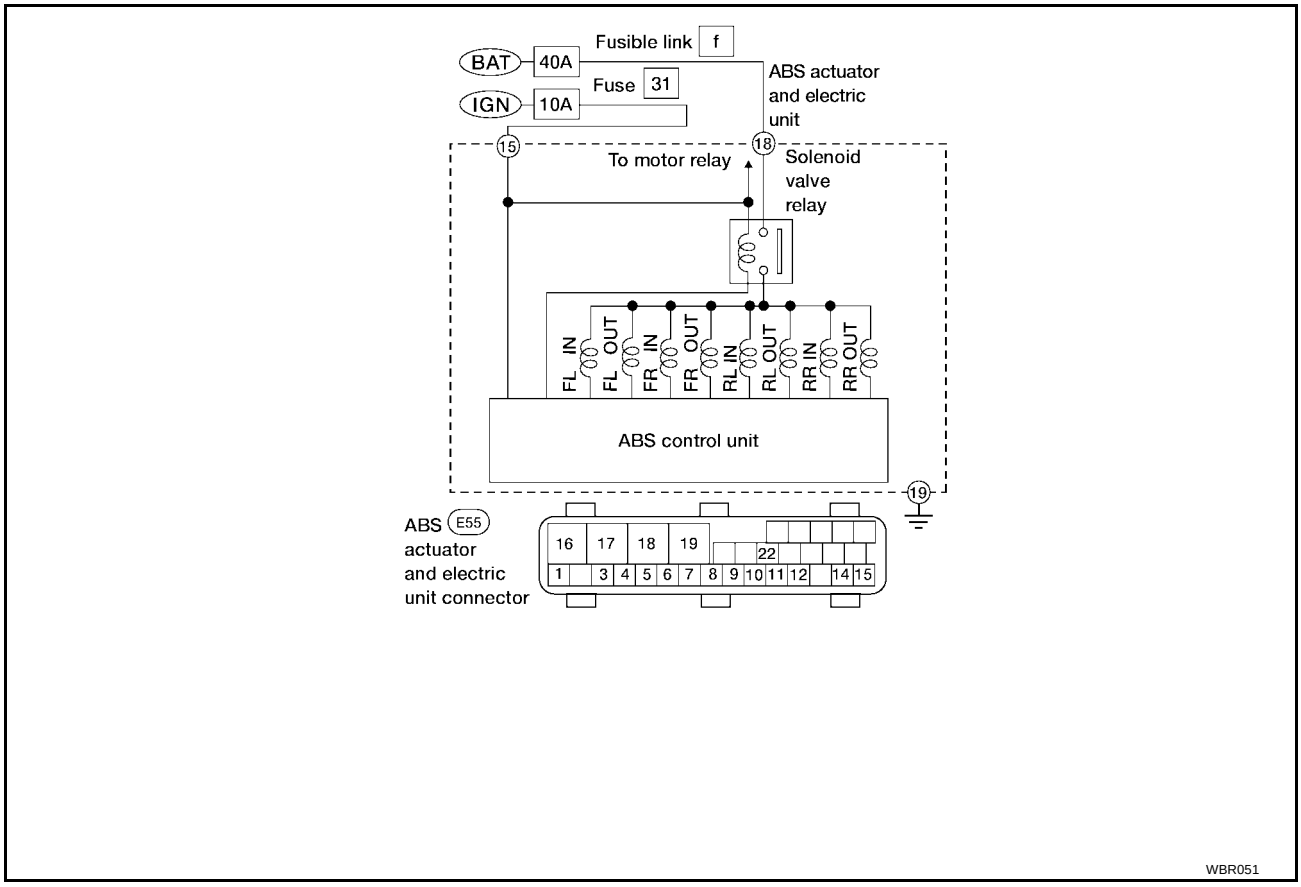
Diagnostic Procedure

EFS0024M

Malfunction code No. 41, 42, 45, 46, 51, 52, 55, 56, 63

1. INSPECTION START

Solenoid valve relay inspection



>> GO TO 2.

2. CHECK FUSIBLE LINK

Check 40A fusible link **f** . For fusible link layout, refer to PG-3, "POWER SUPPLY ROUTING" .

Is fusible link OK?

YES >> GO TO 3.
NO >> GO TO 6.

3. CHECK CONNECTOR

1. Disconnect connector from ABS actuator and electric unit. Check terminals for damage or loose connection. Then reconnect connector.
2. Carry out self-diagnosis again.

Does warning lamp activate again?

YES >> GO TO 4.
NO >> Inspection End.

4. CHECK ABS ACTUATOR AND ELECTRIC UNIT GROUND CIRCUIT

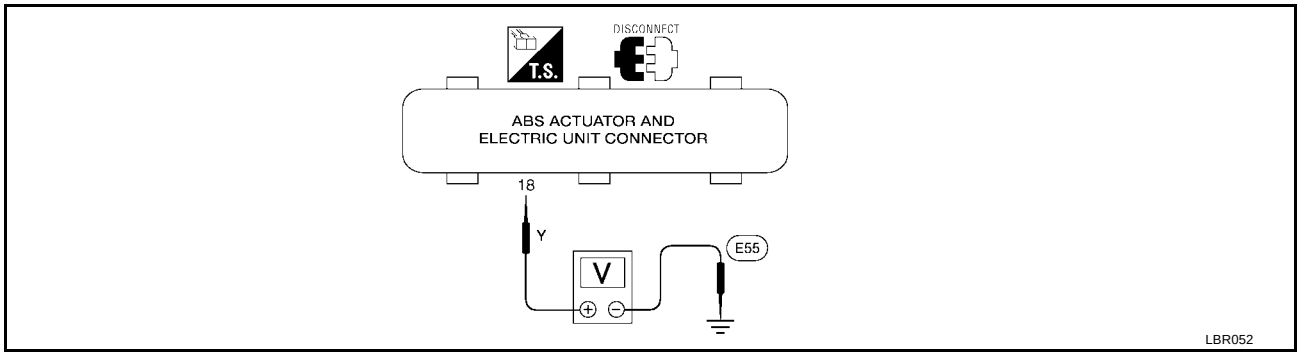
Refer to BRC-25, "ABS ACTUATOR AND ELECTRIC UNIT GROUND" .

Is ground circuit OK?

YES >> GO TO 5.
NO >> Repair harness or connector.

5. CHECK SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Disconnect ABS actuator and electric unit connector.
2. Check voltage between ABS actuator and electric unit connector E55 terminal 18 (Y) and ground.



Does battery voltage exist?

YES >> Replace ABS actuator and electric unit. Refer to BRC-47, "ACTUATOR" .
NO >> Check the following.
- If NG, repair harness or connectors.
  - Harness connector E55
  - Harness for open between ABS actuator and electric unit and fusible link.

6. REPLACE FUSE

Replace 40A fusible link **f** . For fuse layout, refer to PG-3, "POWER SUPPLY ROUTING" .

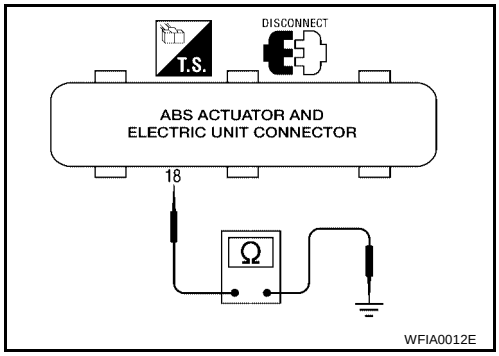
Does the fusible link blow when ignition switch is turned ON?

YES >> GO TO 7.
NO >> Inspection End.

7. CHECK SOLENOID VALVE RELAY POWER SUPPLY CIRCUIT FOR SHORT

1. Disconnect battery cable and ABS actuator and electric unit connector.
2. Check continuity between ABS actuator and electric unit connector E55 terminal 18 (Y) and ground.

Continuity should not exist.



Does continuity exist?

YES >> Check the following.
- Harness connector E55
- Harness for short between ABS actuator and electric unit and fusible link.

NO >> Replace ABS actuator and electric unit. Refer to BRC-47, "ACTUATOR" .

MOTOR RELAY OR MOTOR

PFP:47600

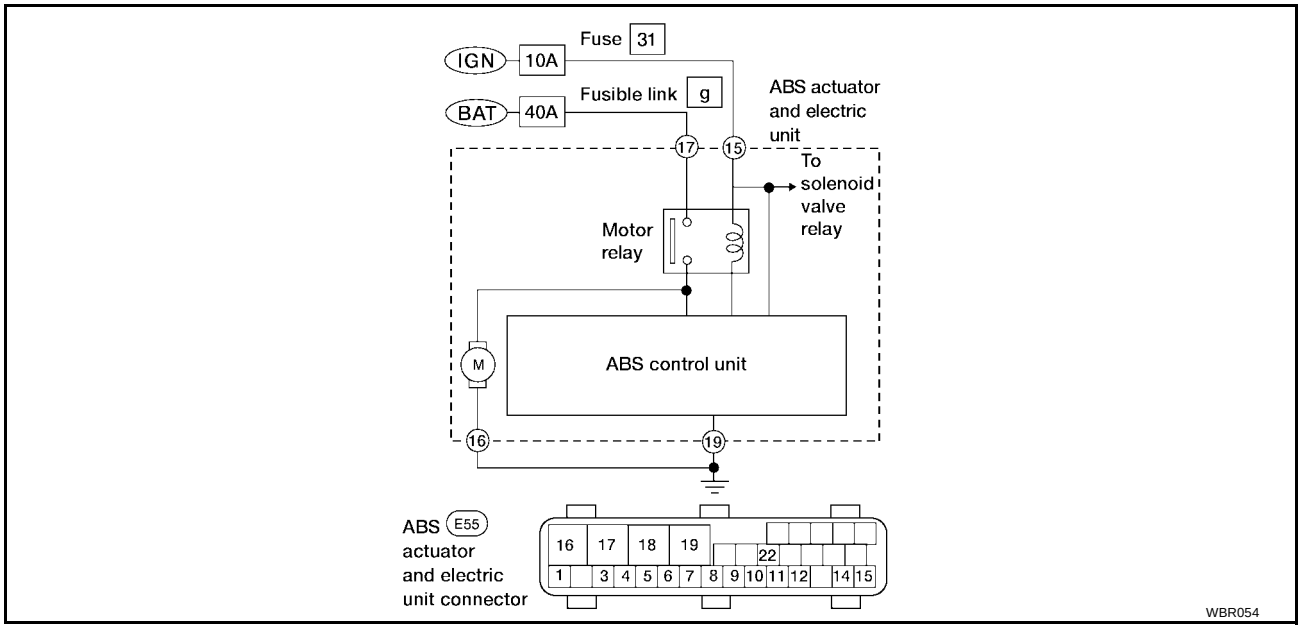
Diagnostic Procedure

EFS0024N

Malfunction code No. 61

1. INSPECTION START

ABS motor relay inspection



>> GO TO 2.

2. CHECK FUSIBLE LINK

Check 40A fusible link **g** . For fusible link layout, refer to PG-3, "POWER SUPPLY ROUTING" .

Is fusible link OK?

YES >> GO TO 3.
NO >> GO TO 6.

3. CHECK CONNECTOR

1. Disconnect ABS actuator and electric unit connector. Check terminals for damage or loose connection. Then reconnect connector.
2. Carry out self-diagnosis again.

Does warning lamp activate again?

YES >> GO TO 4.
NO >> Inspection End.

4. CHECK ABS ACTUATOR AND ELECTRIC UNIT GROUND CIRCUIT

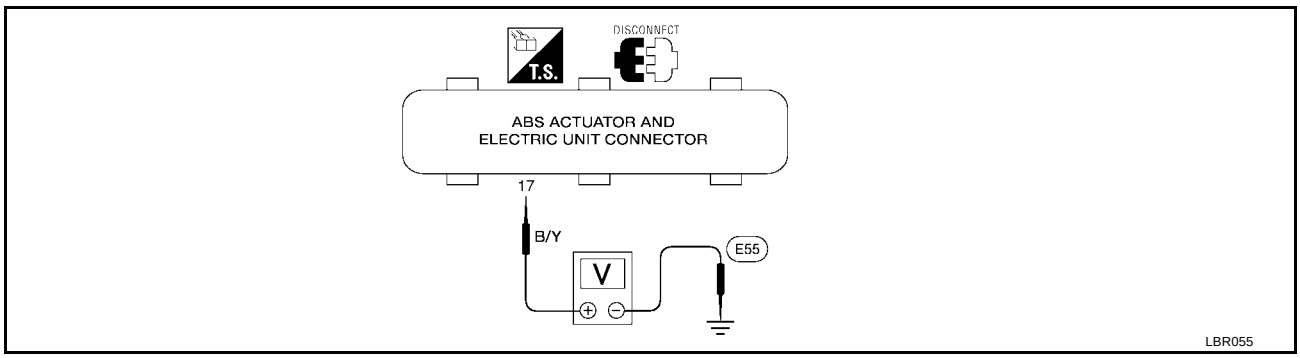
Refer to BRC-25, "ABS ACTUATOR AND ELECTRIC UNIT GROUND" .

Is ground circuit OK?

YES >> GO TO 5.
NO >> Repair harness or connector.

5. CHECK MOTOR RELAY POWER SUPPLY CIRCUIT

1. Disconnect ABS actuator and electric unit connector.
2. Check voltage between ABS actuator and electric unit connector E55 terminal 17 (B/Y) and ground.



Does battery voltage exist?

YES >> Replace ABS actuator and electric unit. Refer to BRC-47, "ACTUATOR" .
NO >> Check the following.

- Harness connector E55
- Harness for open between ABS actuator and electric unit and fusible link

6. REPLACE FUSIBLE LINK

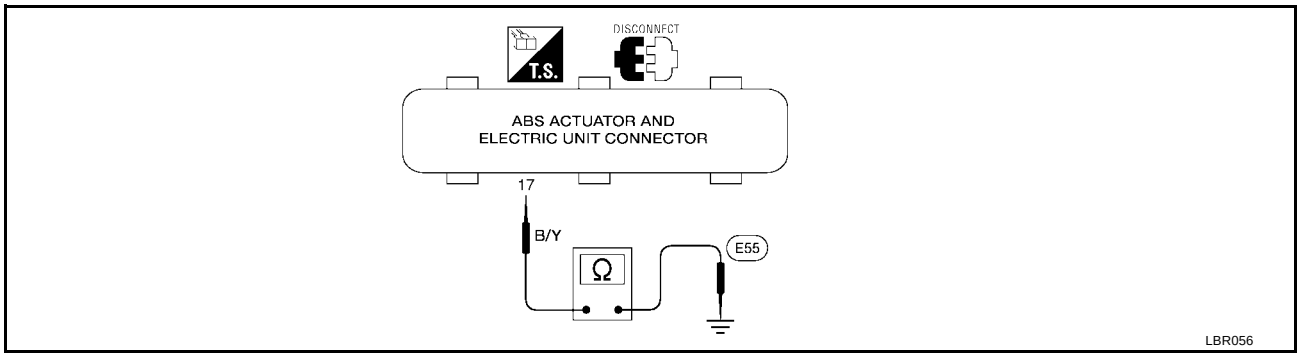
Replace 40A fusible link **g** . For fuse layout, refer to PG-3, "POWER SUPPLY ROUTING" .

Does the fusible link blow when ignition switch is turned ON?

YES >> GO TO 7.
NO >> Inspection End.

7. CHECK ABS ACTUATOR MOTOR POWER SUPPLY CIRCUIT FOR SHORT

1. Disconnect battery cable and ABS actuator and electric unit connector.
2. Check continuity between ABS actuator and electric unit connector E55 terminal 17 (B/Y) and ground.



Continuity should not exist.

Does continuity exist?

YES >> Check the following.

- Harness connector E55
- Harness for short between ABS actuator and electric unit and fusible link

NO >> Replace ABS actuator and electric unit. Refer to BRC-47, "ACTUATOR" .

LOW VOLTAGE

PFP:00004

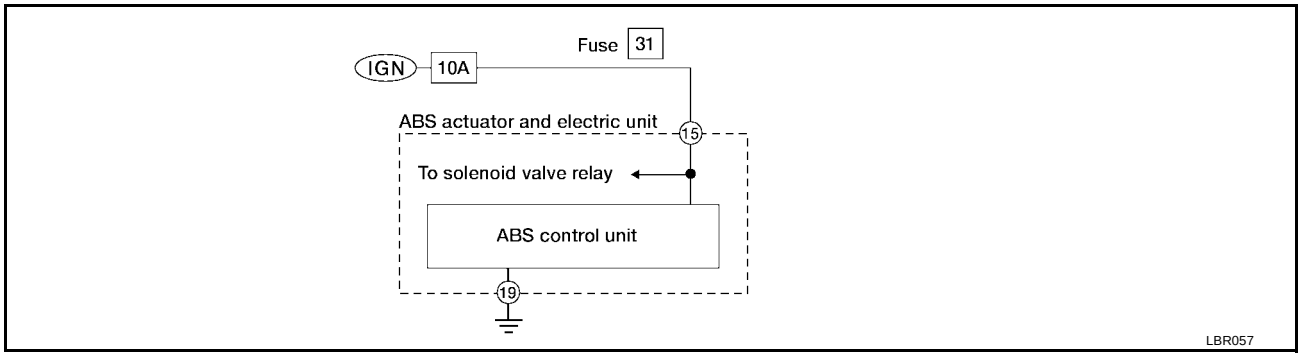
Diagnostic Procedure

EFS0024O

Malfunction code No. 57

1. INSPECTION START

ABS actuator and electric unit power supply and ground circuit inspection



>> GO TO 2.

2. CHECK FUSE

Check 10A fuse No. 31. For fuse layout, refer to PG-3, "POWER SUPPLY ROUTING" .

Is fuse OK?

YES >> GO TO 3.
NO >> GO TO 6.

3. CHECK CONNECTOR

1. Disconnect ABS actuator and electric unit connector. Check terminals for damage or loose connections. Then reconnect connector.
2. Carry out self-diagnosis again.

Does warning lamp activate again?

YES >> GO TO 4.
NO >> Inspection End.

4. CHECK ABS ACTUATOR AND ELECTRIC UNIT GROUND CIRCUIT

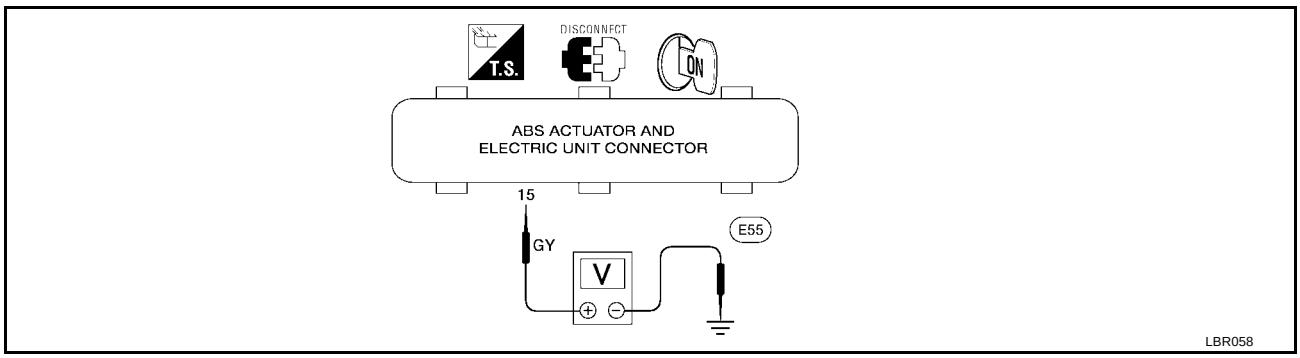
Refer to BRC-25, "ABS ACTUATOR AND ELECTRIC UNIT GROUND" .

Is ground circuit OK?

YES >> GO TO 5.
NO >> Repair harness or connector.

5. CHECK ABS ACTUATOR AND ELECTRIC UNIT POWER SUPPLY CIRCUIT

1. Disconnect ABS actuator and electric unit connector.
2. Check voltage between ABS actuator and electric unit connector E55 terminal 15 (GY) and ground.



Does battery voltage exist when ignition switch is turned ON?

YES >> Replace ABS actuator and electric unit. Refer to BRC-47, "ACTUATOR" .
NO >> Check the following.

- Harness connector E55
- Harness for open between ABS actuator and electric unit and fuse

6. REPLACE FUSE

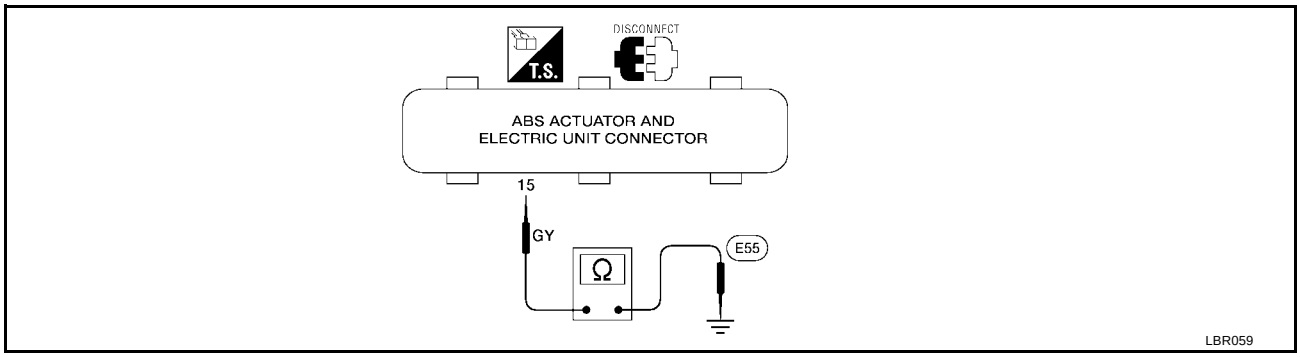
Replace 10A fuse 31. For fuse layout, refer to PG-3, "POWER SUPPLY ROUTING" .

Does the fuse blow when ignition switch is turned ON?

YES >> GO TO 7.
NO >> Inspection End.

7. CHECK ABS ACTUATOR AND ELECTRIC UNIT POWER SUPPLY CIRCUIT FOR SHORT

1. Disconnect battery cable and ABS actuator and electric unit connector.
2. Check continuity between ABS actuator and electric unit connector E55 terminal 15 (GY) and ground.



Continuity should not exist.

Does continuity exist?

YES >> Check the following.

- If continuity exists, repair harness or connector.
  Harness connector E55
- Harness for short between ABS actuator and electric unit and fuse

NO >> Replace ABS actuator and electric unit. Refer to BRC-47, "ACTUATOR" .

CONTROL UNIT

PFP:27500

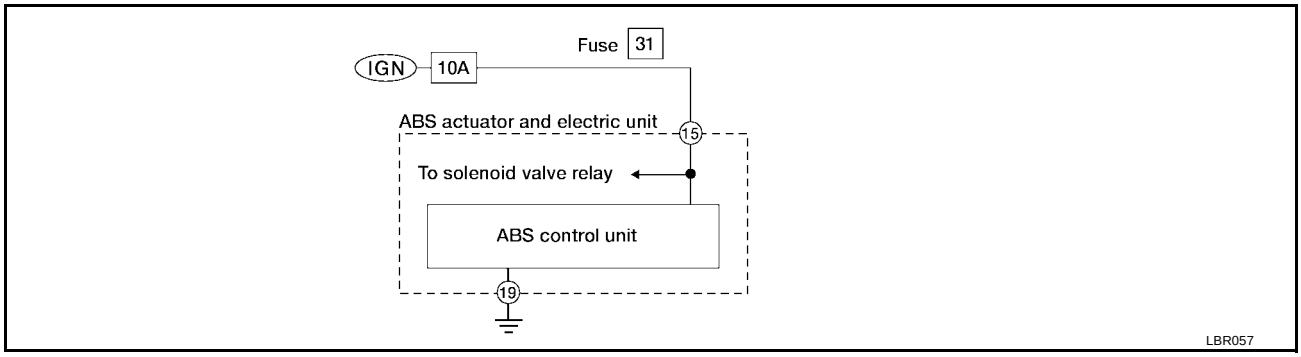
Diagnostic Procedure

EFS0024P

Malfunction code No. 71

1. INSPECTION START

ABS actuator and electric unit power supply and ground circuit inspection



>> GO TO 2.

2. CHECK CONNECTOR

1. Disconnect ABS actuator and electric unit connector.
   Check terminals for damage or loose connection. Then reconnect connector.
2. Carry out self-diagnosis again.

Does warning lamp activate again?

YES >> GO TO 3.
NO >> Inspection End.

3. CHECK ABS ACTUATOR AND ELECTRIC UNIT POWER SUPPLY CIRCUIT

Check voltage. Refer to BRC-33, "Diagnostic Procedure" .

Does battery voltage exist when ignition switch is turned ON?

YES >> GO TO 4.
NO >> Check harness for open or short between ABS actuator and electric unit and fuse.

4. SELF-DIAGNOSIS RESULT CHECK

Check the self-diagnosis results.

Is code No. 71 indicated again?

YES >> Replace ABS actuator and electric unit. Refer to BRC-47, "ACTUATOR" .
NO >> Inspect the system according to the code No.

TROUBLE DIAGNOSES FOR SYMPTOMS

PFP:00007

Symptom 1. ABS Works Frequently

EFS0024Q

1. CHECK BRAKE FLUID PRESSURE

Check brake fluid pressure distribution.
Refer to BR-10, "Inspection" .

Is brake fluid pressure distribution normal?

YES >> GO TO 2.
NO >> ● Repair. Then perform Preliminary Check.
● Refer to BR-11, "Inspection" .

2. CHECK WHEEL SENSOR

1. Check wheel sensor connector for terminal damage or loose connections.
2. Perform wheel sensor check.
Refer to BRC-27, "Diagnostic Procedure" .

Is wheel sensor mechanism OK?

YES >> GO TO 3.
NO >> Repair.

3. CHECK FRONT AXLE

Check wheel bearing axial end play. Refer to FAX-9, "WHEEL HUB AND KNUCKLE" or RAX-6, "WHEEL HUB" .

Is wheel bearing axial end play within specifications?

YES >> Go to BRC-36, "Symptom 2. Unexpected Pedal Action" .
NO >> Repair.

Symptom 2. Unexpected Pedal Action

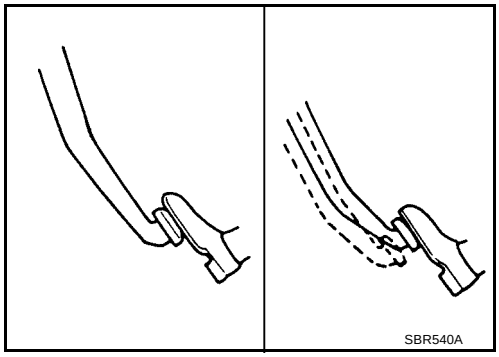
EFS0024R

1. CHECK BRAKE PEDAL TRAVEL

Check brake pedal travel.

Is brake pedal travel excessive?

YES >> Perform Preliminary Check. Refer to BRC-23, "Preliminary Check" .
NO >> GO TO 2.



2. CHECK MECHANICAL BRAKE SYSTEM PERFORMANCE

Disconnect ABS actuator and electric unit connector and check whether brake is effective.

Does brake system function properly when brake pedal is depressed?

YES >> GO TO 3.
NO >> Perform Preliminary Check. Refer to BRC-23, "Preliminary Check" .

3. CHECK WARNING LAMP INDICATION

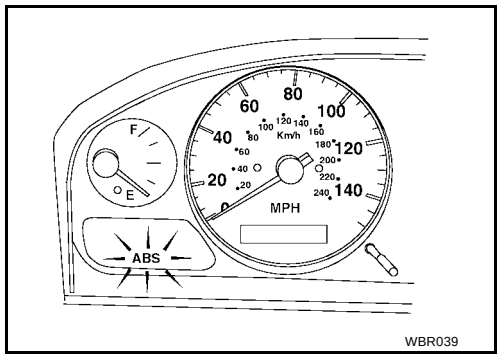
Ensure warning lamp remains off while driving.

Is warning lamp turned off?

YES >> GO TO 4.

NO (with CONSULT-II)>> Carry out self-diagnosis. Refer to BRC-16, "SELF-DIAGNOSIS PROCEDURE" .

NO (without CONSULT-II)>> Carry out self-diagnosis. Refer to BRC-14, "SELF-DIAGNOSIS PROCEDURE" .



WBR039

4. CHECK WHEEL SENSOR

1. Check wheel sensor connectors for terminal damage or loose connection.
2. Perform wheel sensor check. Refer to BRC-27, "Diagnostic Procedure" .

Are wheel sensor mechanisms OK?

YES >>
- Check ABS actuator and electric unit pin terminals for damage, and the connection of ABS actuator and electric unit harness connector.
- Reconnect ABS actuator and electric unit harness connector.
- Retest.

NO >> Repair.

Symptom 3. Long Stopping Distance

EFS0024S

1. CHECK MECHANICAL BRAKE SYSTEM PERFORMANCE

Disconnect ABS actuator and electric unit connector and check whether stopping distance is still long.

Does brake system function properly when brake pedal is depressed?

YES >> Perform Preliminary Check and air bleeding (if necessary).

NO >> Go to BRC-38, "Symptom 4. ABS Does Not Work" .

NOTE:

Stopping distance may be longer for vehicles without ABS when road condition is slippery.

Symptom 4. ABS Does Not Work

EFS0024T

1. CHECK WARNING LAMP INDICATION

Does the ABS warning lamp activate?

Yes or No

YES (with CONSULT-II)>> Carry out self-diagnosis. Refer to BRC-16, "SELF-DIAGNOSIS PROCEDURE" .
YES (without CONSULT-II)>> Carry out self-diagnosis. Refer to BRC-14, "SELF-DIAGNOSIS PROCEDURE" .
NO >> Go to BRC-36, "Symptom 2. Unexpected Pedal Action" .

NOTE:
ABS does not work when vehicle speed is under 10 km/h (6 MPH).

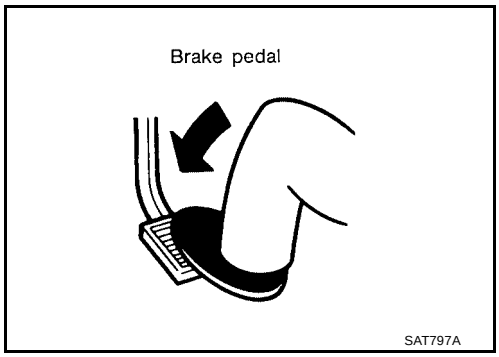
Symptom 5. Pedal Vibration and Noise

EFS0024U

1. INSPECTION START

Pedal vibration and noise inspection.

>> GO TO 2.



2. CHECK SYMPTOM

1. Apply brake.
2. Start engine.

Does the symptom occur only when engine is started?

YES (with CONSULT-II)>> Carry out self-diagnosis. Refer to BRC-16, "SELF-DIAGNOSIS PROCEDURE" .
YES (without CONSULT-II)>> Carry out self-diagnosis. Refer to BRC-14, "SELF-DIAGNOSIS PROCEDURE" .
NO >> Go to BRC-36, "Symptom 2. Unexpected Pedal Action" .

NOTE:
ABS may operate and cause vibration under any of the following conditions.

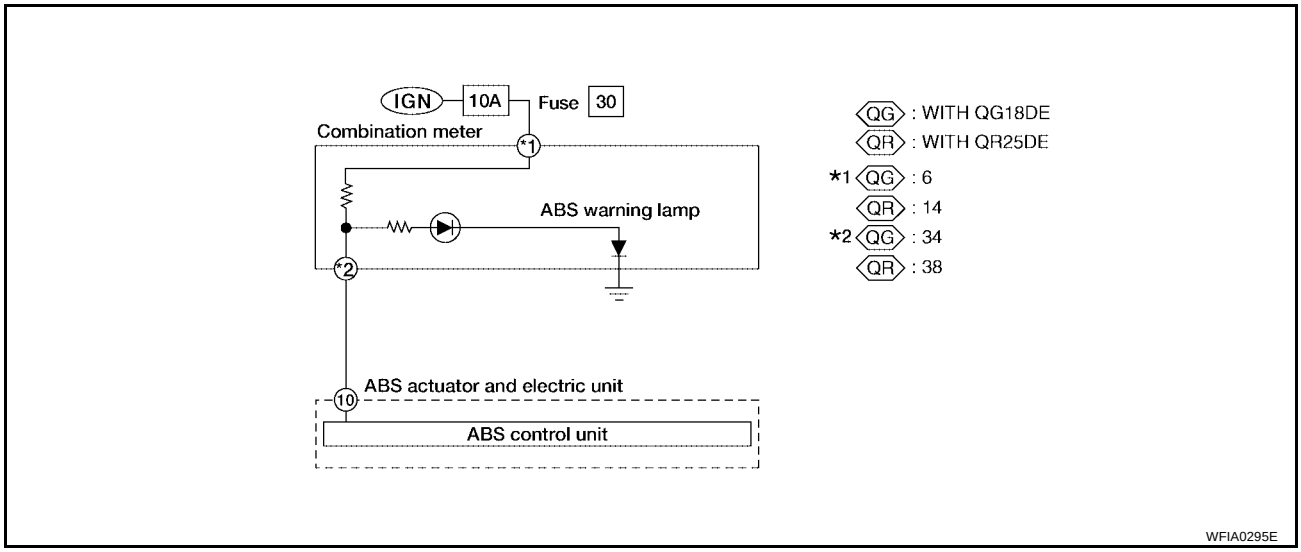
- Low friction (slippery) road.
- High speed cornering.
- Driving over bumps and potholes.

Symptom 6. Warning Lamp Does Not Come On When Ignition Switch Is Turned On

EFS0024V

1. INSPECTION START

Warning lamp circuit inspection.



>> GO TO 2.

2. CHECK FUSE

Check 10A fuse No. 30. For fuse layout, refer to PG-3, "POWER SUPPLY ROUTING" .

Is fuse OK?

YES >> GO TO 4.
NO >> GO TO 3.

3. REPLACE FUSE

Replace 10A fuse No. 30. For fuse layout, refer to PG-3, "POWER SUPPLY ROUTING" .

Does the fuse blow when ignition switch is turned ON?

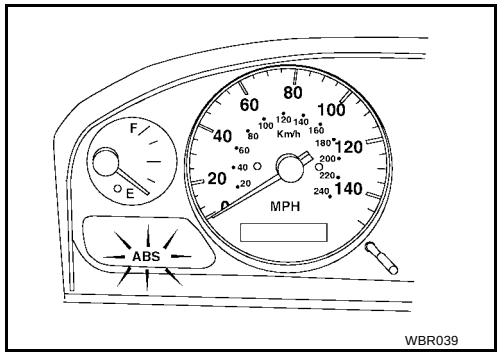
YES >> Check wiring for short between fuse and combination meter. Repair as required.
NO >> Inspection End.

4. CHECK WARNING LAMP ACTIVATION

Disconnect ABS actuator and electric unit connector.

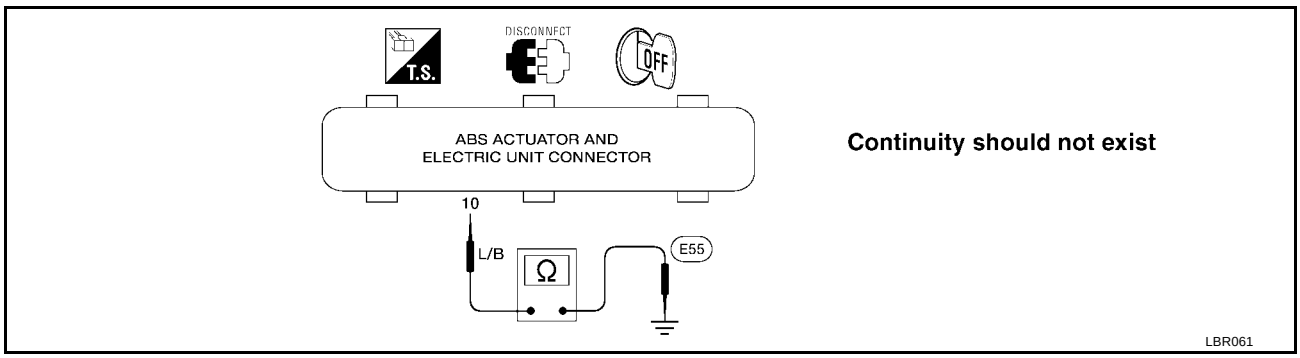
Does the warning lamp activate?

YES >> Replace ABS actuator and electric unit. Refer to BRC-47, "ACTUATOR" .
NO >> GO TO 5.



5. CHECK HARNESS FOR SHORT

1. Disconnect ABS actuator and electric unit connector and combination meter connector M30.
2. Check continuity between ABS actuator and electric unit connector E55 terminal 10 (L/B) and ground.



Does continuity exist?

YES >> Repair harness or connectors.
NO >> Check combination meter. Refer to DI-17, "PRELIMINARY CHECK" .

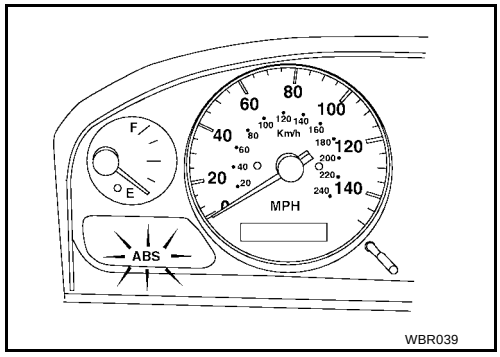
Symptom 7. Warning Lamp Stays On When Ignition Switch Is Turned On

EFS0024W

1. INSPECTION START

ABS control unit inspection.

>> GO TO 2.



2. CHECK FUSE

Check 10A fuse No. 31. For fuse layout, refer to PG-3, "POWER SUPPLY ROUTING" .

Is fuse OK?

YES >> GO TO 3.
NO >> GO TO 8.

3. CHECK HARNESS CONNECTOR

Check ABS actuator and electric unit pin terminals for damage and connection of ABS actuator and electric unit harness connector. Reconnect ABS actuator and electric unit harness connector. Then retest.

Does warning lamp stay on when ignition switch is turned ON?

YES >> GO TO 4.
NO >> Inspection End.

4. CHECK ABS ACTUATOR AND ELECTRIC UNIT GROUND CIRCUIT

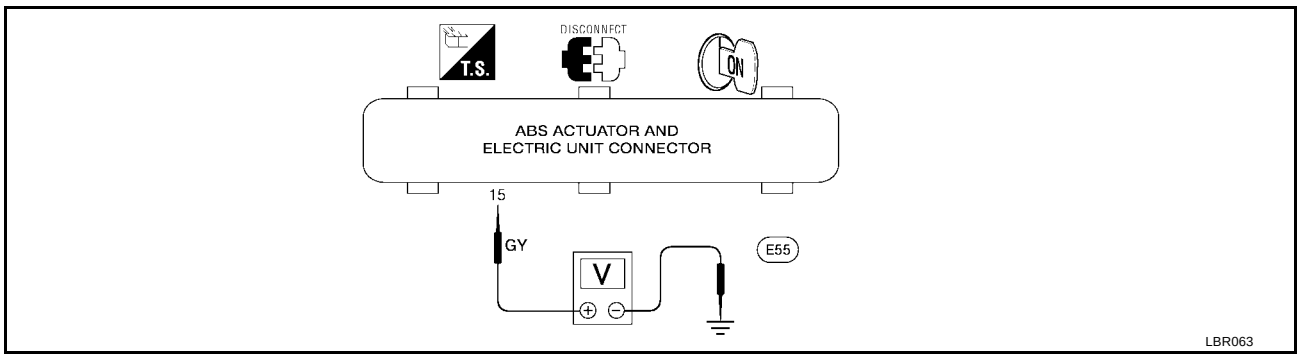
Refer to BRC-25, "ABS ACTUATOR AND ELECTRIC UNIT GROUND" .

Is ground circuit OK?

YES >> GO TO 5.
NO >> Repair harness or connector.

5. CHECK ABS ACTUATOR AND ELECTRIC UNIT POWER SUPPLY CIRCUIT

1. Disconnect ABS actuator and electric unit connector.
2. Check voltage between ABS actuator and electric unit connector E55 terminal 15 (GY) and ground.



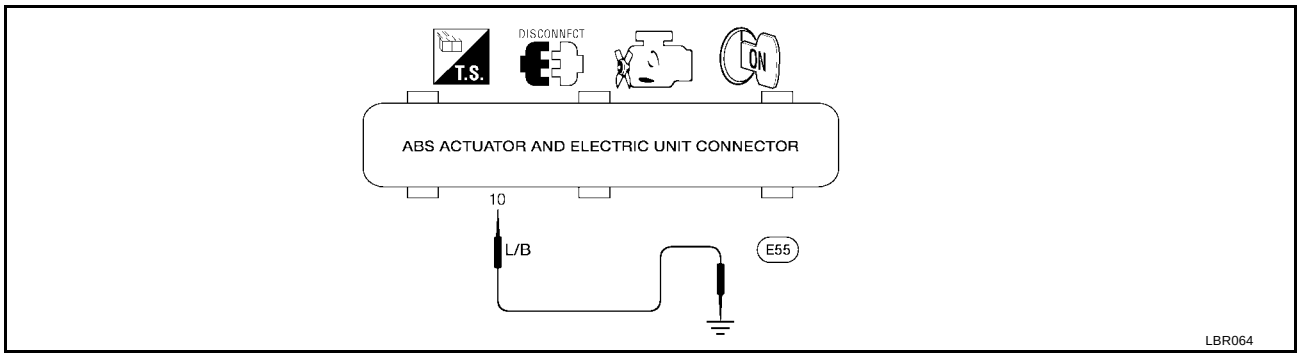
Does battery voltage exist when ignition switch is turned ON?

YES >> GO TO 6.
NO >> Check the following.

- Harness connector E55
- Harness for open between ABS actuator and electric unit and fuse

6. CHECK WARNING LAMP

1. Disconnect ABS actuator and electric unit connector.
2. Connect suitable wire between ABS actuator and electric unit connector E55 terminal 10 (L/B) and ground.



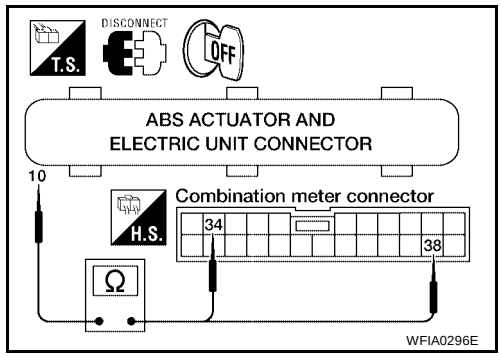
Does the warning lamp deactivate?

YES >> Replace ABS actuator and electric unit. Refer to BRC-47, "ACTUATOR" .
NO >> GO TO 7.

7. CHECK ABS WARNING LAMP CONTROL CIRCUIT FOR OPEN

1. Disconnect combination meter connector M30.
2. Check continuity between combination meter connector M30 terminal 34 (L/B) (QG18DE models) or 38 (L/B) (QR25DE models) and ABS actuator and electric unit connector E55 terminal 10 (L/B).

Continuity should exist.



Does continuity exist?

YES >> Check combination meter. Refer to DI-7, "Combination Meter" .
NO >> GO TO 8.

8. REPLACE FUSE

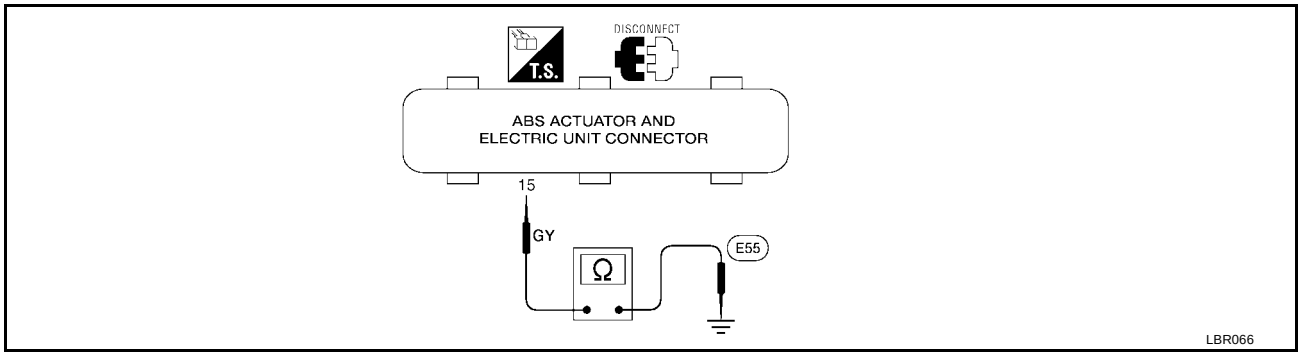
Replace fuse.

Does the fuse blow when ignition switch is turned ON?

YES >> GO TO 9.
NO >> Inspection End.

9. CHECK ABS ACTUATOR AND ELECTRIC UNIT POWER SUPPLY CIRCUIT FOR SHORT

1. Disconnect battery cable and ABS actuator and electric unit connector.
2. Check continuity between ABS actuator and electric unit connector E55 terminal 15 (GY) and ground.



Continuity should not exist.

Does continuity exist?

YES >> Check the following.
- Harness connector E55
- Harness for short between ABS actuator and electric unit and fuse

NO >> Replace ABS actuator and electric unit. Refer to BRC-47, "ACTUATOR" .

REMOVAL AND INSTALLATION

PFP:00000

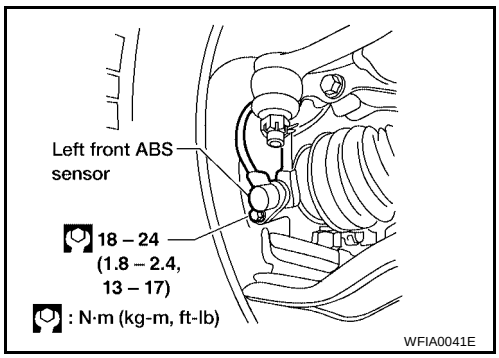
Removal and Installation

EFS0024X

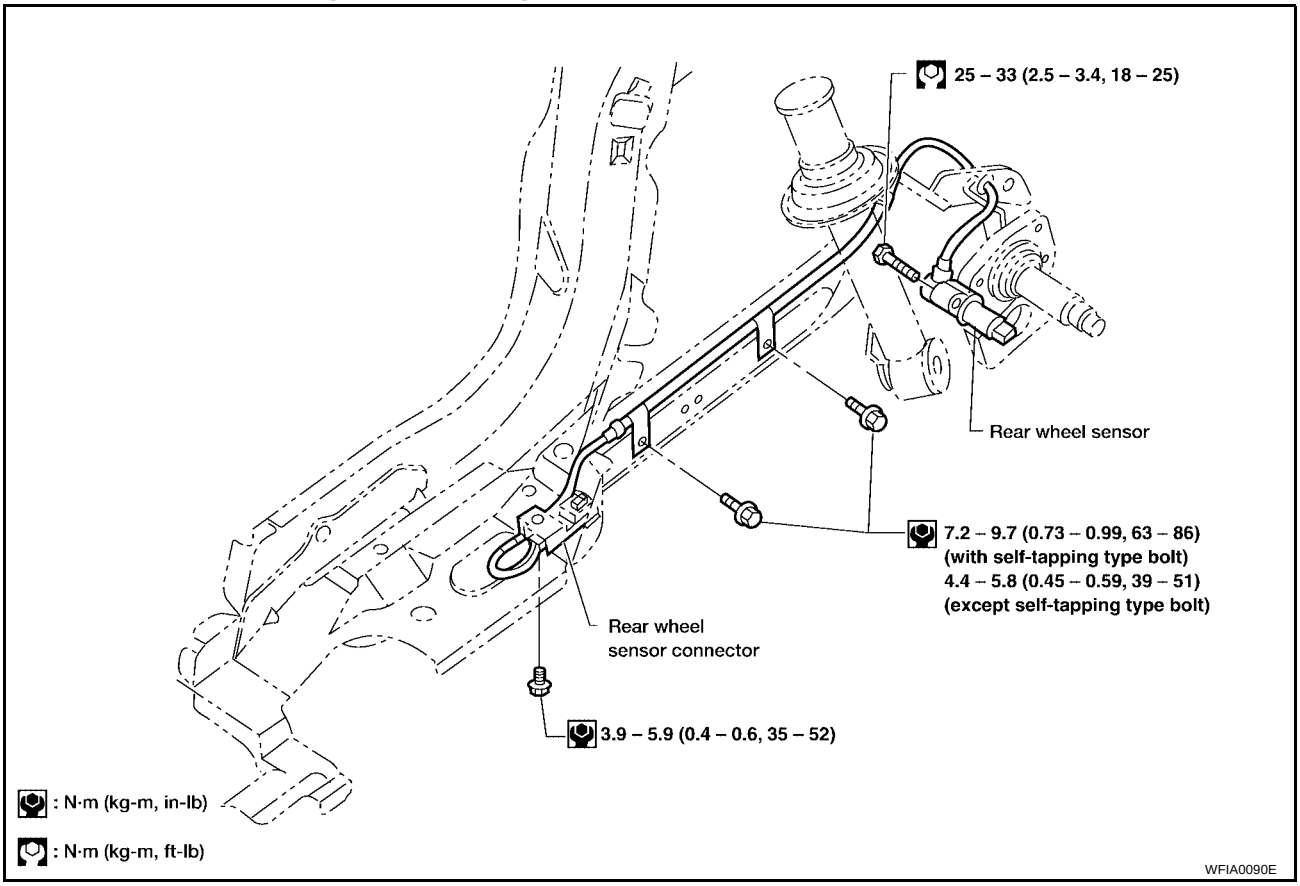
CAUTION:

Be careful not to damage sensor edge and sensor rotor teeth. When removing the front or rear wheel hub assembly, disconnect the ABS wheel sensor from the assembly and move it away.

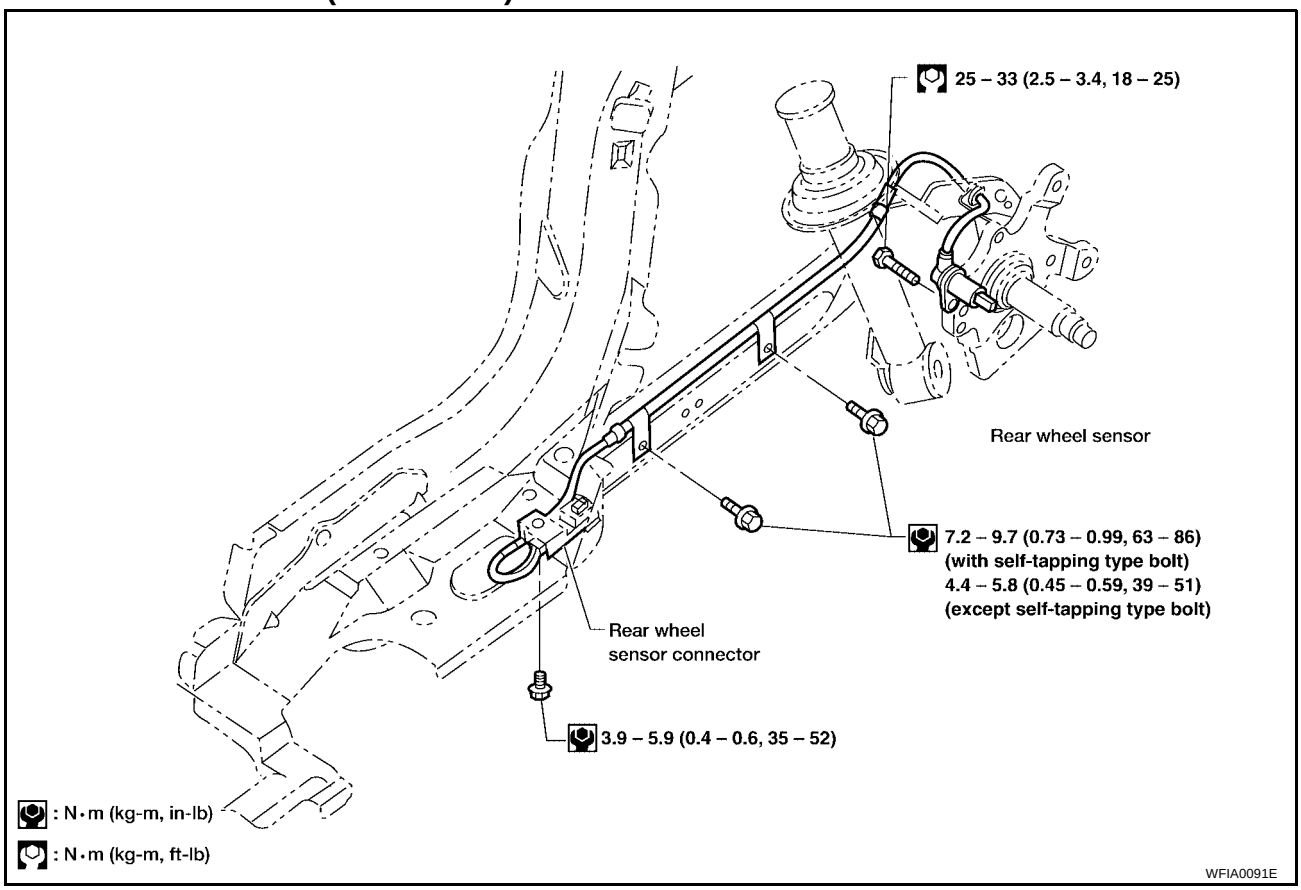
FRONT WHEEL SENSOR



REAR WHEEL SENSOR (REAR DRUM)



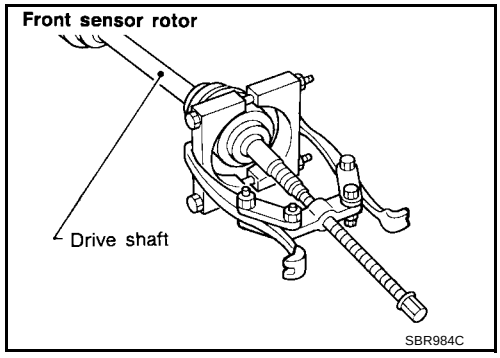
REAR WHEEL SENSOR (REAR DISC)



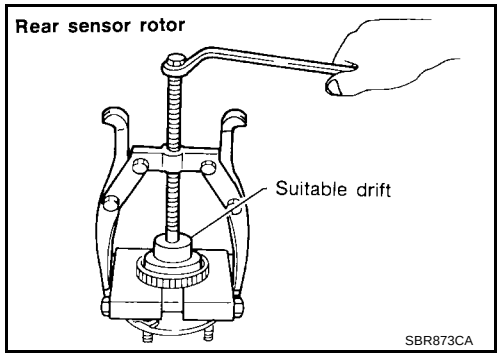
SENSOR ROTOR

Removal

1. Remove the drive shaft or rear wheel hub. Refer to FAX-14, "Removal" , or RAX-6, "Removal" respectively.



2. Remove the sensor rotor using suitable puller, drift and bearing replacer.



Installation

Install the sensor rotor. For front sensor rotor, use hammer and wooden block. For rear sensor rotor, use suitable drift and press.

CAUTION:
Do not reuse sensor rotor. When installing, replace it with a new one.

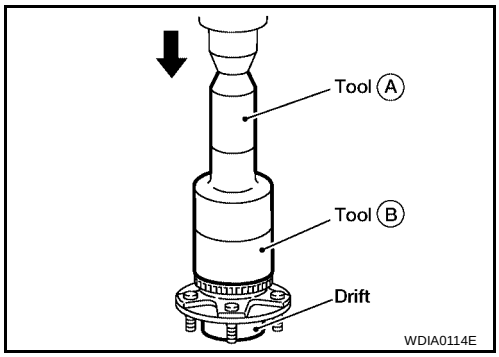
- Pay attention to the dimension of rear sensor rotor as shown.

  Tool number

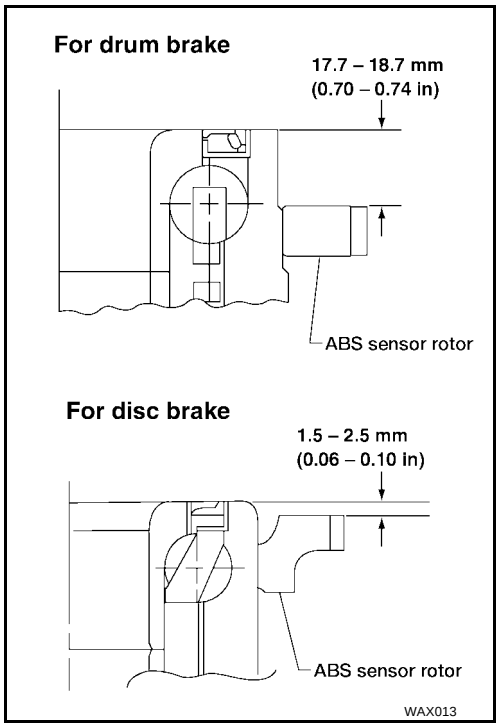
  A: ST30720000

  B: KV40104710

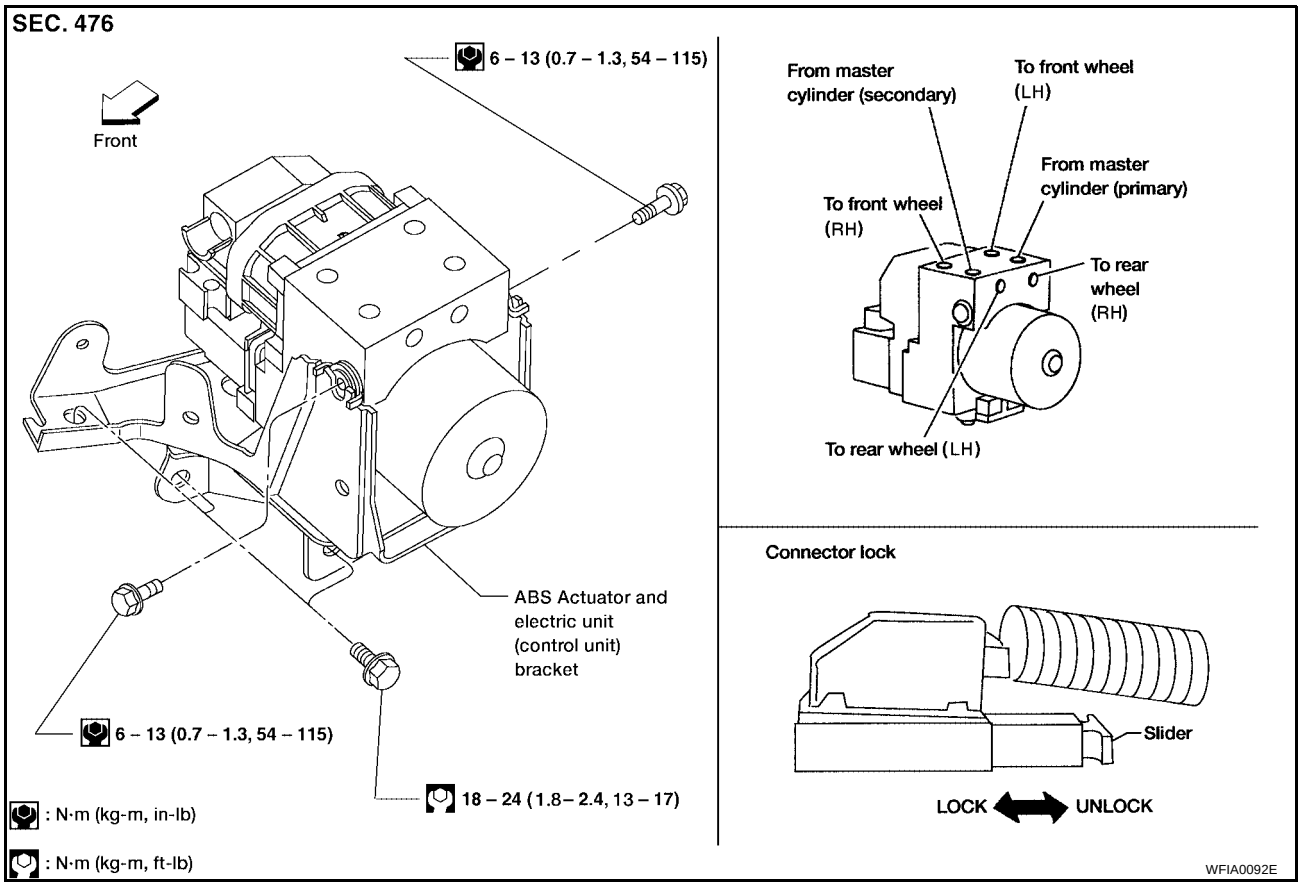
  CAUTION:
  Do not reuse sensor rotor. When installing, replace it with a new one.



- Press-fit sensor rotor as far as the location shown.



ACTUATOR



Removal

1. Disconnect negative battery cable.
2. Drain brake fluid. Refer to BR-6, "Changing Brake Fluid" .
3. Remove the A/C high pressure and A/C low pressure lines. Refer to MTC-80, "Removal and Installation" .
4. Remove strut tower bar (if equipped). Refer to FSU-5, "Components" .
5. Remove mounting bracket bolts.
6. Disconnect harness connector and brake lines.

Installation

1. Connect brake lines temporarily.
2. Tighten bolts.
3. Tighten brake lines.
4. Connect harness connector and negative battery cable.
5. Install strut tower bar (if equipped). Refer to FSU-5, "Components" .
6. Refill and bleed the brake fluid. Then bleed air. Refer to BR-7, "Bleeding Brake System" .
7. Install the A/C high pressure and A/C low pressure lines. Evacuate and recharge the A/C system. Refer to MTC-78, "Evacuating System and Charging Refrigerant" .

SECTION PS
POWER STEERING SYSTEM

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EGS000FE

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precautions for Steering System

EGS000FF

- **Before disassembly, thoroughly clean the outside of the unit.**
- **Disassembly should be done in a clean work area. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.**
- **For easier and proper assembly, place disassembled parts in order on a parts rack.**
- **Use nylon cloths or paper towels to clean the parts; common shop rags can leave lint that might interfere with their operation.**
- **Before inspection or reassembly, carefully clean all parts with a general purpose, non-flammable solvent.**
- **Before assembly, apply a coat of recommended Genuine NISSAN PSF or equivalent to hydraulic parts. Petroleum jelly may be applied to O-rings and seals. Do not use any grease.**
- **Replace all gaskets, seals and O-rings. Avoid damaging O-rings, seals and gaskets during installation. Perform functional tests whenever designated.**

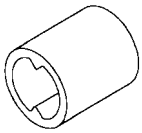
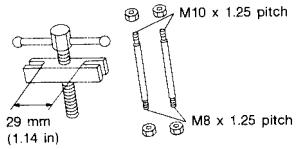
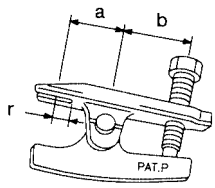
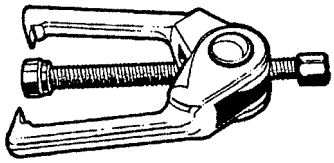
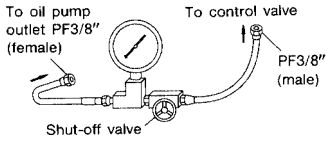
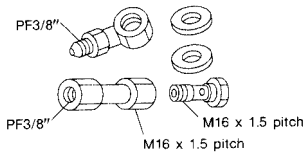
PREPARATION

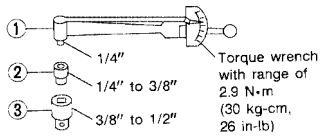
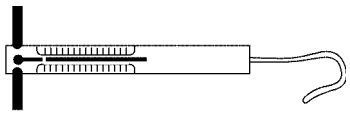
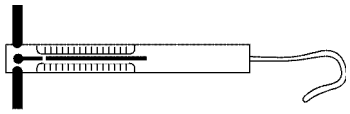
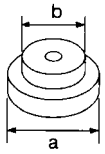
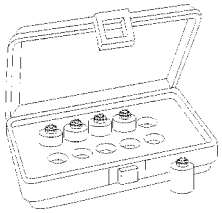
PFP:00002

Special Service Tools

EGS000FG

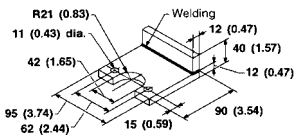
The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV48101100 (J26364) Torque adapter  NT169	Measuring pinion rotating torque
ST27180001 (J25726-B) Steering wheel puller  S-NT544	Removing steering wheel
HT72520000 (J25730-B) Ball joint remover  NT546	Removing tie-rod and lower ball joint **a: 33 mm (1.30 in)** **b: 50 mm (1.97 in)** **r: R11.5 mm (0.453 in)**
(J-24319-B) Tie rod puller  LGIA0007E	Remove outer tie rod
KV48103500 (J26357 and J26357-10) Pressure gauge  S-NT547	Measuring oil pressure
KV48102500 (J33914) Pressure gauge adapter  S-NT542	Measuring oil pressure

Tool number (Kent-Moore No.) Tool name		Description
ST3127S000 1 GG91030000 (See J25765-A) Torque wrench 2 HT62940000 (—) Socket adapter 3 HT62900000 (—) Socket adapter	 S-NT541	Measuring turning torque
(J44372) 5-60 Pound pull gauge	 WST052	Measuring steering wheel turning force
(J44183-A) 20-100 Pound pull gauge	 WST052	Measuring rack sliding force
ST35300000 (—) Drift	 NT073	Installing power steering pump oil seal **a: 49 mm (1.93 in) dia.** **b: 41 mm (1.61 in) dia.**
(J-44615) Air Bag Master Key Set	 LRS194	Removing and installing accessory air bag bolts.

Commercial Service Tool

EGS000FH

Tool number	Description
Power steering pump attachment  S-NT179	Disassembling and assembling power steering pump Unit: mm (in)
10 mm Drift LST027	Installing power steering pump snap ring

NOISE, VIBRATION, AND HARSHNESS(NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

EGS000FI

Use the chart below to help you find the cause of the symptom. If necessary, repair or replace these parts.

Possible cause and SUSPECTED PARTS			Fluid level	Air in hydraulic system	Tie-rod ball joint swinging force	Tie-rod ball joint rotating torque	Tie-rod ball joint end play	Steering gear fluid leakage	Steering wheel play	Steering gear rack sliding force	Drive belt looseness	Improper steering wheel	Improper installation or looseness or tilt lock lever	Mounting rubber deterioration	Steering column deformation or damage	Improper installation or looseness of steering column	Steering linkage looseness	DRIVE SHAFT	AXLE	SUSPENSION	TIRES	ROAD WHEEL	BRAKES
Reference page			Refer to PS-8	Refer to PS-8	Refer to PS-19	Refer to PS-19	Refer to PS-19	Refer to PS-8	Refer to PS-7	Refer to PS-9	MA-16, "Checking Drive Belts", MA-23, "Checking Drive Belts"	Refer to PS-11	Refer to PS-14	Refer to PS-8	Refer to PS-14	Refer to PS-12	Refer to PS-12	FAX-4, "NVH Troubleshooting Chart"	FAX-4, "NVH Troubleshooting Chart"	FSU-4, "NVH Troubleshooting Chart"	WT-2, "NVH Troubleshooting Chart"	WT-2, "NVH Troubleshooting Chart"	BR-5, "NVH Troubleshooting Chart"
Symptom	STEERING	Noise	×	×	×	×	×	×	×	×	×							×	×	×	×	×	×
		Shake										×	×	×				×	×	×	×	×	×
		Vibration										×	×	×	×	×		×	×	×	×		
		Shimmy										×	×	×			×		×	×	×	×	×
		Judder												×			×		×	×	×	×	×

×: Applicable

ON-VEHICLE SERVICE

PFP:00000

Checking Steering Wheel Play

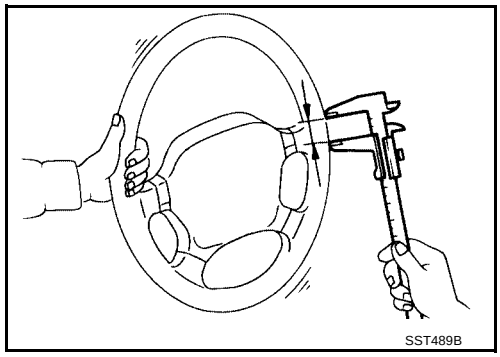
EGS000FJ

- With wheels in a straight-ahead position, check steering wheel play.

Steering wheel play **: 35 mm (1.38 in) or less**

- If it is not within specification, check the following for loose or worn components:

– Steering gear assembly
– Steering column
– Front suspension and axle



Checking Neutral Position on Steering Wheel

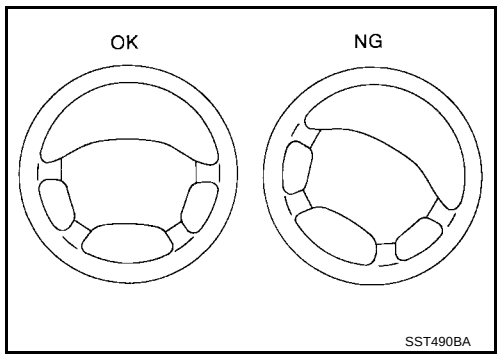
EGS000FK

PRE-CHECKING

- Make sure that wheel alignment is correct.

Wheel alignment **: Refer to FSU-6, "Front Wheel Alignment"**

- Verify that the steering gear is centered before removing the steering wheel.



CHECKING

1. Check that the steering wheel is in the neutral position when driving straight ahead.
2. If it is not in the neutral position, remove the steering wheel and reinstall it correctly.
3. If the neutral position is between two teeth, loosen tie-rod lock nuts. Turn the tie-rods by the same amount in opposite directions on both left and right sides.

Front Wheel Turning Angle

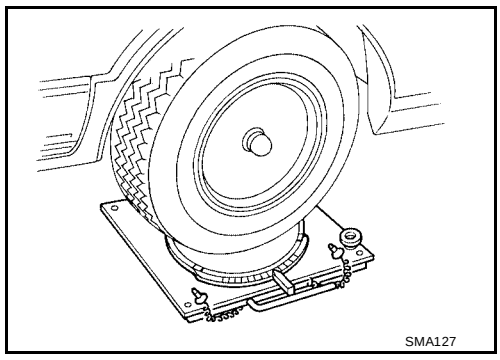
EGS000FL

1. Rotate steering wheel all the way right and left; measure turning angle.

Turning angle of full turns **: Refer to FSU-6, "Front Wheel Alignment"**

2. If it is not within specification, check rack stroke.

Rack stroke “S” **: Refer to PS-27, "Steering Gear and Linkage"**

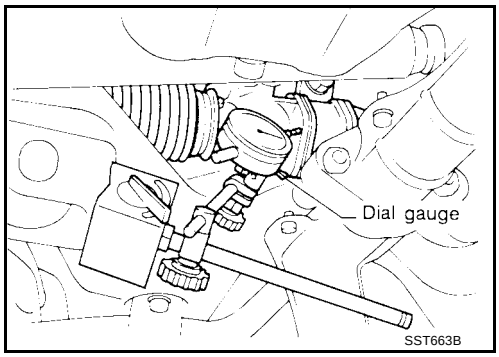


Checking Gear Housing Movement

EGS000FM

1. Check the movement of steering gear housing during stationary steering on a dry paved surface.
   - Apply a force of 49 N (5 kg, 11 lb) to steering wheel to check the gear housing movement.
     Turn off ignition key while checking.

     Movement of gear housing : ±2 mm (±0.08 in) or less
2. If movement exceeds the limit, replace mount insulator after confirming proper installation of gear housing clamps.



Checking and Adjusting Drive Belts

EGS000FN

Refer to MA-16, "Checking Drive Belts" (QG18DE), MA-23, "Checking Drive Belts" (QR25DE).

Checking Fluid Level

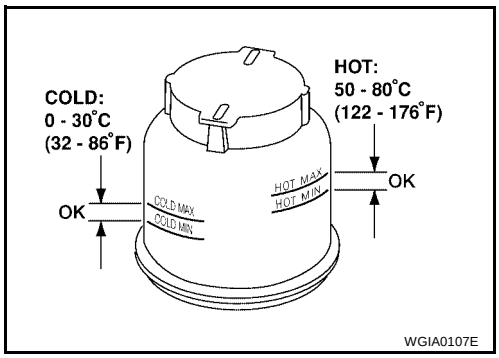
EGS000FO

Check fluid level, referring to the scale on reservoir tank.

- Use “HOT” range for fluid temperatures of 50 - 80°C (122 - 176°F).
- Use “COLD” range for fluid temperatures of 0 - 30°C (32 - 86°F).

CAUTION:

- **Do not overfill.**
- **Recommended fluid is Genuine NISSAN PSF or equivalent. Refer to MA-13, "Fluids and Lubricants" .**



Checking Fluid Leakage

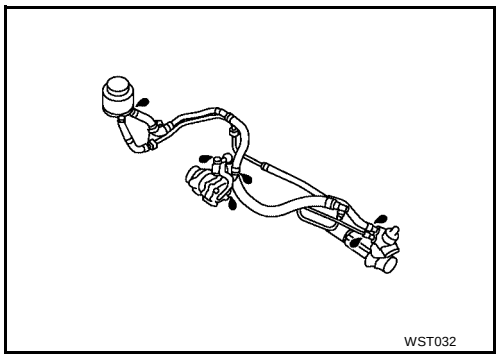
EGS000FP

Check the lines for improper attachment and for leaks, cracks, damage, loose connections, chafing and deterioration.

1. Run engine between idle speed and 1,000 rpm.
   - Make sure temperature of fluid in oil tank rises to 60 - 80°C (140 - 176°F).
2. Turn steering wheel right-to-left several times.
3. Hold steering wheel at each “lock” position for five seconds and carefully check for fluid leakage.

   CAUTION:
   Do not hold the steering wheel in a locked position for more than 15 seconds.
4. If fluid leakage at connectors is noticed, shut off engine, then loosen and retighten flare nut.

   CAUTION:
   Do not overtighten connector as this can damage O-ring, washer and connector.
5. If fluid leakage from power steering pump is noticed, check power steering pump. Refer to PS-22, "PRE-DISASSEMBLY INSPECTION" .
6. Check dust boots for accumulation of power steering fluid.



Bleeding Hydraulic System

EGS000FQ

1. Raise front end of vehicle until wheels are clear of the ground.
2. Add fluid into reservoir tank to specified level. Then quickly turn steering wheel fully to right and left and lightly touch steering stoppers.
3. Repeat steering wheel operation until fluid level no longer decreases.
4. Start engine and repeat step 2 above.
   - If any of the following occurs, bleed air again:

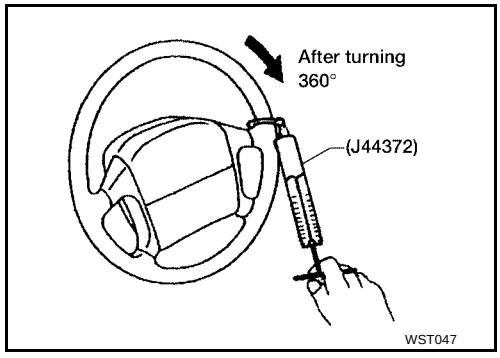
- Air bubbles in reservoir tank
- Clicking noise in oil pump
- Excessive buzzing in oil pump

Fluid noise may occur in the valve or oil pump. This is common when the vehicle is stationary or while turning the steering wheel slowly. This does not affect the performance or durability of the system.

Checking Steering Wheel Turning Force

EGS000FR

1. Park vehicle on a level, dry surface and set parking brake.
2. Start engine.
3. Bring power steering fluid up to adequate operating temperature. [Make sure temperature of fluid is approximately 60 - 80°C (140 - 176°F).]
4. Check steering wheel turning force using Tool when steering wheel has been turned 360° from the neutral position.



NOTE:
Tires need to be inflated to normal pressure.

Tool number : J-44372-A

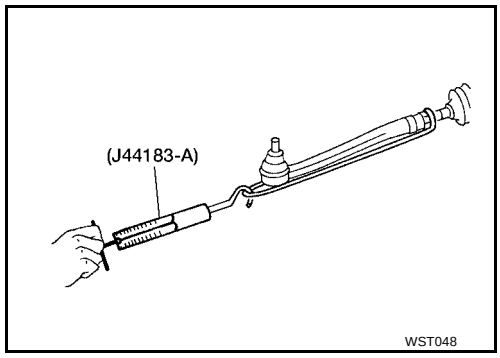
Steering wheel turning force : 39 N (4 kg, 9 lb) or less

5. If steering wheel turning force is out of specification, check rack sliding force as follows.

a. Disconnect steering column lower joint and knuckle arms from the gear.

b. Start and run engine at idle to make sure steering fluid has reached normal operating temperature.

c. Pull tie-rod using Tool slowly to move it from neutral position to ±11.5 mm (±0.453 in) at speed of 3.5 mm (0.138 in)/s. Check that rack sliding force is within specification.



Tool number : J-44183-A

Average rack sliding force (QG18DE models)	**: 140 - 330 N (14.3 - 33.6 kg, 31.5 - 74.1 lb)**
Average rack sliding force (QR25DE models)	**: 160 - 350 N (16.3 - 35.7 kg, 36.0 - 78.7 lb)**
Maximum force deviation	**: 98 N (10 kg, 22 lb)**

d. Check sliding force outside the above range at rack speed of 40 mm (1.75 in)/s.

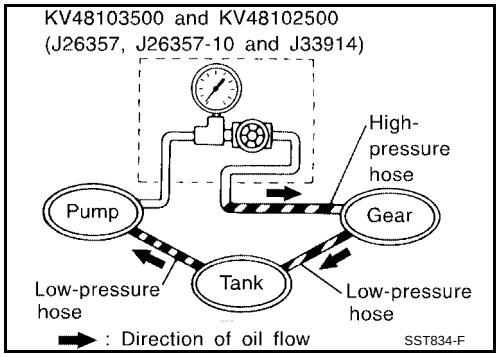
Maximum rack sliding force	**: Not more than 294 N (30 kg, 66 lb)**
Maximum force deviation	**: 147 N (15 kg, 33 lb)**

6. If rack sliding force is not within specification, overhaul steering gear assembly.
7. If rack sliding force is OK, inspect steering column. Refer to PS-14, "Inspection" .

Checking Hydraulic System

EGS000FS

Before starting, check belt tension, driving pulley and tire pressure.



1. Set Tool. Open shut-off valve. Then bleed air. Refer to PS-8, "Bleeding Hydraulic System" .

   Tool numbers : KV48103500 (J-26357 and J-26357-10)
   : KV48102500 (J-33914)

2. Run engine at idle speed or 1,000 rpm.

   NOTE:
   Make sure temperature of fluid in tank rises to 60 - 80°C (140 - 176°F).

   WARNING:
   Warm up engine with shut-off valve fully opened. If engine is started with shut-off valve closed, fluid pressure in oil pump increases to maximum. This will raise oil temperature abnormally.

3. Check pressure with steering wheel fully turned to left and right positions with engine idling at 1,000 rpm.

   CAUTION:
   Do not hold the steering wheel in a locked position for more than 15 seconds.

   Oil pump maximum standard pressure

   QG18DE : 7,649 - 8,238 kPa (78 - 84 kg/cm^2 , 1,109 - 1,194 psi)

   QR25DE : 8,000 - 8,800 kPa (82 - 90 kg/cm^2 , 1,160 - 1,276 psi)

   - If pressure reaches maximum operating pressure, system is OK.
   - If pressure increases above maximum operating pressure, check power steering pump flow control valve. Refer to PS-22, "Disassembly and Assembly" .

4. If power steering pressure is below the maximum operating pressure, slowly close shut-off valve and check pressure again.

   CAUTION:
   Do not close shut-off valve for more than 15 seconds.

   - If pressure increases to maximum operating pressure, gear is damaged. Refer to PS-16, "Removal and Installation" .
   - If pressure remains below maximum operating pressure, pump is damaged. Refer to PS-23, "DISASSEMBLY" .

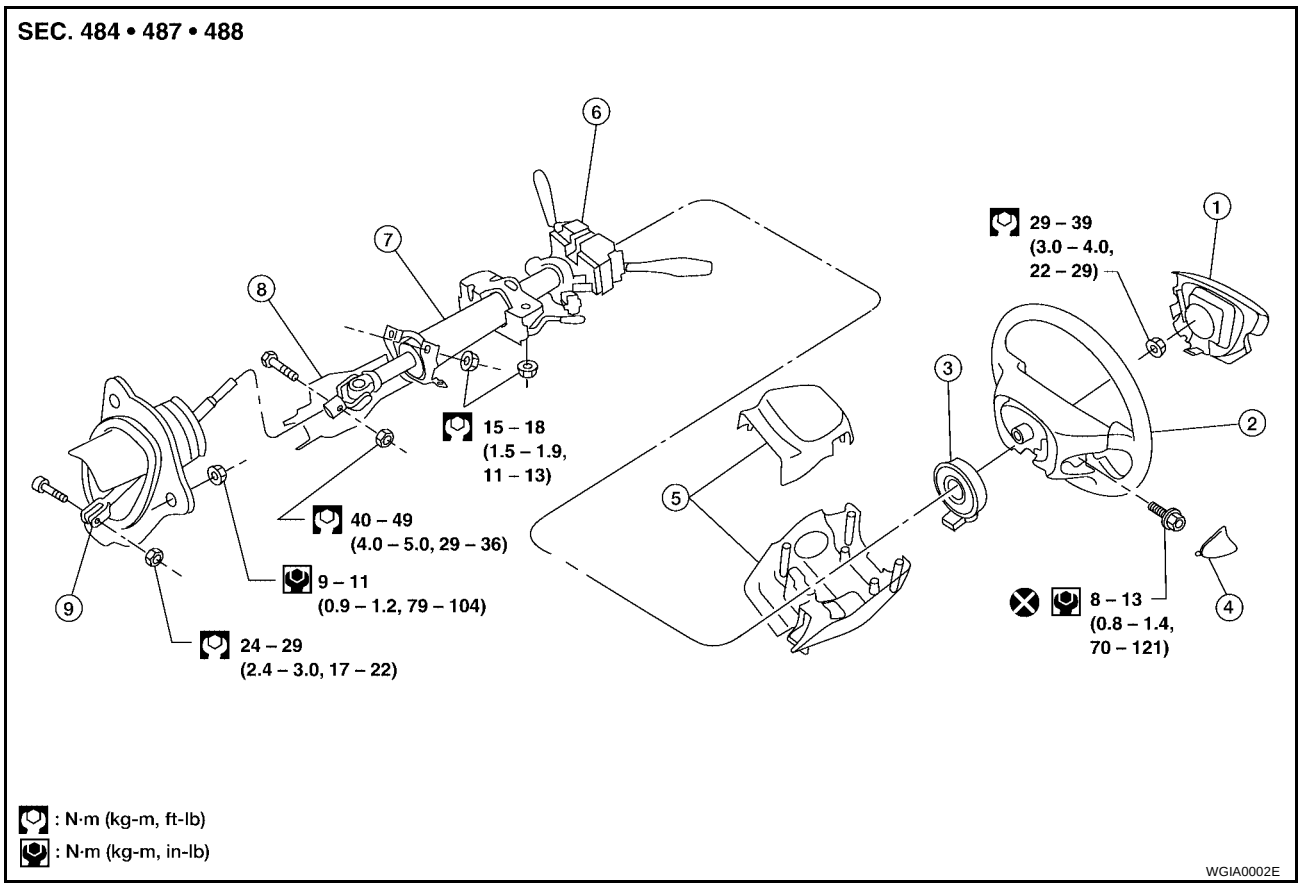
5. After checking hydraulic system, remove Tool and add fluid as necessary. Then completely bleed air out of system. Refer to PS-8, "Bleeding Hydraulic System" .

STEERING WHEEL AND STEERING COLUMN

PFP:48430

Components

EGS000FT



1. Air bag module
2. Steering wheel
3. Spiral cable
4. Side lid LH
5. Column cover
6. Combination switch
7. Steering column assembly
8. Steering column lower cover
9. Lower joint

CAUTION:

- **The rotation of the spiral cable (SRS "Air bag" component part) is limited. If the steering gear must be removed, set the front wheels in the straight-ahead direction. Do not rotate the steering column while the steering gear is removed.**
- **Remove the steering wheel before removing the steering lower joint to avoid damaging the SRS spiral cable.**

Removal and Installation

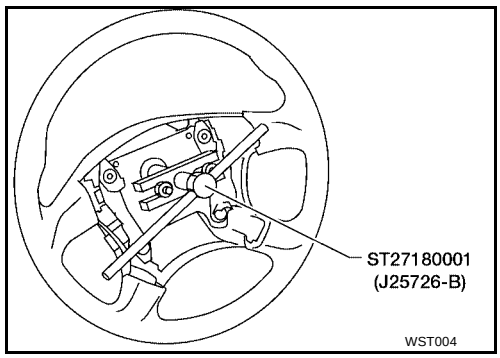
EGS000FU

STEERING WHEEL

1. Remove air bag module. Refer to SRS-41, "Removal and Installation" .
2. Remove steering wheel mounting nut.
3. Remove steering wheel using Tool.

Tool number : ST27180001 (J25726-B)

4. Installation is in the reverse order of removal.



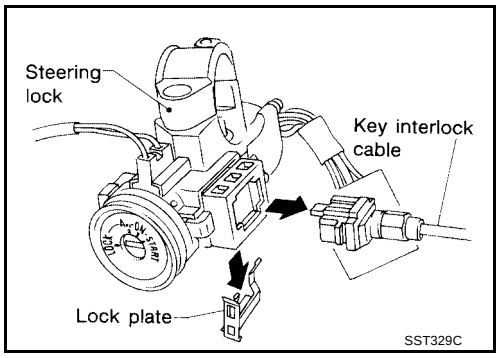
STEERING COLUMN

Removal

CAUTION:

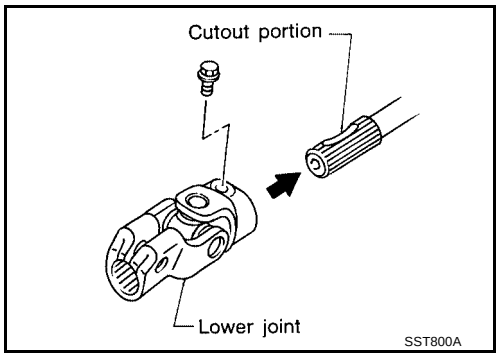
- **The rotation of the spiral cable (SRS “Air Bag” component part) is limited. If the steering gear must be removed, set the front wheels in the straight-ahead direction. Do not rotate the steering column while the steering gear is removed.**
- **Remove the steering wheel before removing the steering lower joint to avoid damaging the SRS spiral cable.**

1. Disconnect the battery negative terminal.
2. Remove the steering wheel. Refer to PS-11, "STEERING WHEEL" .
3. Removal spiral cable. Refer to SRS-43, "Removal and Installation" .
4. Disconnect data link connector.
5. Remove lower instrument panel and lower reinforcement panel. Refer to IP-10, "Removal and Installation" .
6. Remove the column covers.
7. Disconnect electrical connectors.
8. Remove three screws securing combination switch and remove combination switch.
9. Remove key interlock cable (A/T models).
10. Remove the hole cover, then remove bolt from lower joint.
11. Remove the steering column lower cover.
12. Remove four nuts securing steering column and remove steering column.



Installation

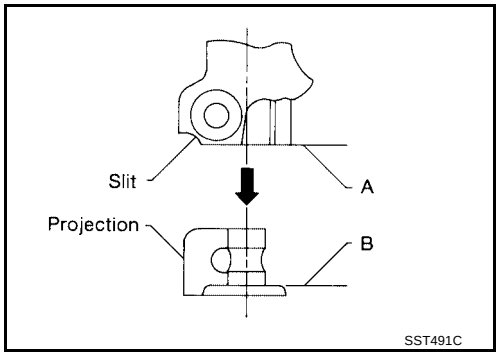
1. Installation is the reverse order of removal.
   - When installing steering column, finger tighten all lower bracket and clamp retaining bolts; then tighten them securely. Do not apply undue stress to steering column.
   - When attaching coupling joint, be sure tightening bolt faces cutout portion.



   - Align slit of lower joint with projection on dust cover. Insert joint until surface A contacts surface B.

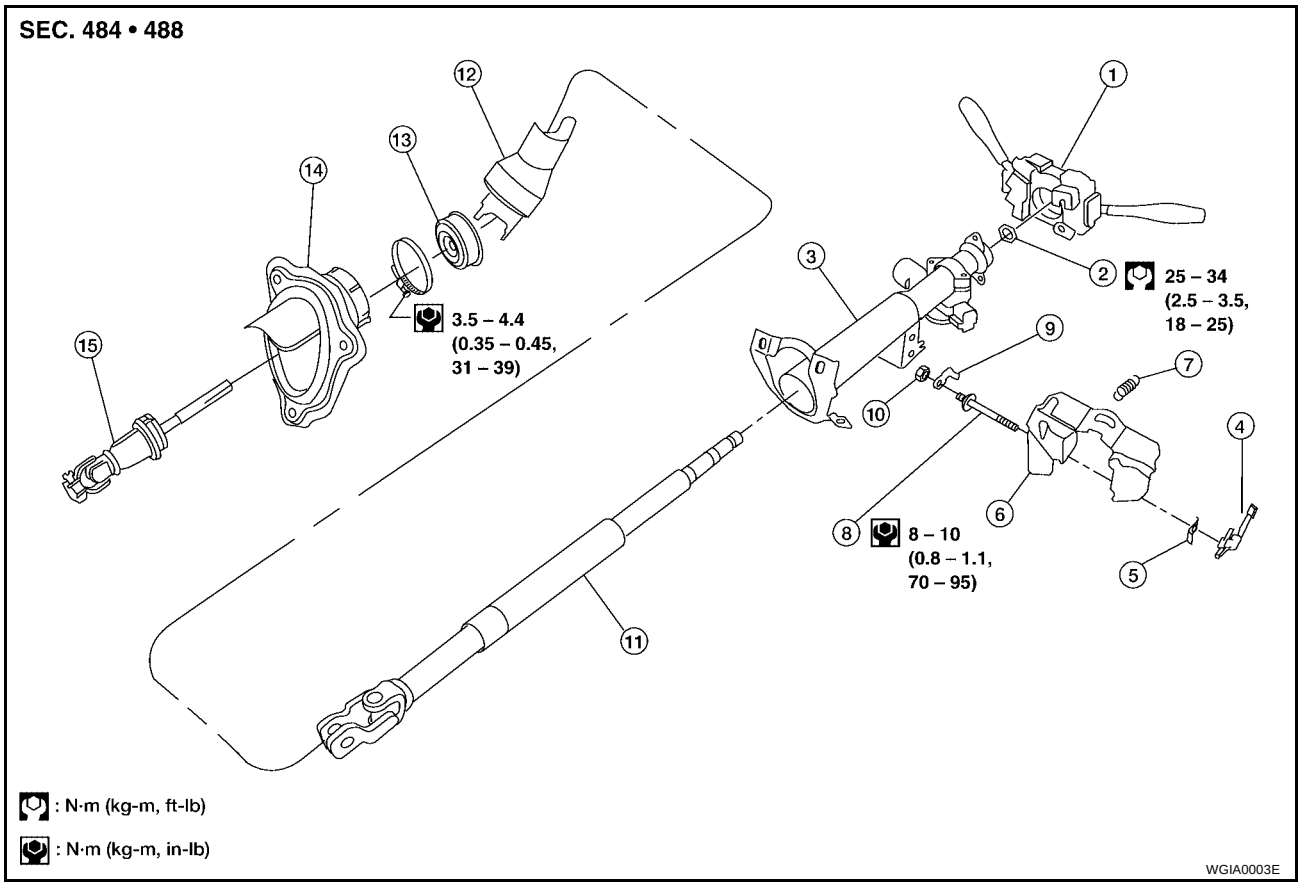
CAUTION:

After installation, turn steering wheel to make sure it moves smoothly. Ensure the number of turns are the same from the straight forward position to left and right locks. Be sure that the steering wheel is in a neutral position when driving straight ahead.



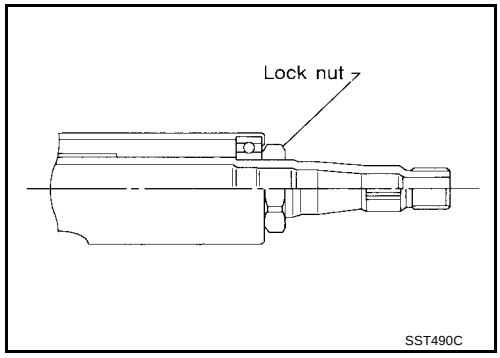
Disassembly and Assembly

EGS000FV



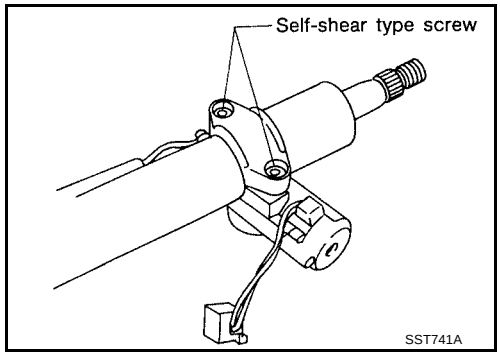
1. Combination switch
2. Lock nut
3. Jacket tube assembly
4. Tilt lever
5. Tilt lever stopper
6. Steering column mounting bracket
7. Spring
8. Adjust bolt
9. Adjust bolt stopper
10. Nut
11. Column shaft assembly
12. Steering column lower cover
13. Hole cover seal
14. Hole cover
15. Lower joint

- When disassembling and assembling, unlock steering lock with key.
- Install lock nut on steering column shaft and tighten the nut.

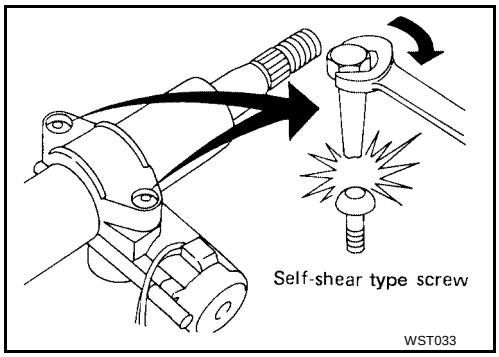


- Steering lock:

– Break self-shear type screws using a drill or other appropriate tool.



– Install new self-shear type screws, then tighten until screw heads break off.



Inspection

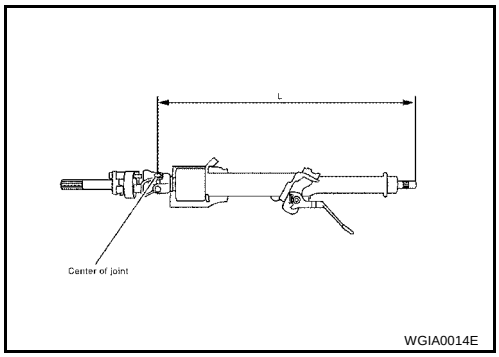
EGS000FW

- When steering wheel does not turn smoothly, check the steering column as follows and replace damaged parts.

– Check column bearings for damage or unevenness. Lubricate with recommended multi-purpose grease or replace steering column as an assembly, if necessary.

– Check jacket tube for deformation or breakage. Replace if necessary.

- When the vehicle comes into a light collision, check length “L”.

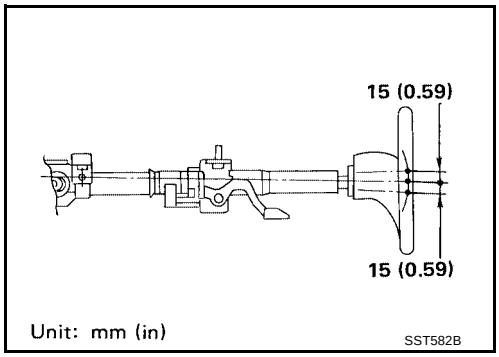


Steering column length “L” : 542 - 544 mm (21.34 - 21.42 in)

If out of specification, replace steering column as an assembly.

TILT MECHANISM

- After installing steering column, check tilt mechanism operation.



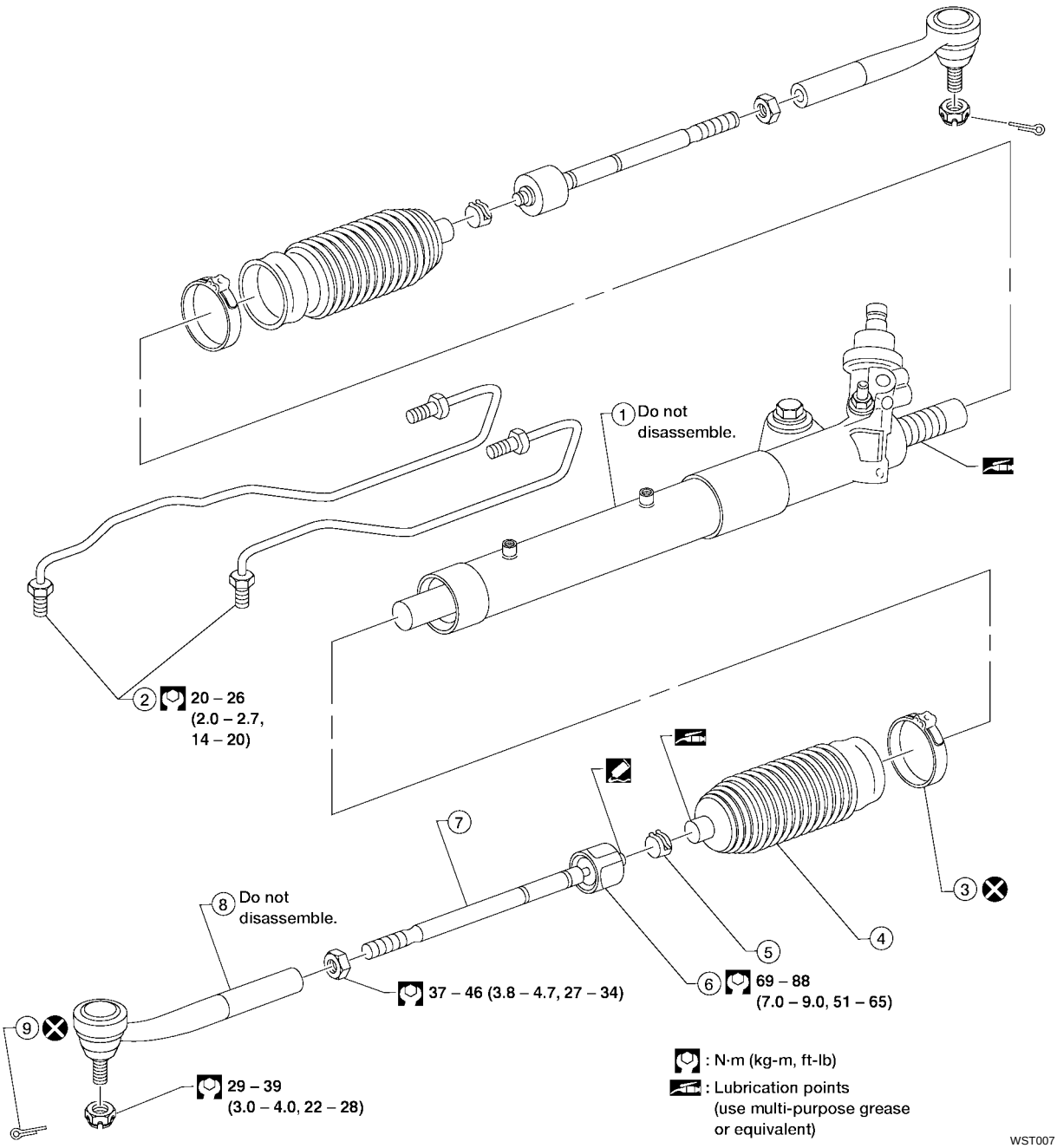
POWER STEERING GEAR AND LINKAGE

PFP:49001

Components

EGS000FX

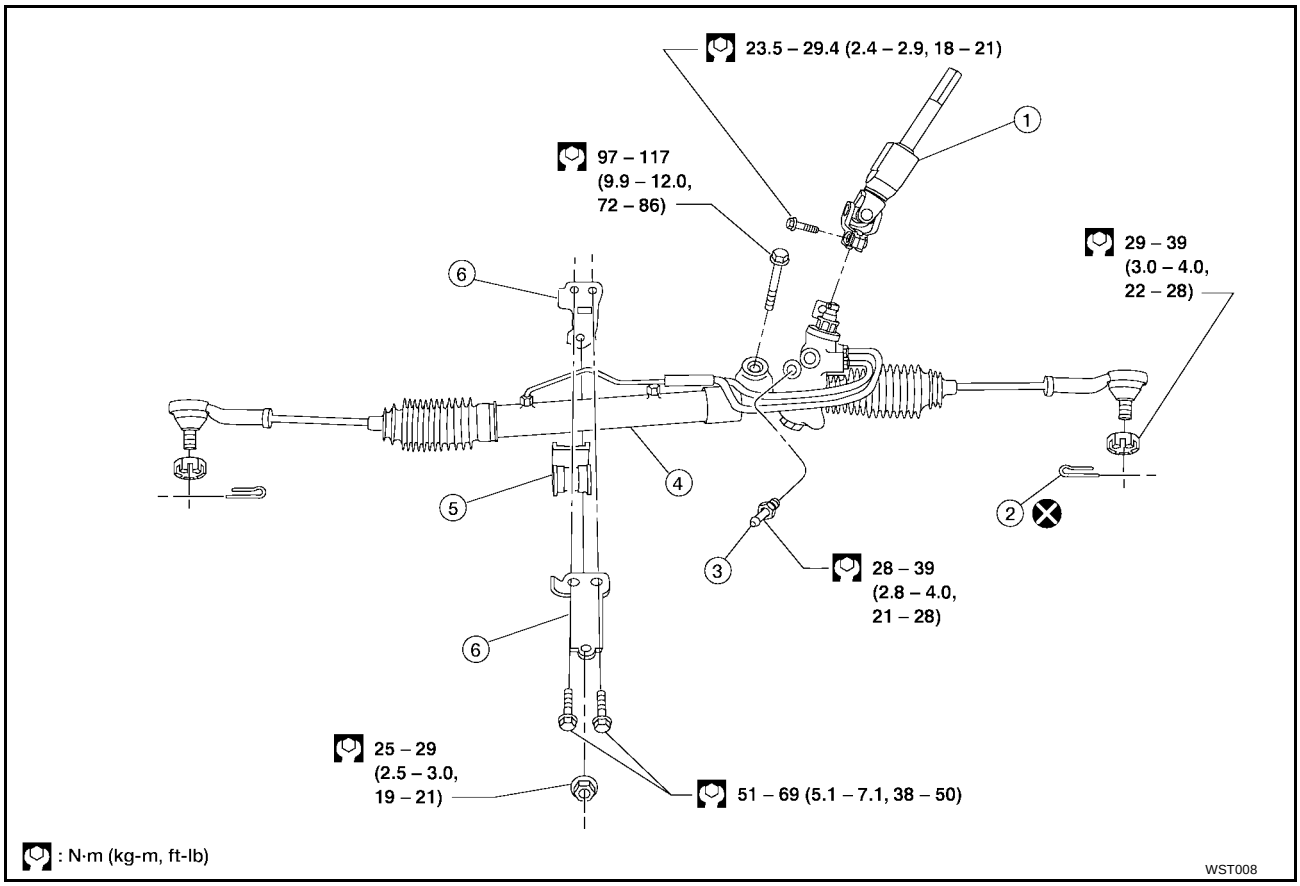
SEC. 492



1. Steering gear
2. Gear housing tube
3. Boot clamp
4. Dust boot
5. Boot band
6. Tie-rod inner socket
7. Tie-rod
8. Tie-rod outer socket
9. Cotter pin

Removal and Installation

EGS000FY



1. Lower joint
2. Cotter pin
3. Low pressure line fitting
4. Gear and linkage assembly
5. Rack mounting insulator
6. Gear housing mounting bracket

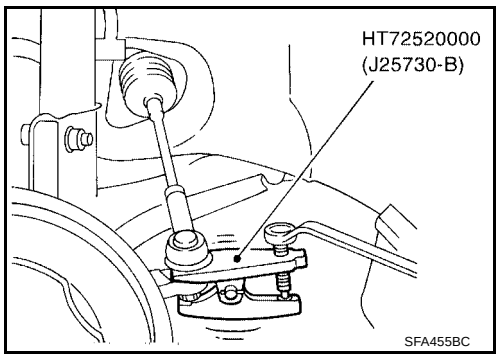
REMOVAL

CAUTION:

- **The rotation of the spiral cable (SRS "Air bag" component part) is limited. If the steering gear must be removed, set the front wheels in the straight-ahead direction. Do not rotate the steering column while the steering gear is removed.**
- **Remove the steering wheel before removing the steering lower joint to avoid damaging the SRS spiral cable.**

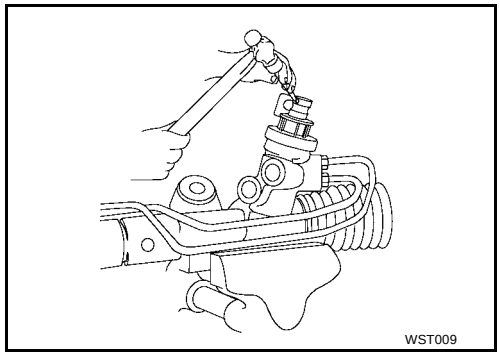
1. Remove the front wheels and tires.
2. Drain the power steering fluid.
3. Remove the tie-rod outer socket nut and separate the tie-rod from the knuckle using Tool.

   Tool number : HT72520000 (J25730-B)

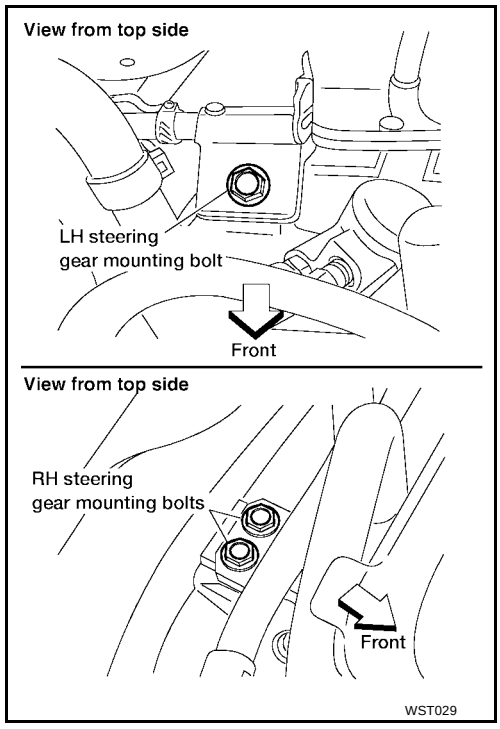


4. Disconnect the high pressure line connector.

5. Disconnect the steering gear lower joint.
   - Before removing lower joint from gear, set gear in neutral (wheels in straight-ahead position). After removing lower joint, put matching mark on pinion shaft and pinion housing to record neutral position.



6. Position the bracket for the hoses and harness aside.
7. If necessary, remove the low pressure line fitting.
8. Disconnect the heated oxygen sensor 2 electrical connector.
9. Remove the steering gear mounting bolts.
10. Remove the steering gear through the passenger side.



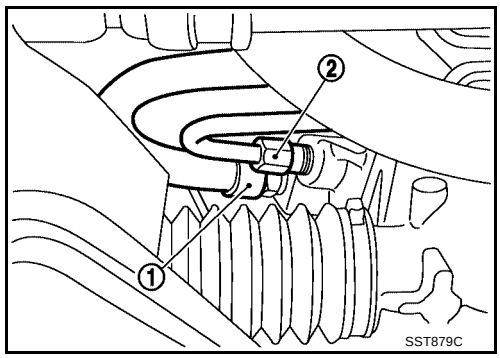
INSTALLATION

Installation is the reverse order of removal.

- Install the low pressure line fitting.
- Observe specified tightening torque when tightening high pressure line connector and low pressure line fitting. Excessive tightening will damage threads of connector or O-ring.

Tightening torque

Low pressure line fitting (1)	**: 28 - 39 N·m (2.8 - 4.0 kg-m, 21 - 28 ft-lb)**
High pressure side (2)	**: 15 - 25 N·m (1.5 - 2.5 kg-m, 11 - 18 ft-lb)**

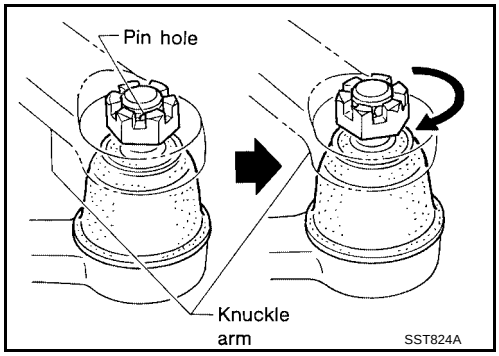


- The O-ring in low pressure line fitting is larger than that in high pressure connector. Take care to install the proper O-ring.

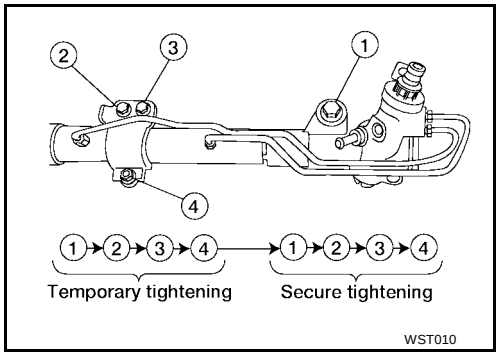
- Initially, tighten tie-rod outer socket nut. Then tighten further to align nut groove with first pin hole so that cotter pin can be installed.

  Tie rod outer socket nut : 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 28 ft-lb)

  CAUTION:
  Tightening torque must not exceed 49 N·m (5 kg-m, 36 ft-lb).
- To install, set left and right dust boots to equal deflection. Attach lower joint by aligning matching marks of pinion shaft and pinion housing.



- Tighten gear housing mounting bracket bolts and nut in the order shown.



Disassembly

EGS000FZ

1. Prior to disassembling, measure pinion rotating torque using Tools.

   Tool numbers : KV48101100 (J26364)
   : ST3127S000 (25765-A)

   Within ±100° from the neutral position

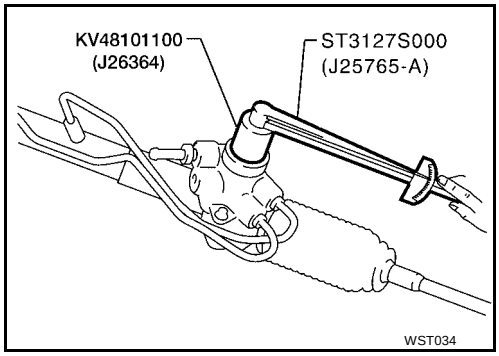
   Average rotating torque : 0.6 - 2.0 N·m (7 - 20 kg-cm, 6 - 17 in-lb)

   Maximum torque deviation : 0.5 N·m (7 kg-cm, 5.8 in-lb)

   Except for above measuring range

   Maximum rotating torque : 1.9 N·m (19 kg-cm, 17 in-lb)

   Maximum torque deviation : 0.65 N·m (7 kg-cm, 6 in-lb)



   - **If pinion rotating torque is not within the specifications, replace steering gear assembly.**
   - **Before measuring, disconnect gear housing tube and drain fluid.**
   - **Use soft jaws when holding steering gear housing. Handle gear housing carefully, as it is made of aluminum. Do not grip cylinder in a vise.**
2. Remove tie-rod outer sockets and dust boots.
3. Remove tie-rod inner sockets.

Inspection

EGS000G0

Thoroughly clean all parts in cleaning solvent or Genuine NISSAN PSF or equivalent, refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" . Blow dry with compressed air, if available.

BOOT

- Check condition of boot. If cracked excessively, replace it.
- Check boots for accumulation of power steering fluid.

TIE-ROD OUTER AND INNER SOCKETS

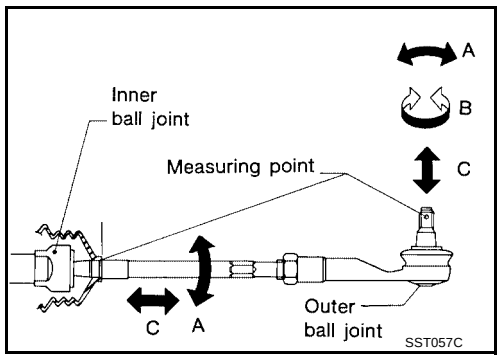
- Check outer and inner ball joints for swinging force “A” and axial end play “C”.

  Refer to PS-27, "Steering Gear and Linkage" .

- Check outer ball joint for rotating torque “B”.

  Refer to PS-27, "Steering Gear and Linkage" .

- Check condition of dust cover. If excessively cracked, replace outer tie-rod.

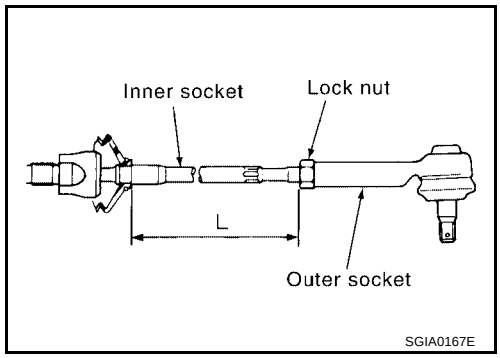


EGS000G1

Assembly

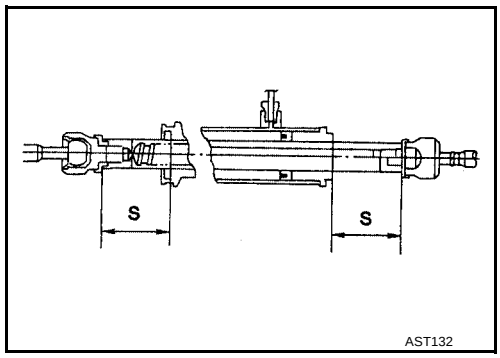
1. Install tie-rod inner sockets, dust boots and outer sockets.
2. Tighten outer socket lock nut.

Tie-rod length “L” : Refer to PS-27, "Steering Gear and Linkage" .

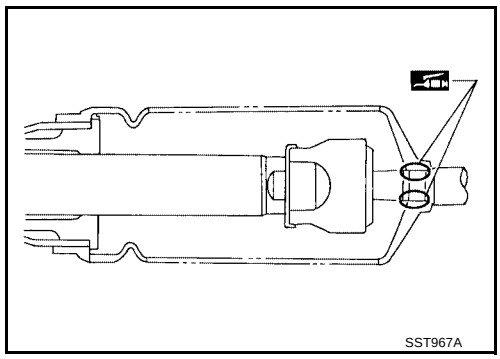


3. Measure rack stroke.

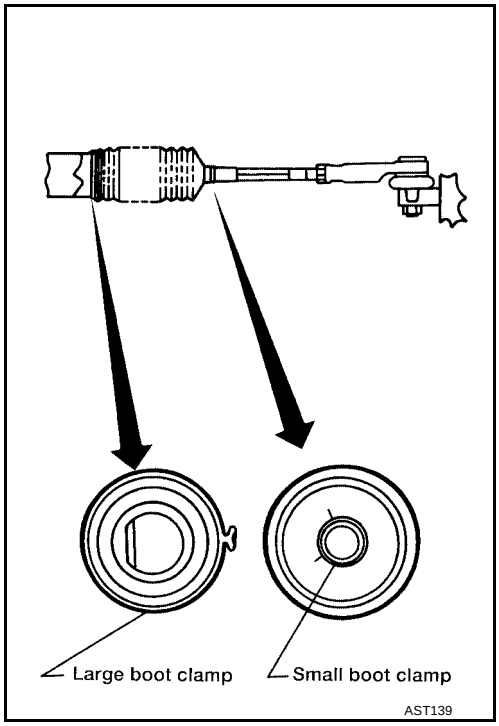
Rack stroke “S” : Refer to PS-27, "Steering Gear and Linkage" .



4. Before installing boot, coat the contact surfaces between boot and tie-rod with grease.



5. Install boot clamps.
   - Install large boot clamp using suitable tool and crimp securely.
   - Install small boot clamp as shown.



POWER STEERING OIL PUMP

PFP:49110

Removal and Installation

EGS000IQ

REMOVAL

1. Remove the reservoir tank.
2. Remove the engine undercover.
3. Remove the drive belts. Refer to MA-16, "Checking Drive Belts" (QG18DE) or MA-23, "Checking Drive Belts" (QR25DE) for routing.
4. Remove the front exhaust tube. Refer to EX-3, "Removal and Installation" .
5. Disconnect the high pressure line connector.
6. Disconnect the low pressure hose.
7. Remove the power steering through bolt and the power steering pump.

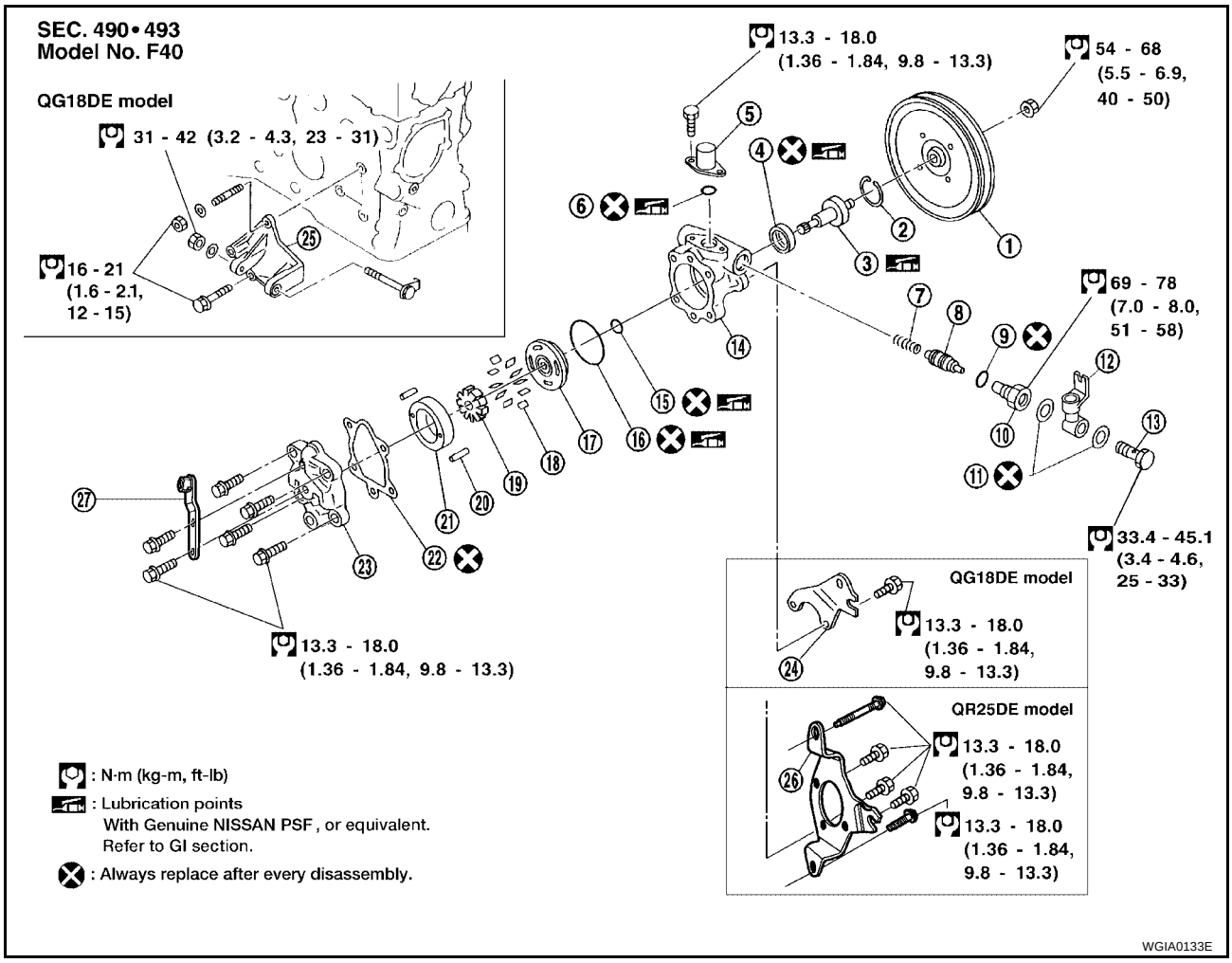
INSTALLATION

Installation is in the reverse order of removal.

- Refer to PS-22, "Disassembly and Assembly" for tightening specifications.

Disassembly and Assembly

EGS000G2

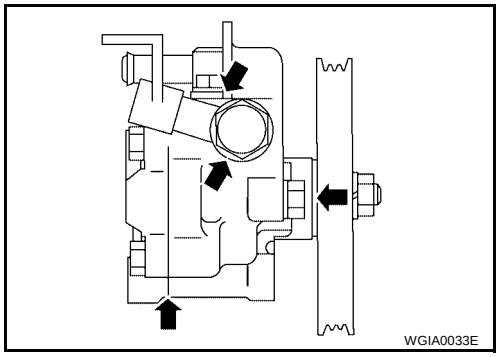


1. Pulley	2. Snap ring	3. Drive shaft
4. Oil seal	5. Suction pipe	6. O-ring
7. Spring	8 Flow control valve	9. O-ring
10. Connector	11. Washer	12. Joint
13. Connector bolt	14. Pump case	15. O-ring
16. O-ring	17. Front side plate	18. Vane
19. Rotor	20. Pin	21. Cam ring
22. Gasket	23. Rear cover	24. Mounting bracket
25. Power steering pump bracket	26. Mounting bracket	27. Mounting bracket

PRE-DISASSEMBLY INSPECTION

Disassemble the power steering oil pump only if the following items are found.

- Fluid leak from any point shown in the figure.
- Deformed or damaged pulley
- Poor performance

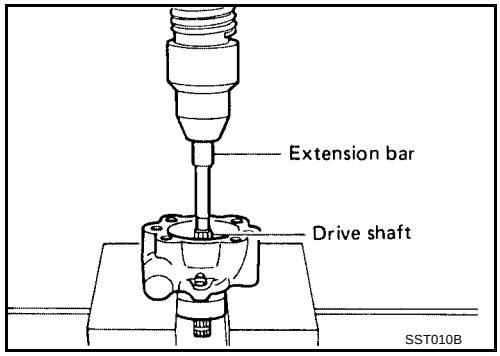


DISASSEMBLY

CAUTION:

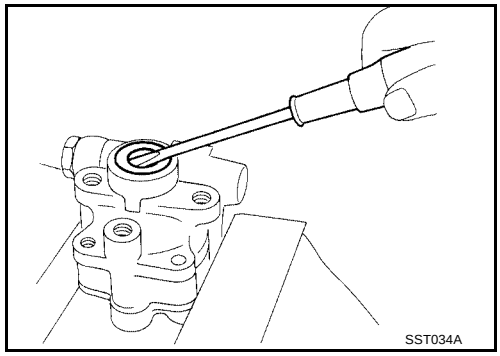
- **Parts which can be disassembled are strictly limited. Never disassemble parts other than those specified.**
- **Disassemble in as clean a place as possible.**
- **Clean your hands before disassembly.**
- **Do not use rags; use nylon cloths or paper towels.**
- **Refer to PS-2, "Precautions for Steering System" .**
- **When disassembling and reassembling, do not let foreign matter enter or contact the parts.**
- Remove snap ring, then press the drive shaft out.

  CAUTION:
  Be careful not to drop drive shaft.



- Remove oil seal using suitable tool.

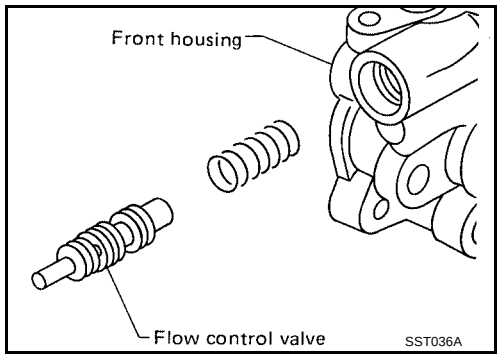
  CAUTION:
  Be careful not to damage front housing.



- Remove connector and flow control valve with spring.

  CAUTION:
  Be careful not to drop flow control valve.

  NOTE:
  Do not disassemble flow control valve.



INSPECTION

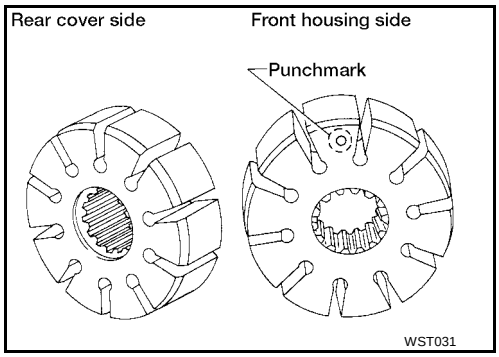
- If pulley is cracked or deformed, replace it.
- If an oil leak is found around pulley shaft oil seal, replace the seal.
- If serration on pulley or pulley shaft is deformed or worn, replace it.

ASSEMBLY

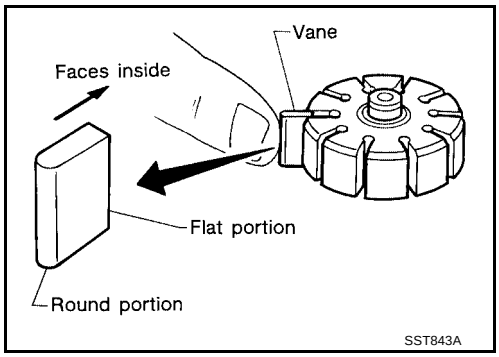
Assemble oil pump, noting the following.

- Make sure O-rings and oil seal are properly installed.
- Always install new O-rings and oil seal.
- Be careful of oil seal direction.
- Cam ring, rotor and vanes must be replaced as a set if necessary.

- Coat each part with Genuine NISSAN PSF or equivalent, refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" , when assembling.
- Pay attention to the direction of rotor.

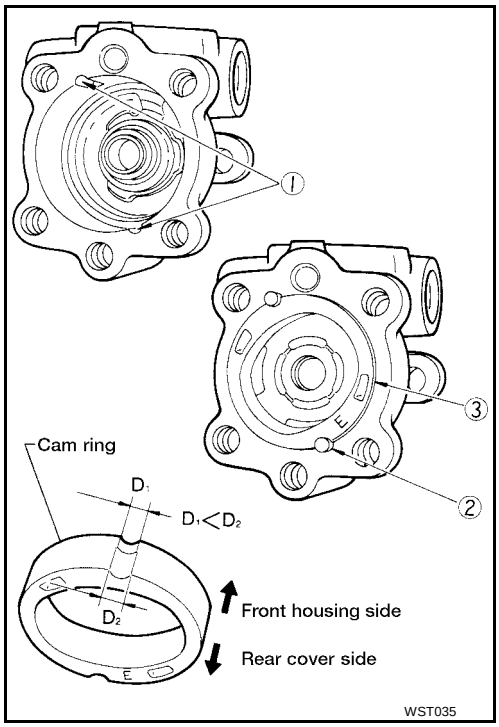


- When assembling vanes to rotor, flat surfaces of vanes must face inside of rotor (rounded surfaces of vanes face cam ring side).



- Insert pin 2 into pin groove 1 of front housing and front side plate. Then install cam ring 3 as shown at left.

Cam ring : D_1 is less than D_2 .



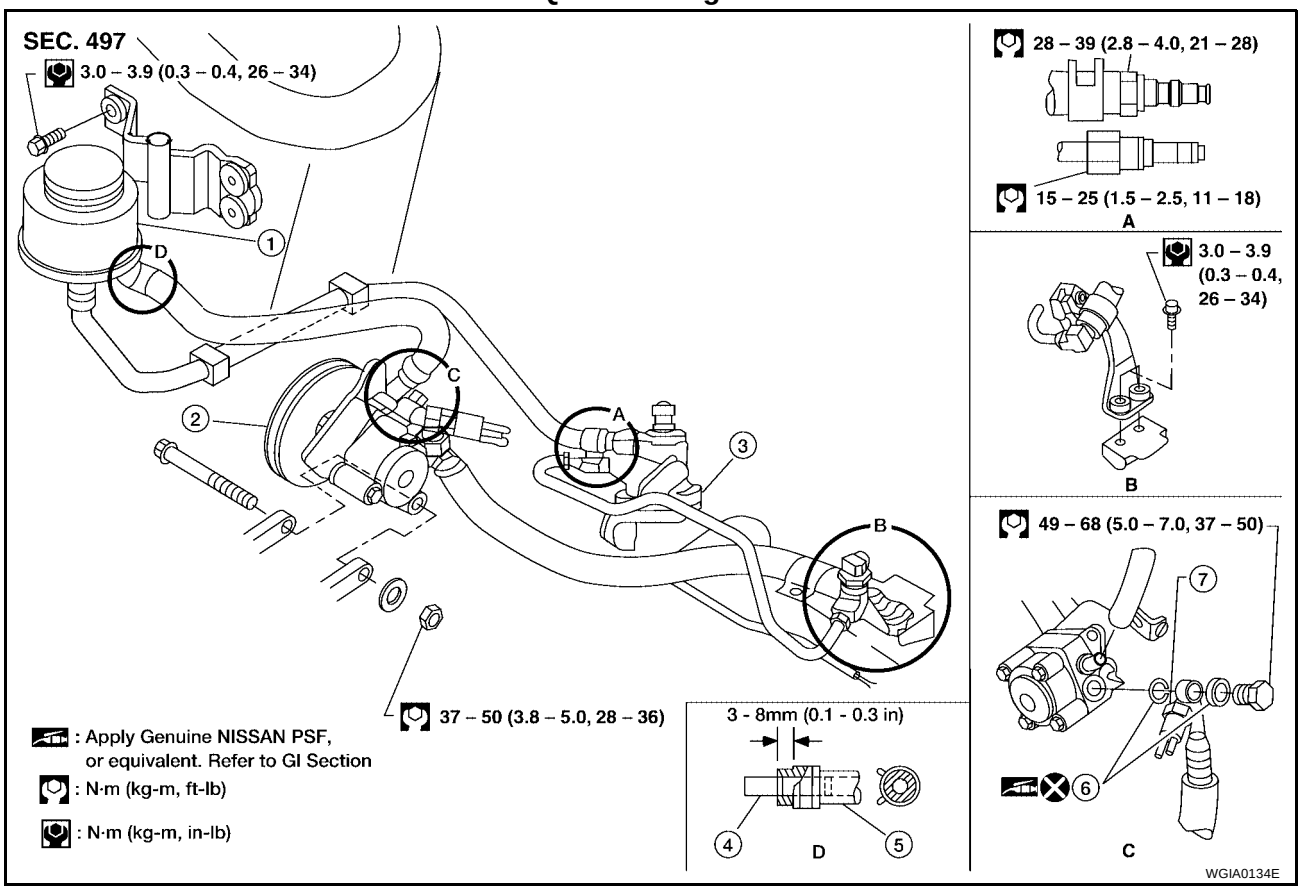
HYDRAULIC LINE

PFP:49721

Removal and Installation

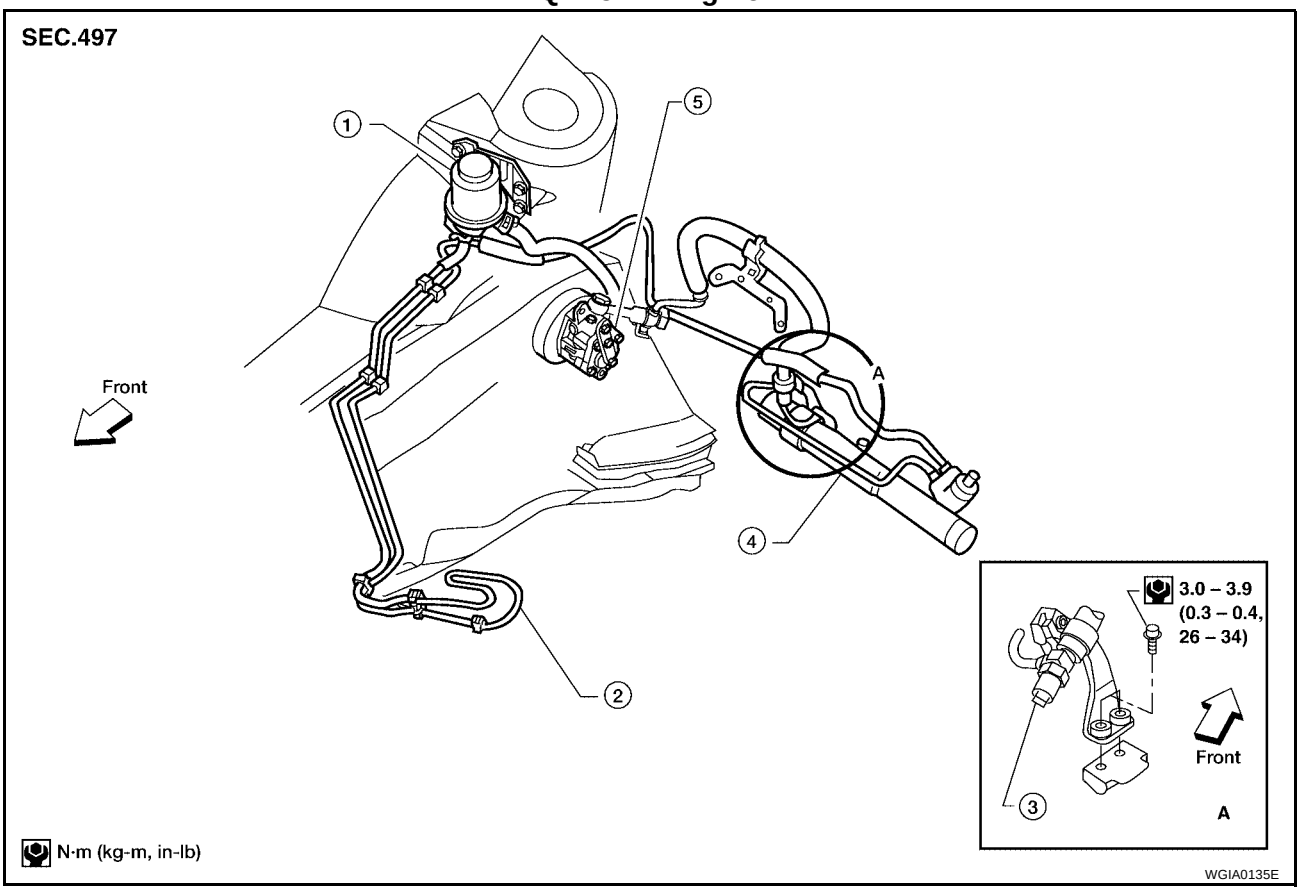
EGS000JP

QG18DE Engine



1. Power steering fluid reservoir
2. Power steering pump
3. Steering gear
4. Tube
5. Hose
6. Washers
7. Power steering pressure sensor

QR25DE Engine



1. Power steering fluid reservoir
2. Power steering oil cooler
3. Power steering pressure switch
4. Steering gear
5. Power steering oil pump

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

EGS000G3

Applied model	QG18DE	QR25DE
Steering model	Power steering	
Steering gear type	Rack and Pinion (PR25T)	
Steering overall gear ratio	17.48	15.80
Turns of steering wheel (Lock to lock)	3.01	2.4
Steering column type	Collapsible, tilt	

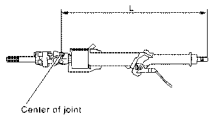
Steering Wheel

EGS000G4

Applied model	All
Steering wheel axial play mm (in)	0 (0)
Steering wheel play mm (in)	35 (1.38) or less
Movement of gear housing mm (in)	±2 (±0.08) or less

Steering Column

EGS000G5

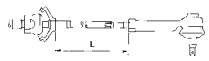


SST855C

Applied model	All
Steering column length “L” mm (in)	542 - 544 (21.34 - 21.42)

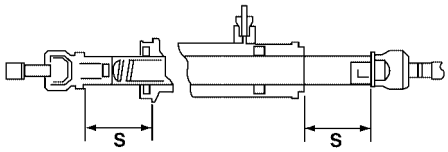
Steering Gear and Linkage

EGS000G6



SST867C

Applied model		QG18DE	QR25DE
Steering gear type		Rack and Pinion (PR25T)	
Tie-rod outer socket	Swinging force at cotter pin hole: “A” N (kg, lb)	6.9 - 65.7 (0.66 - 6.59, 1.5 - 14.8)	
	Rotating torque: “B” N·m (kg-cm, in-lb)	0.29 - 2.94 (3.0 - 30.0, 2.6 - 26.0)	
	Axial end play: “C” mm (in)	0.4 (0.016) or less	
	Initial tightening torque N·m (kg-cm, ft-lb)	29 - 39 (3 - 4, 22 - 28)	
	Maximum tightening torque N·m (kg-cm, ft-lb)	49 (5, 36)	
Tie-rod inner socket	Swinging force*: “A” N (kg, lb)	5.9 - 46.1 (0.58 - 4.65, 1.3 - 10.4)	
	Axial end play: “C” mm (in)	0.2 (0.004) or less	
	Initial tightening torque N·m (kg-cm, ft-lb)	29 - 39 (3 - 4, 22 - 28)	
	Maximum tightening torque N·m (kg-cm, ft-lb)	49 (5, 36)	
Tie-rod standard length “L” mm (in)		133.04 (5.238)	136.09 (5.358)



SST086BA

Retainer adjustment Adjusting screw	Initial tightening torque N·m (kg-cm, in-lb)	4.9 - 5.9 (50 - 60, 43 - 52)
	Retightening torque after loosening N·m (kg-cm, in-lb)	0.2 (2, 1.7)
	Tightening torque after gear has settled N·m (kg-cm, in-lb)	4.9 - 5.9 (50 - 60, 43 - 52)
	Returning angle degree	60° - 80°
Steering gear type		PR25T
Rack stroke “S” mm (in)		65 (2.56)
Pinion gear preload without gear fluid Within ±100° from the neutral position	Average rotating torque N·m (kg-cm, in-lb)	0.6 - 2.0 (7 - 20, 6 - 17)
	Maximum torque deviation N·m (kg-cm, in-lb)	0.6 (7, 5.8)
Except above range	Maximum rotating torque N·m (kg-cm, in-lb)	1.9 (19, 17)
	Maximum torque deviation N·m (kg-cm, in-lb)	0.65 (7, 6)

*: Measuring point [l: 172 mm (6.77 in)]

Power Steering

EGS000G7

Applied model			QG18DE	QR25DE
Steering gear type			Rack and Pinion (PR25T)	
Pump type			F40	
Rack sliding force N (kg, lb) Under normal operating oil pressure	Range within ±11.5 mm (±0.453 in) from the neutral position at rack speed of 3.5 mm (0.138 in)/s	Average rack sliding force	140 - 330 (14.3 - 33.6, 31.5 - 74.1)	160 - 350 (16.3 - 35.7, 36.0 - 78.7)
		Maximum force deviation	98 (10, 22)	
	Except for the above range	Maximum rack sliding force	294 (30, 66)	
		Maximum force deviation	147 (15, 33)	
Steering wheel turning force (Measured at one full turn from the neutral position) N (kg, lb)			39 (4, 9) or less	
Fluid capacity (Approximate) ℓ (US qt, Imp qt)			1.0 (1-1/8, 7/8)	
Oil pump maximum pressure kPa (kg/cm^2 , psi)			7,649 - 8,238 (78 - 84, 1,109 - 1,194)	8,000 - 8,800 (82 - 90, 1,160 - 1,276)

SECTION SB
SEAT BELTS

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EHS000LQ

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**

Precaution for Seat Belt Service

EHS000J7

CAUTION:

- **Before removing the front seat belt pre-tensioner assembly, turn the ignition switch off, disconnect both battery cables and wait at least 3 minutes.**
- **Do not use electrical test equipment for front seat belt pre-tensioner connector.**
- **After replacing or reinstalling front seat belt pre-tensioner assembly, or reconnecting front seat belt pre-tensioner connector, check the system function. Refer to SRS-18, "SRS Operation Check" .**
- **Do not use disassembled buckle or seat belt assembly.**
- **Replace anchor bolts if they are deformed or worn out.**
- **Never oil tongue and buckle.**
- **If any component of seat belt assembly is questionable, do not repair. Replace the whole seat belt assembly.**
- **If webbing is cut, frayed, or damaged, replace seat belt assembly.**
- **When replacing seat belt assembly, use a Genuine NISSAN seat belt assembly.**

AFTER A COLLISION

WARNING:

Inspect all seat belt assemblies including retractors and attaching hardware after any collision. NISSAN recommends that all seat belt assemblies in use during a collision be replaced unless the collision was minor and the belts show no damage and continue to operate properly. Failure to do so could result in serious personal injury in an accident. Seat belt assemblies not in use during a collision should also be replaced if either damage or improper operation is noted. Seat belt pre-tensioner should be replaced even if the seat belts are not in use during a frontal collision in which the air bags are deployed.

Replace any seat belt assembly (including anchor bolts) if:

- The seat belt was in use at the time of a collision (except for minor collisions and the belts, retractors and buckles show no damage and continue to operate properly).
- The seat belt was damaged in an accident. (i.e. torn webbing, bent retractor or guide, etc.)
- The seat belt attaching point was damaged in an accident. Inspect the seat belt attaching area for damage or distortion and repair as necessary before installing a new seat belt assembly.
- Anchor bolts are deformed or worn out.
- The front seat belt pre-tensioner should be replaced even if the seat belts are not in use during the collision in which the air bags are deployed.

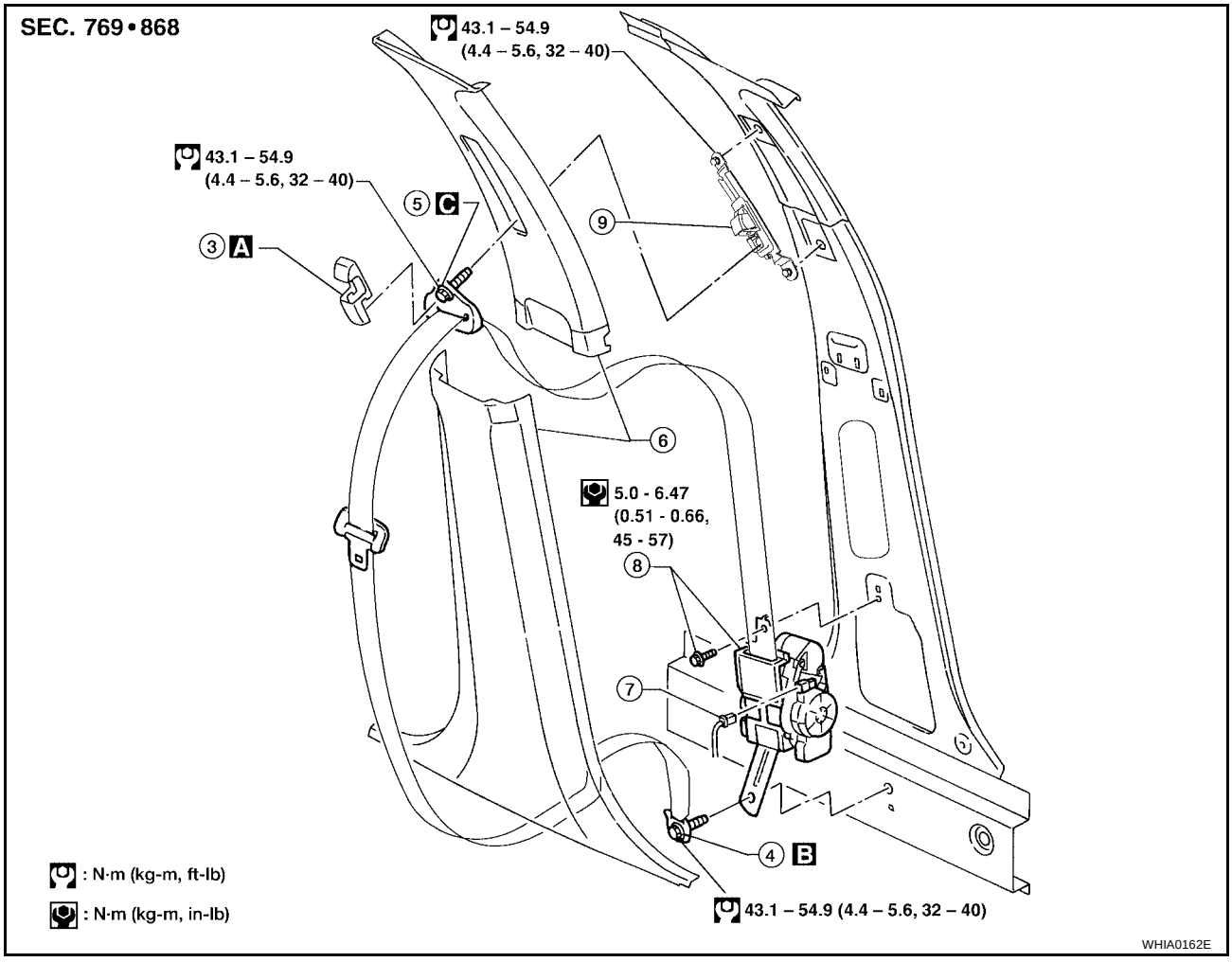
FRONT SEAT BELT

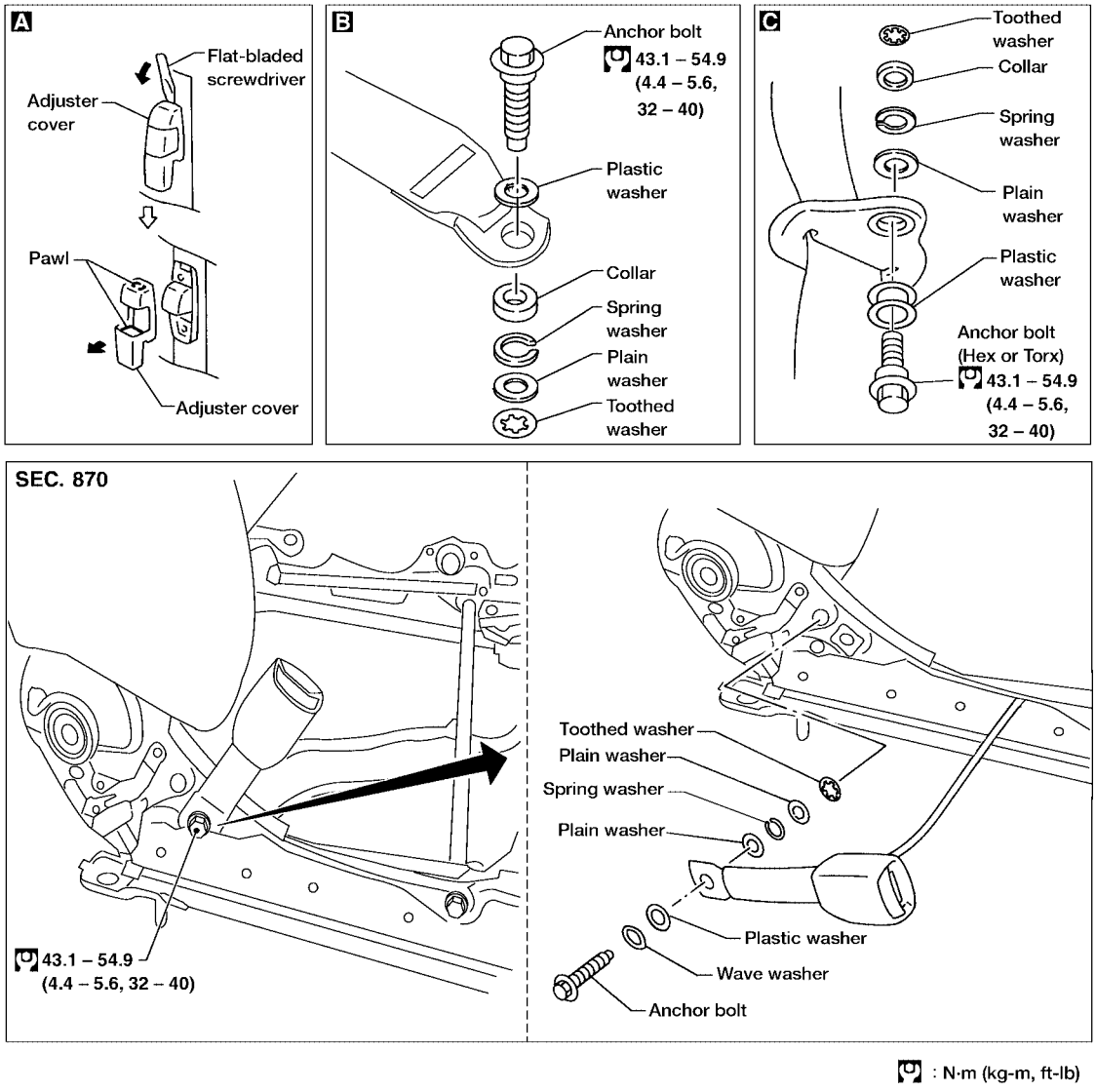
PFP:86880

Removal and Installation

EHS000J8

1. Disconnect both battery cables.
2. Slide the seat all the way forward and tilt the seat back toward the front.
3. Remove adjuster cover. A
4. Remove floor anchor bolt. B
5. Remove shoulder anchor bolt. C
6. Remove center pillar upper and lower garnish. Refer to EI-28, "SIDE AND FLOOR TRIM" for details.
7. Disconnect front seat belt pre-tensioner connector.
   - For removal/installation of the direct-connect SRS connectors, refer to SRS-6, "Direct-connect SRS Component Connectors" .
8. Remove the screw securing front seat belt pre-tensioner retractor, then remove seat belt and seat belt pre-tensioner retractor.
9. Remove bolts securing seat belt adjuster, then remove seat belt adjuster.





: N·m (kg-m, ft-lb)

WRS044

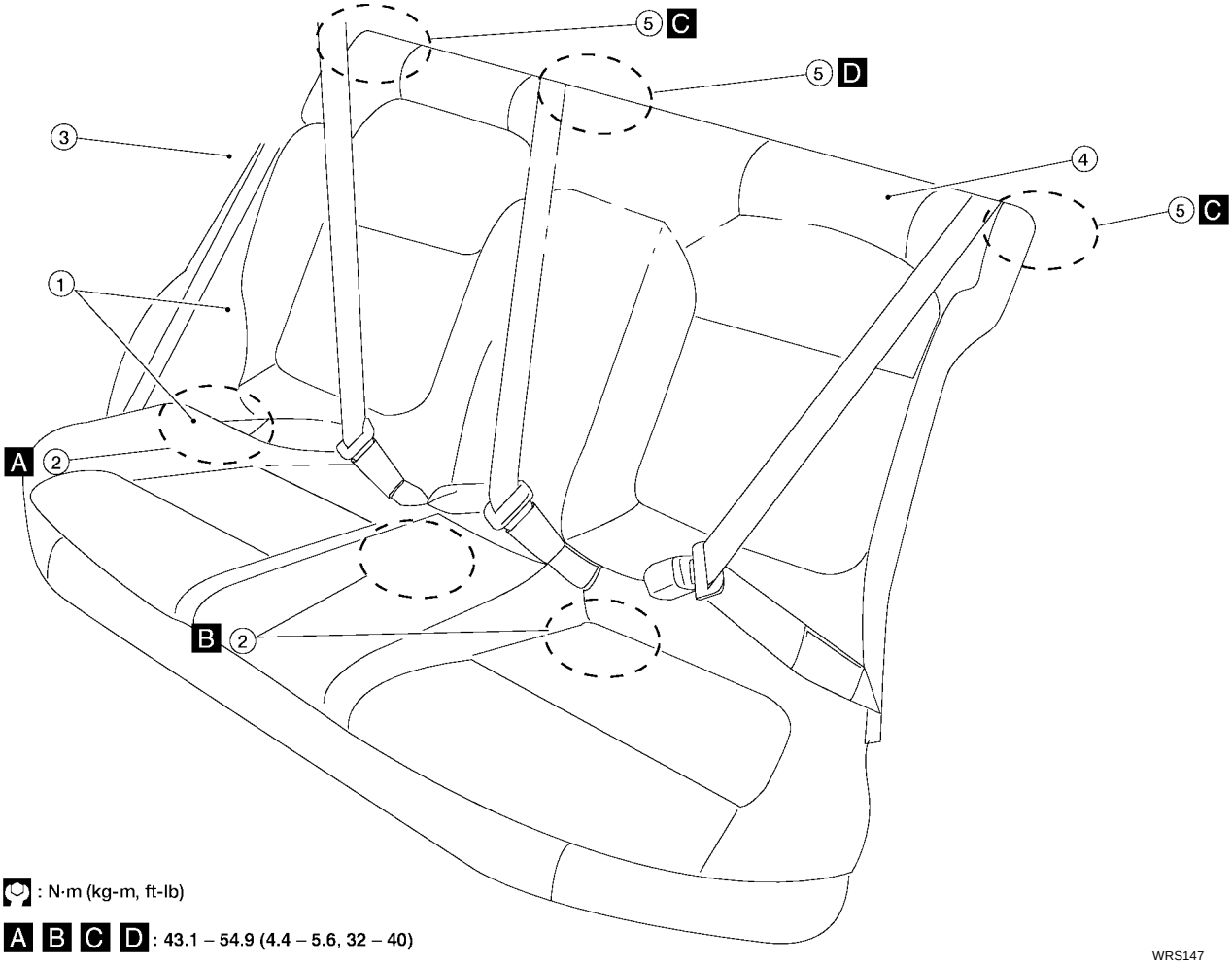
REAR SEAT BELT

PFP:88840

Removal and Installation

EHS000J9

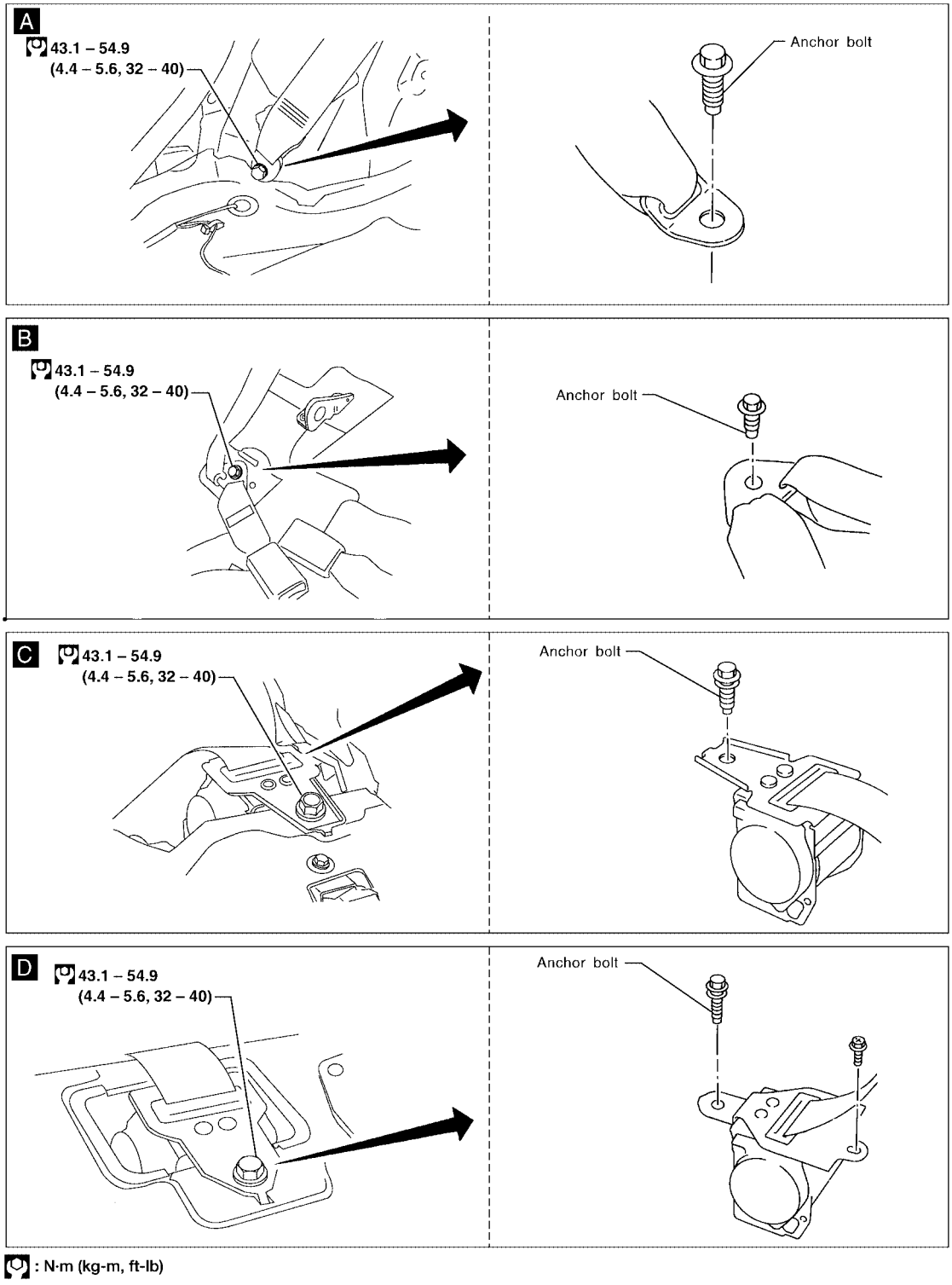
1. Remove rear seat. Refer to SE-5, "REAR SEAT" for details.
2. Remove outer and floor anchor bolt. A B
3. Remove rear side garnish. Refer to EI-28, "SIDE AND FLOOR TRIM" for details.
4. Remove rear parcel shelf finisher. Refer to EI-28, "SIDE AND FLOOR TRIM" for details.
5. Remove bolts securing rear seat belt retractor, then remove seat belt and seat belt retractor. C D



: N·m (kg-m, ft-lb)

A B C D : 43.1 – 54.9 (4.4 – 5.6, 32 – 40)

WRS147



: N·m (kg-m, ft-lb)

WRS153

BASIC INSPECTION

PFP:00013

Seat Belt Inspection

EHS000JA

AFTER A COLLISION

WARNING:

Inspect all seat belt assemblies including retractors and attaching hardware after any collision. NISSAN recommends that all seat belt assemblies in use during a collision be replaced unless the collision was minor and the belts show no damage and continue to operate properly. Failure to do so could result in serious personal injury in an accident. Seat belt assemblies not in use during a collision should also be replaced if either damage or improper operation is noted. Front seat belt pre-tensioner should be replaced even if the seat belts are not in use during a frontal collision in which the air bags are deployed.

Replace any seat belt assembly (including anchor bolts) if:

- The seat belt was in use at the time of a collision (except for minor collisions if the belts, retractors and buckles show no damage and continue to operate properly).
- The seat belt was damaged in an accident. (i.e. torn webbing, bent retractor or guide, etc.)
- The seat belt attaching point was damaged in an accident. Inspect the seat belt attaching area for damage or distortion and repair as necessary before installing a new seat belt assembly.
- Anchor bolts are deformed or worn out.
- The front seat belt pre-tensioner should be replaced even if the seat belts are not in use during the collision in which the air bags are deployed.

PRELIMINARY CHECKS

1. Check the seat belt warning lamp/chime for proper operation as follows:

a. Switch ignition ON. With driver seat belt unfastened, the seat belt warning lamp should illuminate. Also, the seat belt warning chime should sound for about seven seconds.

b. Fasten driver seat belt. The seat belt warning lamp should go out and the chime (if sounding) should stop.

2. If the “AIR BAG” warning lamp is blinking, conduct self-diagnosis using CONSULT-II, and “AIR BAG” warning lamp. Refer to SRS-18, "SRS Operation Check" .

3. Check that the seat belt retractor, seat belt anchor and buckle bolts are securely attached.

4. Check the shoulder seat belt guide and shoulder belt height adjuster for front seats. Ensure guide swivels freely and that belt lays flat and does not bind in guide. Ensure height adjuster operates properly and holds securely.

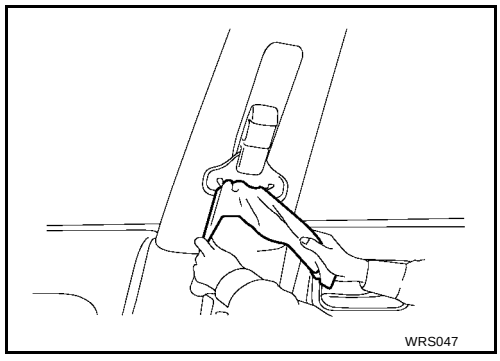
5. Check retractor operation:

a. Fully extend the seat belt webbing and check for twists, tears or other damage.

b. Allow the seat belt to retract. Ensure that belt returns smoothly and completely into the retractor. If the seat belt does not return smoothly, wipe the inside of the loops with a clean paper cloth etc. because dirt built up in the loops of the upper anchors can cause the seat belts to retract slowly.

c. Fasten the seat belt. Pull firmly on belt and buckle to ensure belt remains latched. Unfasten seat belt. Ensure belt releases freely and buckle button returns to original position.

6. Repeat steps above as necessary to check the other seat belts.



SEAT BELT RETRACTOR ON-VEHICLE CHECK

Emergency Locking Retractors (ELR) and Automatic Locking Retractors (ALR)

NOTE:

All seat belt retractors are of the Emergency Locking Retractors (ELR) type. In an emergency (sudden stop) the retractor will lock and prevent the belt from extending any further. All 3-point type seat belt retractors except the driver's seat belt also have an Automatic Locking Retractors (ALR) mode. The ALR mode (also called child restraint mode) is used when installing child seats. The ALR mode is activated when the seat belt is fully extended. When the belt is then retracted partially, the ALR mode automatically locks the seat belt in a specific position so the belt cannot be extended any further. To cancel the ALR mode, allow the seat belt to fully wind back into the retractor.

Check the seat belt retractors using the following test(s) to determine if a retractor assembly is operating properly.

ELR Function Stationary Check

Grasp the shoulder belt and pull forward quickly. The retractor should lock and prevent the belt from extending further.

ALR Function Stationary Check

1. Pull out entire length of seat belt from retractor until a click is heard.
2. Retract the belt partially. A clicking noise should be heard as the belt retracts indicating that the retractor is in the Automatic Locking Retractors (ALR) mode.
3. Grasp the seat belt and try to pull out of the retractor. The belt must lock and not extend any further. If NG, replace the retractor assembly.
4. Allow the entire length of the belt to retract to cancel the automatic locking mode.

ELR Function Moving Check

WARNING:

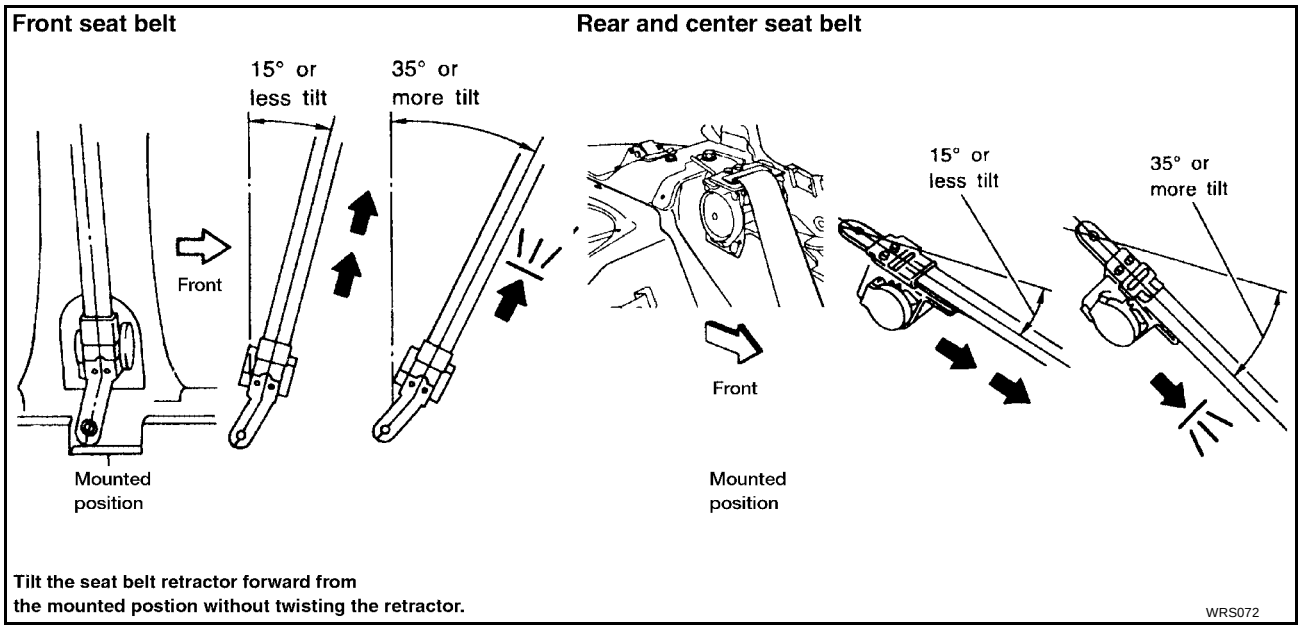
Perform the following test in a safe, open area clear of other vehicles and obstructions (for example, a large, empty parking lot). Road surface must be paved and dry. DO NOT perform the following test on wet or gravel roads or on public streets and highways. This could result in an accident and serious personal injury. The driver and passenger must be prepared to brace themselves in the event the retractor does not lock.

1. Fasten driver's seat belt. Buckle a passenger into the seat for the belt that is to be tested.
2. Proceed to the designated safe area.
3. Drive the vehicle at approximately 16 km/h (10 MPH). Notify any passengers of a pending sudden stop and the driver and passenger must be prepared to brace themselves in the event the retractor does not lock, apply brakes firmly and make a very hard stop.

During stop, seat belts should lock and not be extended. If the seat belt retractor assembly does not lock, perform the retractor off-vehicle check.

SEAT BELT RETRACTOR OFF-VEHICLE CHECK

1. Remove the seat belt retractor assembly.
2. Slowly pull out belt while tilting the retractor assembly forward from the mounted position without twisting the retractor assembly as shown in the illustration.



15 degrees or less tilt : Belt can be pulled out.

35 degrees or more tilt : Belt locks and cannot be pulled out.

If NG, replace the retractor assembly.

TOP TETHER STRAP CHILD RESTRAINT

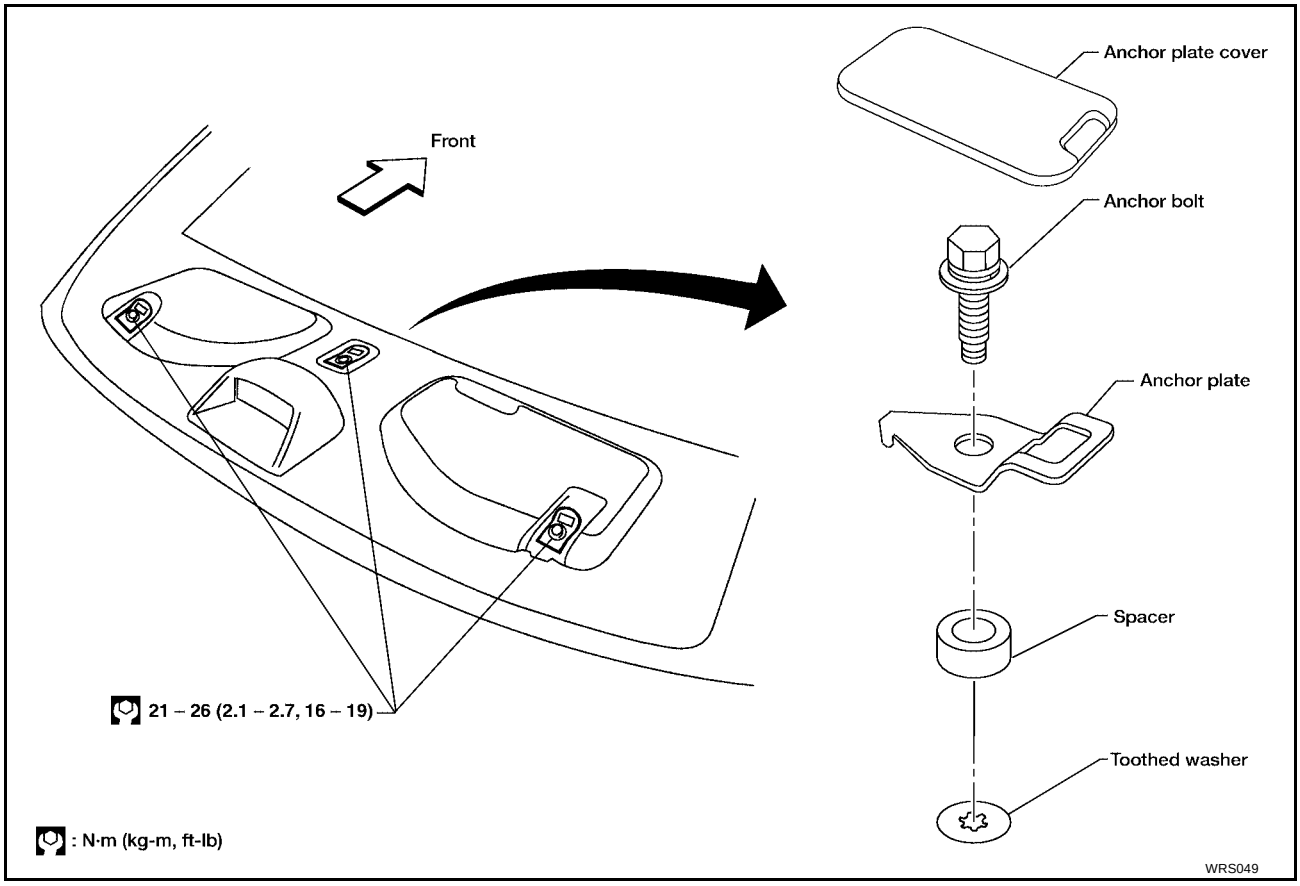
PFP:00025

Removal and Installation

EHS000JB

CAUTION:

Replace anchor bolts if they are deformed or worn out.



1. Remove anchor plate cover. Refer to EI-28, "SIDE AND FLOOR TRIM" for details.
2. Remove anchor plate.

NOTE:

- To install, reverse the removal procedure sequence.

LATCH (LOWER ANCHORS AND TETHER FOR CHILDREN) SYSTEM

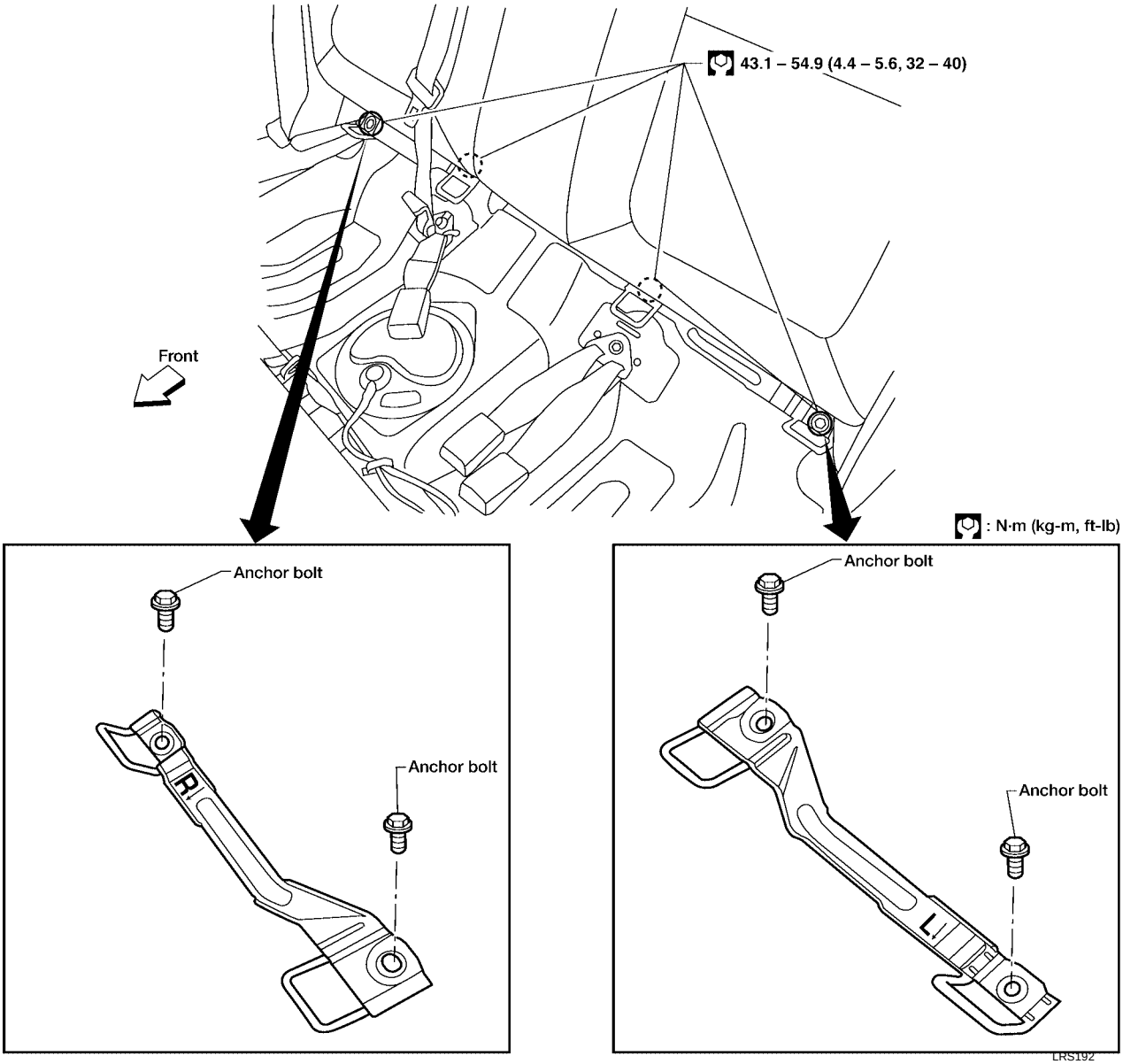
PFP:88840

Removal and Installation

EHS000JC

CAUTION:

Replace anchor bolts if they are deformed or worn out.



1. Remove rear seat cushion. Refer to SE-5, "REAR SEAT" for details.
2. Remove LH and RH LATCH System anchors.

NOTE:

LH and RH LATCH System anchors are different.
Install with arrow facing forward.

SECTION SRS

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EHS000PP

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precautions for SRS “AIR BAG” and “SEAT BELT PRE-TENSIONER” Service

EHS000JE

- Do not use electrical test equipment to check SRS circuits unless instructed to in this Service Manual.
- Before servicing the SRS, turn ignition switch “OFF”, disconnect both battery cables and wait at least 3 minutes.
  For approximately 3 minutes after the cables are removed, it is still possible for the air bag and seat belt pre-tensioner to deploy. Therefore, do not work on any SRS connectors or wires until at least 3 minutes have passed.
- Diagnosis sensor unit must always be installed with their arrow marks “⇐” pointing towards the front of the vehicle for proper operation. Also check diagnosis sensor unit for cracks, deformities or rust before installation and replace as required.
- The spiral cable must be aligned with the neutral position since its rotations are limited. Do not attempt to turn steering wheel or column after removal of steering gear.
- Handle air bag module carefully. Always place driver and front passenger air bag modules with the pad side facing upward and front side air bag module standing with the stud bolt side facing down.
- Conduct self-diagnosis to check entire SRS for proper function after replacing any components.
- After air bag inflates, the front instrument panel assembly should be replaced if damaged.

Wiring Diagrams and Trouble Diagnosis

EHS000JF

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams"
- PG-3, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident"

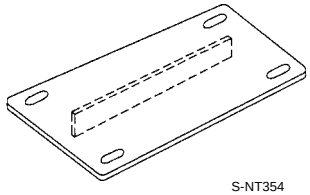
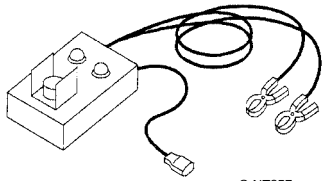
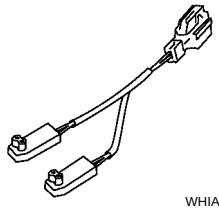
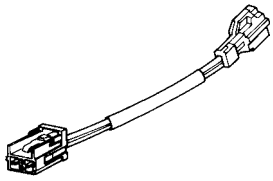
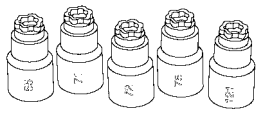
PREPARATION

PFP:00002

Special service tool

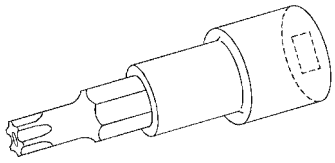
EHS000JG

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV99105300 (J-41246) Air bag module bracket  S-NT354	Anchoring air bag module
KV99106400 (J-38381) Deployment tool  S-NT357	Disposing of air bag module and front seat belt pre-tensioner
— (J-38381-80) Deployment tool adapter for front driver air bag module and front seat belt pre-tensioner  WHIA0089E	Connection between the deployment tool and front driver air bag module and front seat belt pre-tensioner
KV9910830 (J-38381-35) Deployment tool adapter for front side air bag modules and front passenger air bag module  ZZA1166D	Connection between the deployment tool and front side air bag modules and front passenger air bag module
— (J-44615) Air bag lock master key set  LRS210	Removing and installing air bag locking bolts

Commercial Service Tool

EHS000JH

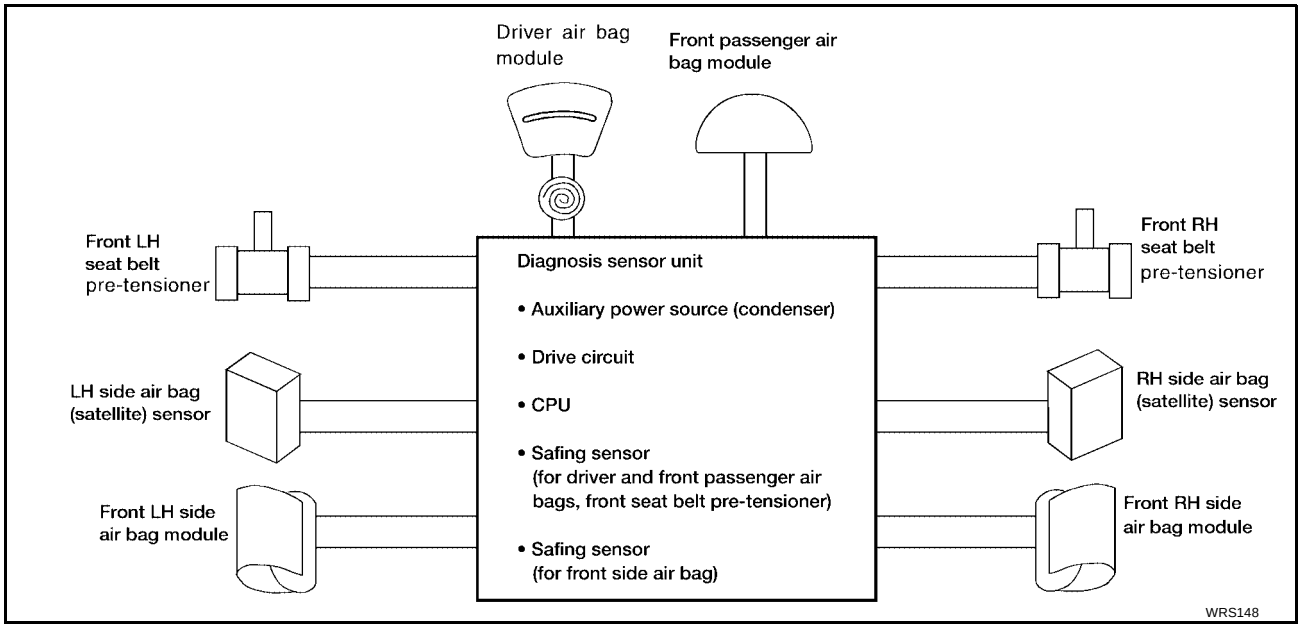
Tool name	Description
Tamper resistant torx socket  S-NT757	Size: T30

SRS CONFIGURATION

PFP:00000

SRS Configuration

EHS000JI



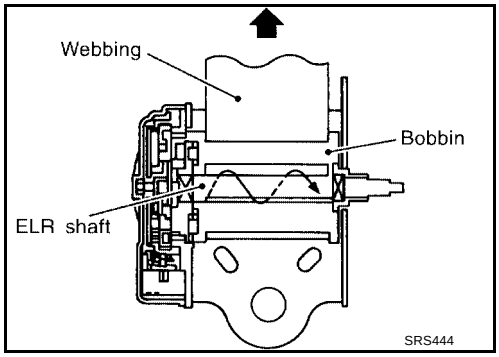
The air bag deploys if the diagnosis sensor unit activates while the ignition switch is in the “ON” or “START” position.
The collision modes for which supplemental restraint systems are activated are different among the SRS systems. For example, the driver air bag module and front passenger air bag module are activated in a frontal collision but not in a side collision.
SRS configurations which are activated for some collision modes are as follows;

SRS configuration	Frontal collision	Left side collision	Right side collision
Driver air bag module	X	—	—
Front passenger air bag module	X	—	—
Front LH seat belt pre-tensioner	X	—	—
Front RH seat belt pre-tensioner	X	—	—
Front LH side air bag module	—	X	—
Front RH side air bag module	—	—	X

Seat Belt Pre-tensioner with Load Limiter

EHS000JJ

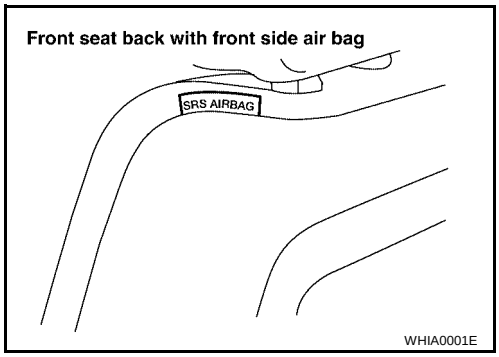
The front seat belt pre-tensioner system with load limiter is installed to both the driver's seat and the front passenger's seat. It operates simultaneously with the SRS air bag system in the event of a frontal collision with an impact exceeding a specified level.
When the frontal collision with an impact exceeding a specified level occurs, seat belt slack resulting from clothing or other factors is immediately taken up by the pre-tensioner. Vehicle passengers are securely restrained.
When passengers in a vehicle are thrown forward in a collision and the restraining force of the seat belt exceeds a specified level, the load limiter permits the specified extension of the seat belt by the twisting of the ELR shaft, and a relaxation of the chest-area seat belt web tension while maintaining force.



Side Air Bag

EHS000JK

Front side air bag is built-in type.
The front seat backs with built-in type side air bag have the label shown in figure at right.



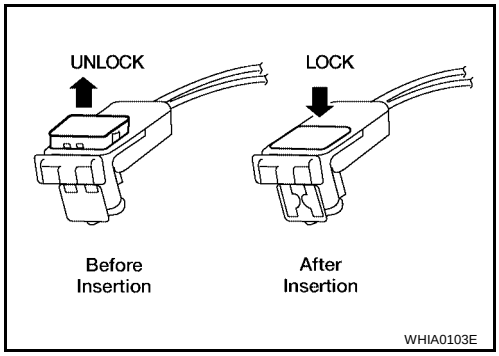
Direct-connect SRS Component Connectors

EHS000LD

The following SRS components use direct-connect style harness connectors.

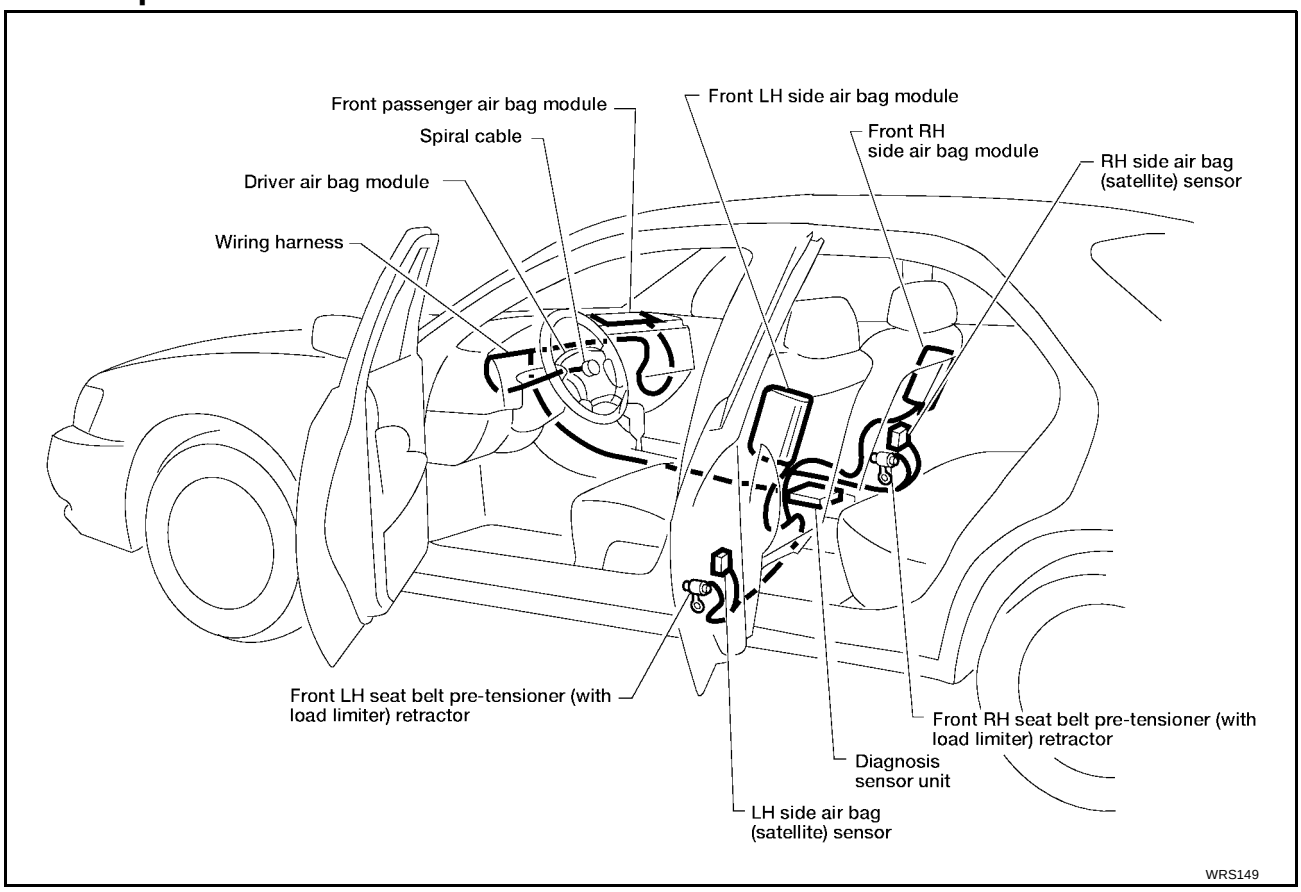
- Driver air bag module
- Front LH seat belt pre-tensioner
- Front RH seat belt pre-tensioner

Always pull up to release black locking tab prior to removing connector from SRS component.
Always push down to lock black locking tab after installing connector to SRS component. When locked, the black locking tab is level with the connector housing.



SRS Component Parts Location

EHS000JL



TROUBLE DIAGNOSIS

PFP:00004

Trouble Diagnoses Introduction

EHS000JM

CAUTION:

- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**
- **Do not attempt to repair, splice or modify the SRS wiring harness. If the harness is damaged, replace it with a new one.**
- **Keep ground portion clean.**

DIAGNOSIS FUNCTION

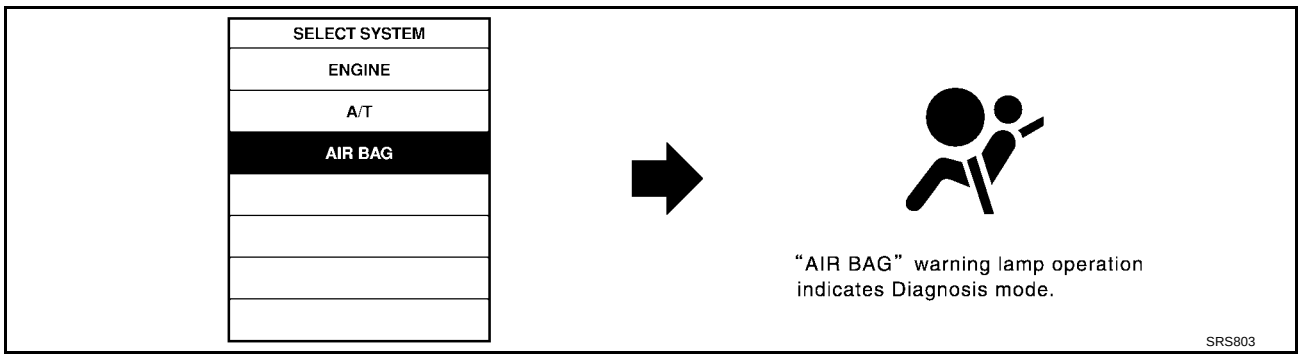
The SRS self-diagnosis results can be read by using “AIR BAG” warning lamp and/or CONSULT-II. The reading of these results is accomplished using one of two modes — “User mode” and “Diagnosis mode”.
The User mode is exclusively prepared for the customer (driver). This mode warns the driver of a system malfunction through the operation of the “AIR BAG” warning lamp.
The Diagnosis mode allows the technician to locate and inspect the malfunctioning part.
The mode applications for the “AIR BAG” warning lamp and CONSULT-II are as follows:

	User mode	Diagnosis mode	Display type
“AIR BAG” warning lamp	X	X	ON-OFF operation
CONSULT-II	—	X	Monitoring

HOW TO CHANGE SELF-DIAGNOSIS MODE WITH CONSULT-II

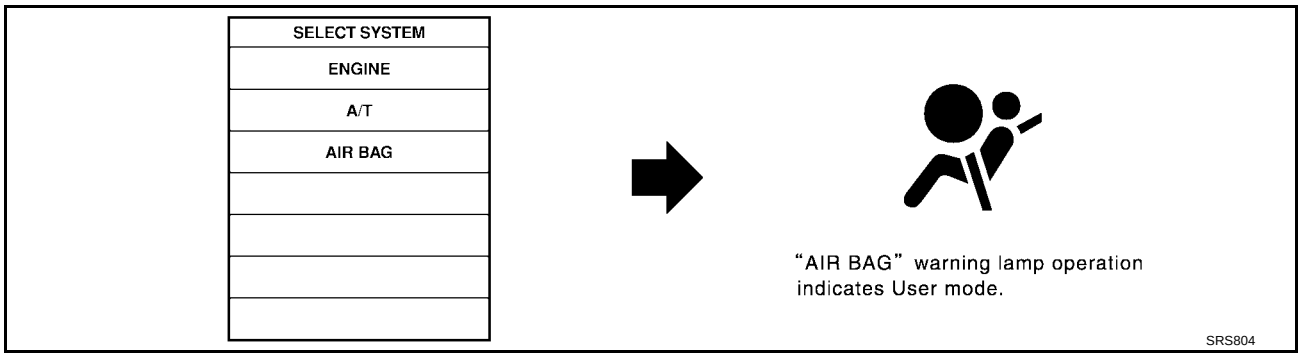
From User Mode to Diagnosis Mode

After selecting “AIR BAG” on the “SELECT SYSTEM” screen, User mode automatically changes to Diagnosis mode.



From Diagnosis Mode to User Mode

To return to User mode from Diagnosis mode, touch “BACK” key of CONSULT-II until “SELECT SYSTEM” appears, Diagnosis mode automatically changes to User mode.



HOW TO CHANGE SELF-DIAGNOSIS MODE WITHOUT CONSULT-II

From User Mode to Diagnosis Mode

Diagnosis mode activates only when a malfunction is detected, by turning ignition switch as follows:

1. Turn ignition switch “ON”.
2. After “AIR BAG” warning lamp lights for 7 seconds, turn ignition switch “OFF” within 1 second.
3. Wait more than 3 seconds.
4. Repeat steps 1 to 3 three times.
5. Turn ignition switch “ON”.

SRS will enter Diagnosis mode, if a malfunction is detected.

From Diagnosis Mode to User Mode

After a malfunction is repaired, turn ignition switch “OFF” for at least one second, then back “ON”. Diagnosis mode is returned to User mode.
If switching Diagnosis mode to User mode is required while malfunction is being detected, turn ignition switch as follows:

1. Turn ignition switch “ON”.
2. After “AIR BAG” warning lamp lights for 7 seconds, turn ignition switch “OFF” within 1 second.
3. Wait more than 3 seconds.
4. Repeat steps 1 to 3 three times.
5. Turn ignition switch “ON”.

HOW TO ERASE SELF-DIAGNOSIS RESULTS

With CONSULT-II

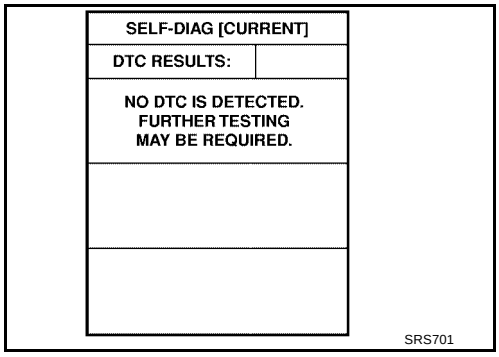
- “SELF-DIAG [CURRENT]”
  A current Self-diagnosis result is displayed on the CONSULT-II screen in real time.

After the malfunction is repaired completely, no malfunction is detected on “SELF-DIAG [CURRENT]”.

- “SELF-DIAG [PAST]”
  Return to the “SELF-DIAG [CURRENT]” CONSULT-II screen by pushing “BACK” key of CONSULT-II and select “SELF-DIAG [CURRENT]” in SELECT DIAG MODE. Touch “ERASE” in “SELF-DIAG [CURRENT]” mode.

  NOTE:
  If the memory of the malfunction in “SELF-DIAG [PAST]” is not erased, the User mode shows the system malfunction by the operation of the warning lamp even if the malfunction is repaired completely.

- “TROUBLE DIAG RECORD”
  The memory of “TROUBLE DIAG RECORD” cannot be erased.



Without CONSULT-II

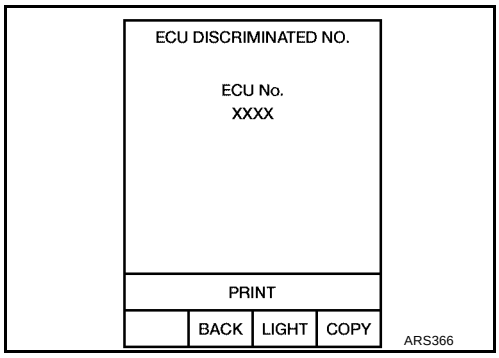
After a malfunction is repaired, switch the ignition “OFF” for at least one second, then back “ON”. Diagnosis mode returns to the User mode. At that time, the self-diagnostic result is cleared.

CONSULT-II Function (AIR BAG)

EHS0017A

CONSULT-II can display each diagnostic item using the diagnostic test modes shown following.

AIR BAG diagnostic mode	Description
SELF-DIAG [CURRENT]	A current Self-diagnosis result (also indicated by the number of warning lamp flashes in the Diagnosis mode) is displayed on the CONSULT-II screen in real time. This refers to a malfunctioning part requiring repairs.
SELF-DIAG [PAST]	Diagnosis results previously stored in the memory are displayed on the CONSULT-II screen. The stored results will remain until memory erasing is executed.
TROUBLE DIAG RECORD	With TROUBLE DIAG RECORD, diagnosis results previously erased by a reset operation can be displayed on the CONSULT-II screen.
ECU DISCRIMINATED NO.	The diagnosis sensor unit for each vehicle model is assigned with its own, individual classification number. This number will be displayed on the CONSULT-II screen, as shown. When replacing the diagnosis sensor unit, refer to the part number for the compatibility. After installation, replacement with a correct unit can be checked by confirming this classification number on the CONSULT-II screen. **For NISSAN MODEL B15, the diagnosis sensor unit discriminated numbers assigned are A616 (for models with side air bags) and A615 (for models without side air bags).**



How to Perform Trouble Diagnoses for Quick and Accurate Repair

EHS000JN

A good understanding of the malfunction conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a malfunction. It is important to fully understand the symptoms or conditions for a customer complaint.

INFORMATION FROM CUSTOMER

WHAT ..... Vehicle model
WHEN ..... Date, Frequencies
WHERE ..... Road conditions
HOW ..... Operating conditions, Symptoms

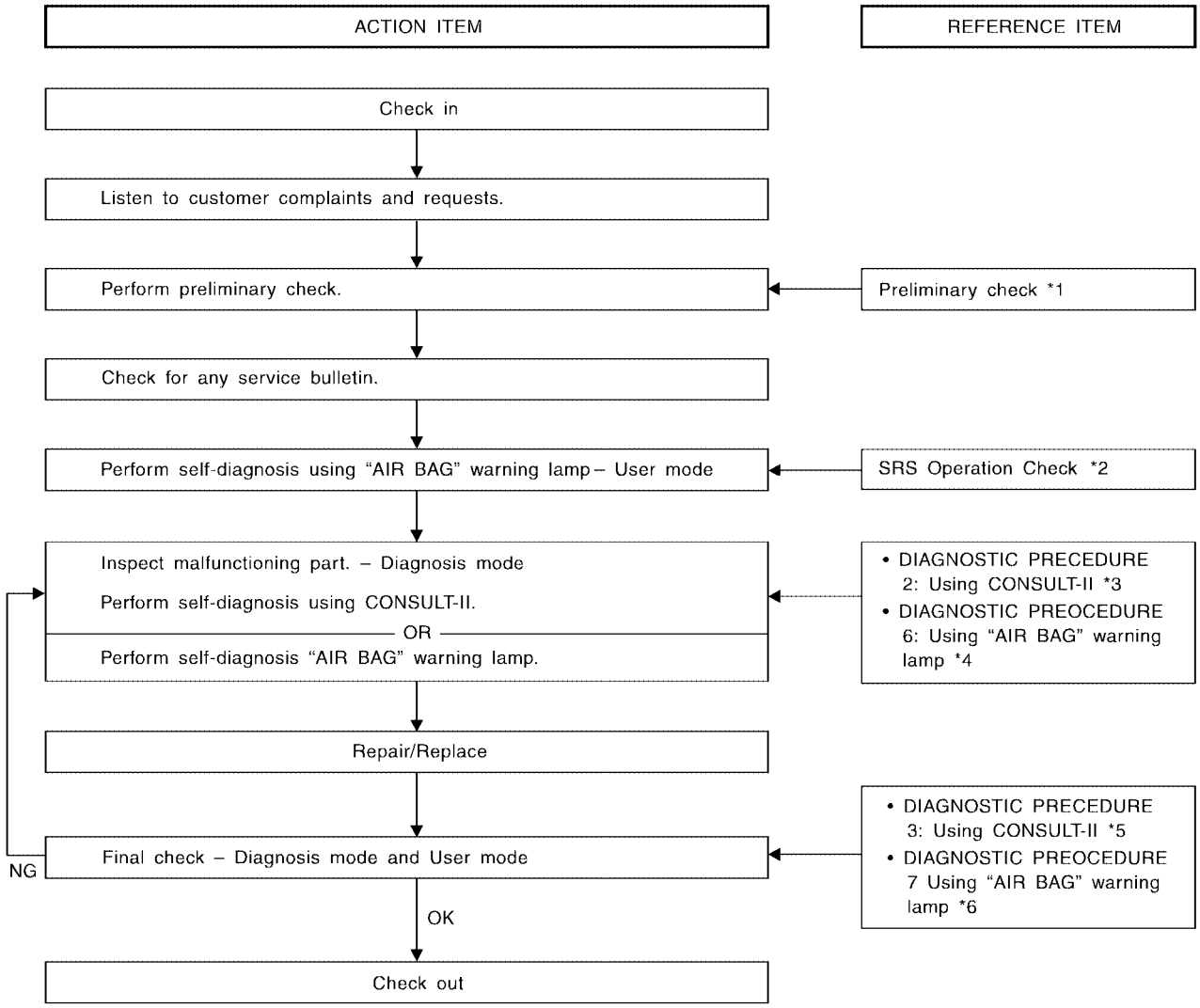
PRELIMINARY CHECK

Check that the following parts are in good order.

- Battery [Refer to SC-4, "BATTERY" .]
- Fuse
- System component-to-harness connections

WORK FLOW

NOTE:
Seat belt pre-tensioner malfunction is indicated by “AIR BAG” warning lamp.

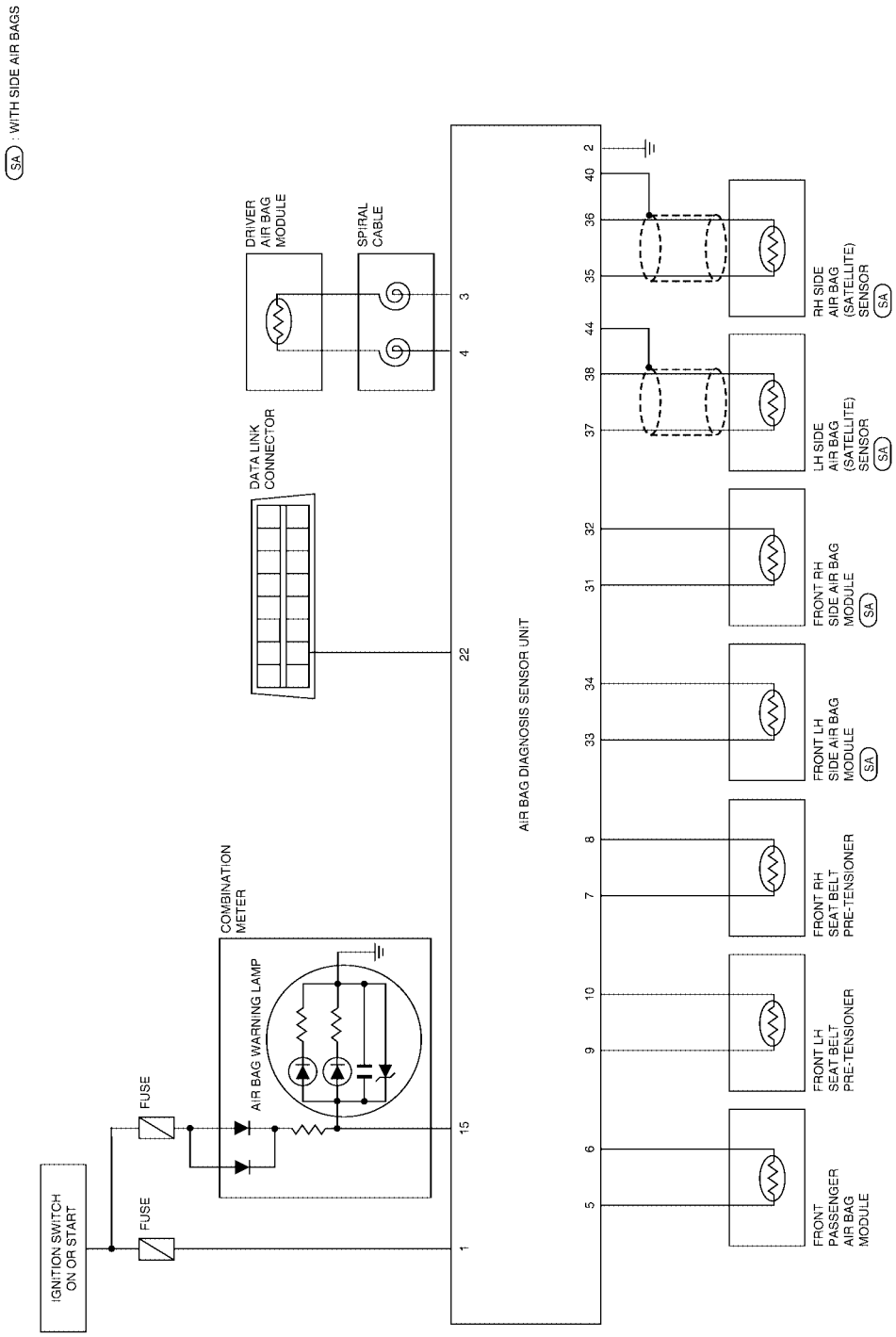


WRS155

*1: SRS-12 *2: SRS-18 *3: SRS-18
*4: SRS-29 *5: SRS-22 *6: SRS-34

Schematic

EHS000JO

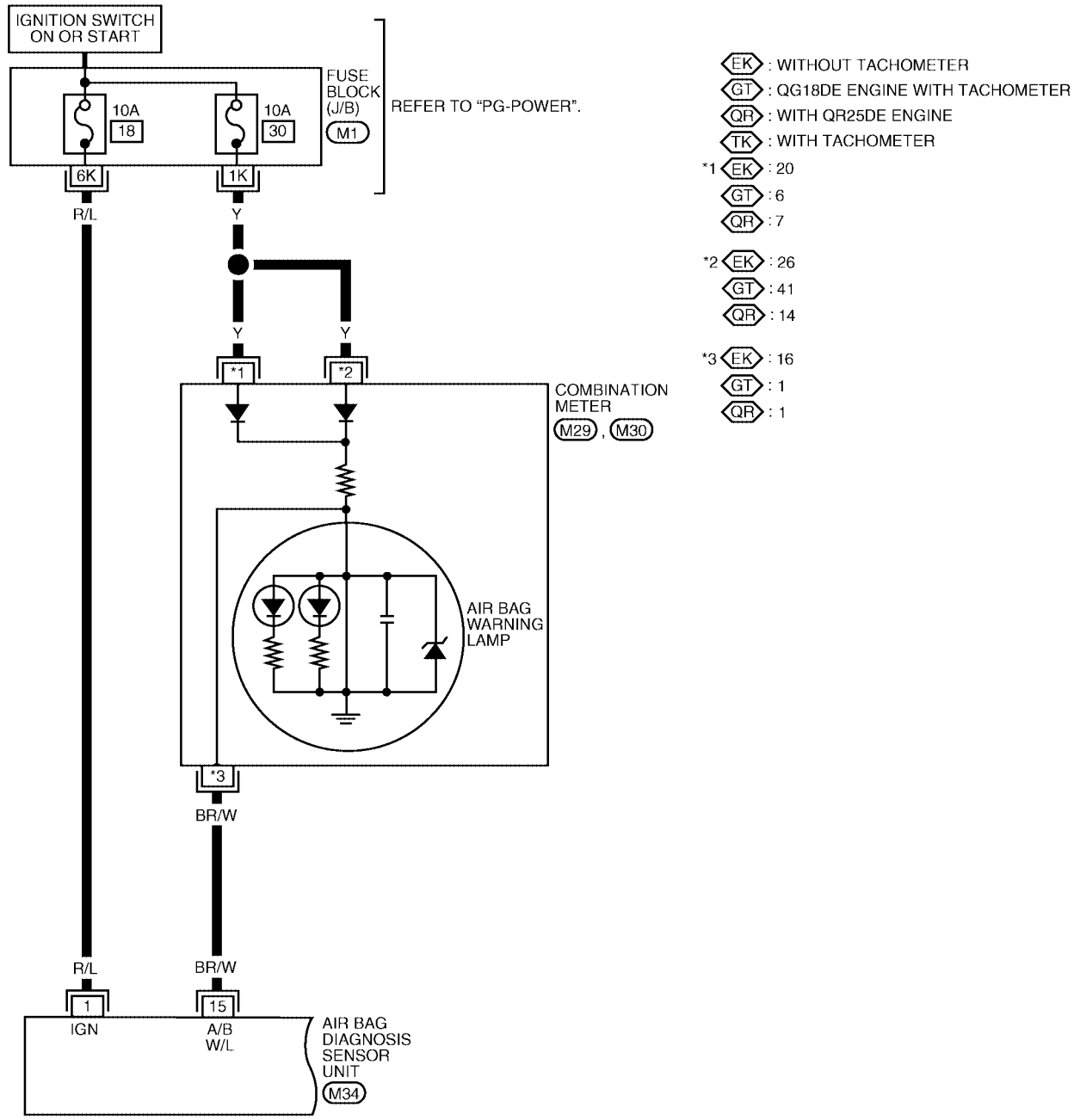


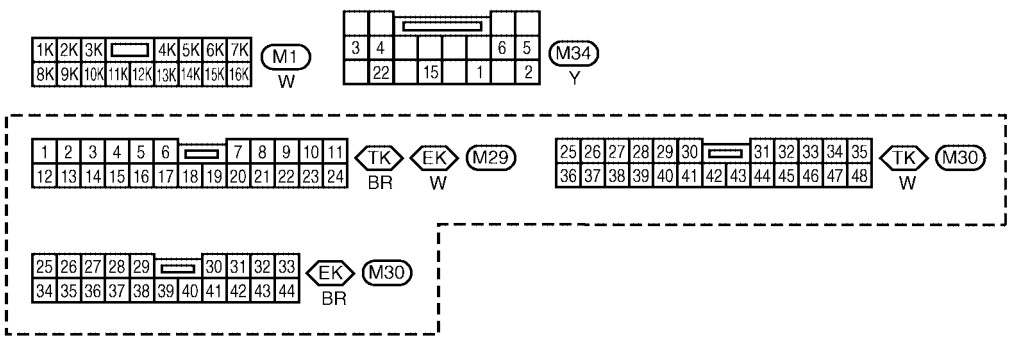
WHWA0045E

Wiring Diagram — SRS —

EHS000JP

SRS-SRS-01

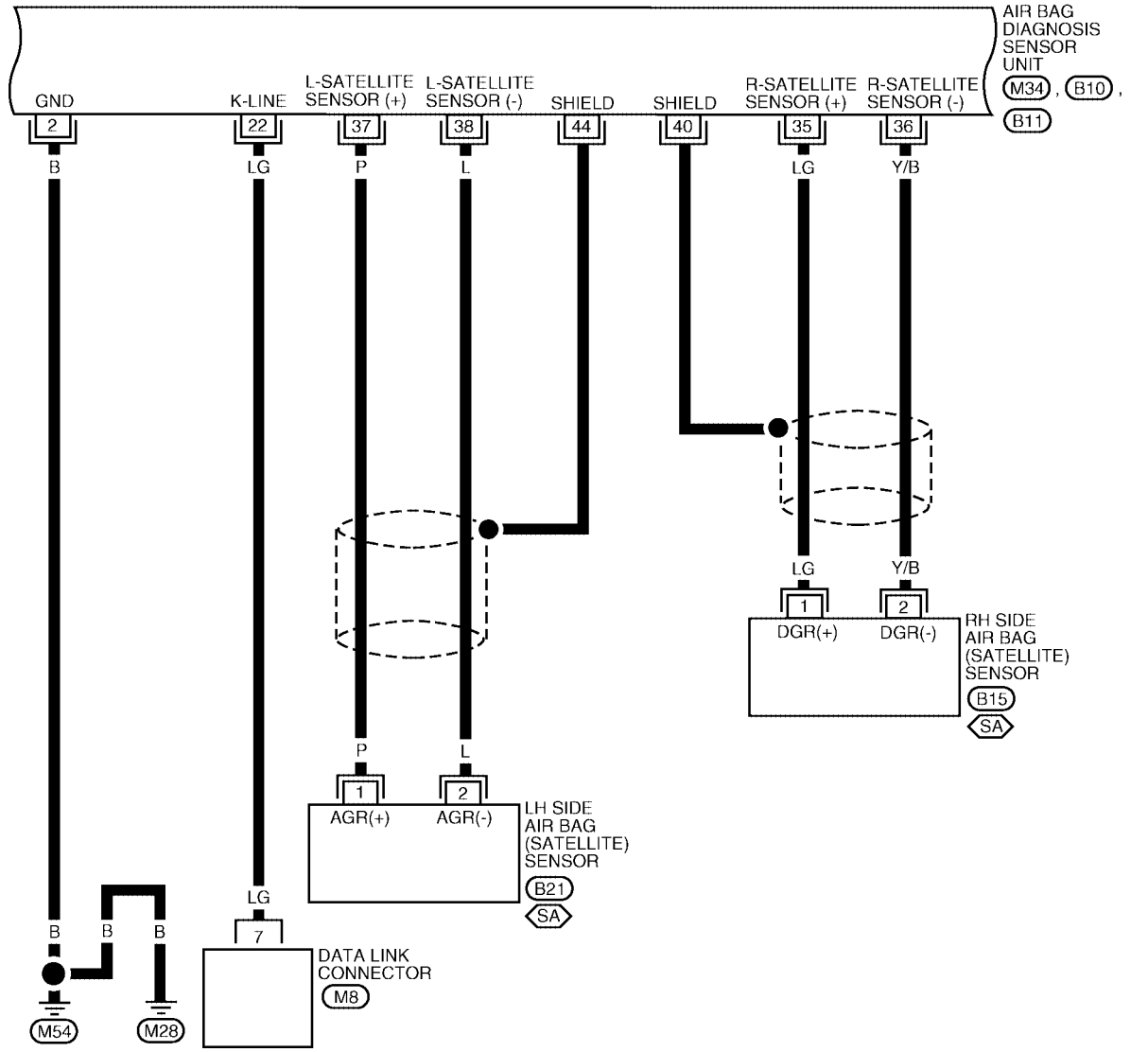


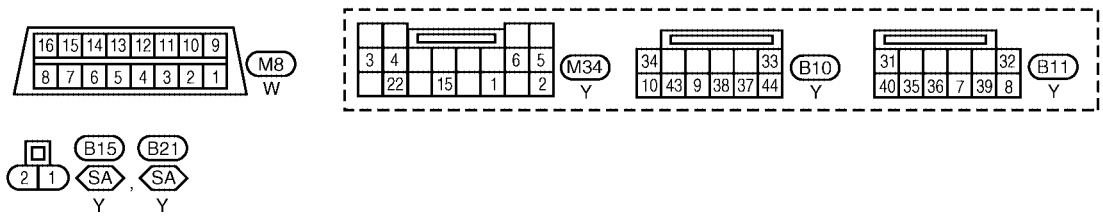


WHWA0085E

SRS-SRS-02

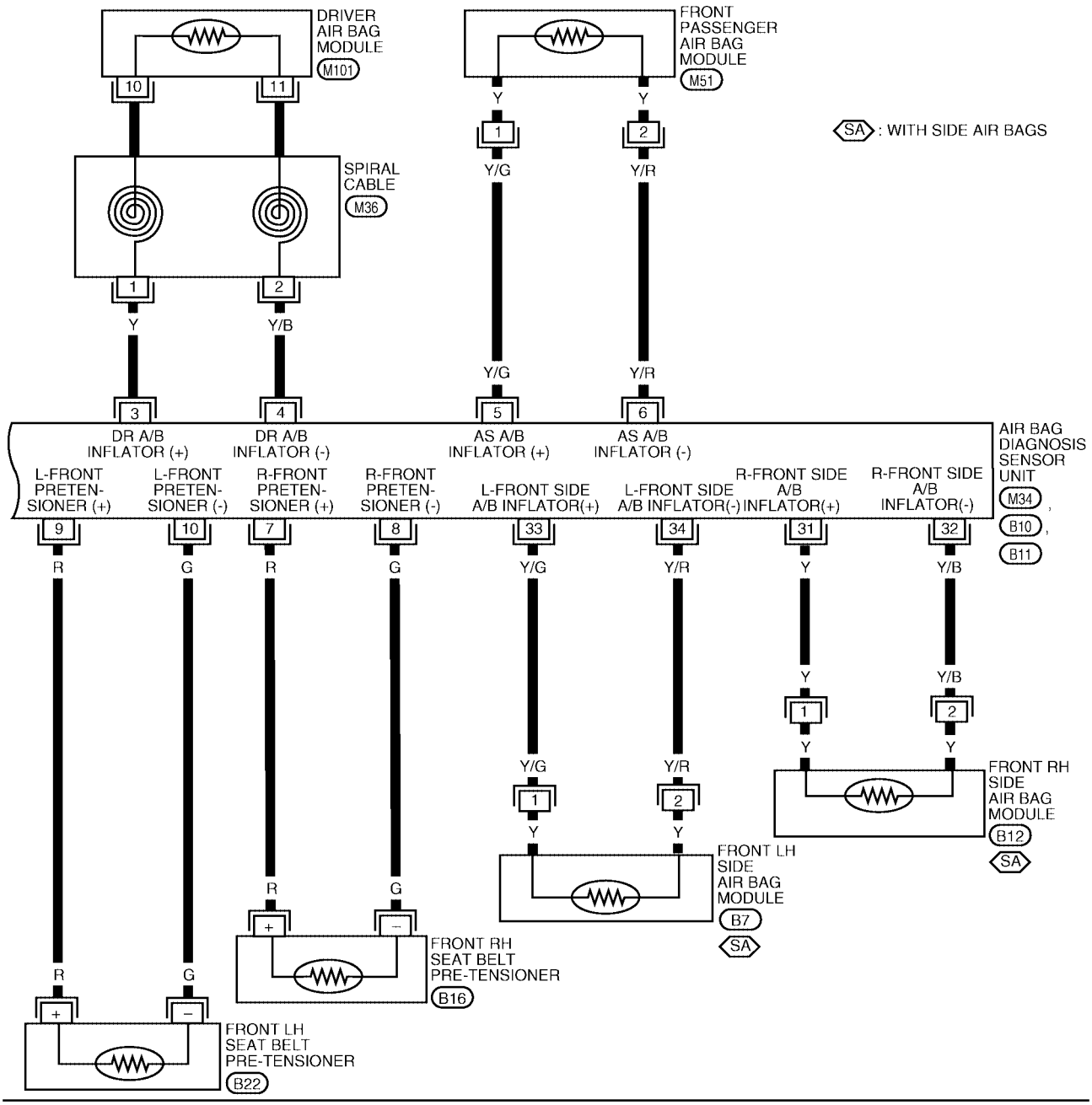
SA : WITH SIDE AIR BAGS

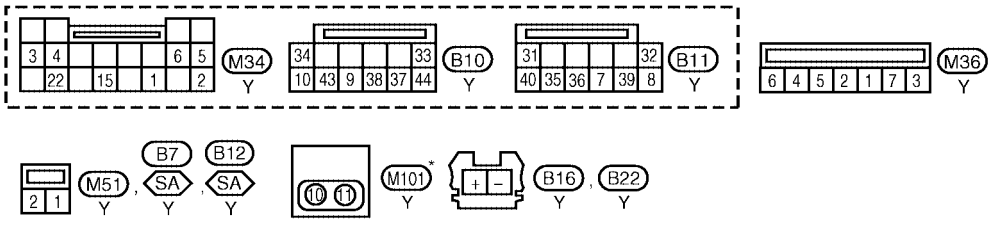




WHWA0086E

SRS-SRS-03





* THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT " OF PG SECTION.

WHWA0087E

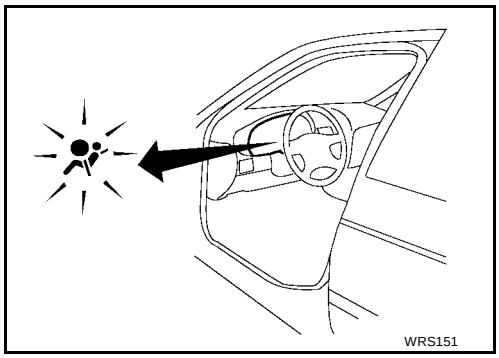
SRS Operation Check

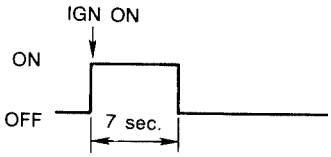
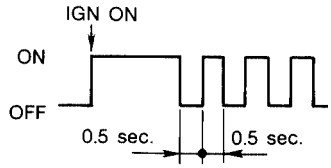
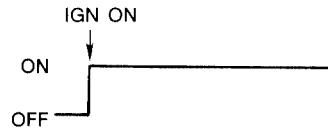
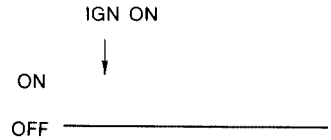
EHS000JQ

DIAGNOSTIC PROCEDURE 1

Checking Air Bag Operation by Using “AIR BAG” Warning Lamp — User Mode

1. After turning ignition switch from “OFF” to “ON”, “AIR BAG” warning lamp operates.
2. Compare “AIR BAG” warning lamp operation to the chart below.



“AIR BAG” warning lamp operation — User mode —	SRS condition	Reference item
 MRS095A	No malfunction is detected. No further action is necessary.	—
 MRS096A	The system is malfunctioning and needs to be repaired as indicated.	Go to SRS-18, "DIAGNOSTIC PROCEDURE 2" or SRS-29, "DIAGNOSTIC PROCEDURE 6" .
 MRS097A	Air bag is deployed. Front seat belt pre-tensioner is deployed.	Go to SRS-54, "COLLISION DIAGNOSIS" .
	Air bag fuse, diagnosis sensor unit or harness is malfunctioning and needs to be repaired.	Go to SRS-36, "DIAGNOSTIC PROCEDURE 9" .
 MRS098A	One of the following has occurred and needs to be repaired. ● Meter fuse is blown. ● “AIR BAG” warning lamp circuit has open or short. ● Diagnosis sensor unit is malfunctioning.	Go to SRS-37, "DIAGNOSTIC PROCEDURE 10" .

Trouble Diagnoses with CONSULT-II

EHS000JR

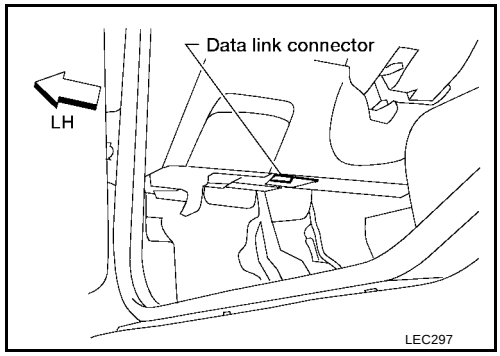
DIAGNOSTIC PROCEDURE 2

Inspecting SRS malfunctioning parts by using CONSULT-II — Diagnosis mode

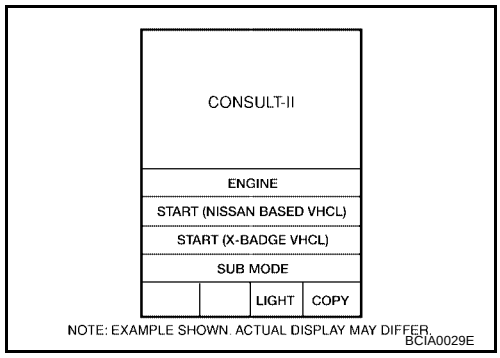
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunction might be detected in self-diagnosis depending on control unit which carry out CAN communication.

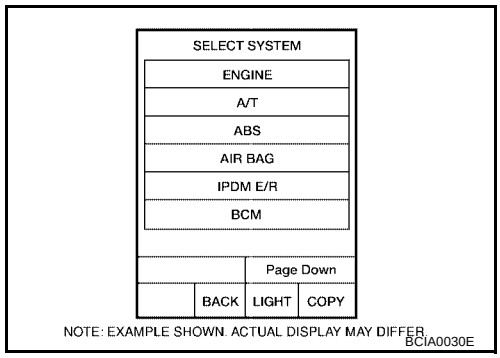
1. Turn ignition switch OFF.
2. Connect CONSULT-II to the data link connector.



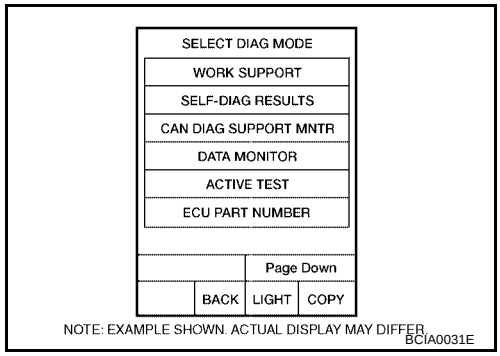
3. Turn ignition switch ON.
4. Touch “START (NISSAN BASED VHCL)”.



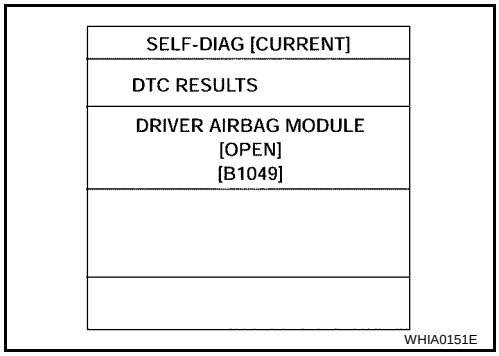
5. Touch “AIR BAG”.
   If "AIR BAG" is not indicated, refer to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Touch "SELF-DIAG [CURRENT]".

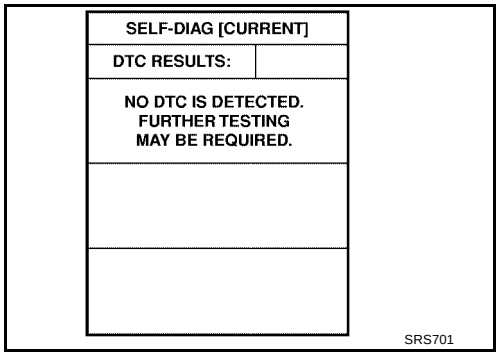


7. Diagnostic code is displayed on "SELF-DIAG [CURRENT]".



If no malfunction is detected on “SELF-DIAG [CURRENT]” even though malfunction is detected in “SRS Operation Check”, refer to SRS-24, "DIAGNOSTIC PROCEDURE 4 (CONTINUED FROM DIAGNOSTIC PROCEDURE 2)" , to diagnose the following cases:

- Self-diagnostic result “SELF-DIAG [PAST]” (previously stored in the memory) might not be erased after repair.
- The SRS system malfunctions intermittently.



8. Touch “PRINT”.
9. Compare diagnostic codes. Refer to SRS-20, "CONSULT-II Diagnostic Code Chart (“SELF-DIAG [CURRENT]”)" .
10. Touch “BACK” key of CONSULT-II until “SELECT SYSTEM” appears in order to return to User mode from Diagnosis mode.
11. Turn ignition switch “OFF”, then turn off and disconnect CONSULT-II and disconnect both battery cables.
12. Repair the system as outlined by the “Repair order” in “CONSULT-II Diagnostic Code Chart”, that corresponds to the self-diagnostic result.
13. After repairing the system, refer to SRS-22, "DIAGNOSTIC PROCEDURE 3" for final checking.

CONSULT-II Diagnostic Code Chart (“SELF-DIAG [CURRENT]”)

Diagnostic item	Explanation		Repair order **Recheck SRS at each replacement.**
NO DTC IS DETECTED.	When malfunction is indicated by the “AIR BAG” warning lamp in User mode	● Self-diagnostic result “SELF-DIAG [PAST]” (previously stored in the memory) might not be erased after repair. ● Intermittent malfunction has been detected in the past.	● Go to SRS-24, "DIAGNOSTIC PROCEDURE 4 (CONTINUED FROM DIAGNOSTIC PROCEDURE 2)" .
		● Low battery voltage (Less than 9V)	● Go to SRS-22, "DIAGNOSTIC PROCEDURE 3" after charging battery.
	● No malfunction is detected.		● Go to SRS-22, "DIAGNOSTIC PROCEDURE 3" .

Diagnostic item	Explanation	Repair order **Recheck SRS at each replacement.**
DRIVER AIR BAG MODULE [OPEN] [B1049]	● Driver air bag module circuit is open. (including the spiral cable)	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the spiral cable. 4. Replace driver air bag module. (Before disposal, it must be deployed.) 5. Replace the diagnosis sensor unit. 6. Replace the related harness.
DRIVER AIR BAG MODULE [VB-SHORT] [B1050]	● Driver air bag module circuit is shorted to some power supply circuit. (including the spiral cable)	
DRIVER AIR BAG MODULE [GND-SHORT] [B1051]	● Driver air bag module circuit is shorted to ground. (including the spiral cable)	
DRIVER AIR BAG MODULE [SHORT] [B1052]	● Driver air bag module circuits are shorted to each other.	
ASSIST A/B MODULE [OPEN] [B1065]	● Front passenger air bag module circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace front passenger air bag module. (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
ASSIST A/B MODULE [VB-SHORT] [B1066]	● Front passenger air bag module circuit is shorted to some power supply circuit.	
ASSIST A/B MODULE [GND-SHORT] [B1067]	● Front passenger air bag module circuit is shorted to ground.	
ASSIST A/B MODULE [SHORT] [B1068]	● Front passenger air bag module circuits are shorted to each other.	
SIDE MODULE LH [OPEN] [B1134]	● Front LH side air bag module circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace front LH seatback assembly. (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
SIDE MODULE LH [VB-SHORT] [B1135]	● Front LH side air bag module circuit is shorted to some power supply circuits.	
SIDE MODULE LH [GND-SHORT] [B1136]	● Front LH side air bag module circuit is shorted to ground.	
SIDE MODULE LH [SHORT] [B1137]	● Front LH side air bag module circuits are shorted to each other.	
SIDE MODULE RH [OPEN] [B1129]	● Front RH side air bag module circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace front RH seatback assembly. (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
SIDE MODULE RH [VB-SHORT] [B1130]	● Front RH side air bag module circuit is shorted to some power supply circuits.	
SIDE MODULE RH [GND-SHORT] [B1131]	● Front RH side air bag module circuit is shorted to ground.	
SIDE MODULE RH [SHORT] [B1132]	● Front RH side air bag module circuits are shorted to each other.	

Diagnostic item	Explanation	Repair order **Recheck SRS at each replacement.**
SATELLITE SENS LH [UNIT FAIL] [B1118] or [B1119] SATELLITE SENS LH [COMM FAIL] [B1120]	● LH side air bag (satellite) sensor	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the LH side air bag (satellite) sensor. 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
SATELLITE SENS RH [UNIT FAIL] [B1113] or [B1114] SATELLITE SENS RH [COMM FAIL] [B1115]	● RH side air bag (satellite) sensor	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the RH side air bag (satellite) sensor. 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
PRE-TEN FRONT LH [OPEN] [B1086]	● The circuit for the front LH pre-tensioner is open to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace the front LH seat belt. (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
PRE-TEN FRONT LH [VB-SHORT] [B1087]	● The circuit for the front LH pre-tensioner is shorted to some power supply circuit.	
PRE-TEN FRONT LH [GND-SHORT] [B1088]	● The circuit for the front LH pre-tensioner is shorted to ground.	
PRE-TEN FRONT LH [SHORT] [B1089]	● The circuits for the front LH pre-tensioner are shorted to each other.	
PRE-TEN FRONT RH [OPEN] [B1081]	● The circuit for the front RH pre-tensioner is open to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace the front RH seat belt. (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
PRE-TEN FRONT RH [VB-SHORT] [B1082]	● The circuit for the front RH pre-tensioner is shorted to some power supply circuit.	
PRE-TEN FRONT RH [GND-SHORT] [B1083]	● The circuit for the front RH pre-tensioner is shorted to ground.	
PRE-TEN FRONT RH [SHORT] [B1084]	● The circuits for the front RH pre-tensioner are shorted to each other.	
CONTROL UNIT [B1XXX]	● Diagnosis sensor unit is malfunctioning.	1. Visually check wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace diagnosis sensor unit. 4. Replace the related harness.

Follow the procedures in numerical order when repairing malfunctioning parts. Confirm whether malfunction is eliminated using the air bag warning lamp or CONSULT-II each time repair is finished. If malfunction is still observed, proceed to the next step. When malfunction is eliminated, further repair work is not required.

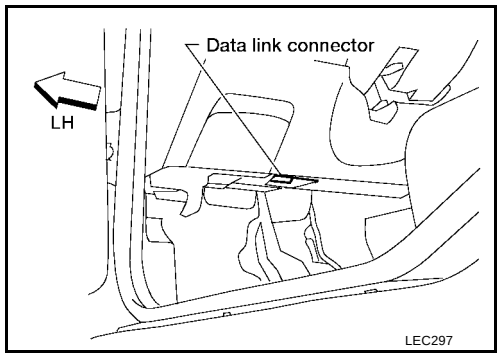
DIAGNOSTIC PROCEDURE 3

Final checking after repairing SRS by using CONSULT-II — Diagnosis mode

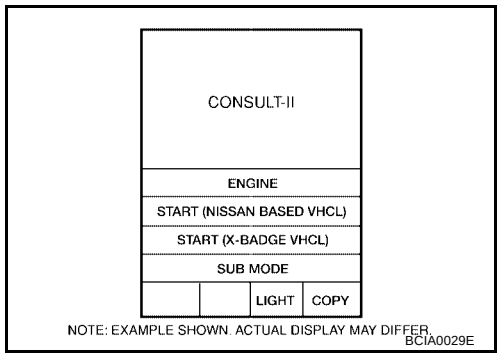
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunction might be detected in self-diagnosis depending on control unit which carry out CAN communication.

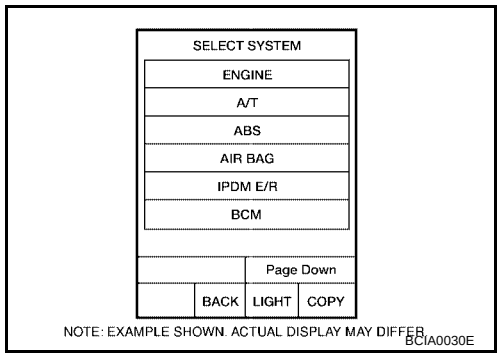
1. After repairing SRS, connect both battery cables.
2. Connect CONSULT-II to data link connector.
3. Turn ignition switch ON.



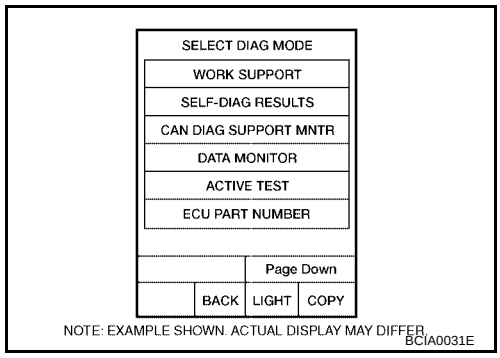
4. Touch “START (NISSAN BASED VHCL)”.



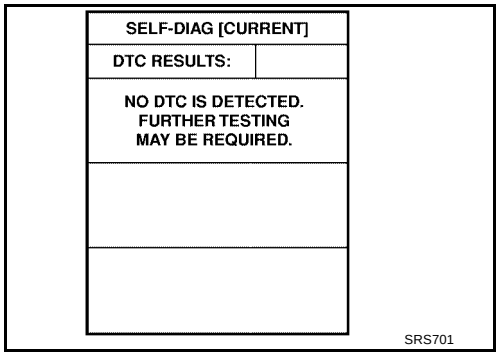
5. Touch “AIR BAG”.
   If "AIR BAG" is not indicated, refer to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Touch “SELF-DIAG [CURRENT]”.

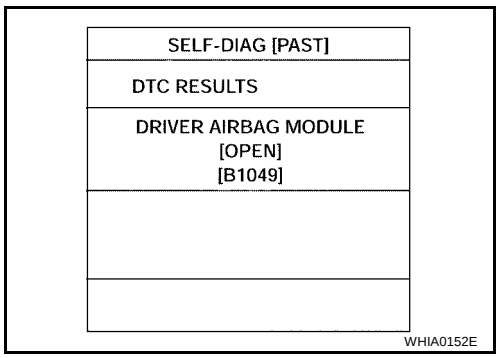


7. If no malfunction is detected on “SELF-DIAG [CURRENT]”, repair of SRS is completed. Go to step 8.
   If any malfunction is detected on “SELF-DIAG [CURRENT]”, the malfunctioning part is not repaired completely or another malfunctioning part is detected. Go to SRS-18, "DIAGNOSTIC PROCEDURE 2" , and repair malfunctioning part completely.

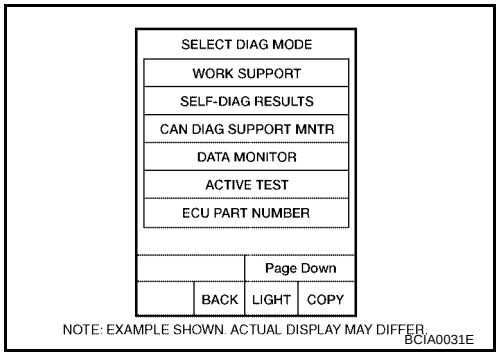


8. Touch “ERASE”.

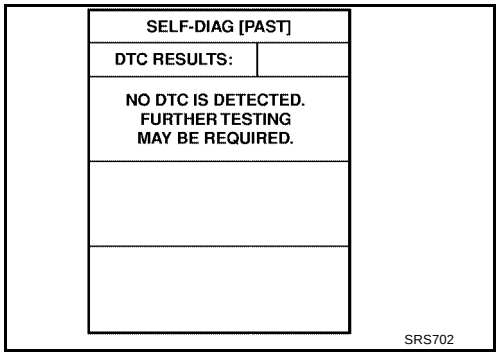
   NOTE:
   Touch “ERASE” to clear the memory of the malfunction (“SELF-DIAG [PAST]”).
   If the memory of the malfunction in “SELF-DIAG [PAST]” is not erased, the User mode shows the system malfunction by the operation of the warning lamp even if the malfunction is repaired completely.



9. Touch “BACK” key of CONSULT-II to “SELECT DIAG MODE” screen. Touch “SELF-DIAG [PAST]”.



10. Check that no malfunction is detected on “SELF-DIAG [PAST]”.
11. Touch “BACK” key of CONSULT-II until “SELECT SYSTEM” appears in order to return to User mode from Diagnosis mode.
12. Turn ignition switch OFF then turn off and disconnect CONSULT-II.
13. Go to SRS-18, "Checking Air Bag Operation by Using “AIR BAG” Warning Lamp — User Mode" .



DIAGNOSTIC PROCEDURE 4 (CONTINUED FROM DIAGNOSTIC PROCEDURE 2)

Inspecting SRS malfunctioning record

1. CONSIDER POSSIBILITY OF NOT ERASING SELF-DIAGNOSTIC RESULT AFTER REPAIRING

Is it the first time for maintenance of SRS?

Yes or No

Yes >> Go to SRS-25, "DIAGNOSTIC PROCEDURE 5" .

No >> Self-diagnostic result “SELF-DIAG [PAST]” (previously stored in the memory) might not be erased after repair. Go to SRS-22, "DIAGNOSTIC PROCEDURE 3" .

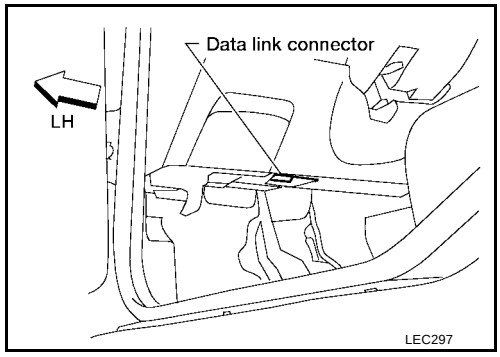
DIAGNOSTIC PROCEDURE 5

Inspecting SRS intermittent malfunction by using CONSULT-II — Diagnosis mode

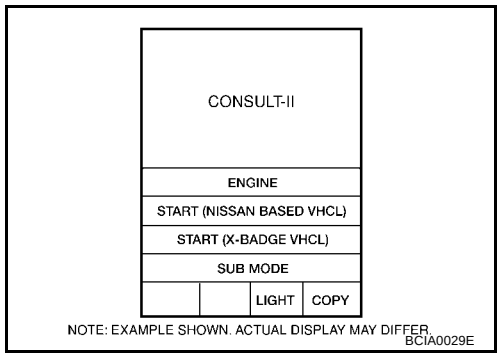
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunction might be detected in self-diagnosis depending on control unit which carry out CAN communication.

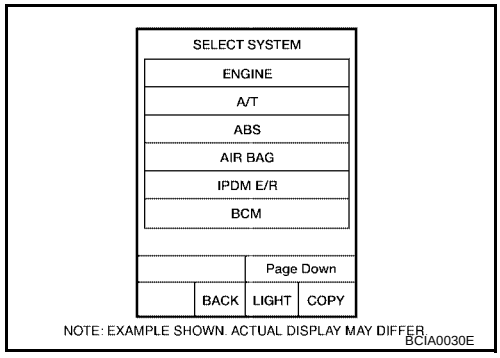
1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector.



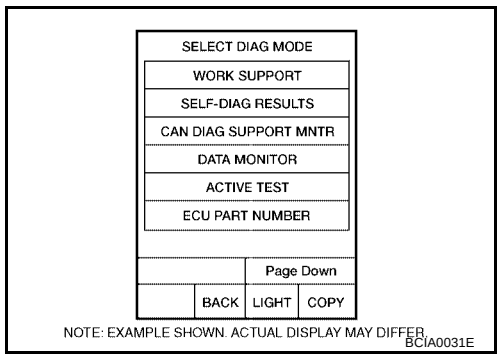
3. Turn ignition switch ON.
4. Touch “START (NISSAN BASED VHCL)”.



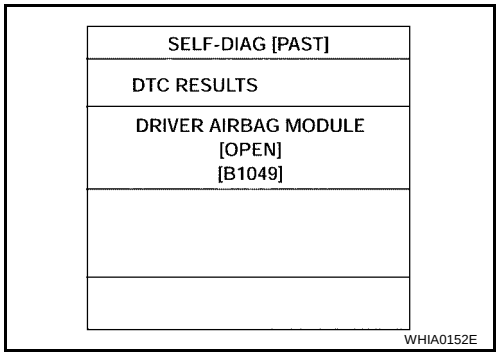
5. Touch “AIR BAG”.
   If "AIR BAG" is not indicated, refer to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



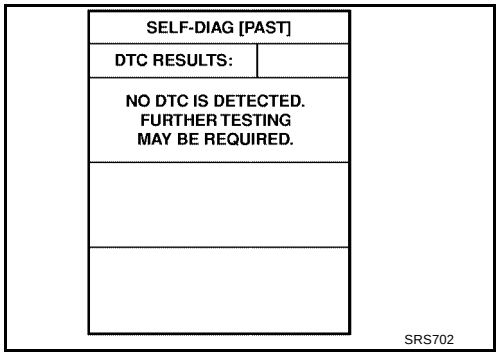
6. Touch “SELF-DIAG [PAST]”.



7. If diagnostic codes are displayed on “SELF-DIAG [PAST]”, go to step 10.

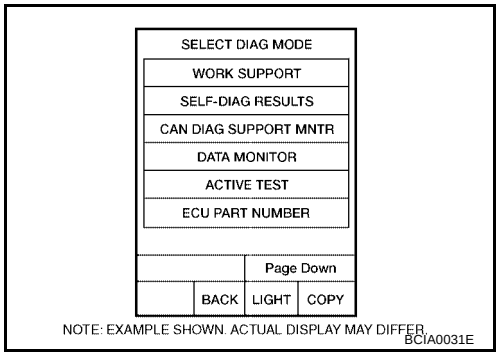


If no malfunction is detected on “SELF-DIAG [PAST]”, touch “BACK” and go back to “SELECT DIAG MODE”.

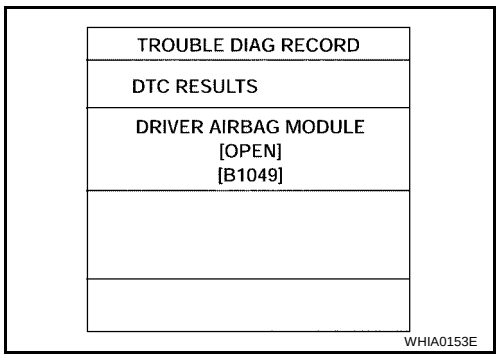


8. Touch “TROUBLE DIAG RECORD”.

NOTE:
With “TROUBLE DIAG RECORD”, diagnosis results previously erased by a reset operation can be displayed.



9. Diagnostic code is displayed on “TROUBLE DIAG RECORD”.
10. Touch “PRINT”.
11. Compare diagnostic codes to SRS-27, "Intermittent Malfunction Diagnostic Code Chart (“SELF-DIAG [PAST]” or “TROUBLE DIAG RECORD”)" .
12. Touch “BACK” key of CONSULT-II until “SELECT SYSTEM” appears.
13. Turn ignition switch OFF, then turn off and disconnect CONSULT-II, and both battery cables.
14. Repair the system as outlined by the “Repair order” in “Intermittent Malfunction Diagnostic Code Chart”, that corresponds to the self-diagnostic result. For replacement procedure of component parts, refer to the Removal and Installation procedure for the appropriate component.
15. Go to SRS-22, "DIAGNOSTIC PROCEDURE 3" , for final checking.



Intermittent Malfunction Diagnostic Code Chart ("SELF-DIAG [PAST]" or "TROUBLE DIAG RECORD")

Diagnostic item	Explanation	Repair order
NO DTC IS DETECTED.	● No malfunction is detected.	● Go to SRS-22, "DIAGNOSTIC PROCEDURE 3" .
DRIVER AIR BAG MODULE [OPEN] [B1049]	● Driver air bag module circuit is open. (including the spiral cable)	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the spiral cable, diagnosis sensor unit and driver air bag module. (Before disposal, it must be deployed.)
DRIVER AIR BAG MODULE [VB-SHORT] [B1050]	● Driver air bag module circuit is shorted to some power supply circuit. (including the spiral cable)	
DRIVER AIR BAG MODULE [GND-SHORT] [B1051]	● Driver air bag module circuit is shorted to ground. (including the spiral cable)	
DRIVER AIR BAG MODULE [SHORT] [B1052]	● Driver air bag module circuits are shorted to each other.	
ASSIST A/B MODULE [OPEN] [B1065]	● Front passenger air bag module circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and front passenger air bag module. (Before disposal, it must be deployed.)
ASSIST A/B MODULE [VB-SHORT] [B1066]	● Front passenger air bag module circuit is shorted to some power supply circuit.	
ASSIST A/B MODULE [GND-SHORT] [B1067]	● Front passenger air bag module circuit is shorted to ground.	
ASSIST A/B MODULE [SHORT] [B1068]	● Front passenger air bag module circuits are shorted to each other.	
SIDE MODULE LH [OPEN] [B1134]	● Front LH side air bag module circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and front LH seatback assembly. (Before disposal, it must be deployed.)
SIDE MODULE LH [VB-SHORT] [B1135]	● Front LH side air bag module circuit is shorted to some power supply circuits.	
SIDE MODULE LH [GND-SHORT] [B1136]	● Front LH side air bag module circuit is shorted to ground.	
SIDE MODULE LH [SHORT] [B1137]	● Front LH side air bag module circuits are shorted to each other.	
SIDE MODULE RH [OPEN] [B1129]	● Front RH side air bag module circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and front RH seatback assembly. (Before disposal, it must be deployed.)
SIDE MODULE RH [VB-SHORT] [B1130]	● Front RH side air bag module circuit is shorted to some power supply circuits.	
SIDE MODULE RH [GND-SHORT] [B1131]	● Front RH side air bag module circuit is shorted to ground.	
SIDE MODULE RH [SHORT] [B1132]	● Front RH side air bag module circuits are shorted to each other.	

Diagnostic item	Explanation	Repair order
SATELLITE SENS LH [UNIT FAIL] [B1118] or [B1119] SATELLITE SENS LH [COMM FAIL] [B1120]	● LH side air bag (satellite) sensor	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and LH side air bag (satellite) sensor.
SATELLITE SENS RH [UNIT FAIL] [B1113] or [B1114] SATELLITE SENS RH [COMM FAIL] [B1115]	● RH side air bag (satellite) sensor	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and RH side air bag (satellite) sensor.
PRE-TEN FRONT LH [OPEN] [B1086]	● The circuit for front LH pre-tensioner is open to some power supply circuit.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and front LH seat belt. (Before disposal, it must be deployed.)
PRE-TEN FRONT LH [VB-SHORT] [B1087]	● The circuit for front LH pre-tensioner is shorted to some power supply circuit.	
PRE-TEN FRONT LH [GND-SHORT] [B1088]	● The circuit for front LH pre-tensioner is shorted to ground.	
PRE-TEN FRONT LH [SHORT] [B1089]	● The circuits for the front LH pre-tensioner are shorted to each other.	
PRE-TEN FRONT RH [OPEN] [B1081]	● The circuit for front RH pre-tensioner is open to some power supply circuit.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and front RH seat belt. (Before disposal, it must be deployed.)
PRE-TEN FRONT RH [VB-SHORT] [B1082]	● The circuit for front RH pre-tensioner is shorted to some power supply circuit.	
PRE-TEN FRONT RH [GND-SHORT] [B1083]	● The circuit for front RH pre-tensioner is shorted to ground.	
PRE-TEN FRONT RH [SHORT] [B1084]	● The circuits for the front RH pre-tensioner are shorted to each other.	
CONTROL UNIT [B1XXX]	● Diagnosis sensor unit is malfunctioning.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit.

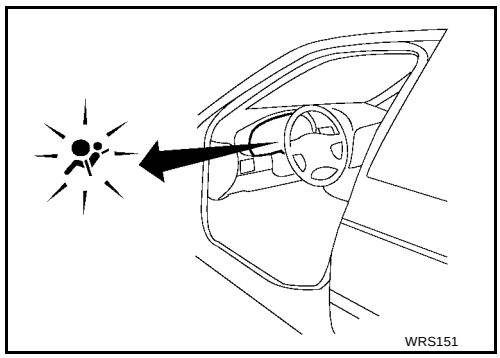
Follow the procedures in numerical order when repairing malfunctioning parts, then make the final system check.

Trouble Diagnoses without CONSULT-II

EHS000JS

DIAGNOSTIC PROCEDURE 6

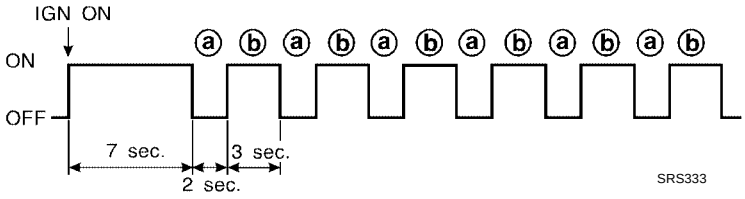
Inspecting SRS malfunctioning parts by using “AIR BAG” warning lamp — Diagnosis mode

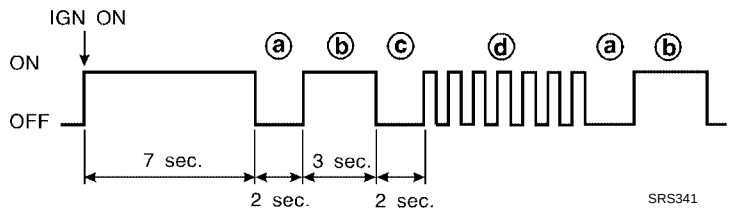
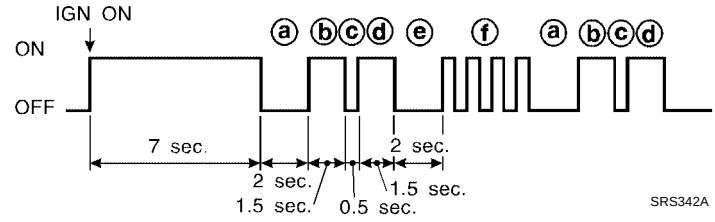


NOTE:
SRS will not enter Diagnosis mode if no malfunction is detected in User mode.

1. Turn ignition switch “ON”.
2. After “AIR BAG” warning lamp lights for 7 seconds, turn ignition switch “OFF” within 1 second.
3. Wait more than 3 seconds.
4. Repeat steps 1 to 3 three times.
5. Turn ignition switch “ON”.
   SRS is now in Diagnosis mode.
6. “AIR BAG” warning lamp operates in Diagnosis mode as follows:

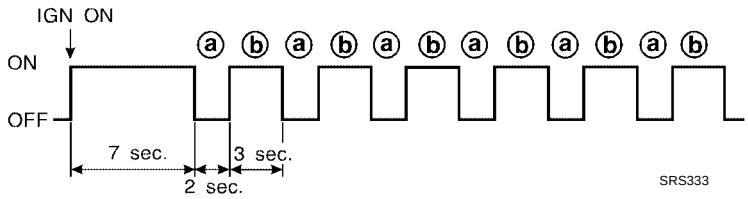
NOTE:
If SRS does not enter Diagnosis mode even though malfunction is detected in User mode, check the battery voltage.
If the battery voltage is less than 9V, charge the battery. Then go to SRS-34, "DIAGNOSTIC PROCEDURE 7".
If the battery voltage is OK, replace the diagnosis sensor unit.

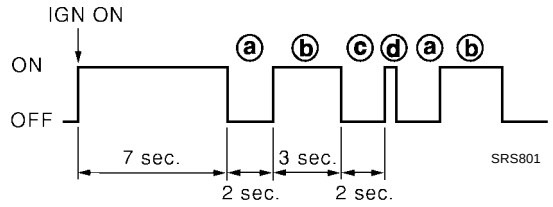
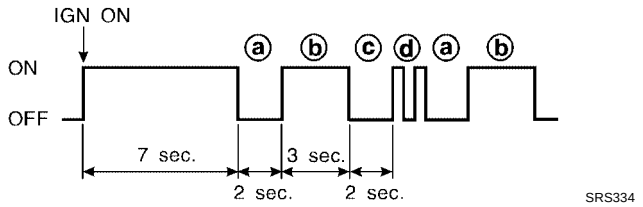
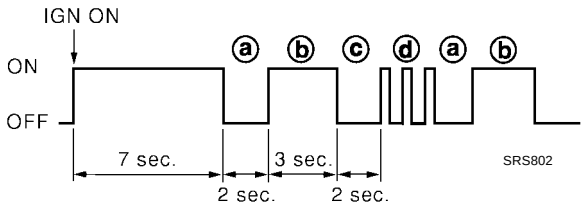
No.	“AIR BAG” warning lamp flash pattern — Diagnosis mode —		SRS condition
1		**a** through **b** are repeated.	● Diagnosis results (previously stored in the memory) might not be erased after repair. ● Intermittent malfunction has been detected in the past. Go to SRS-35, "DIAGNOSTIC PROCEDURE 8 (CONTINUED FROM DIAGNOSTIC PROCEDURE 6)".

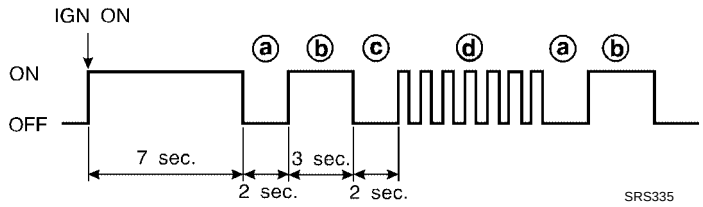
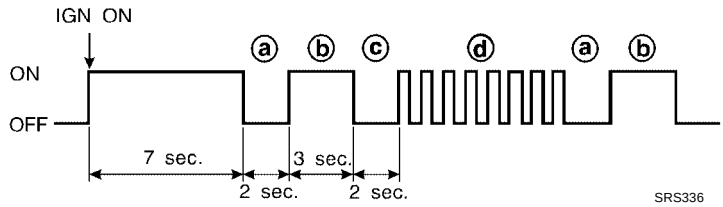
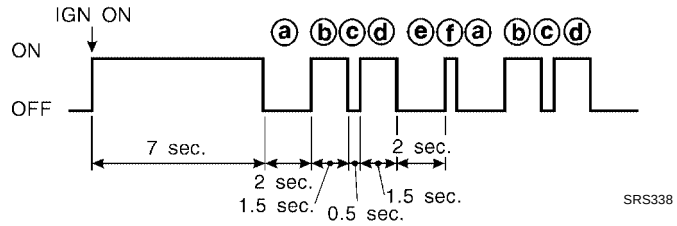
No.	“AIR BAG” warning lamp flash pattern — Diagnosis mode —		SRS condition
2		**a** through **d** are repeated. **b** — Driver and front passenger air bag marker (For identifying driver air bag, front passenger air bag and/or seat belt pre-tensioner malfunctioning) **d** — Indicates malfunctioning part. The number of flash varies with malfunctioning part (0.5 sec. ON and 0.5 sec. OFF is counted as one flash.)	The system is malfunctioning and needs to be repaired.
3		**a** through **f** are repeated. **b**, **c** , **d** — Front side air bag marker (For identifying front side air bag malfunctioning) **f** — Indicates malfunctioning part. The number of flash varies with malfunctioning part (0.5 sec. ON and 0.5 sec. OFF is counted as one flash.)	

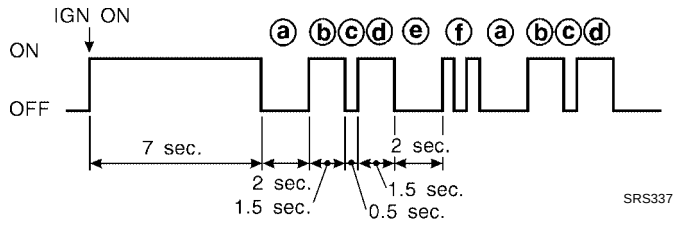
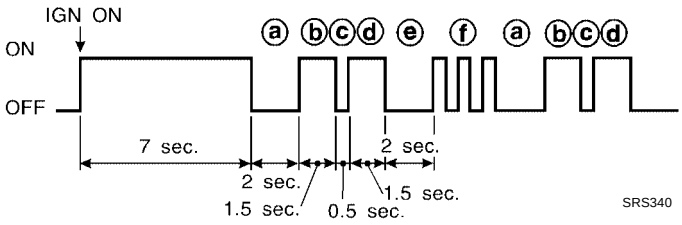
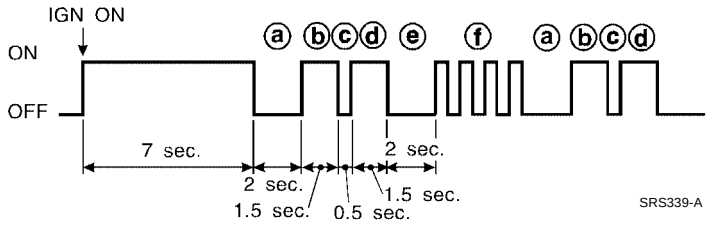
7. Malfunctioning part is indicated by the number of flashes (part **d** or **f**). Compare the number of flashes to SRS-30, "Air Bag Warning Lamp Flash Code Chart (Diagnosis mode)" , and locate malfunctioning part.
8. Turn ignition switch “OFF”, and disconnect both battery cables.
9. Repair the system as outlined by the “Repair order” in “Warning Lamp Flash Code Chart” that corresponds to the flash code. For replacement procedure of component parts, refer to the Removal and Installation procedure for the appropriate component.
10. After repairing the system, refer to SRS-34, "DIAGNOSTIC PROCEDURE 7" .

Air Bag Warning Lamp Flash Code Chart (Diagnosis mode)

	Flash pattern	
● Diagnosis results (previously stored in the memory) might not be erased after repair. ● Intermittent malfunction has been detected in the past.		**a** through **b** are repeated.
	Repair order	
	● Go to SRS-35, "DIAGNOSTIC PROCEDURE 8 (CONTINUED FROM DIAGNOSTIC PROCEDURE 6)" .	

The front RH seat belt pre-tensioner circuit is malfunctioning. (**d** : 1 flash)	Flash pattern	
		**a** through **d** are repeated. **d** — One flash indicates malfunctioning front RH pre-tensioner circuit.
	Repair order (“Recheck SRS at each replacement”).	
	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace front RH seat belt pre-tensioner. (Before disposing, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	
The driver air bag module circuit is malfunctioning. (**d** : 2 flashes)	Flash pattern	
		**a** through **d** are repeated. **d** — Two flashes indicate malfunctioning driver air bag module circuit.
	Repair order (“Recheck SRS at each replacement.”)	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the spiral cable. 4. Replace driver air bag module. (Before disposal, it must be deployed.) 5. Replace the diagnosis sensor unit. 6. Replace the related harness.	
The front LH seat belt pre-tensioner circuit is malfunctioning. (**d** : 3 flashes)	Flash pattern	
		**a** through **d** are repeated. **d** — Three flashes indicate malfunctioning front LH pre-tensioner circuit.
	Repair order (“Recheck SRS at each replacement”).	
	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace front LH seat belt pre-tensioner. (Before disposing, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	

The diagnosis sensor unit is malfunctioning. (**d** : 7 flashes)	Flash pattern	
		**a** through d are repeated. **d** — Seven flashes indicate malfunctioning diagnosis sensor unit.
	Repair order (“Recheck SRS at each replacement.”)	
	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace the diagnosis sensor unit. 4. Replace the related harness.	
The front passenger air bag module circuit is malfunctioning. (**d** : 8 flashes)	Flash pattern	
		**a** through **d** are repeated. **d** — Eight flashes indicate malfunctioning front passenger air bag module circuit.
	Repair order (“Recheck SRS at each replacement.”)	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace front passenger air bag module. (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	
The front RH side air bag module circuit is malfunctioning. (**f** : 1 flash)	Flash pattern	
		**a** through **f** are repeated. **f** — One flash indicates malfunctioning front RH side air bag module circuit.
	Repair order (“Recheck SRS at each replacement.”)	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace front RH seatback assembly. (Before disposal, the front RH side air bag module must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	

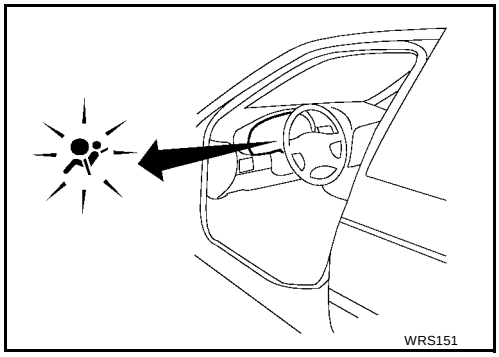
The front LH side air bag module circuit is malfunctioning. (**f** : 2 flashes)	Flash pattern	
		**a** through **f** are repeated. **f** — Two flashes indicate malfunctioning front LH side air bag module circuit.
	Repair order (“Recheck SRS at each replacement.”)	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace front LH seatback assembly. (Before disposal, the front LH side air bag module must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	
The RH side air bag (satellite) sensor is malfunctioning. (**f** : 3 flashes)	Flash pattern	
		**a** through **f** are repeated. **f** — Three flashes indicate malfunctioning RH side air bag (satellite) sensor circuit.
	Repair order (“Recheck SRS at each replacement.”)	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the RH side air bag (satellite) sensor. 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	
The LH side air bag (satellite) sensor is malfunctioning. (**f** : 4 flashes)	Flash pattern	
		**a** through **f** are repeated. **f** — Four flashes indicate malfunctioning LH side air bag (satellite) sensor circuit.
	Repair order (“Recheck SRS at each replacement.”)	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the LH side air bag (satellite) sensor. 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	

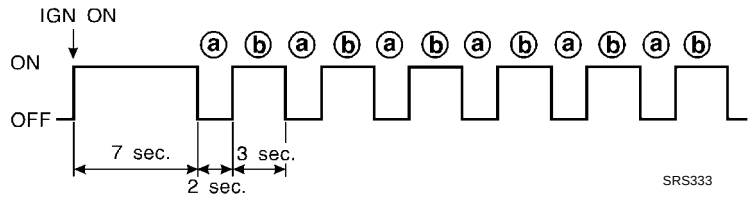
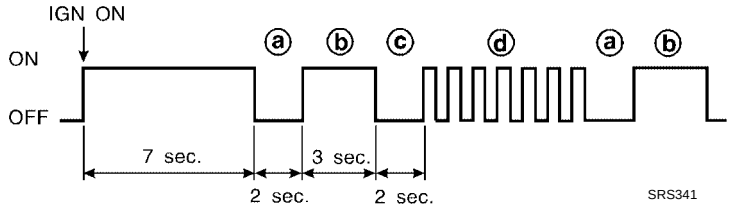
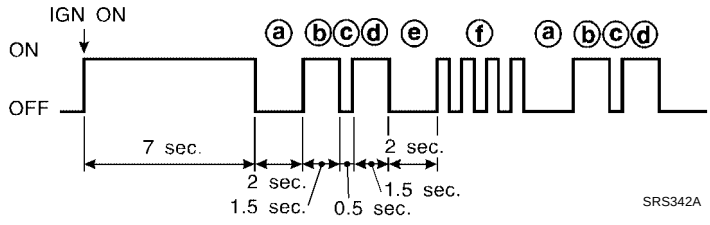
Follow the procedures in numerical order when repairing malfunctioning parts. Confirm whether malfunction is eliminated using the air bag warning lamp or CONSULT-II each time repair is finished. If malfunction is still observed, proceed to the next step. When malfunction is eliminated, further repair work is not required.

DIAGNOSTIC PROCEDURE 7

Final checking after repairing SRS by using “AIR BAG” warning lamp — Diagnosis mode and User mode

1. After repairing SRS, connect both battery cables.
2. Open driver's door.
3. Turn ignition switch “ON”.
4. “AIR BAG” warning lamp operates in Diagnosis mode as follows:



No.	“AIR BAG” warning lamp flash pattern — Diagnosis mode —		SRS condition
1		**a** through **b** are repeated.	No malfunction is detected or repair is completed. No further action is necessary.
2		**a** through **d** are repeated. **b** — Driver and front passenger air bag marker (For identifying driver air bag, front passenger air bag and/or seat belt pre-tensioner malfunctioning) **d** — Indicates malfunctioning part. The number of flashes varies with malfunctioning part (0.5 sec. ON and 0.5 sec. OFF is counted as one flash.)	The system is malfunctioning and needs to be repaired.
3		**a** through **f** are repeated. **b**, **c** , **d** — Front side air bag marker (For identifying front side air bag malfunctioning) **f** — Indicates malfunctioning part. The number of flashes varies with malfunctioning part (0.5 sec. ON and 0.5 sec. OFF is counted as one flash.)	

NOTE:
When diagnosis sensor unit is replaced with new one, “AIR BAG” warning lamp will operate in User mode. Checking “AIR BAG” warning lamp operation in Diagnosis mode is not required. Go to step 6.

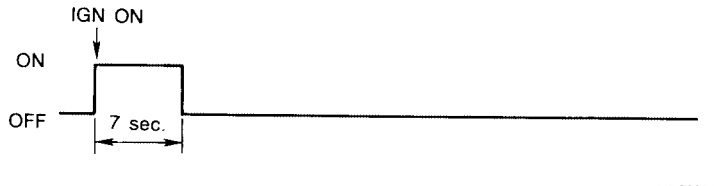
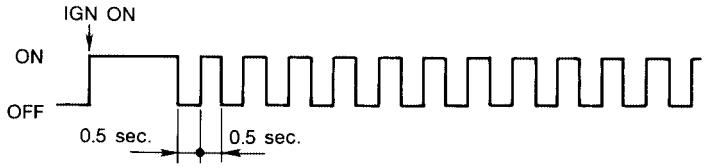
5. If “AIR BAG” warning lamp operates as shown in No. 1 in chart above, turn ignition switch “OFF” to reset from Diagnosis mode to User mode and to erase the memory of the malfunction. Then go to step 6.
   If “AIR BAG” warning lamp operates as shown in No. 2 or No. 3 in chart above, the malfunctioning part is not repaired completely, or another malfunctioning part is detected. Go to SRS-29, "DIAGNOSTIC PROCEDURE 6" , and repair malfunctioning part completely.
6. Turn ignition switch “ON”. “AIR BAG” warning lamp operates in User mode. Compare “AIR BAG” warning lamp operation to the chart below.

NOTE:
If switching Diagnosis mode to User mode is required while malfunction is being detected, turn ignition switch as follows:

7. Turn ignition switch “ON”.
8. After “AIR BAG” warning lamp lights for 7 seconds, turn ignition switch “OFF”.

9. Wait more than 3 seconds.
10. Repeat steps 1 to 3 three times.
11. Turn ignition switch “ON”.

SRS is now in User mode.

“AIR BAG” warning lamp operation — User mode —	SRS condition	Reference item
 MRS095A	No malfunction is detected. No further action is necessary.	—
 MRS096A	The system is malfunctioning and needs to be repaired as indicated.	Go to SRS-29, "DIAGNOSTIC PROCEDURE 6" .
MRS097A	Air bag is deployed.	Go to SRS-54, "COLLISION DIAGNOSIS" .
	Air bag fuse, diagnosis sensor unit or harness is malfunctioning and needs to be repaired.	Go to SRS-36, "DIAGNOSTIC PROCEDURE 9" .
MRS098A	One of the following has occurred and needs to be repaired. ● Meter fuse is blown. ● “AIR BAG” warning lamp circuit has open or short. ● Diagnosis sensor unit is malfunctioning.	Go to SRS-37, "DIAGNOSTIC PROCEDURE 10" .

DIAGNOSTIC PROCEDURE 8 (CONTINUED FROM DIAGNOSTIC PROCEDURE 6)

Inspecting SRS malfunctioning record

1. CONSIDER POSSIBILITY OF NOT ERASING SELF-DIAGNOSTIC RESULT AFTER REPAIRING

Is it the first time for maintenance of SRS?

Yes or No

Yes >> Go to SRS-25, "DIAGNOSTIC PROCEDURE 5" . (Further inspection cannot be performed without CONSULT-II.)

No >> Diagnosis results (previously stored in the memory) might not be erased after repair. Go to SRS-34, "DIAGNOSTIC PROCEDURE 7" .

Trouble Diagnoses: “AIR BAG” Warning Lamp Does Not Turn Off

EHS000JT

DIAGNOSTIC PROCEDURE 9

1. SEE THE DEPLOYMENT OF AIR BAG MODULE

Is air bag module deployed?

Yes or No

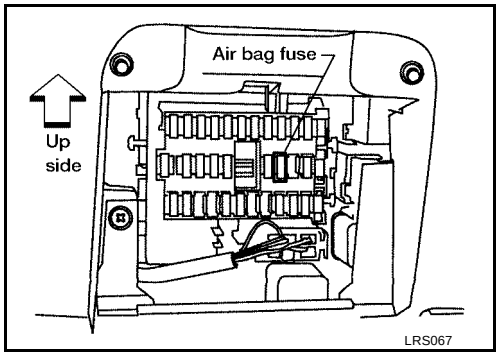
Yes >> Refer to SRS-54, "COLLISION DIAGNOSIS" .
No >> GO TO 2.

2. CHECK AIR BAG FUSE

Check 10A fuse 18 [located in the fuse block (J/B)].

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. CHECK AIR BAG FUSE AGAIN

Replace “AIR BAG” fuse and turn ignition switch ON.

Is “AIR BAG” fuse blown again?

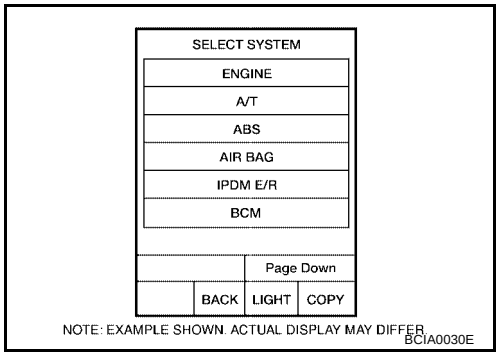
Yes >> Repair main harness and/or replace related harness.
No >> Inspection End.

4. CHECK DIAGNOSIS SENSOR UNIT

Connect CONSULT-II and touch “START”.
Is “AIR BAG” displayed on CONSULT-II?

Yes or No

Yes >> GO TO 5.
No >> Visually check the wiring harness connection of diagnosis sensor unit. If the harness connection check result is OK, replace diagnosis sensor unit. Refer to SRS-38, "Removal and Installation" .



5. CHECK HARNESS CONNECTION

Is harness connection between warning lamp and diagnosis sensor unit OK?

OK or NG

OK >> Replace diagnosis sensor unit. Refer to SRS-38, "Removal and Installation" .
NG >> Connect “AIR BAG” warning lamp and diagnosis sensor unit connector properly. If “AIR BAG” warning lamp still does not go off, replace harness.

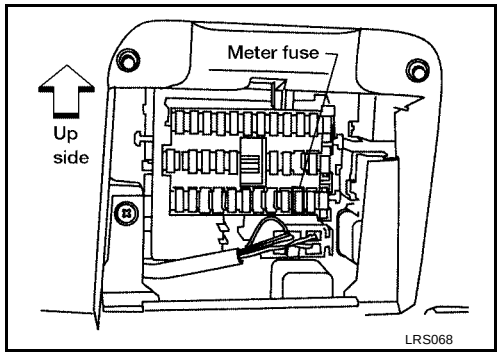
Trouble Diagnoses: “AIR BAG” Warning Lamp Does Not Turn On

EHS000JU

DIAGNOSTIC PROCEDURE 10

1. CHECK “METER” FUSE

Check 10A fuse 30 [located in the fuse block (J/B)].



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK “METER” FUSE AGAIN

Replace “METER” fuse and turn ignition switch ON.

Is “METER” fuse blown again?

Yes >> Repair main harness.
No >> Inspection End.

3. CHECK HARNESS CONNECTION BETWEEN DIAGNOSIS SENSOR UNIT AND “AIR BAG” WARNING LAMP

Disconnect diagnosis sensor unit connector and turn ignition switch “ON”.
Does “AIR BAG” warning lamp turn on?

Yes or No

Yes >> Replace diagnosis sensor unit. Refer to SRS-38, "Removal and Installation" .
No >> Check the ground circuit of “AIR BAG” warning lamp.

DIAGNOSIS SENSOR UNIT

PFP:28556

Removal and Installation

EHS000JV

REMOVAL

CAUTION:

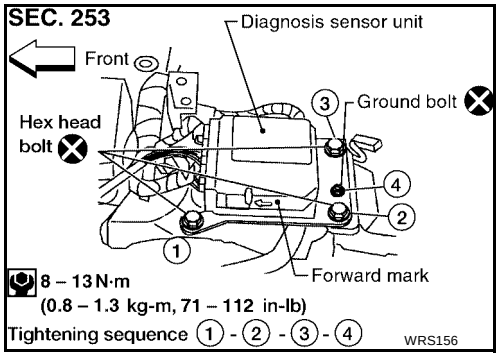
- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait for at least 3 minutes.**
- **Do not use old bolts after removal; replace with new ones.**
- **Check diagnosis sensor unit for proper installation.**
- **Check diagnosis sensor unit to ensure it is free of deformities, dents, cracks or rust. If they show any visible signs of damage, replace them with new ones.**
- **Check diagnosis sensor unit brackets to ensure they are free of deformities or rust.**
- **Replace diagnosis sensor unit if it has been dropped or sustained an impact.**
- **After replacement of diagnosis sensor unit, perform self-diagnosis for SRS. Refer to SRS-18, "SRS Operation Check" for details.**

1. Disconnect driver, front passenger and front side air bag module connectors. Also, disconnect front seat belt pre-tensioner connectors.
2. Remove console box. Refer to IP-10, "INSTRUMENT PANEL ASSEMBLY" .
3. Disconnect diagnosis sensor unit connector.
4. Remove bolts from diagnosis sensor unit.
   Then remove the diagnosis sensor unit.

INSTALLATION

NOTE:

- To install, reverse the removal procedure sequence.



FRONT SEAT BELT PRE-TENSIONER

PFP:86884

Removal and Installation

EHS000JW

For removal and installation of front seat belt pre-tensioners, refer to SB-3, "Removal and Installation" .

SIDE AIR BAG (SATELLITE) SENSOR

PFP:K8EH0

Removal and Installation

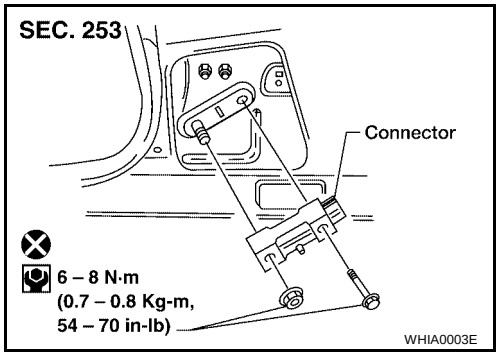
EHS000JX

REMOVAL

CAUTION:

- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait at least 3 minutes.**
- **Do not use old nut or bolt coated with bonding agent after removal; replace with new ones.**
- **Check side air bag (satellite) sensor to ensure they are free of deformities, dents, cracks or rust. If it shows any visible signs of damage, replace it with new one.**
- **Do not attempt to disassemble side air bag (satellite) sensor.**
- **Replace side air bag (satellite) sensor if it has been dropped or sustained an impact.**

1. Remove front seat belt pre-tensioner. Refer to SB-3, "Removal and Installation" .
2. Disconnect side air bag (satellite) sensor connector.
3. Remove bolt and nut from side air bag (satellite) sensor unit. Then remove the side air bag (satellite) sensor.



INSTALLATION

CAUTION:

- **Check side air bag (satellite) sensor for proper installation.**
- **After replacement of side air bag (satellite) sensor, check SRS function and perform self-diagnosis. Refer to SRS-18, "SRS Operation Check" for details.**

To install, reverse the removal procedure sequence.

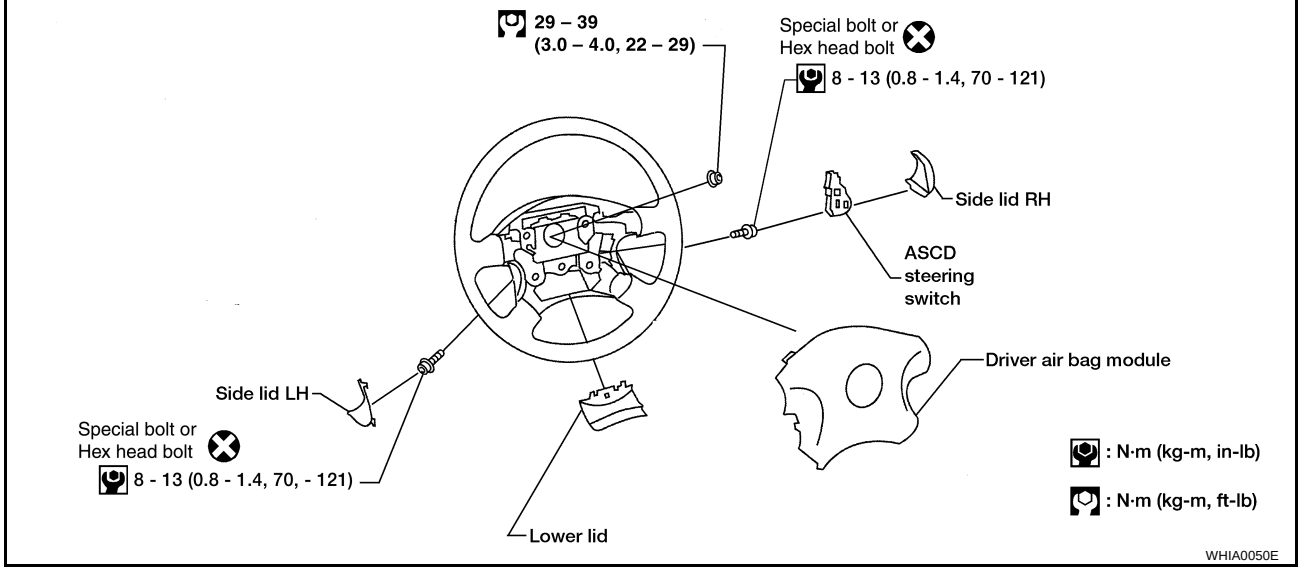
DRIVER AIR BAG MODULE

PFP:K8510

Removal and Installation

EHS000JY

SEC. 253•484



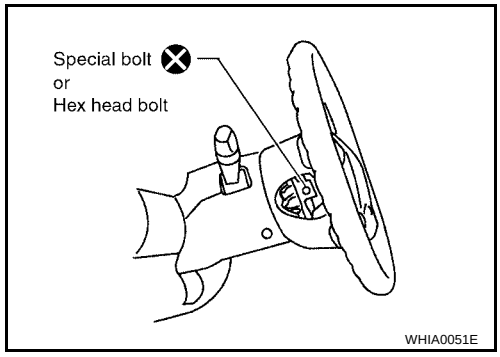
Removal

EHS000JZ

CAUTION:

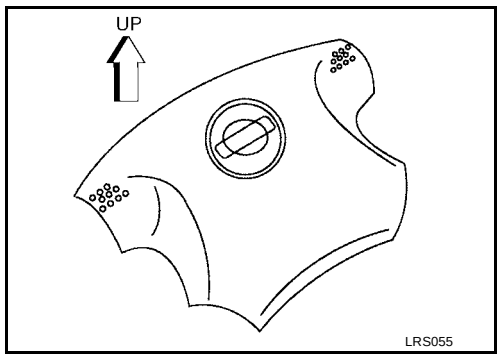
- **Do not attempt to repair or replace damaged direct-connect driver air bag module connectors. If a direct-connect harness connector is damaged, the harness must be replaced.**
- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait at least 3 minutes.**
- **Always work from the side of driver air bag module.**

1. Remove side lids and ASCD steering switch (if equipped). Using the TAMPER RESISTANT TORX (Size T30) (if equipped), remove left and right special bolts or hex head bolts. Driver air bag module can then be removed.
2. Disconnect the air bag harness connector and remove the air bag module.
   - For removal/installation of the direct-connect SRS connectors, refer to SRS-6, "Direct-connect SRS Component Connectors" .

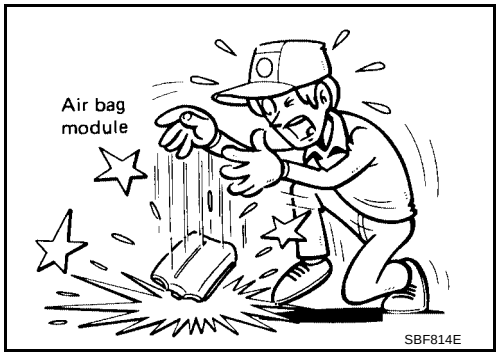


CAUTION:

- **Always place driver air bag module with pad side facing upward.**
- **Do not attempt to disassemble air bag module.**
- **The bolts are coated with bonding agent. Do not use old bolts after removal; replace with new ones.**
- **Do not insert any foreign objects (screwdriver, etc.) into air bag module connector.**



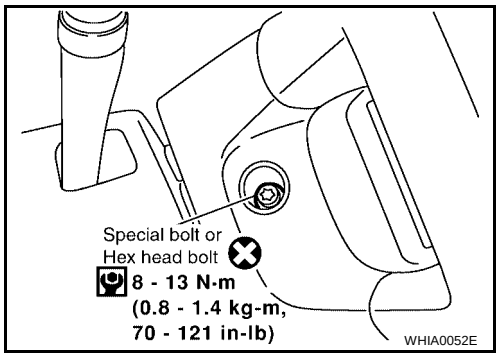
- **Replace driver air bag module if it has been dropped or sustained an impact.**
- **Do not expose the driver air bag module to temperatures exceeding 90°C (194°F).**
- **Do not allow oil, grease or water to come in contact with the driver air bag module.**



Installation

EHS000K0

1. Connect driver air bag harness connector.
   - For removal/installation of the direct-connect SRS connectors, refer to SRS-6, "Direct-connect SRS Component Connectors" .
2. Position driver air bag module, press firmly and tighten with new special bolts.
3. Install ASCD steering switch (if equipped) and all lids.
4. Connect both battery cables, then conduct self-diagnosis to ensure entire SRS operates properly. (Use CONSULT-II or warning lamp check.)
5. Turn steering wheel to the left end and then to the right end fully to make sure that spiral cable is set in the neutral position.
   If air bag warning lamp blinks or stays ON (at the user mode), it shows the spiral cable may be snapped due to its improper position. Perform self-diagnosis again (use CONSULT-II or warning lamp). Refer to SRS-18, "SRS Operation Check" . If a malfunction is detected, replace the spiral cable with a new one.
6. Perform self-diagnosis again to check that no malfunction is detected. Go to SRS-18, "SRS Operation Check" and perform self-diagnosis to ensure entire SRS operates properly. (Use CONSULT-II or warning lamp check.)

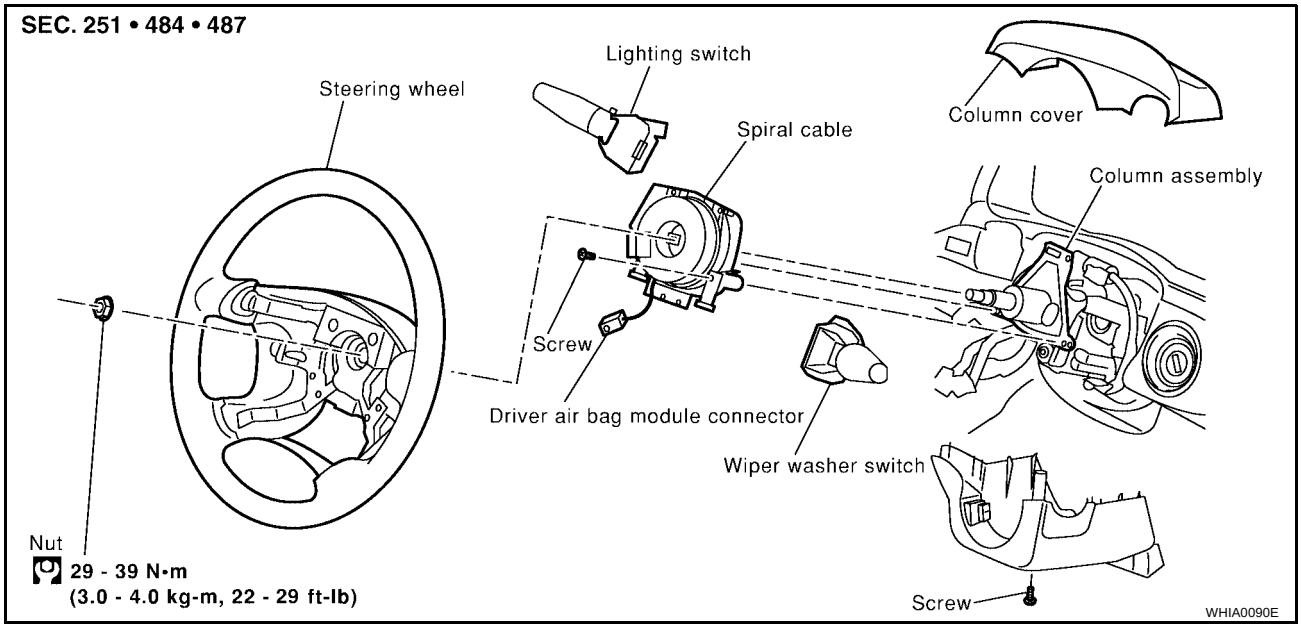


SPIRAL CABLE

PFP:25554

Removal and Installation

EHS000K1



Removal

EHS000K2

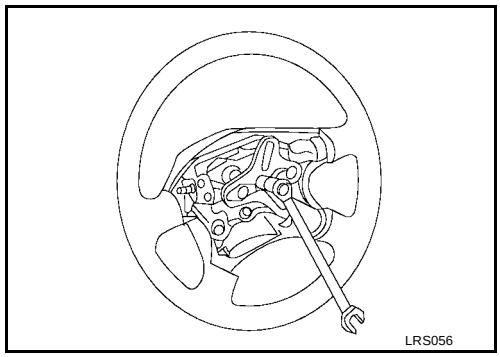
CAUTION:

- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait at least 3 minutes.**

1. Remove driver air bag module. Refer to SRS-41, "Removal" .
2. Set steering wheel in the neutral position.
3. Remove lower lid and disconnect horn connector. Remove steering wheel nut.
4. Using steering wheel puller, remove steering wheel. Be careful not to over-tighten puller bolt on steering wheel.

   CAUTION:

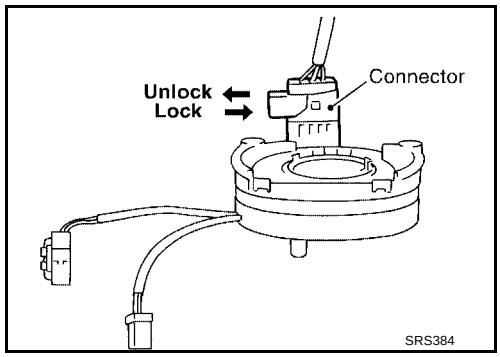
   - **Do not tap or bump the steering wheel.**
5. Remove steering column cover.



6. Unlock the spiral cable connector. Then disconnect connectors and remove the four screws. The spiral cable can then be removed.

   CAUTION:

   - **Do not attempt to disassemble spiral cable.**
   - **Do not apply lubricant to the spiral cable.**

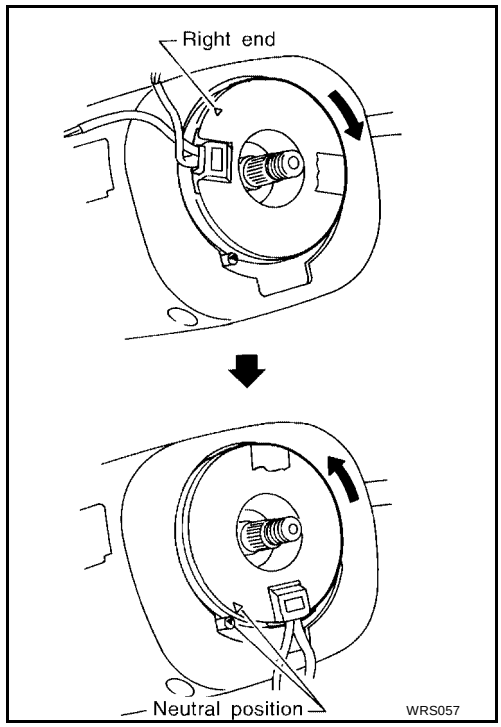


Installation

EHS000K3

1. Set the front wheels in the straight-ahead position.
2. Make sure that the spiral cable is in the neutral position.
   The neutral position is detected by turning left about 3.5 revolutions from the right end position. Align the two marks (⧗).
   CAUTION:
   - **The spiral cable may snap due to steering operation if the cable is installed in an improper position.**
   - **Also, with the steering linkage disconnected, the cable may snap by turning the steering wheel beyond the limited number of turns. To set spiral cable to neutral position turn to the left approximately 3.5 turns from the right end position.**
3. Connect spiral cable connector and tighten with screws. Install steering column cover.
4. Install steering wheel, aligning with spiral cable pin guides, and pull spiral cable through.
5. Connect horn connector and engage spiral cable with pawls in steering wheel. Move driver air bag module connector away from steering wheel lower lid opening.
6. Tighten nut.

   : 29 - 39 N-m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)



7. Install driver air bag module. Refer to SRS-42, "Installation" .
8. Connect both battery cables, then conduct self-diagnosis to ensure entire SRS operates properly. Refer to SRS-18, "SRS Operation Check" .

FRONT PASSENGER AIR BAG MODULE

PFP:K8515

Removal and Installation

EHS000K4

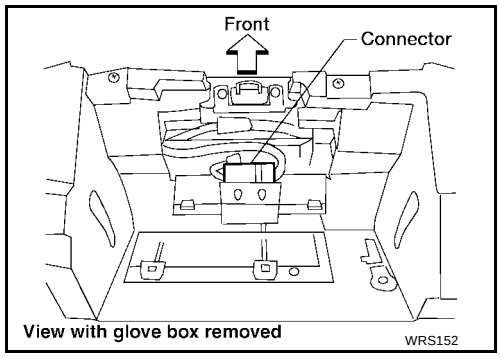
REMOVAL

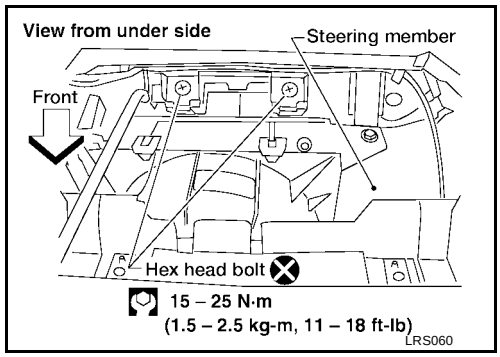
CAUTION:

- **Do not attempt to repair or replace damaged direct-connect front passenger air bag module connectors. If a direct-connect harness connector is damaged, the harness must be replaced.**
- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait for at least 3 minutes.**
- **Always work from the side of or under air bag module.**

1. Remove glove box assembly. Refer to IP-10, "INSTRUMENT PANEL ASSEMBLY" for details.
2. Disconnect front passenger air bag module connector from air bag harness connector.
3. Remove the nuts and hex bolts from front passenger air bag module.
4. Remove the front passenger air bag module from the instrument panel.

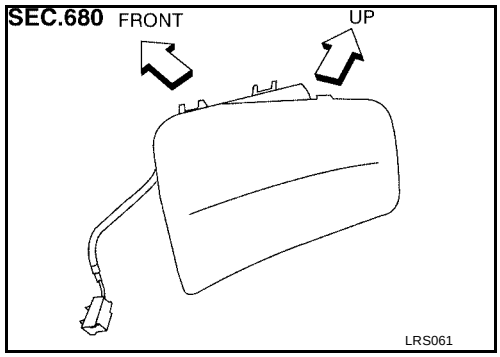
- The front passenger air bag module is heavy and should be supported using both hands during removal.



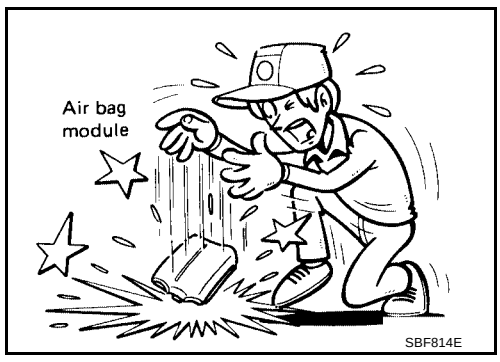


CAUTION:

- **Always place front passenger air bag module with pad side facing upward.**
- **Do not attempt to disassemble air bag module.**
- **The special bolts are coated with bonding agent. Do not use old bolts after removal; replace with new coated bolts.**
- **Do not insert any foreign objects (screwdriver, etc.) into air bag module connector.**



- **Replace air bag module if it has been dropped or sustained an impact.**
- **Do not expose the air bag module to temperatures exceeding 90°C (194°F).**
- **Do not allow oil, grease or water to come in contact with the front passenger air bag module.**
- **After air bag inflates, the front instrument panel assembly should be replaced if damaged.**

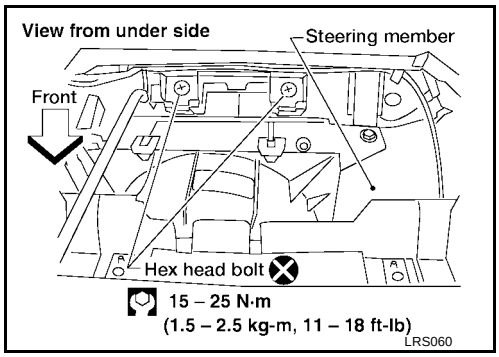


INSTALLATION

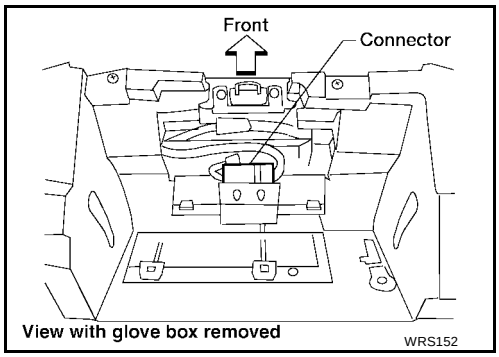
CAUTION:

- **Always work from the side of or under air bag module.**

1. Install front passenger air bag module on steering member.
   - Ensure harness is not caught between rear of air bag module and steering member.
2. Install glove box assembly. (Glove box lid is open.)



3. Connect front passenger air bag module connector to air bag harness connector.
4. Close the glove box lid.
5. Connect both battery cables.
6. Go to SRS-18, "SRS Operation Check" and perform self-diagnosis to ensure entire SRS operates properly. (Use CONSULT-II or warning lamp check.)



FRONT SIDE AIR BAG MODULE

PFP:K8EH0

Removal

EHS000K5

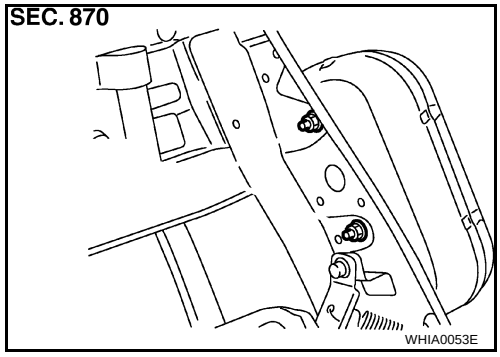
WARNING:

Removal of front side air bag module should only be done to allow deployment of front side air bag module prior to disposal of seatback assembly.
Only complete seatback assemblies can be replaced. Refer to SE-5, "Removal and Installation" .

CAUTION:

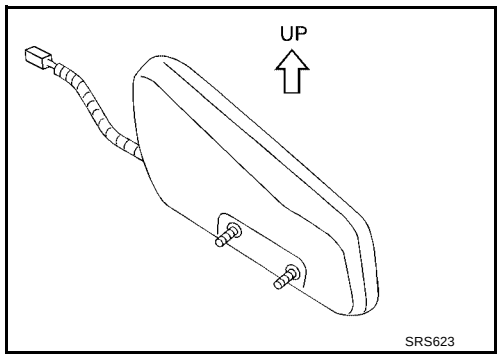
- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait at least 3 minutes.**
- **Always work from the rear of air bag module.**

1. Open seat back zipper to access module.
2. Pull up the seat back trim.
3. Remove the Torx nuts coated with bonding agent from front side air bag module.
4. Remove harness clips. Front side air bag module can then be removed.

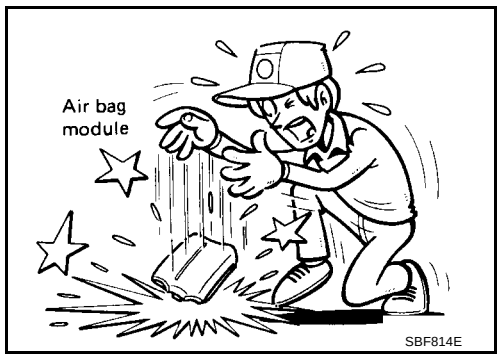


CAUTION:

- **Always place front side air bag module with the stud bolt side facing down.**
- **Do not attempt to disassemble air bag module.**
- **Do not insert any foreign objects (screwdriver, etc.) into air bag module connector.**



- **Replace front seatback assembly if it has been dropped or sustained an impact.**
- **Do not expose front seatback assembly to temperatures exceeding 90°C (194°F).**
- **Do not allow oil, grease or water to come in contact with the air bag module.**
- **After air bag inflates, the front seatback assembly must be replaced.**



DISPOSAL OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER

PFP:00014

Disposal of Air Bag Module and Seat Belt Pre-tensioner

EHS000K6

- Before disposing of air bag module or seat belt pre-tensioner, on vehicles equipped with such systems, deploy the systems. If such systems have already been deployed due to an accident, dispose of them as indicated in SRS-53, "DISPOSING OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER" .
- When deploying the air bag module and seat belt pre-tensioner, always use the Special Service Tool; Deployment tool KV99106400 (Kent-Moore No. J38381).
- When deploying the air bag module or seat belt pre-tensioner, stand at least 5 m (16 ft) away from the deployment component.
- When deploying air bag module or seat belt pre-tensioner, a fairly loud noise is made, followed by smoke being released. The smoke is not poisonous, however, be careful not to inhale smoke since it irritates the throat and can cause choking.
- Only deploy one air bag module at a time.
- Due to heat, leave air bag module unattended for more than 30 minutes after deployment. Leave seat belt pre-tensioner unattended for more than 10 minutes after deployment.
- Be sure to wear gloves when handling a deployed air bag module or seat belt pre-tensioner.
- Never apply water to the deployed air bag module or seat belt pre-tensioner.
- Wash your hands clean after finishing work.
- Place the vehicle outdoors with an open space of at least 6 m (20 ft) on all sides when deploying air bag module or seat belt pre-tensioner while mounted in vehicle.
- Use a voltmeter to make sure the vehicle battery is fully charged.
- Do not dispose of air bag modules or seat belt pre-tensioners un-deployed.

CHECKING DEPLOYMENT TOOL

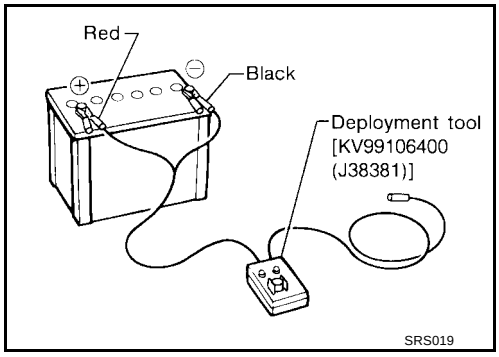
Connecting to Battery

CAUTION:

The battery must show voltage of 9.6V or more.

Remove the battery from the vehicle and place it on dry wood blocks approximately 5 m (16 ft) away from the vehicle.

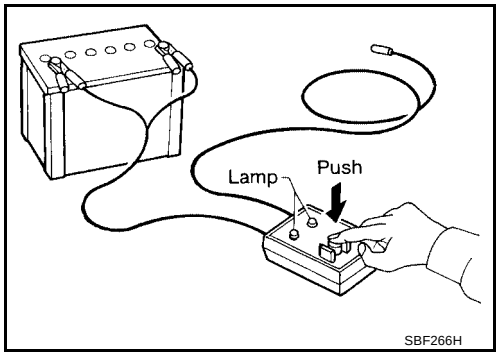
- Wait 3 minutes after the vehicle battery is disconnected before proceeding.
- Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.



Make sure the polarity is correct. The right side lamp in the tool, marked “deployment tool power”, should glow with a green light. If the right side lamp glows red, reverse the connections to the battery.

Deployment Tool Check

Press the deployment tool switch to the “ON” position. The left side lamp in the tool, marked “air bag connector voltage” should illuminate. If it does not illuminate, replace the tool.



Air Bag Deployment Tool Lamp Illumination Chart (Battery connected)

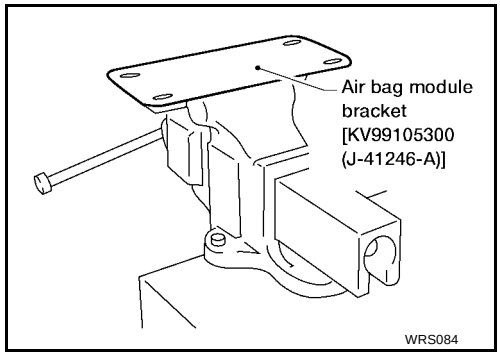
Switch operation	Left side lamp, green* "AIR BAG CONNECTOR VOLTAGE"	Right side lamp, green* "DEPLOYMENT TOOL POWER"
OFF	OFF	ON
ON	ON	ON

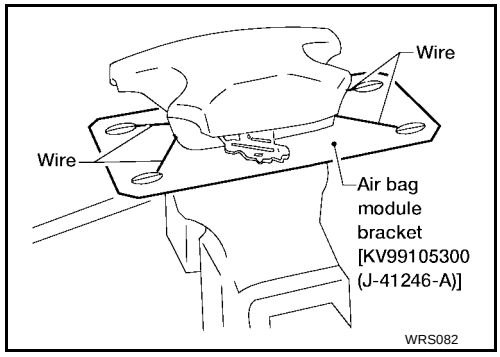
*: If this lamp glows red, the tool is connected to the battery incorrectly. Reverse the connections and make sure the lamp glows green.

DEPLOYMENT PROCEDURES FOR AIR BAG MODULE (OUTSIDE OF VEHICLE)

Unless the vehicle is being scrapped, deploying the air bag in the vehicle is not recommended. This may cause damage to the vehicle interior.

Anchor air bag module bracket [KV99105300 (J-41246-A)] in a vise secured to a firm foundation during deployment.



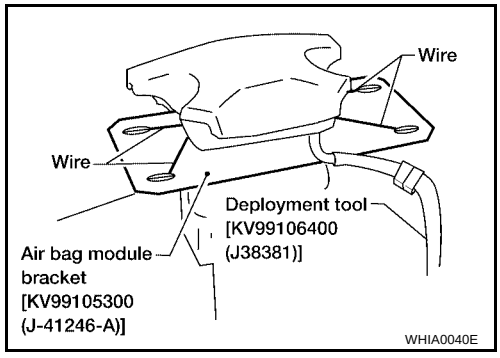


Deployment of Driver Air Bag Module (Outside of vehicle)

1. Using wire, secure driver air bag module to air bag module bracket [SST: KV99105300 (J-41246-A)] at two places.

   CAUTION:
   Use wire of at least 1 mm (0.04 in) diameter.

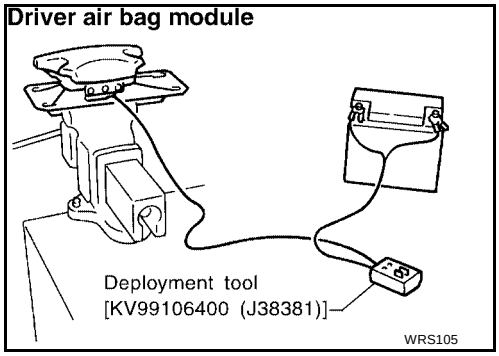
2. Firmly secure air bag module bracket [SST: KV99105300 (J-41246-A)] with air bag module attached, in a vise.
3. Connect deployment tool [SST: KV99106400 (J38381)] to driver air bag module connector. If adapter is required, use SST: KV99109000 (J44230).



4. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
5. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red.
6. Press the button on the deployment tool. The left side lamp on the tool, marked “air bag connector voltage”, will illuminate and the driver air bag module will deploy.

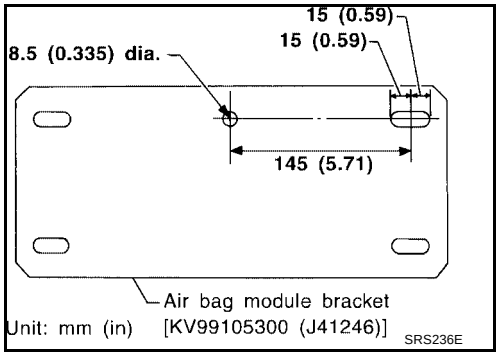
CAUTION:

When deploying the driver air bag module, stand at least 5 m (16 ft) away from the driver air bag module.

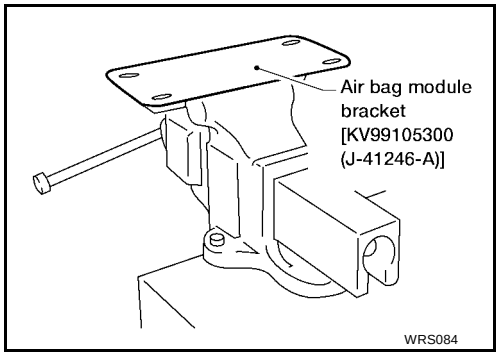


Deployment of Front Passenger Air Bag Module (Outside of vehicle)

1. Make an 8.5 mm (0.335 in) diameter hole in air bag module bracket [SST: KV99105300 (J-41246-A)] at the position shown in figure.



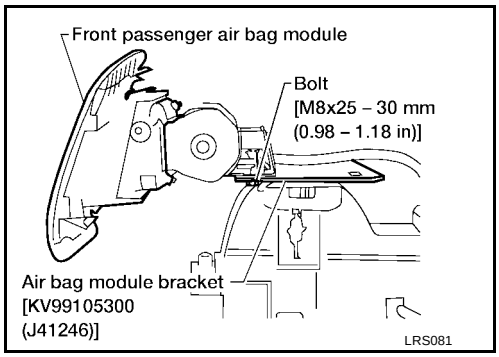
2. Firmly secure air bag module bracket [SST: KV99105300 (J-41246-A)] in a vise.



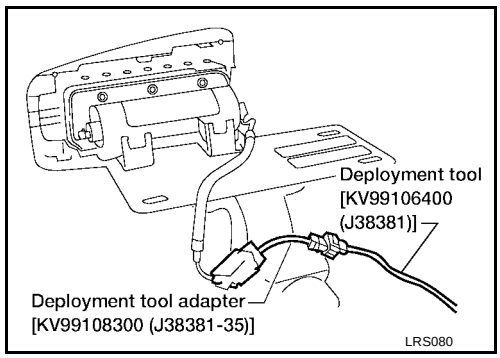
3. Match the two holes in air bag module bracket (held in vise) and front passenger air bag module and fix them with two bolts [M8 × 25 - 30 mm (0.98 - 1.18 in)].

CAUTION:

If a gap exists between front passenger air bag module and air bag module bracket, use a piece of wood inserted in the gap to stabilize the front passenger air bag module.



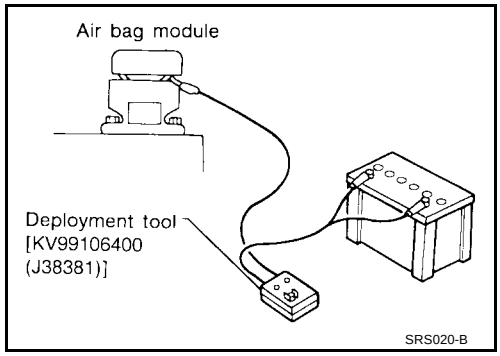
4. Connect deployment tool adapter [SST: KV99108300 (J38381-35)] to deployment tool [SST: KV99106400 (J38381)] connector and front passenger air bag module connector.
5. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
6. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red.



7. Press the button on the deployment tool. The left side lamp on the tool, marked “air bag connector voltage”, will illuminate and the front passenger air bag module will deploy.

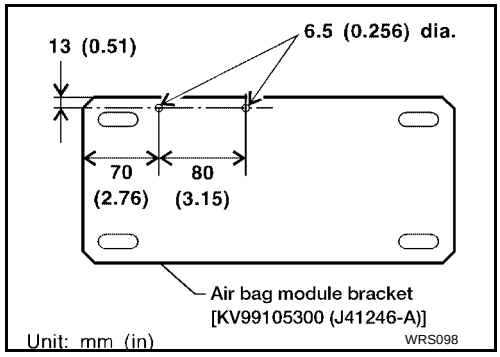
CAUTION:

- **When deploying the front passenger air bag module, do not stand on the deploying side.**
- **Stand at least 5 m (16 ft) away from the front passenger air bag module.**



Deployment of Front Side Air Bag Module (Outside of vehicle)

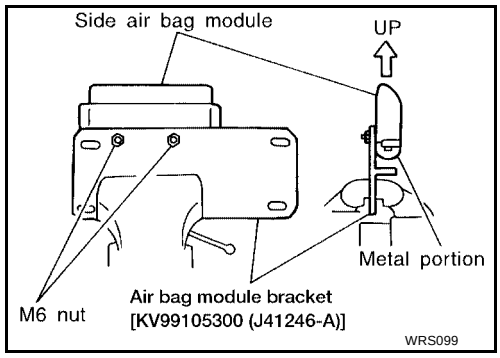
1. Make 6.5 mm (0.256 in) diameter holes in air bag module bracket [SST: KV99105300 (J-41246-A)] at the position shown in figure.



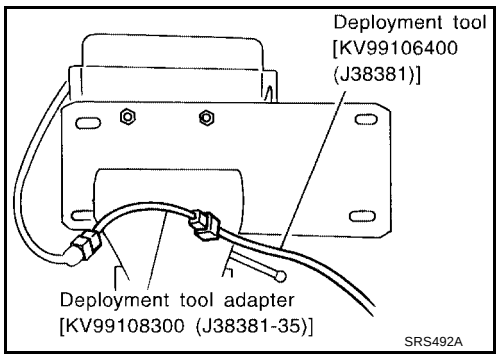
2. Firmly secure air bag module bracket [SST: KV99105300 (J-41246-A)] in a vise.
3. Insert the stud bolts of front side air bag module (built-in type) into the two holes in air bag module bracket (held in vise) and fix them with two M6 nuts.

CAUTION:

Front side air bag module should be secured to air bag module bracket [SST: KV99105300 (J-41246-A)] in a vise with metal portion facing down.

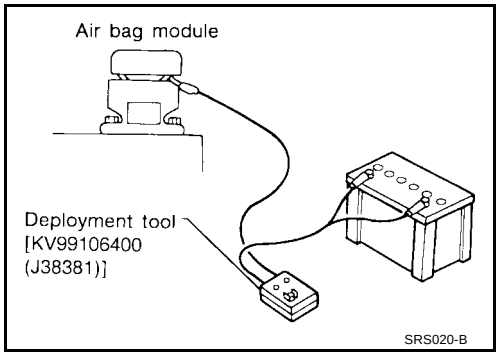


4. Connect deployment tool adapter [SST: KV99108300 (J38381-35)] to deployment tool [SST: KV99106400 (J38381)] connector and connector on air bag module.



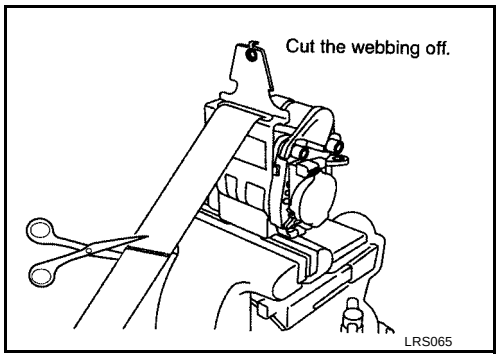
5. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
6. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red.
7. Press the button on the deployment tool. The left side lamp on the tool, marked “air bag connector voltage”, will illuminate and the front side air bag module will deploy.

CAUTION:
When deploying the front side air bag module, stand at least 5 m (16 ft) away from the front side air bag module.

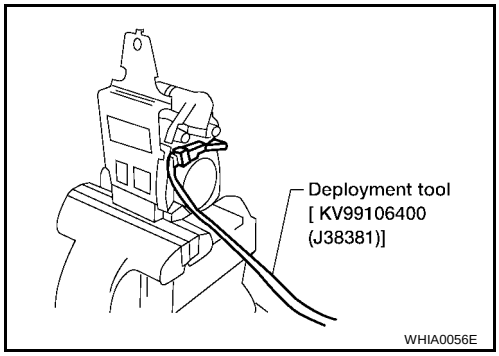


DEPLOYMENT PROCEDURES FOR SEAT BELT PRE-TENSIONER (OUTSIDE OF VEHICLE)

1. Firmly grip front seat belt pre-tensioner in a vise and cut the webbing off.
2. Connect deployment tool adapter to seat belt pre-tensioner.

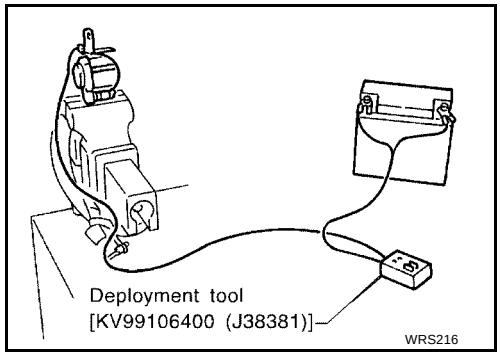


3. Connect deployment tool [SST: KV99106400 (J38381)] connector to front seat belt pre-tensioner connector.



4. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
5. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red.
6. Press the button on the deployment tool. The left side lamp on the tool, marked “seat belt pre-tensioner connector voltage”, will illuminate and the front seat belt pre-tensioner will deploy.

CAUTION:
When deploying the front seat belt pre-tensioner, stand at least 5 m (16 ft) away from the front seat belt pre-tensioner.



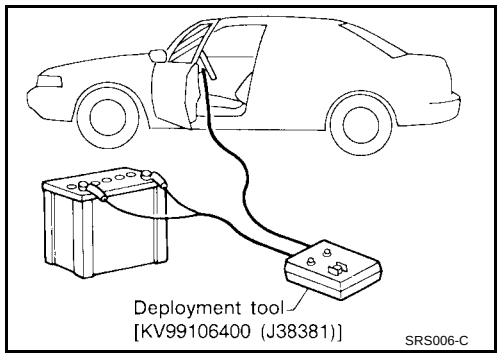
DEPLOYMENT OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER WHILE MOUNTED IN VEHICLE

When disposing of a vehicle, deploy air bag modules and seat belt pre-tensioners while they are mounted in vehicle.

CAUTION:
When deploying air bag module or seat belt pre-tensioner, ensure vehicle is empty.

1. Disconnect both the vehicle battery cables and wait 3 minutes.
2. Disconnect air bag module and seat belt pre-tensioner connectors.
3. Connect deployment tool [SST: KV99106400 (J38381)] to air bag module or seat belt pre-tensioner.
   For driver air bag module, attach deployment tool adapter [SST: KV99109000 (J44230)] to the tool connector.
   For front passenger air bag module, attach deployment tool adapter [SST: KV99108300 (J38381-35)] to the tool connector. For front side air bag module, attach deployment tool adapter [SST: KV99108300 (J38381-35)]. For front seat belt pre-tensioner, attach deployment tool adapter to the tool connector.
4. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
5. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red.
6. Press the button on the deployment tool. The left side lamp on the tool, marked “air bag connector voltage”, will illuminate and the air bag module or seat belt pre-tensioner will deploy.

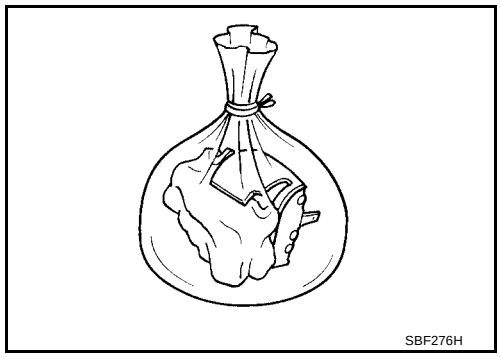
CAUTION:
Activate only one air bag module or seat belt pre-tensioner at a time.



DISPOSING OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER

Deployed air bag modules and seat belt pre-tensioners are very hot. Before disposing of air bag modules or seat belt pre-tensioners, wait at least 30 minutes or 10 minutes, respectively. Seal them in a plastic bag before disposal.

CAUTION:
- **Never apply water to a deployed air bag module or seat belt pre-tensioner.**
- **Be sure to wear gloves when handling a deployed air bag module or seat belt pre-tensioner.**
- **No poisonous smoke is produced upon air bag module deployment. However, be careful not to inhale smoke since it irritates throat and can cause choking.**
- **Do not attempt to disassemble air bag module or seat belt pre-tensioner.**
- **Air bag modules and seat belt pre-tensioners cannot be reused.**
- **Wash your hands clean after finishing work.**



COLLISION DIAGNOSIS

PFP:00015

FOR FRONTAL COLLISION

EHS000K7

To repair the SRS, perform the following steps.

When SRS (except the side air bag) is activated in a collision:

1. Replace the diagnosis sensor unit and (LH and RH) side airbag sensors.
2. Remove the air bag modules (except the side air bag modules) and front seat belt pre-tensioner assemblies.
3. Check the SRS components using the table shown below:

– Replace any SRS components showing visible signs of damage (dents, cracks and deformation).

4. Install new air bag modules (except the side air bag modules), spiral cable and front seat belt pre-tensioner assemblies.
5. Conduct self-diagnosis using CONSULT-II or “AIR BAG” warning lamp. Refer to SRS-18, "SRS Operation Check" for details. Ensure entire SRS operates properly.

When SRS is not activated in a collision:

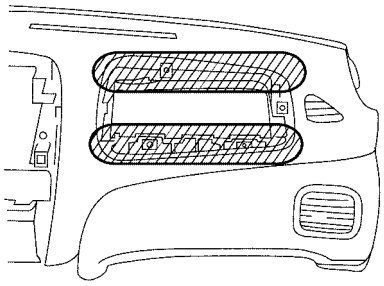
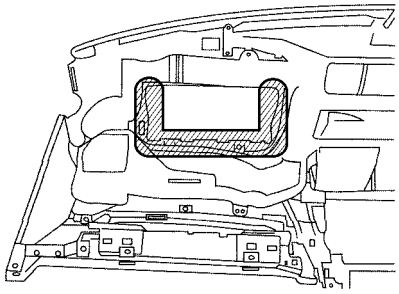
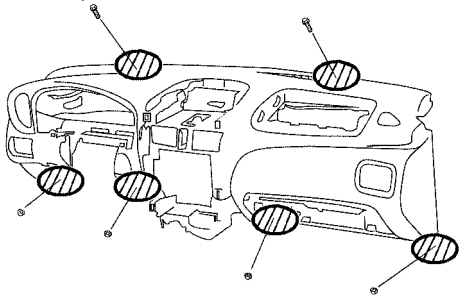
1. Check the SRS components using the table shown below:

– Replace any SRS components showing visible signs of damage (dents, cracks and deformation).

2. Conduct self-diagnosis using CONSULT-II or “AIR BAG” warning lamp. Refer to SRS-18, "SRS Operation Check" for details. Ensure entire SRS operates properly.

SRS INSPECTION (FOR FRONTAL COLLISION)

Part	SRS is activated	SRS is NOT activated
Air bag module (driver and front passenger side)	REPLACE Install with new bolts.	1. Remove air bag module. Check terminals for deformities, and harness for binding. 2. Install air bag modules. – Install driver air bag module into the steering wheel to check fit and alignment with the wheel. – Install front passenger air bag module into the instrument panel to check fit with the instrument panel. 3. If no damage is found, reinstall with new bolts. 4. If damaged—REPLACE. Install air bag modules with new bolts. Air bag must be deployed before discarding.
Front seat belt pre-tensioner assembly	REPLACE Install front seat belt pre-tensioner with new bolts.	1. Remove front seat belt pre-tensioners. Check terminals for deformities, and harness for binding. 2. Check belts for damage and anchors for loose mounting. 3. Check retractor for smooth operation. 4. If no damage is found, reinstall the front seat belt pre-tensioner assembly. 5. If damaged—REPLACE. Install the front seat belt pre-tensioners with new bolts coated with bonding agent. Front seat belt pre-tensioners must be deployed before discarding.
Diagnosis sensor unit	REPLACE (LH and RH) side air bag (satellite) sensor Diagnosis sensor unit	1. Check case and bracket for dents, cracks or deformities. 2. Check connectors for damage, and terminals for deformities. 3. If no damage is found, reinstall with new bolts and ground bolt coated with bonding agent. 4. If damaged—REPLACE. Install with new bolts and ground bolt.
Steering wheel	1. Visually check steering wheel for deformities. 2. Check harness (built into steering wheel) and connectors for damage, and terminals for deformities. 3. Install driver air bag module to check fit or alignment with steering wheel. 4. Check steering wheel for excessive free play. 5. If no damage is found, reinstall with new bolts. 6. If damaged—REPLACE.	

Part	SRS is activated	SRS is NOT activated
Spiral cable	1. Visually check spiral cable and combination switch for damage. 2. Check connectors and protective tape for damage. 3. Check steering wheel for noise, binding or heavy operation. 4. If no damage is found, reinstall with new bolts. 5. If damaged—REPLACE.	
Harness and connectors	1. Check connectors for poor connection, damage, and terminals for deformities. 2. Check harness for binding, chafing, cuts, or deformities. 3. If no damage is found, reinstall the harness and connectors. 4. If damaged—REPLACE damaged harness. Do not attempt to repair, splice or modify any SRS harness.	
Instrument panel	1. When front passenger air bag inflates, check the following points for bending, deformities or cracks. – Opening portion for front passenger air bag  : Check points LRS069 – Front passenger air bag module brackets  : Check points LRS070 – The portions securing the instrument panel  : Check points LRS071 2. If no damage is found, reinstall the instrument panel. 3. If damaged—REPLACE the instrument panel with new bolts and nuts.	

FOR SIDE COLLISION

EHS000K8

To repair the SRS for a side collision, perform the following steps.
When the side air bag is activated in the side collision:

1. Replace the following components:
– Front seatback assembly (on the side on which side air bag is activated)

- Diagnosis sensor unit
- (LH and RH) side air bag (satellite) sensors

2. Check the SRS components and the related parts using the table shown below.

- Replace any SRS components and the related parts showing visible signs of damage (dents, cracks, deformation).

3. Conduct self-diagnosis using CONSULT-II and “AIR BAG” warning lamp. Refer to SRS-18, "SRS Operation Check" for details. Ensure entire SRS operates properly.

When SRS is not activated in the side collision:

1. Check the SRS components and the related parts using the table shown below.

- If the front seatback assembly is damaged, the front seatback assembly must be replaced.

2. Conduct self-diagnosis using CONSULT-II and “AIR BAG” warning lamp. Refer to SRS-18, "SRS Operation Check" for details. Ensure entire SRS operates properly.

SRS INSPECTION (FOR SIDE COLLISION)

Part	Side air bag is activated	SRS is NOT activated
Front (LH or RH) side air bag module	REPLACE front seatback assembly.	1. Check for visible signs of damage (dents, tears, deformation) of the seat back on the collision side. 2. Check harness and connectors for damage, and terminals for deformities. 3. If damaged—REPLACE the front seatback assembly. Air bag must be deployed before disposing of it.
(LH or RH) side air bag (satellite) sensor	REPLACE (LH and RH) side air bag (satellite sensor and diagnosis sensor unit. (Repair the center pillar inner, etc. before installing new one if damaged.)	1. Remove the side air bag (satellite) sensor on the collision side. Check harness connectors for damage, terminals for deformities, and harness for binding. 2. Check for visible signs of damage (dents, cracks, deformation) of the satellite sensor. 3. Install the side air bag (satellite) sensor to check fit. 4. If no damage is found, reinstall the side air bag (satellite) sensor with new nut and bolt coated with bonding agent. 5. If damaged—REPLACE the (LH and RH) side air bag (satellite sensor and diagnosis sensor unit with new nut and bolt coated with bonding agent.
Diagnosis sensor unit	REPLACE (LH and RH) side air bag (satellite sensor and diagnosis sensor unit with new bolts.	1. Check case and bracket for dents, cracks or deformities. 2. Check connectors for damage, and terminals for deformities. 3. If no damage is found, reinstall with new bolts and ground bolt coated with bonding agent. 4. If damaged—REPLACE. Install (LH and RH) side air bag (satellite sensor and diagnosis sensor unit with new bolts and ground bolt coated with bonding agent.
Front seat belt pre-tensioner assembly	1. Check if the seat belt can be extended smoothly. If the seat belt cannot be extended smoothly. – Check for deformities of the center pillar inner. – If the center pillar inner has no damage, REPLACE the front seat belt pre-tensioner assembly. 2. Remove the front seat belt pre-tensioner assembly on the collision side. Check harness cover and connectors for damage, terminals for deformities, and harness for binding. 3. Check for visible signs of damage (dents, cracks, deformation) of the front seat belt pre-tensioner assembly. 4. If no damage is found, reinstall the front seat belt pre-tensioner assembly. 5. If damaged—REPLACE the front seat belt pre-tensioner assembly with new bolts coated with bonding agent. The front seat belt pre-tensioner assembly must be deployed before disposing of it.	
Seat (with side air bag)	REPLACE front seatback assembly.	1. Visually check the seat on the collision side. 2. Remove the seat on the collision side and check the following for damage and deformities. – Harness, connectors and terminals – Frame and recliner (for front and rear seat), and also adjuster and slides (for front seat) 3. If no damage is found, reinstall the seat. 4. If damaged—REPLACE the damaged seat parts with new bolts. If the front seatback assembly is damaged, the front seatback assembly must be replaced.

Part	Side air bag is activated	SRS is NOT activated
Center pillar inner	1. Check the center pillar inner on the collision side for damage (dents, cracks, deformation). 2. If damaged—REPAIR the center pillar inner.	
Trim	1. Check for visible signs of damage (dents, cracks, deformation) of the interior trim on the collision side. 2. If damaged—REPLACE the damaged trim parts.	

SECTION BL

BODY, LOCK & SECURITY SYSTEM

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EIS0014O

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**

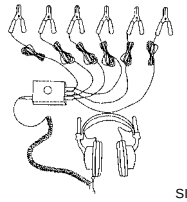
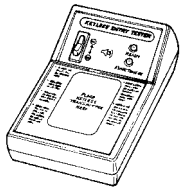
PREPARATION

PFP:00002

Special Service Tools

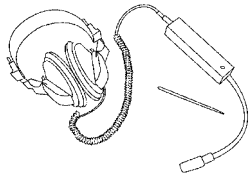
EIS0014P

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
— (J-39570) Chassis ear  SIIA0993E	Locating the noise
— (J-43980) Nissan Squeak and Rattle kit SIIA0994E	Repairing the cause of noise
— (J-43241) Remote Keyless Entry Tester  LEL946A	Used to test keyfobs

Commercial Service Tools

EIS0014Q

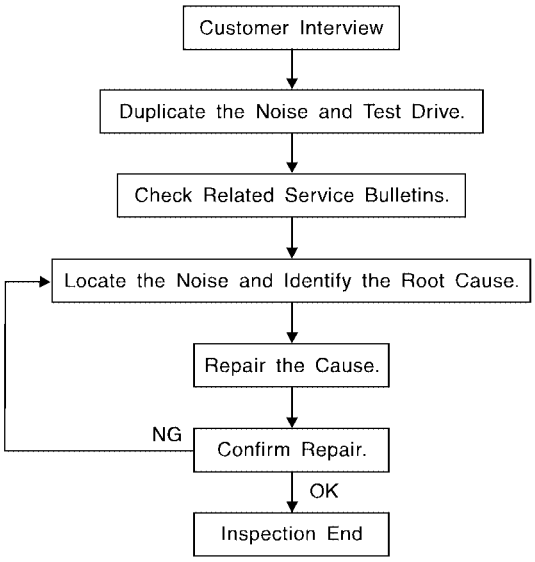
Tool name (Kent-Moore No.)	Description
Engine ear (J-39565)  SIIA0995E	Locating the noise

SQUEAK AND RATTLE TROUBLE DIAGNOSES

PFP:00000

Work Flow

EIS0046R



SBT842

CUSTOMER INTERVIEW

Interview the customer if possible, to determine the conditions that exist when the noise occurs. Use the Diagnostic Worksheet during the interview to document the facts and conditions when the noise occurs and any customer's comments; refer to BL-9, "Diagnostic Worksheet" . This information is necessary to duplicate the conditions that exist when the noise occurs.

- The customer may not be able to provide a detailed description or the location of the noise. Attempt to obtain all the facts and conditions that exist when the noise occurs (or does not occur).
- If there is more than one noise in the vehicle, be sure to diagnose and repair the noise that the customer is concerned about. This can be accomplished by test driving the vehicle with the customer.
- After identifying the type of noise, isolate the noise in terms of its characteristics. The noise characteristics are provided so the customer, service adviser and technician are all speaking the same language when defining the noise.
- Squeak —(Like tennis shoes on a clean floor)
  Squeak characteristics include the light contact/fast movement/brought on by road conditions/hard surfaces = higher pitch noise/softer surfaces = lower pitch noises/edge to surface = chirping.
- Creak—(Like walking on an old wooden floor)
  Creak characteristics include firm contact/slow movement/twisting with a rotational movement/pitch dependent on materials/often brought on by activity.
- Rattle—(Like shaking a baby rattle)
  Rattle characteristics include the fast repeated contact/vibration or similar movement/loose parts/missing clip or fastener/incorrect clearance.
- Knock —(Like a knock on a door)
  Knock characteristics include hollow sounding/sometimes repeating/often brought on by driver action.
- Tick—(Like a clock second hand)
  Tick characteristics include gentle contacting of light materials/loose components/can be caused by driver action or road conditions.
- Thump—(Heavy, muffled knock noise)
  Thump characteristics include softer knock/dead sound often brought on by activity.
- Buzz—(Like a bumble bee)
  Buzz characteristics include high frequency rattle/firm contact.
- Often the degree of acceptable noise level will vary depending upon the person. A noise that you may judge as acceptable may be very irritating to the customer.
- Weather conditions, especially humidity and temperature, may have a great effect on noise level.

DUPLICATE THE NOISE AND TEST DRIVE

If possible, drive the vehicle with the customer until the noise is duplicated. Note any additional information on the Diagnostic Worksheet regarding the conditions or location of the noise. This information can be used to duplicate the same conditions when you confirm the repair.
If the noise can be duplicated easily during the test drive, to help identify the source of the noise, try to duplicate the noise with the vehicle stopped by doing one or all of the following:

1) Close a door.
2) Tap or push/pull around the area where the noise appears to be coming from.
3) Rev the engine.
4) Use a floor jack to recreate vehicle “twist”.
5) At idle, apply engine load (electrical load, half-clutch on M/T model, drive position on A/T model).
6) Raise the vehicle on a hoist and hit a tire with a rubber hammer.

- Drive the vehicle and attempt to duplicate the conditions the customer states exist when the noise occurs.
- If it is difficult to duplicate the noise, drive the vehicle slowly on an undulating or rough road to stress the vehicle body.

CHECK RELATED SERVICE BULLETINS

After verifying the customer concern or symptom, check ASIST for Technical Service Bulletins (TSBs) related to that concern or symptom.
If a TSB relates to the symptom, follow the procedure to repair the noise.

LOCATE THE NOISE AND IDENTIFY THE ROOT CAUSE

1. Narrow down the noise to a general area.To help pinpoint the source of the noise, use a listening tool (Chassis Ear: J-39570, Engine Ear: J-39565 and mechanic's stethoscope).
2. Narrow down the noise to a more specific area and identify the cause of the noise by:

- removing the components in the area that you suspect the noise is coming from.
  Do not use too much force when removing clips and fasteners, otherwise clips and fasteners can be broken or lost during the repair, resulting in the creation of new noise.
- tapping or pushing/pulling the component that you suspect is causing the noise.
  Do not tap or push/pull the component with excessive force, otherwise the noise will be eliminated only temporarily.
- feeling for a vibration with your hand by touching the component(s) that you suspect is (are) causing the noise.
- placing a piece of paper between components that you suspect are causing the noise.
- looking for loose components and contact marks.
  Refer to BL-7, "Generic Squeak and Rattle Troubleshooting" .

REPAIR THE CAUSE

- If the cause is a loose component, tighten the component securely.
- If the cause is insufficient clearance between components:
  - separate components by repositioning or loosening and retightening the component, if possible.
  - insulate components with a suitable insulator such as urethane pads, foam blocks, felt cloth tape or urethane tape. A NISSAN Squeak and Rattle Kit (J-43980) is available through your authorized NISSAN Parts Department.

CAUTION:
Do not use excessive force as many components are constructed of plastic and may be damaged.
Always check with the Parts Department for the latest parts information.
The following materials are contained in the NISSAN Squeak and Rattle Kit (J-43980). Each item can be ordered separately as needed.
URETHANE PADS [1.5 mm (0.059 in) thick]
Insulates connectors, harness, etc.
76268-9E005: 100×135 mm (3.94×5.31 in)/76884-71L01: 60×85 mm (2.36×3.35 in)/76884-71L02: 15×25 mm (0.59×0.98 in)
INSULATOR (Foam blocks)
Insulates components from contact. Can be used to fill space behind a panel.
73982-9E000: 45 mm (1.77 in) thick, 50×50 mm (1.97×1.97 in)/73982-50Y00: 10 mm (0.39 in) thick, 50×50 mm (1.97×1.97 in)
INSULATOR (Light foam block)

80845-71L00: 30 mm (1.18 in) thick, 30×50 mm (1.18×1.97 in)
FELT CLOTH TAPE
Used to insulate where movement does not occur. Ideal for instrument panel applications.
68370-4B000: 15×25 mm (0.59×0.98 in) pad/68239-13E00: 5 mm (0.20 in) wide tape roll. The following materials not found in the kit can also be used to repair squeaks and rattles.
UHMW (TEFLON) TAPE
Insulates where slight movement is present. Ideal for instrument panel applications.
SILICONE GREASE
Used instead of UHMW tape that will be visible or not fit.
Note: Will only last a few months.
SILICONE SPRAY
Use when grease cannot be applied.
DUCT TAPE
Use to eliminate movement.

CONFIRM THE REPAIR

Confirm that the cause of a noise is repaired by test driving the vehicle. Operate the vehicle under the same conditions as when the noise originally occurred. Refer to the notes on the Diagnostic Worksheet.

Generic Squeak and Rattle Troubleshooting

EIS0046S

Refer to Table of Contents for specific component removal and installation information.

INSTRUMENT PANEL

Most incidents are caused by contact and movement between:

1. The cluster lid A and instrument panel
2. Acrylic lens and combination meter housing
3. Instrument panel to front pillar garnish
4. Instrument panel to windshield
5. Instrument panel mounting pins
6. Wiring harnesses behind the combination meter
7. A/C defroster duct and duct joint

These incidents can usually be located by tapping or moving the components to duplicate the noise or by pressing on the components while driving to stop the noise. Most of these incidents can be repaired by applying felt cloth tape or silicone spray (in hard to reach areas). Urethane pads can be used to insulate wiring harness.

CAUTION:
Do not use silicone spray to isolate a squeak or rattle. If you saturate the area with silicone, you will not be able to recheck the repair.

CENTER CONSOLE

Components to pay attention to include:

1. Shifter assembly cover to finisher
2. A/C control unit and cluster lid C
3. Wiring harnesses behind audio and A/C control unit

The instrument panel repair and isolation procedures also apply to the center console.

DOORS

Pay attention to the:

1. Finisher and inner panel making a slapping noise
2. Inside handle escutcheon to door finisher
3. Wiring harnesses tapping
4. Door striker out of alignment causing a popping noise on starts and stops

Tapping or moving the components or pressing on them while driving to duplicate the conditions can isolate many of these incidents. You can usually insulate the areas with felt cloth tape or insulator foam blocks from the NISSAN Squeak and Rattle Kit (J-43980) to repair the noise.

TRUNK

Trunk noises are often caused by a loose jack or loose items put into the trunk by the owner.
In addition look for:

1. Trunk lid bumpers out of adjustment
2. Trunk lid striker out of adjustment
3. The trunk lid torsion bars knocking together
4. A loose license plate or bracket

Most of these incidents can be repaired by adjusting, securing or insulating the item(s) or component(s) causing the noise.

SUNROOF/HEADLINING

Noises in the sunroof/headlining area can often be traced to one of the following:

1. Sunroof lid, rail, linkage or seals making a rattle or light knocking noise
2. Sun visor shaft shaking in the holder
3. Front or rear windshield touching headliner and squeaking

Again, pressing on the components to stop the noise while duplicating the conditions can isolate most of these incidents. Repairs usually consist of insulating with felt cloth tape.

OVERHEAD CONSOLE (FRONT AND REAR)

Overhead console noises are often caused by the console panel clips not being engaged correctly. Most of these incidents are repaired by pushing up on the console at the clip locations until the clips engage.
In addition look for:

1. Loose harness or harness connectors.
2. Front console map/reading lamp lense loose.
3. Loose screws at console attachment points.

SEATS

When isolating seat noise it's important to note the position the seat is in and the load placed on the seat when the noise is present. These conditions should be duplicated when verifying and isolating the cause of the noise.
Cause of seat noise include:

1. Headrest rods and holder
2. A squeak between the seat pad cushion and frame
3. The rear seatback lock and bracket

These noises can be isolated by moving or pressing on the suspected components while duplicating the conditions under which the noise occurs. Most of these incidents can be repaired by repositioning the component or applying urethane tape to the contact area.

UNDERHOOD

Some interior noise may be caused by components under the hood or on the engine wall. The noise is then transmitted into the passenger compartment.
Causes of transmitted underhood noise include:

1. Any component mounted to the engine wall
2. Components that pass through the engine wall
3. Engine wall mounts and connectors
4. Loose radiator mounting pins
5. Hood bumpers out of adjustment
6. Hood striker out of adjustment

These noises can be difficult to isolate since they cannot be reached from the interior of the vehicle. The best method is to secure, move or insulate one component at a time and test drive the vehicle. Also, engine RPM or load can be changed to isolate the noise. Repairs can usually be made by moving, adjusting, securing, or insulating the component causing the noise.

Diagnostic Worksheet

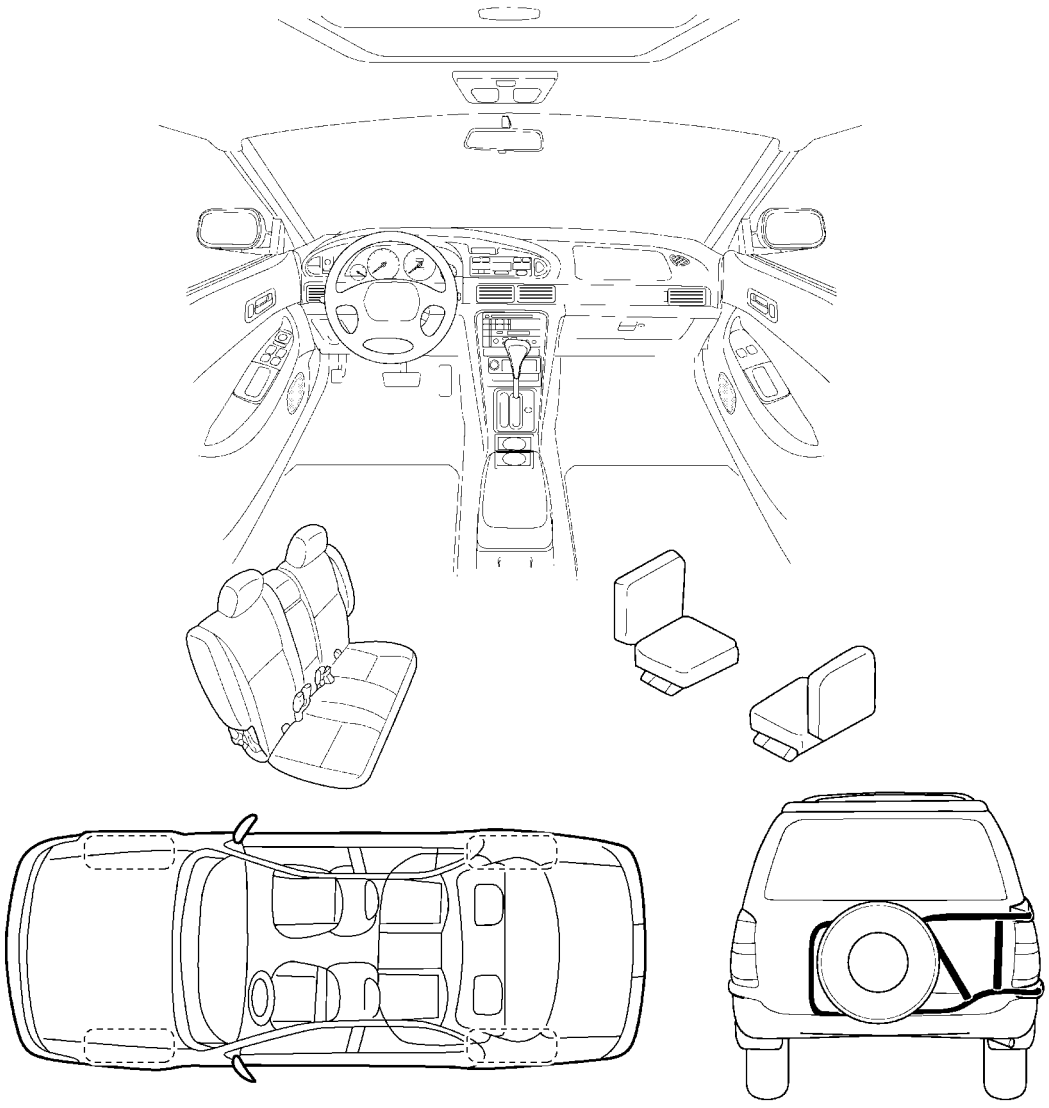
EIS0046T

SQUEAK & RATTLE DIAGNOSTIC WORKSHEET

Dear Nissan Customer:
We are concerned about your satisfaction with your Nissan vehicle. Repairing a squeak or rattle sometimes can be very difficult. To help us fix your Nissan right the first time, please take a moment to note the area of the vehicle where the squeak or rattle occurs and under what conditions. You may be asked to take a test drive with a service advisor or technician to ensure we confirm the noise you are hearing.

I. WHERE DOESTHE NOISE COME FROM? (circle the area of the vehicle)

The illustrations are for reference only, and may not reflect the actual configuration of your vehicle.



Continue to the back of the worksheet and briefly describe the location of the noise or rattle. In addition, please indicate the conditions which are present when the noise occurs.

LIWA0276E

SQUEAK & RATTLE DIAGNOSTIC WORKSHEET- page 2

Briefly describe the location where the noise occurs:

_____

_____

II. WHEN DOES IT OCCUR? (check the boxes that apply)

❑ anytime
❑ 1st time in the morning
❑ only when it is cold outside
❑ only when it is hot outside
❑ after sitting out in the sun
❑ when it is raining or wet
❑ dry or dusty conditions
❑ other: _____

III. WHEN DRIVING:

❑ through driveways
❑ over rough roads
❑ over speed bumps
❑ only at about _____ mph
❑ on acceleration
❑ coming to a stop
❑ on turns : left, right or either (circle)
❑ with passengers or cargo
❑ other: _____
❑ after driving _____ miles or _____ minutes

IV. WHAT TYPE OF NOISE?

❑ squeak (like tennis shoes on a clean floor)
❑ creak (like walking on an old wooden floor)
❑ rattle (like shaking a baby rattle)
❑ knock (like a knock on a door)
❑ tick (like a clock second hand)
❑ thump (heavy, muffled knock noise)
❑ buzz (like a bumble bee)

TO BE COMPLETED BY DEALERSHIP PERSONNEL
Test Drive Notes:

_____

_____

	YES	NO	Initials of person performing
Vehicle test driven with customer	❑	❑	_____
- Noise verified on test drive	❑	❑	
- Noise source located and repaired	❑	❑	_____
- Follow up test drive performed to confirm repair	❑	❑	_____

VIN: _____ Customer Name: _____

W.O. #: _____ Date: _____ SBT844

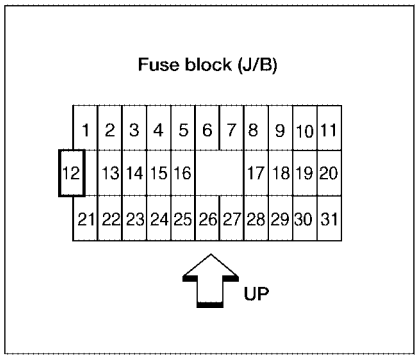
This form must be attached to Work Order

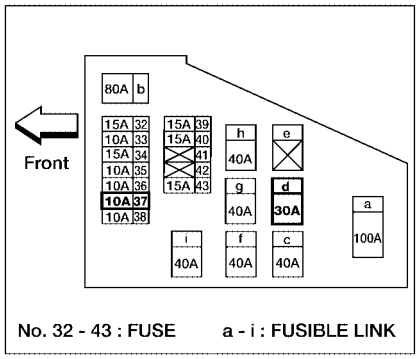
POWER DOOR LOCK

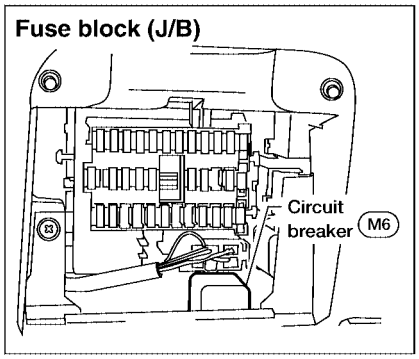
PFP:24814

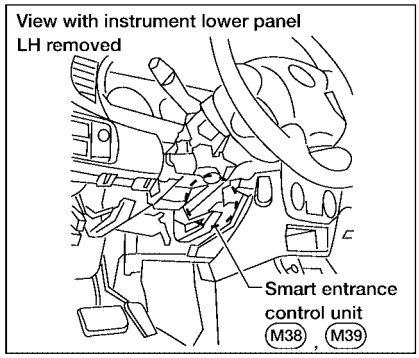
Component Parts and Harness Connector Location

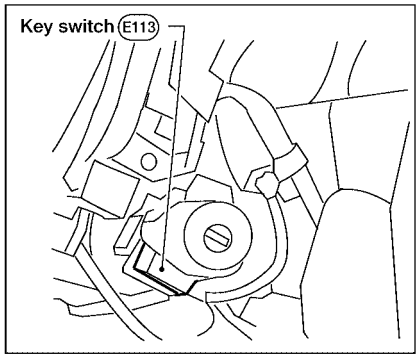
EIS0014U

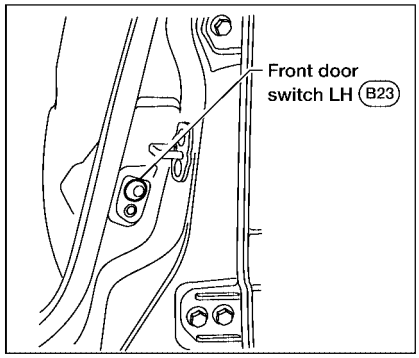


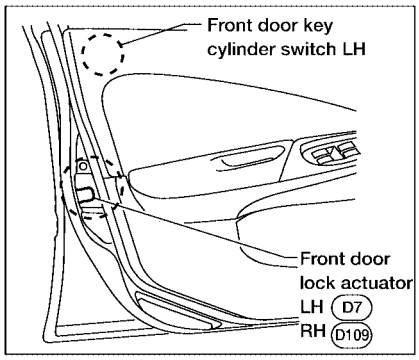


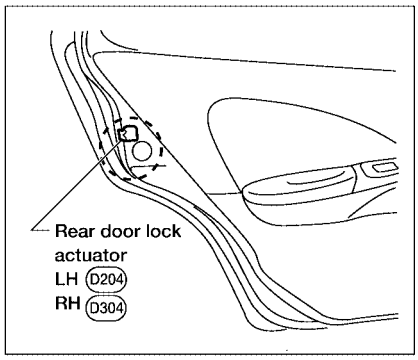


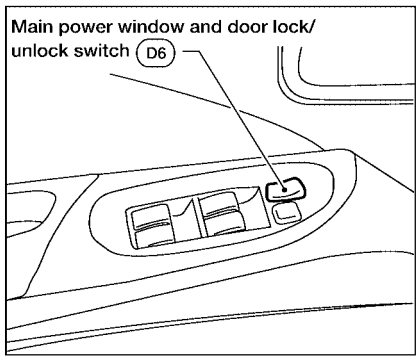


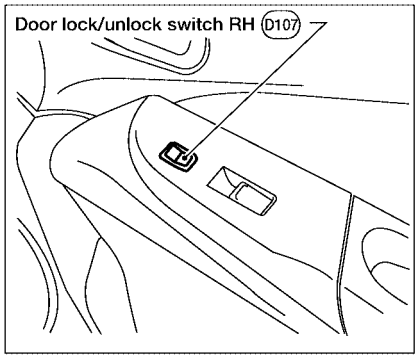












WIIA0005E

System Description

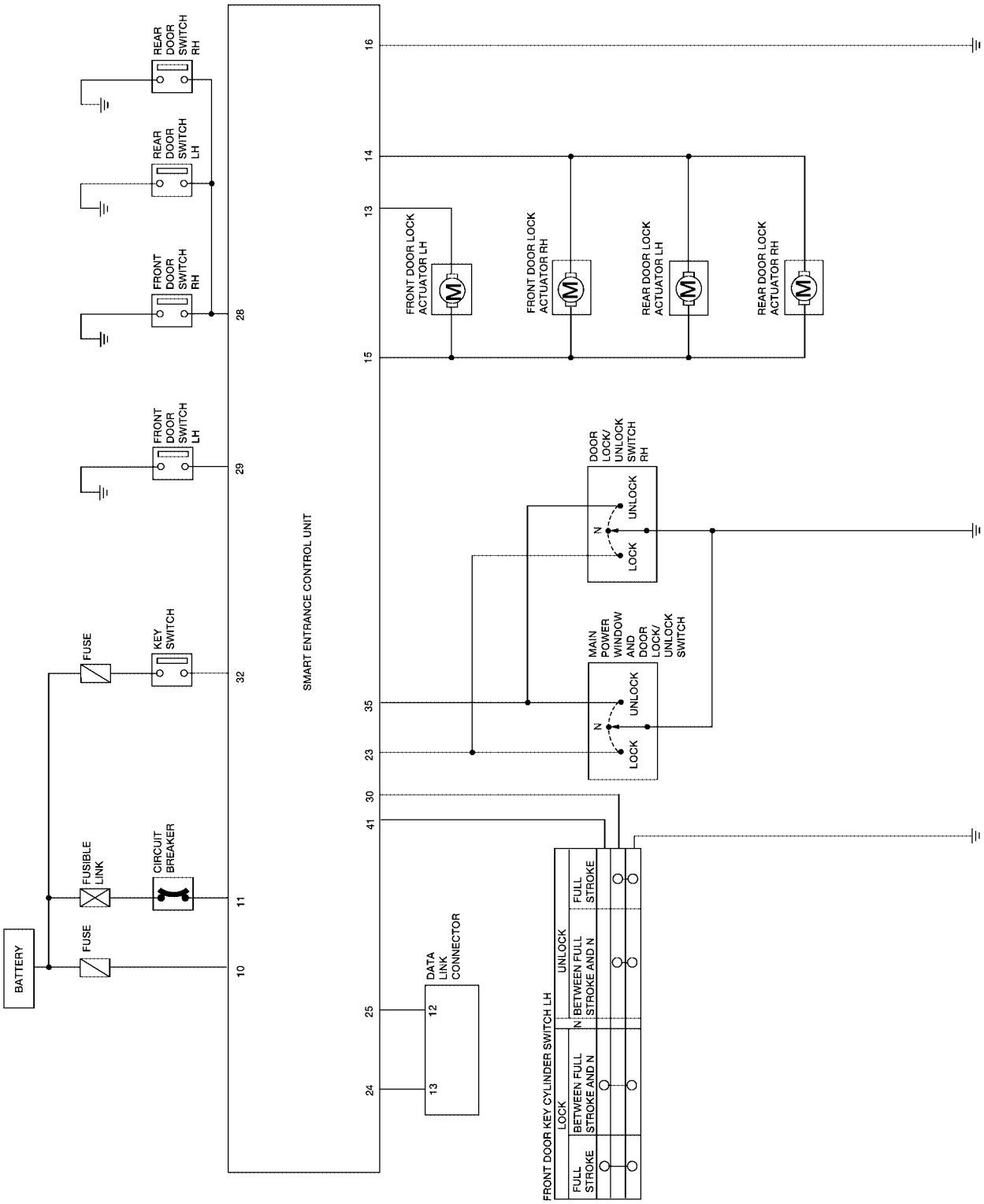
EIS0014V

OPERATION

- The lock/unlock switches (LH and RH) on door trim can lock and unlock all doors.
- With the door key inserted in the key cylinder on front LH, turning it to “LOCK”, will lock all doors; turning it to “UNLOCK” once unlocks the corresponding door; turning it to “UNLOCK” again within 5 seconds after the first unlock operation unlocks all of the other doors. (Signals from door key cylinder switch.)
- If the ignition key is in the ignition key cylinder and one or more of the doors are open, setting the lock/unlock switch (LH or RH) to “LOCK” locks the doors once but then immediately unlocks them (KEY REMINDER DOOR SYSTEM).

Schematic

EIS0014W

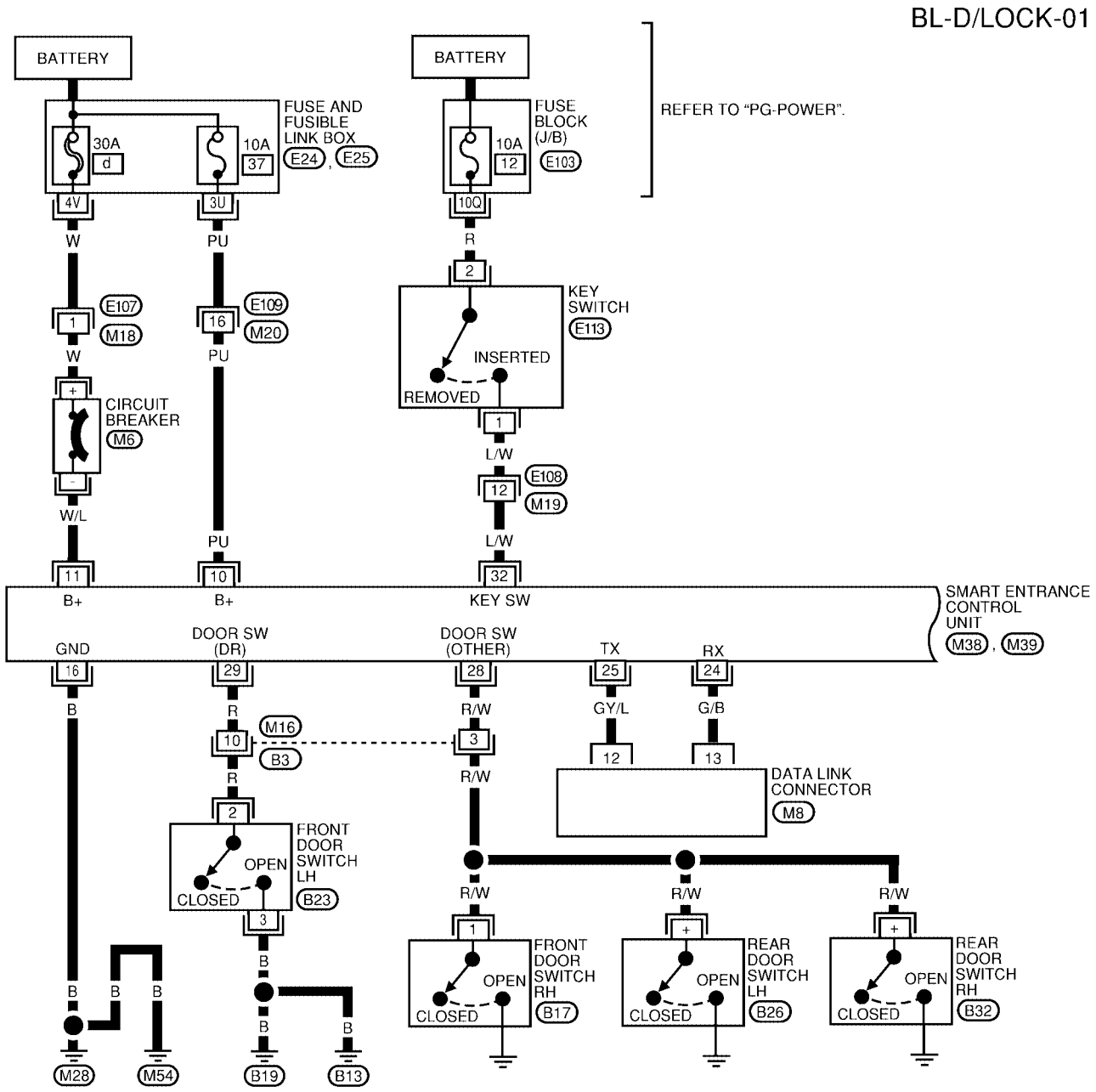


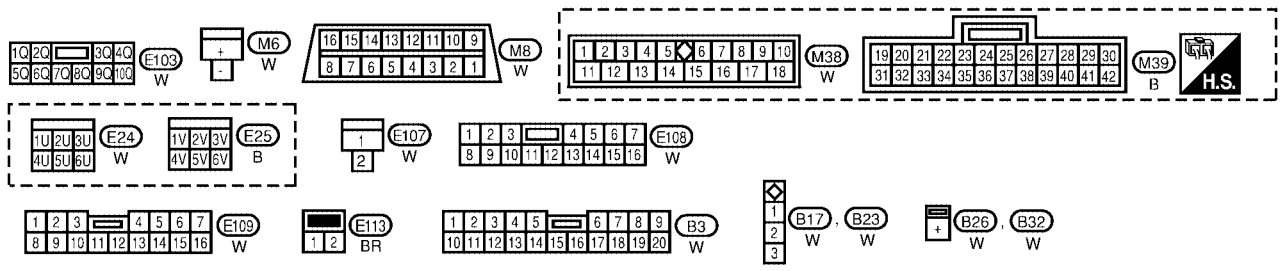
WIWA0014E

Wiring Diagram — D/LOCK —

EIS0014X

FIG. 1





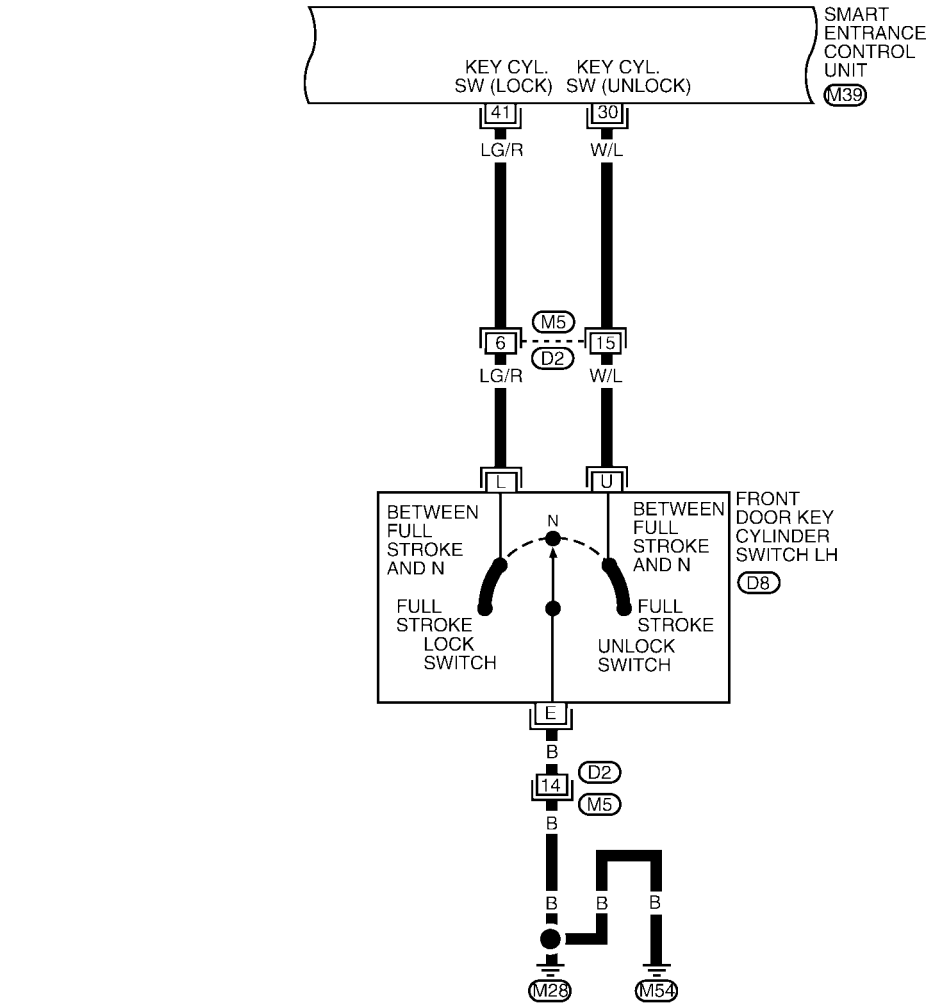
WIWA0312E

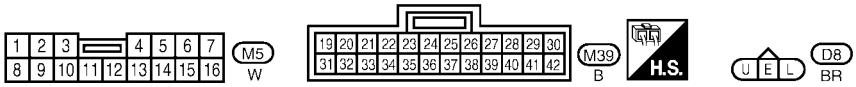
Smart entrance control unit terminals and reference value measured between each terminal and ground

TERMINAL	WIRE COLOR	ITEM	CONDITION	VOLTAGE (V) (Approx.)
10	PU	POWER SOURCE (FUSE)	—	BATTERY
11	W/L	POWER SOURCE (CIRCUIT BREAKER)	—	BATTERY
16	B	GROUND	—	—
28	R/W	OTHER DOOR SWITCHES	OFF (CLOSED)	5
			ON (OPEN)	0
29	R	FRONT DOOR SWITCH LH	OFF (CLOSED)	5
			ON (OPEN)	0
32	L/W	IGNITION KEY SWITCH (INSERT)	IGNITION KEY INSERTED	12
			IGNITION KEY REMOVED	0

FIG. 2

BL-D/LOCK-02





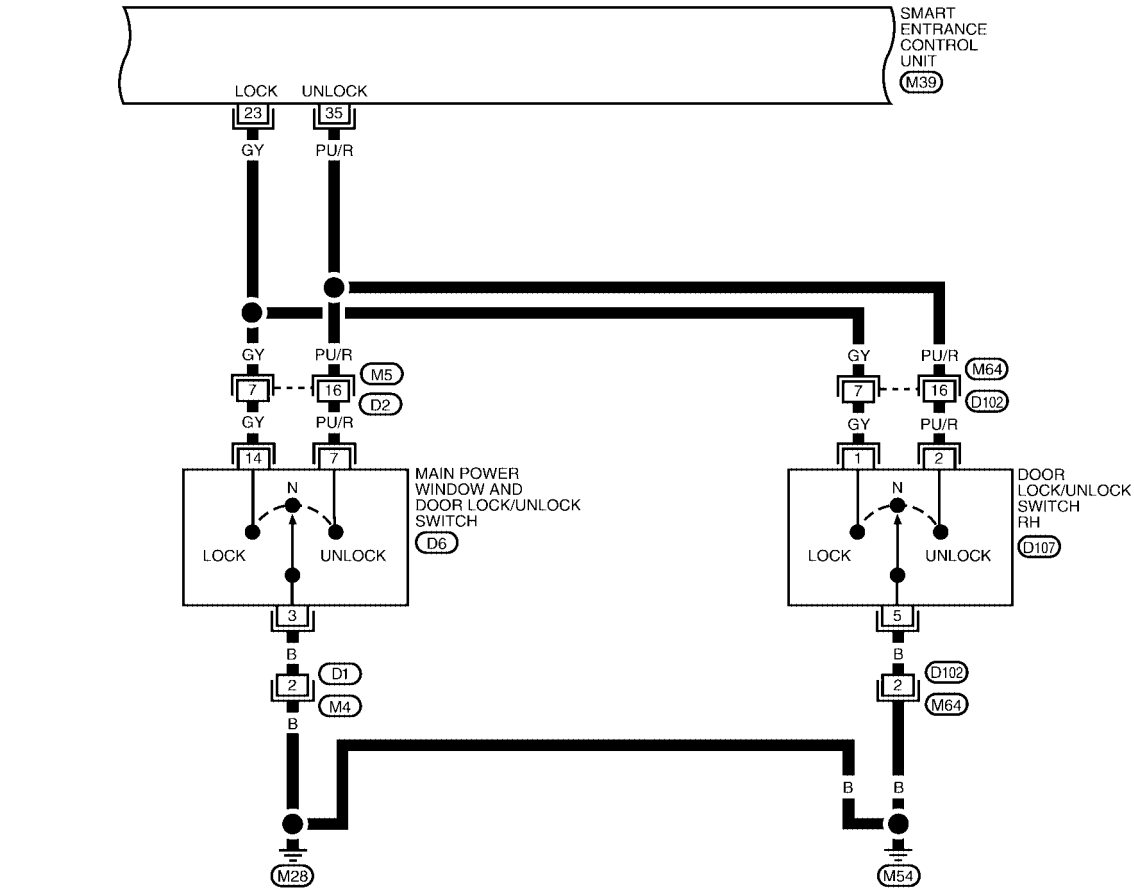
WIWA0067E

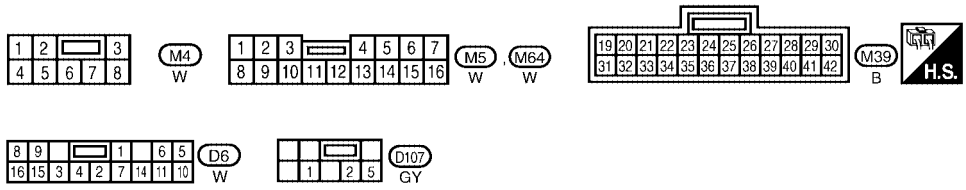
Smart entrance control unit terminals and reference value measured between each terminal and ground

TERMINAL	WIRE COLOR	ITEM	CONDITION	VOLTAGE (V) (Approx.)
30	W/L	FRONT DOOR KEY CYLINDER SWITCH LH	OFF (NEUTRAL)	5
			ON (UNLOCKED)	0
41	LG/R	FRONT DOOR KEY CYLINDER SWITCH LH	OFF (NEUTRAL)	5
			ON (UNLOCKED)	0

FIG. 3

BL-D/LOCK-03





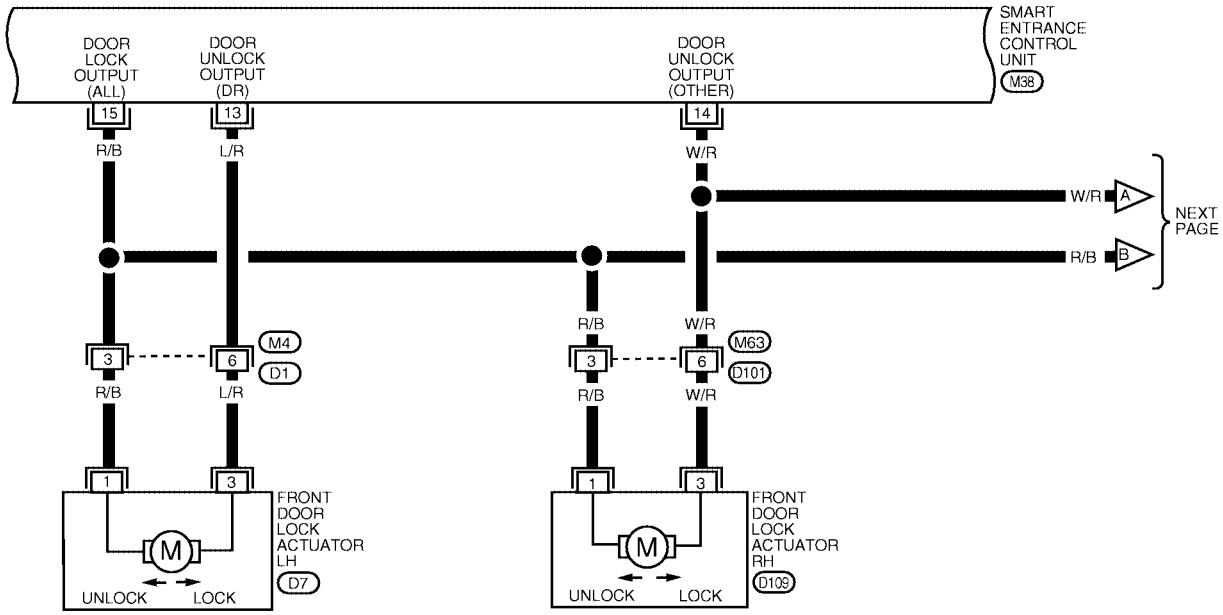
WIWA0021E

Smart entrance control unit terminals and reference value measured between each terminal and ground

TERMINAL	WIRE COLOR	ITEM	CONDITION	VOLTAGE (V) (Approx.)
23	GY	DOOR LOCK/UNLOCK SWITCHES	NEUTRAL	5
			LOCK	0
41	PU/R	DOOR LOCK/UNLOCK SWITCHES	NEUTRAL	5
			UNLOCK	0

FIG. 4

BL-D/LOCK-04



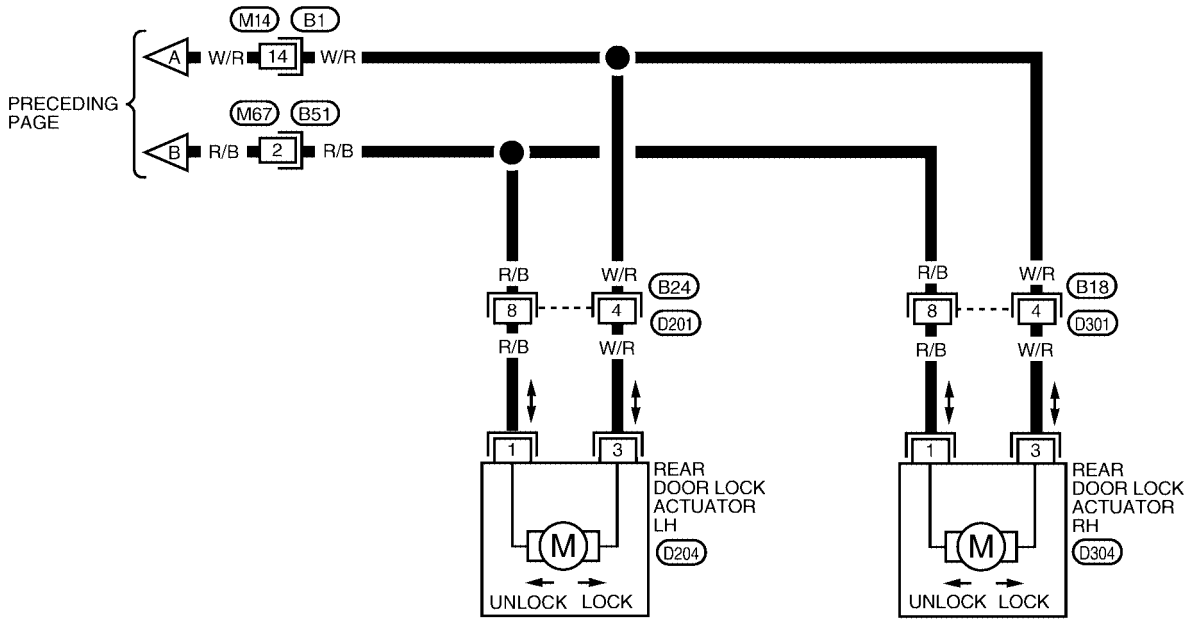
WIWA0022E

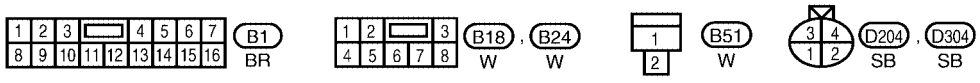
Smart entrance control unit terminals and reference value measured between each terminal and ground

TERMINAL	WIRE COLOR	ITEM	CONDITION	VOLTAGE (V) (Approx.)
13	L/R	FRONT DOOR LOCK ACTUATOR LH	NEUTRAL	0
			UNLOCK	12
14	W/R	FRONT DOOR LOCK ACTUATOR RH AND REAR DOOR LOCK ACTUATORS	NEUTRAL	0
			UNLOCK	12
15	R/B	DOOR LOCK ACTUATORS	NEUTRAL	0
			LOCK	12

FIG. 5

BL-D/LOCK-05





WIWA0068E

CONSULT-II Function (SMART ENTRANCE)

EIS0014Y

CONSULT-II can display each diagnostic item using the diagnostic test modes shown following.

SMART ENTRANCE diagnostic test item	Diagnostic mode	Descriptiont
Inspection by part	DATA MONITOR	Displays smart entrance control unit input/output data in real time.
	ACTIVE TEST	Operation of electrical loads can be checked by sending drive signal to them.

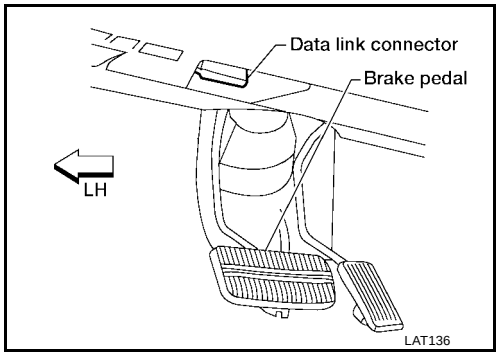
CONSULT-II INSPECTION PROCEDURE

DOOR LOCK

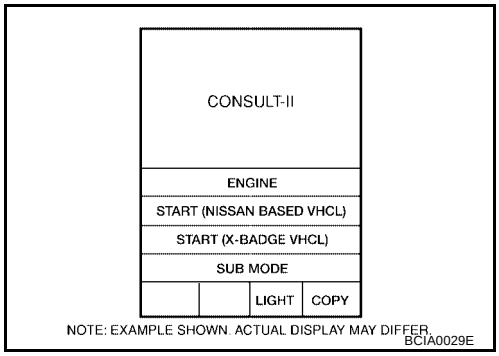
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carries out CAN communication.

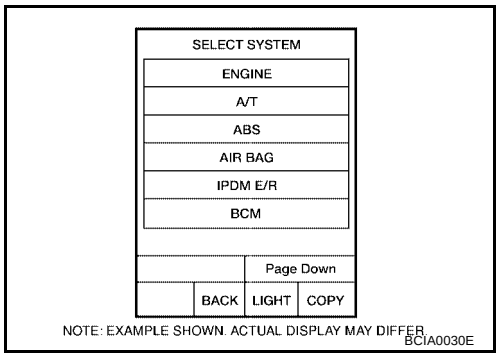
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to the data link connector.



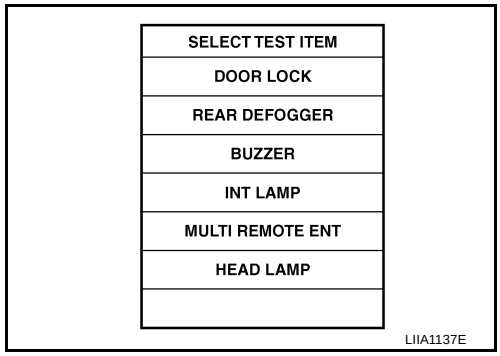
3. Turn ignition switch ON.
4. Touch “START (NISSAN BASED VHCL)”.



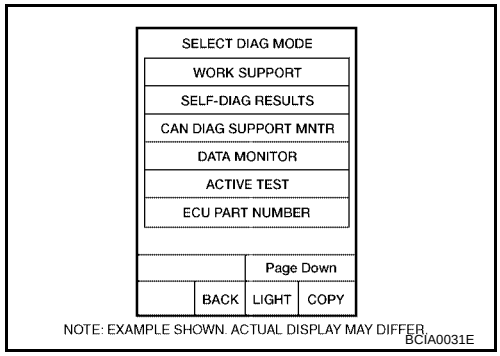
5. Touch “SMART ENTRANCE”.
   If "SMART ENTRANCE" is not indicated, refer to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Touch “DOOR LOCK”.



7. Select diagnosis mode.
“DATA MONITOR” and “ACTIVE TEST” are available.



CONSULT-II Application Items

EIS0014Z

DOOR LOCK

Data Monitor

Monitored Item	Description
KEY ON SW	Indicates [ON/OFF] condition of key switch.
LOCK SW DR/AS	Indicates [ON/OFF] condition of lock signal from lock/unlock switch LH and RH.
UNLK SW DR/AS	Indicates [ON/OFF] condition of unlock signal from lock/unlock switch LH and RH.
KEY CYL LK SW	Indicates [ON/OFF] condition of lock signal from key cylinder.
KEY CYL UN SW	Indicates [ON/OFF] condition of unlock signal from key cylinder.
DOOR SW-ALL	Indicates [ON/OFF] condition of door switch (All).
LK BUTTON/SIG	Indicates [ON/OFF] condition of lock signal from keyfob.
UN BUTTON/SIG	Indicates [ON/OFF] condition of unlock signal from keyfob.
UN BUTTON ON	Indicates [ON/OFF] condition of second unlock signal from keyfob within 5 seconds after first unlock operation.

Active Test

Test Item	Description
ALL D/LK MTR	This test is able to check all door lock actuators lock operation. These actuators lock when “ON” on CONSULT-II screen is touched.
DR D/UN MTR	This test is able to check front door lock actuator LH unlock operation. The actuator unlocks when “ON” on CONSULT-II screen is touched.
NON DR D/UN	This test is able to check door lock actuators (except front door lock actuator LH) unlock operation. These actuators unlock when “ON” on CONSULT-II screen is touched.

Trouble Diagnoses
SYMPTOM CHART

EIS00150

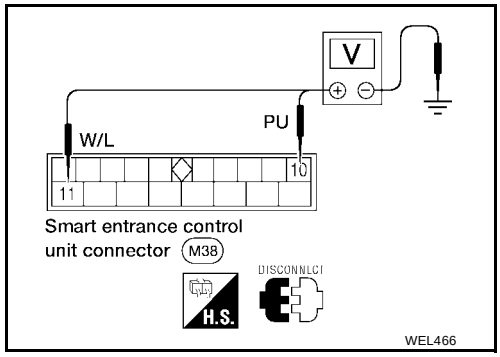
REFERENCE PAGE (BL-)	BL-23	BL-24	BL-25	BL-26	BL-28	BL-29
SYMPTOM	MAIN POWER SUPPLY AND GROUND CIRCUIT CHECK	DOOR SWITCH CHECK	KEY SWITCH (INSERT) CHECK	DOOR LOCK/UNLOCK SWITCH CHECK	FRONT DOOR KEY CYLINDER SWITCH CHECK	DOOR LOCK ACTUATOR CHECK
Key reminder door system does not operate properly.	X	X	X			X
Specific door lock actuator does not operate.	X					X
Power door lock does not operate with door lock and unlock switch (LH and RH) on door trim.	X			X		
Power door lock does not operate with front door key cylinder operation.	X				X	

X: Applicable

MAIN POWER SUPPLY AND GROUND CIRCUIT CHECK

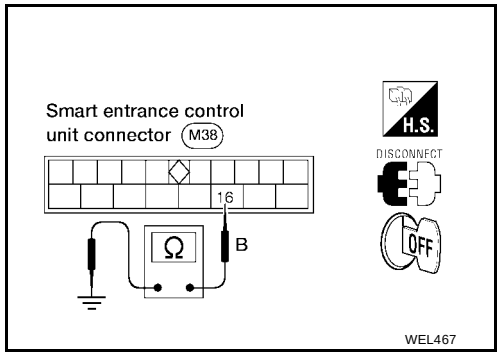
Main Power Supply Circuit Check

Terminals		Ignition switch position		
(+)	(-)	OFF	ACC	ON
10	Ground	Battery voltage	Battery voltage	Battery voltage
11				



Ground Circuit Check

Terminals	Continuity
16 - Ground	Yes

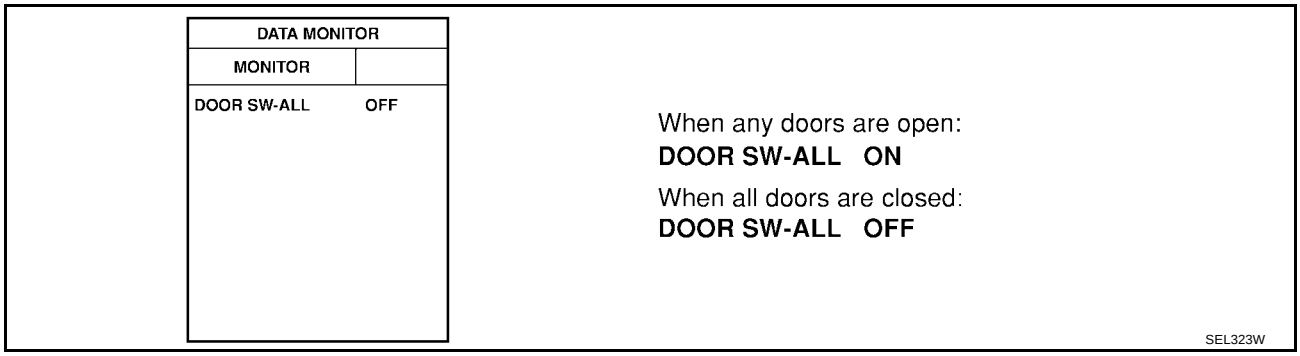


DOOR SWITCH CHECK

1. CHECK DOOR SWITCHES INPUT SIGNAL

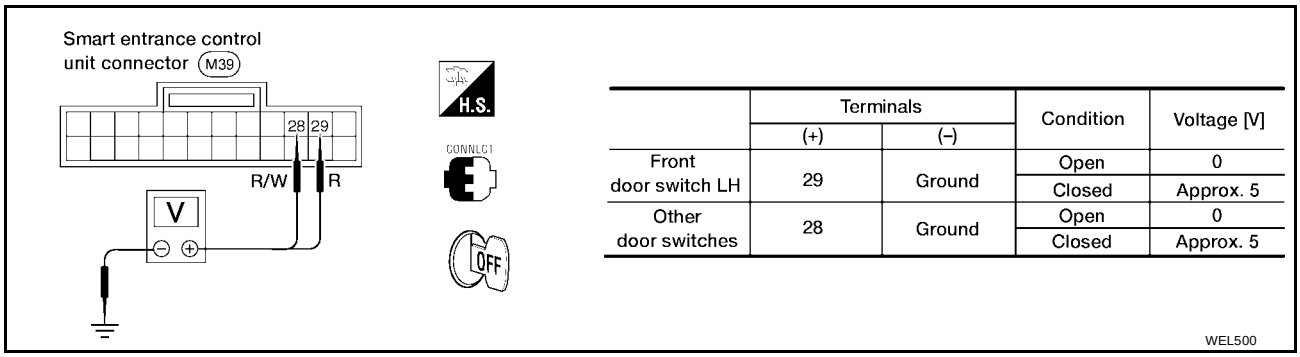
With CONSULT-II

Check door switches (“DOOR SW-ALL”) in “DATA MONITOR” mode with CONSULT-II.



Without CONSULT-II

Check voltage between smart entrance control unit harness connector terminals 28 or 29 and ground.



	Terminals		Condition	Voltage [V]
	(+)	(−)		
Front door switch LH	29	Ground	Open	0
			Closed	Approx. 5
Other door switches	28	Ground	Open	0
			Closed	Approx. 5

Refer to BL-14, "FIG. 1" .

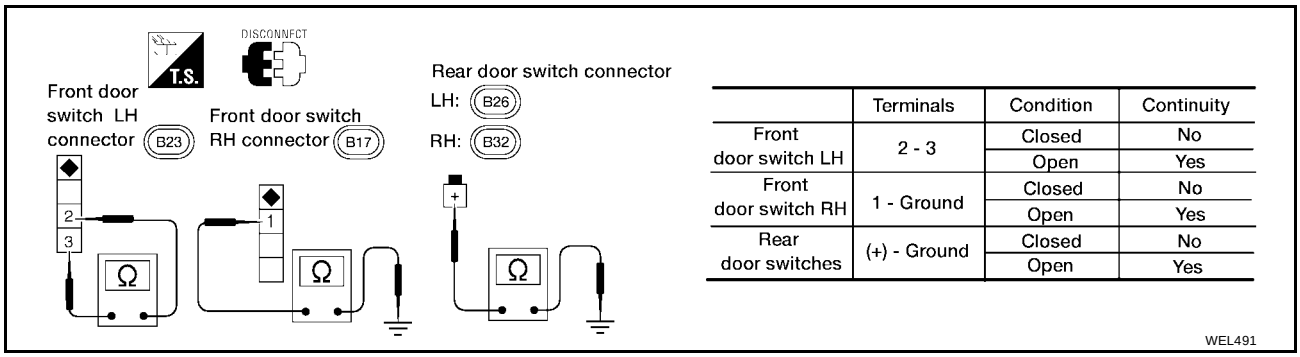
OK or NG

OK >> Door switch is OK.

NG >> GO TO 2.

2. CHECK DOOR SWITCHES

1. Disconnect door switch harness connector.
2. Check continuity between door switch connector terminals.



	Terminals	Condition	Continuity
Front door switch LH	2 - 3	Closed	No
		Open	Yes
Front door switch RH	1 - Ground	Closed	No
		Open	Yes
Rear door switches	(+) - Ground	Closed	No
		Open	Yes

OK or NG

OK >> Check the following.

- Door switch ground circuit or door switch ground condition
- Harness for open or short between smart entrance control unit and door switch

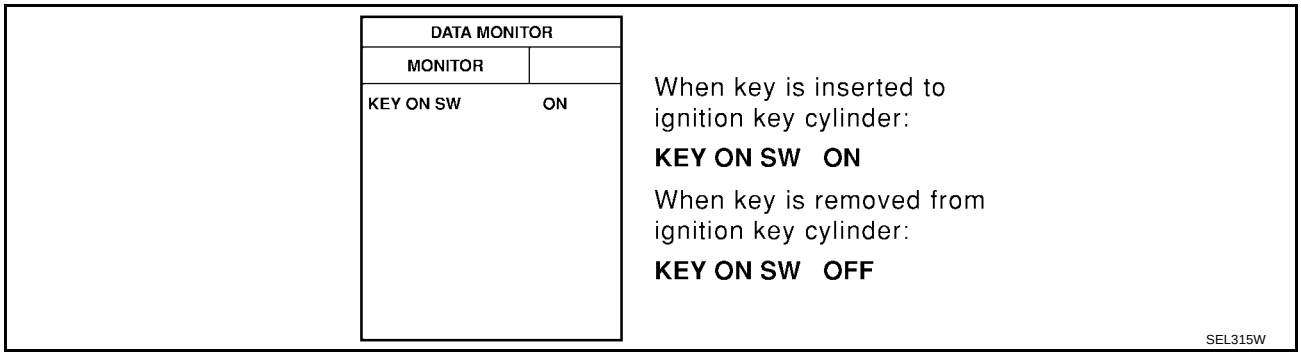
NG >> Replace door switch.

KEY SWITCH (INSERT) CHECK

1. CHECK KEY SWITCH INPUT SIGNAL

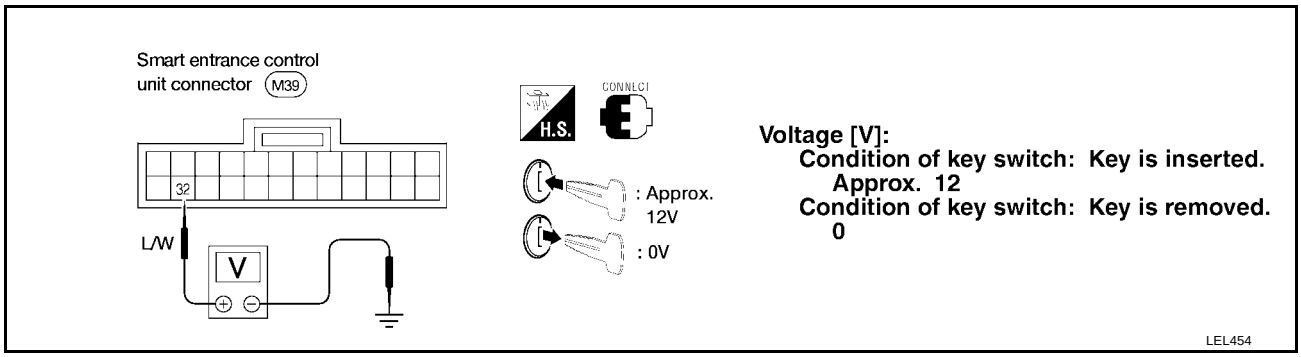
With CONSULT-II

Check key switch (“KEY ON SW”) in “DATA MONITOR” mode with CONSULT-II.



Without CONSULT-II

Check voltage between smart entrance control unit harness connector terminal 32 and ground.



Refer to BL-14, "FIG. 1" .

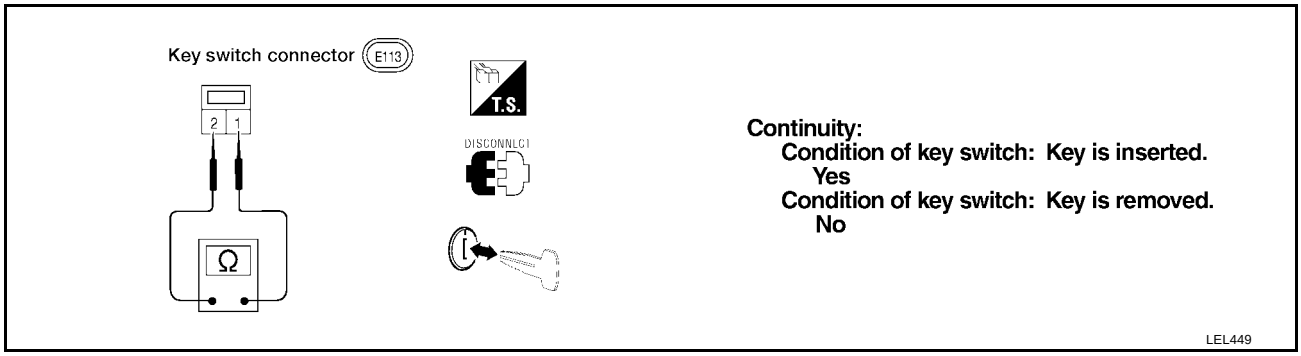
OK or NG

OK >> Key switch is OK.

NG >> GO TO 2.

2. CHECK KEY SWITCH

Check continuity between key switch connector terminals 1 and 2.



OK or NG

OK >> Check the following.

- 10A fuse [No. 12, located in fuse block (J/B)]
- Harness for open or short between key switch and fuse
- Harness for open or short between smart entrance control unit and key switch

NG >> Replace key switch.

DOOR LOCK/UNLOCK SWITCH CHECK

1. CHECK DOOR LOCK/UNLOCK SWITCH INPUT SIGNAL

With CONSULT-II

Check door lock/unlock switch (“LOCK SW DR/AS”/“UNLK SW DR/AS”) in “DATA MONITOR” mode with CONSULT-II.

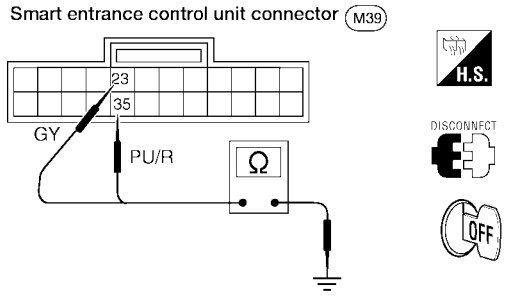
DATA MONITOR	
MONITOR	
LOCK SW DR/AS	OFF
UNLK SW DR/AS	OFF

When lock/unlock switch is turned to LOCK:
LOCK SW DR/AS ON
When lock/unlock switch is turned to UNLOCK:
UNLK SW DR/AS ON

SEL341W

Without CONSULT-II

1. Disconnect smart entrance control unit harness connector.
2. Check continuity between smart entrance control unit harness connector terminal 23 or 35 and ground.



Terminals	Door lock/unlock switch (LH or RH) condition	Continuity
23 - Ground	Lock	Yes
	N and Unlock	No
35 - Ground	Unlock	Yes
	N and Lock	No

WEL501

Refer to BL-17, "FIG. 3" .

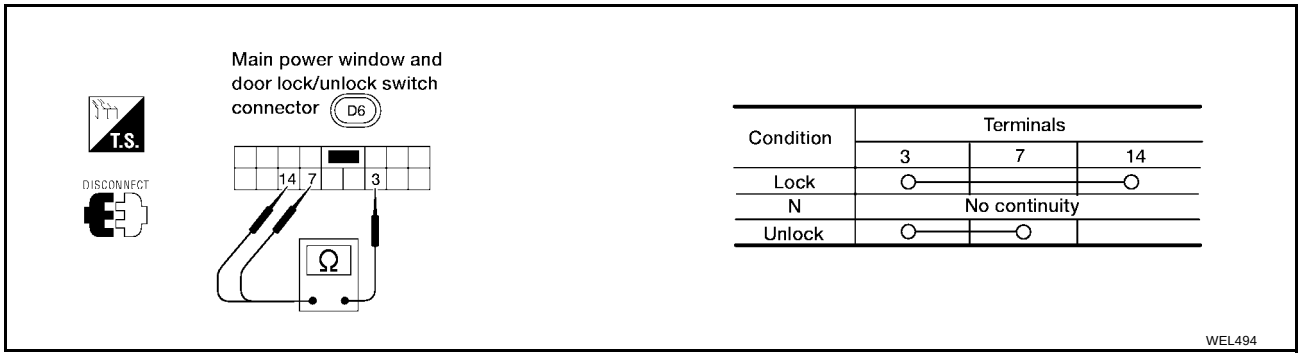
OK or NG

OK >> Door lock/unlock switch is OK.
NG >> GO TO 2.

2. CHECK DOOR LOCK/UNLOCK SWITCH

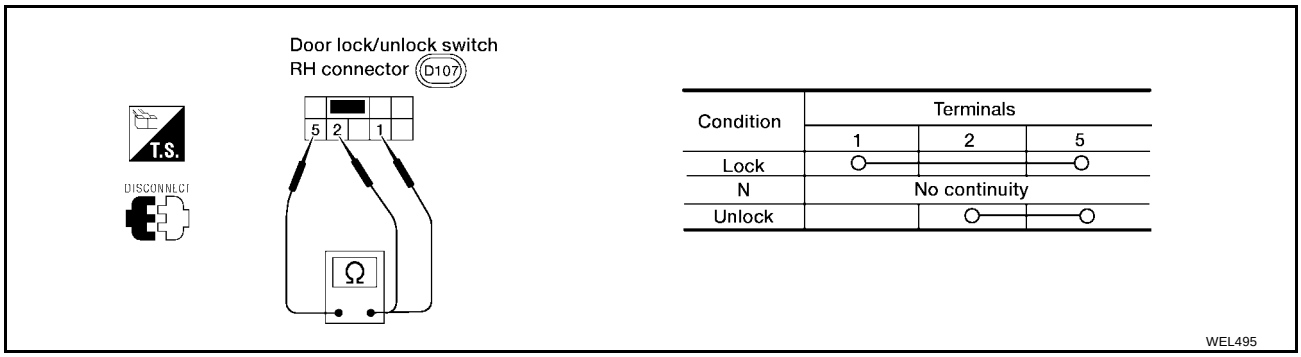
1. Disconnect door lock/unlock switch harness connector.
2. Check continuity between each door lock/unlock switch terminals.

– Main power window and door lock/unlock switch



Condition	Terminals		
	3	7	14
Lock	○		○
N	No continuity		
Unlock	○	○	

– Door lock/unlock switch RH



Condition	Terminals		
	1	2	5
Lock	○		○
N	No continuity		
Unlock		○	○

OK or NG

OK >> Check the following.
- Ground circuit for door lock/unlock switch
- Harness for open or short between door lock/unlock switch and smart entrance control unit connector

NG >> Replace door lock/unlock switch.

FRONT DOOR KEY CYLINDER SWITCH CHECK

1. CHECK FRONT DOOR KEY CYLINDER SWITCH INPUT SIGNAL (LOCK/UNLOCK SIGNAL)

With CONSULT-II

Check front door key cylinder switch (“KEY CYL LK-SW”/“KEY CYL UN-SW”) in “DATA MONITOR” mode with CONSULT-II.

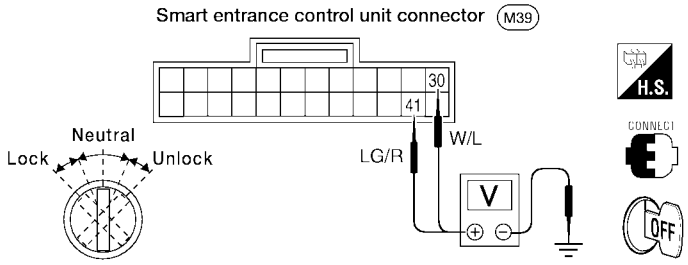
DATA MONITOR	
MONITOR	
KEY CYL LK-SW	OFF
KEY CYL UN-SW	OFF

When key inserted in front key cylinder is turned to LOCK:
KEY CYL LK-SW ON
When key inserted in front key cylinder is turned to UNLOCK:
KEY CYL UN-SW ON

SEL342W

Without CONSULT-II

Check voltage between smart entrance control unit harness connector terminals 30 or 41 and ground.



Terminals (+)	Terminals (–)	Key position	Voltage [V]
41	Ground	Neutral/Unlock	Approx. 5
		Lock	0
30	Ground	Neutral/Lock	Approx. 5
		Unlock	0

WEL502

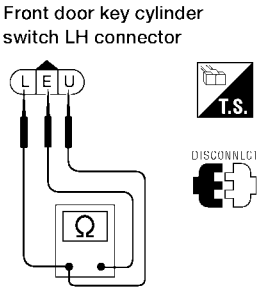
Refer to BL-16, "FIG. 2" .

OK or NG

OK >> Door key cylinder switch is OK.
NG >> GO TO 2.

2. CHECK DOOR KEY CYLINDER SWITCH

1. Disconnect door key cylinder switch harness connector.
2. Check continuity between door key cylinder switch connector D8 terminals L, E, and U, E.



Ⓔ : Ground terminal
Ⓤ : Door unlock switch terminal
Ⓛ : Door lock switch terminal

Terminals	Key position	Continuity
Ⓛ - Ⓔ	Neutral/Unlock	No
	Lock	Yes
Ⓤ - Ⓔ	Neutral/Lock	No
	Unlock	Yes

LEL101A

OK or NG

OK >> Check the following.
- Door key cylinder switch ground circuit
- Harness for open or short between smart entrance control unit and door key cylinder switch

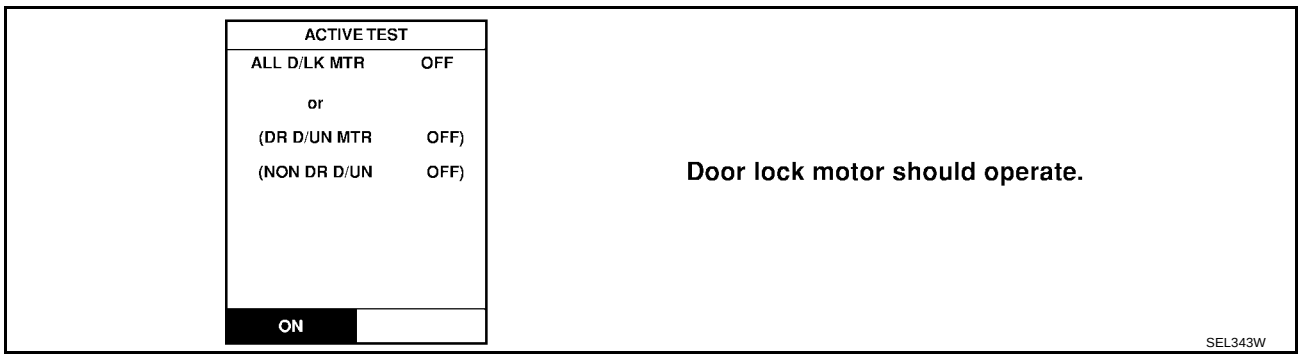
NG >> Replace door key cylinder switch.

DOOR LOCK ACTUATOR CHECK

1. CHECK DOOR LOCK ACTUATOR OPERATION

With CONSULT-II

1. Select “ACTIVE TEST” in “DOOR LOCK” with CONSULT-II.
2. Select “ALL D/LK MTR” and touch “ON”.
3. Then, select “DR D/UN MTR” and touch “ON”.
4. Select “NON DR D/UN” and touch “ON”.



NOTE:
If CONSULT-II is not available, skip this procedure and go to the next step.

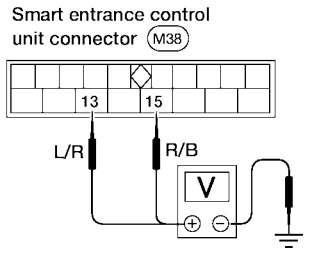
OK or NG

OK >> Door lock actuator is OK.
NG >> GO TO 2.

2. CHECK DOOR LOCK ACTUATOR CIRCUIT

Check voltage for door lock actuator.

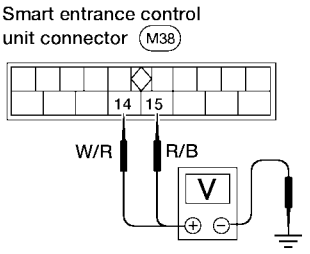
- Door lock actuator front LH



Door lock/unlock switch condition	Terminals (+)	Terminals (–)	Voltage [V]
Lock	15	Ground	Approx. 12
Unlock	13	Ground	

WEL504

- Door lock actuator front RH and rear



Door lock/unlock switch condition	Terminals (+)	Terminals (–)	Voltage [V]
Lock	15	Ground	Approx. 12
Unlock	14	Ground	

WEL505

Refer to BL-18, "FIG. 4" .

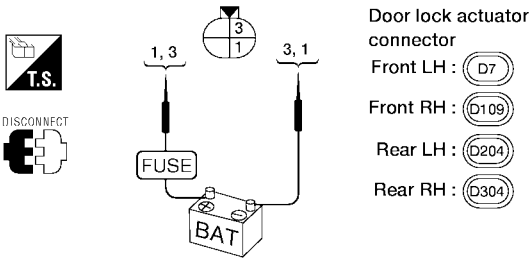
OK or NG

OK >> GO TO 3.

NG >> Replace smart entrance control unit. (Before replacing the smart entrance control unit, perform BL-26, "DOOR LOCK/UNLOCK SWITCH CHECK" .)

3. CHECK DOOR LOCK ACTUATOR

1. Disconnect door lock actuator harness connector.
2. Apply 12V direct current to door lock actuator and check operation.



Door lock actuator operation:
Terminals between (+): 1 and (-): 3
Unlocked → Locked
Terminals between (+): 3 and (-): 1
Locked → Unlocked

WEL499

OK or NG

OK >> Check harness for open or short between smart entrance control unit connector and door lock actuator.

NG >> Replace door lock actuator.

DOOR

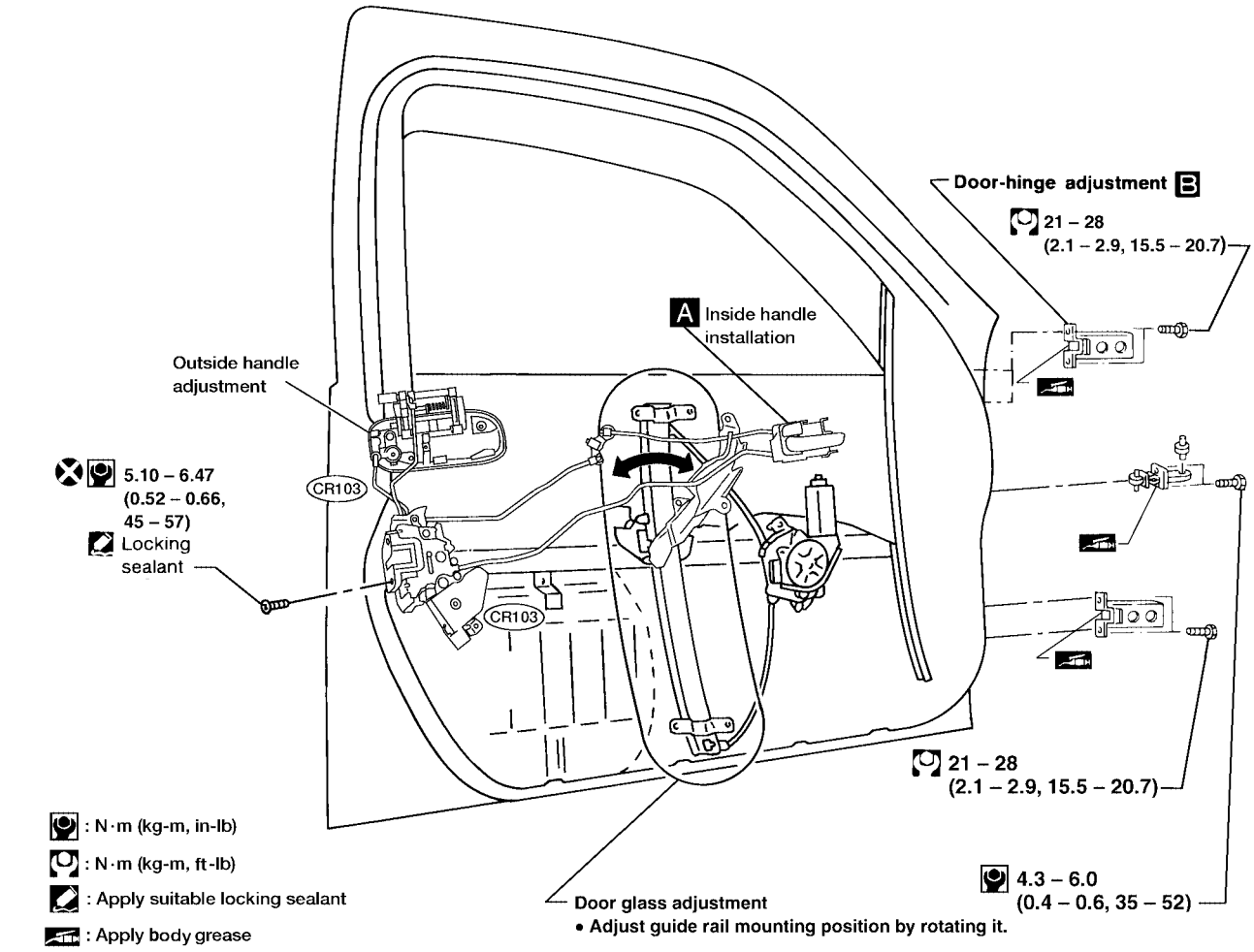
PFP:80100

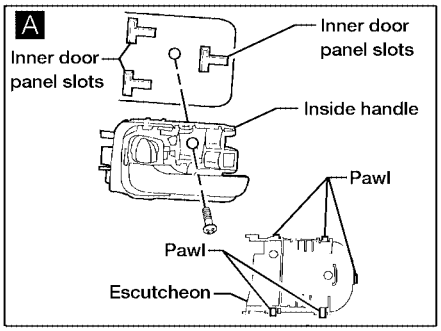
Front Door

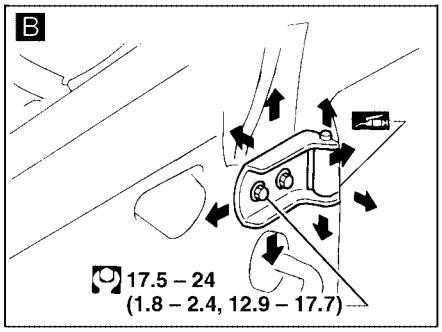
EIS00151

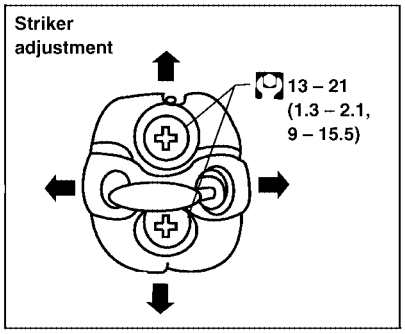
- For removal of door finisher, refer to EI-31, "Removal and Installation" .
- After adjusting the door or door lock, check the door lock operation.

SEC. 800•803•805









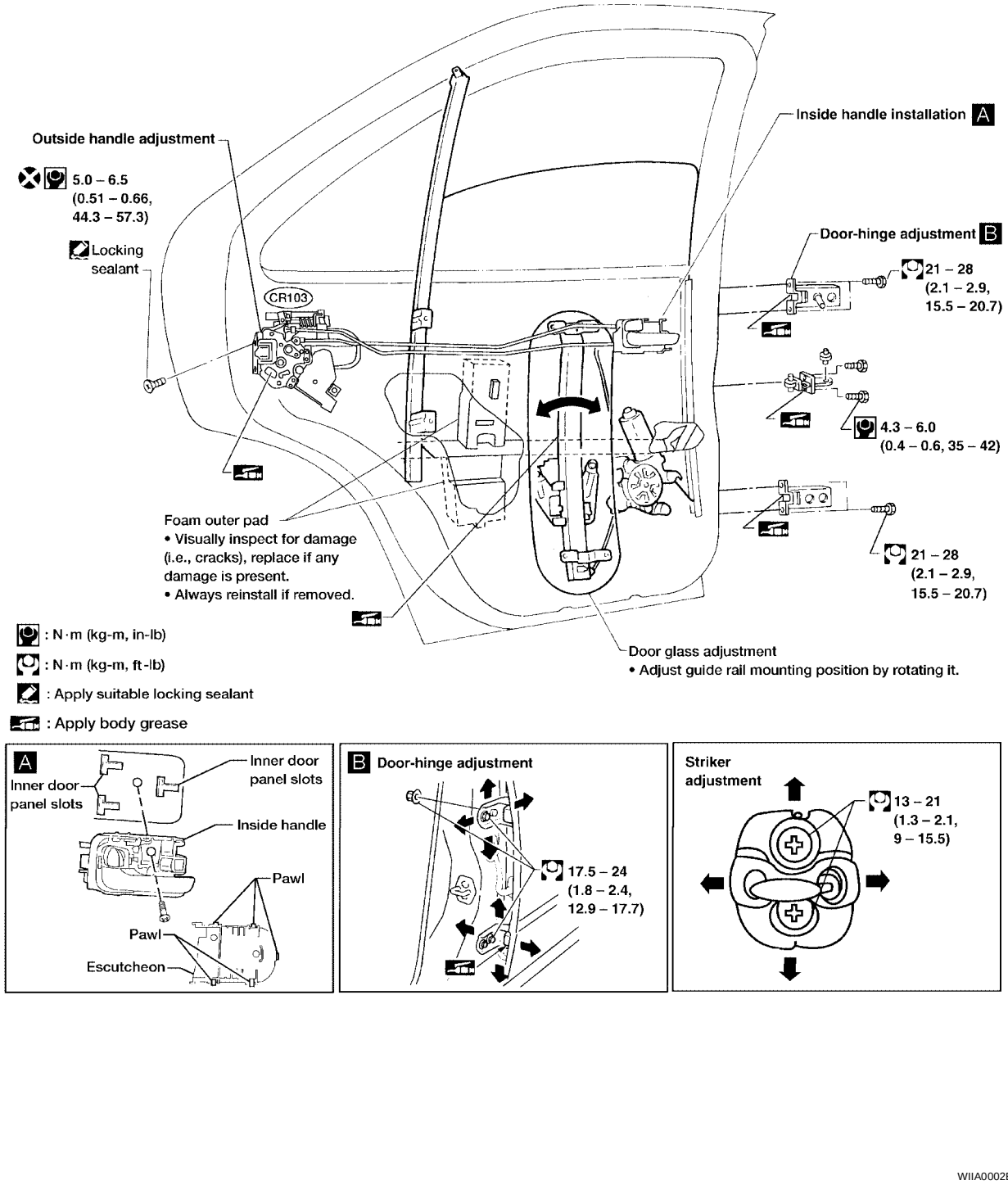
WIIA0006E

Rear Door

EIS00152

- For removal of door finisher, refer to EI-31, "Removal and Installation" .

- After adjusting the door or door lock, check the door lock operation.



WIIA0002E

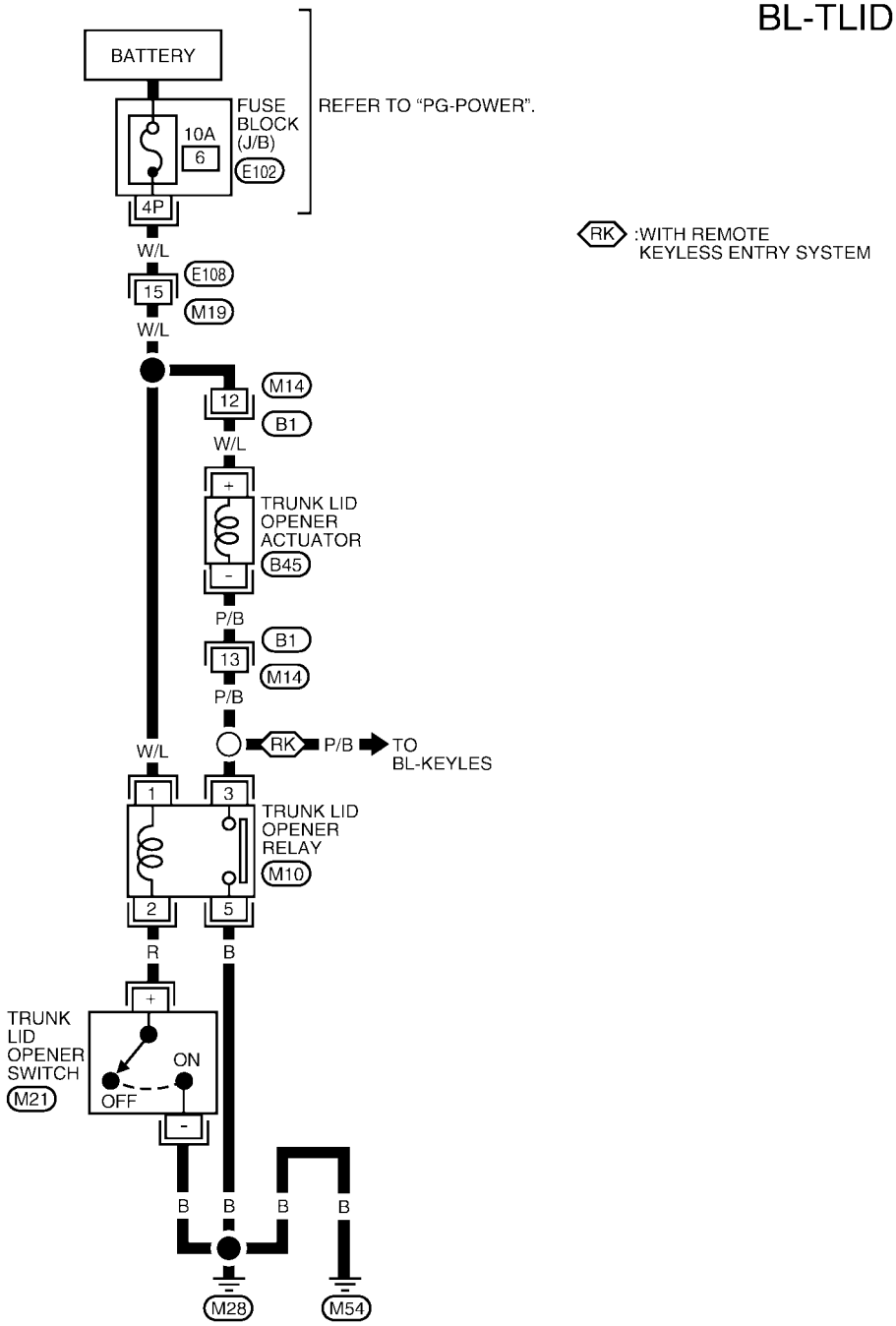
TRUNK LID OPENER

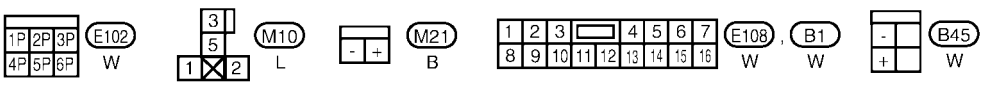
PFP:84640

Wiring Diagram — TLID —

EIS00153

BL-TLID-01





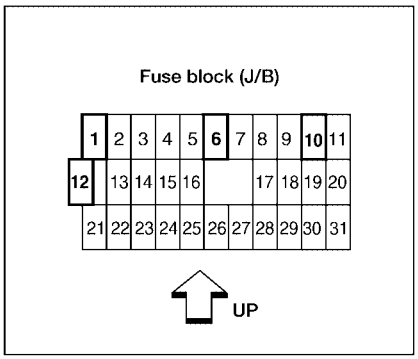
WIWA0077E

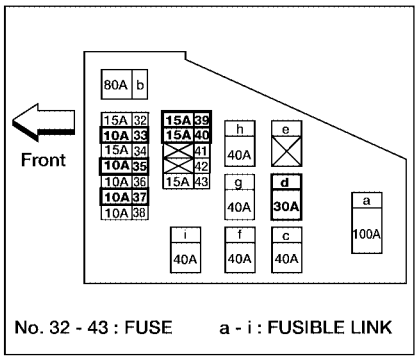
REMOTE KEYLESS ENTRY SYSTEM

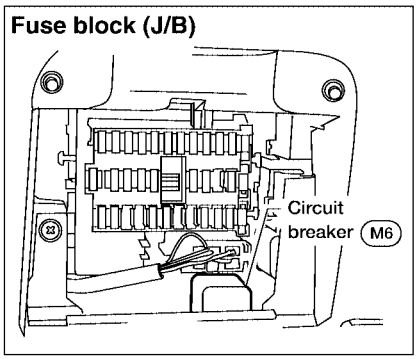
PFP:28596

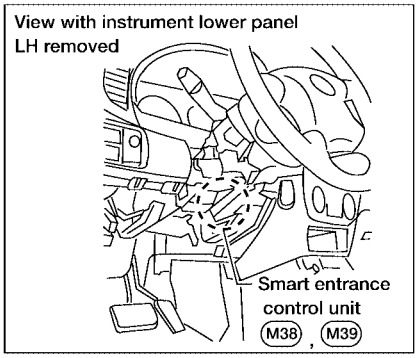
Component Parts and Harness Connector Location

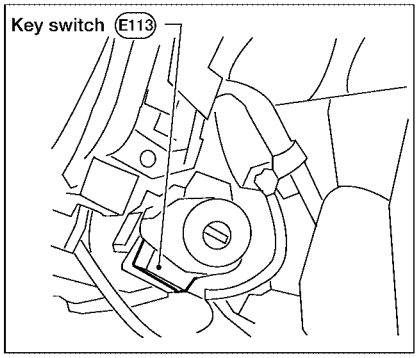
EIS00154

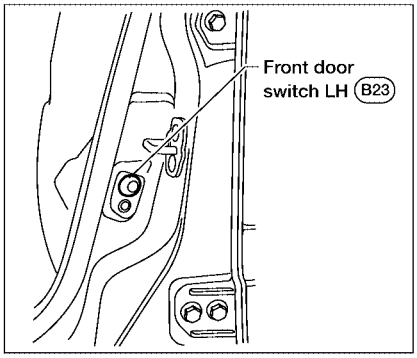


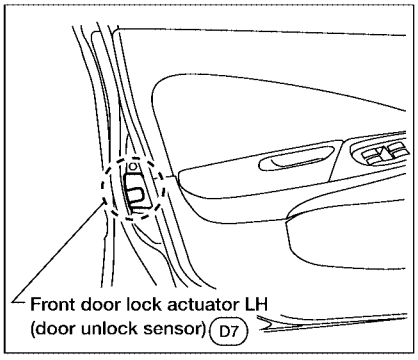


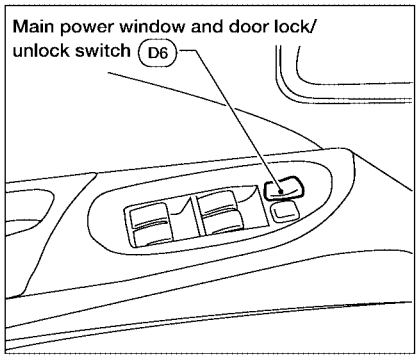


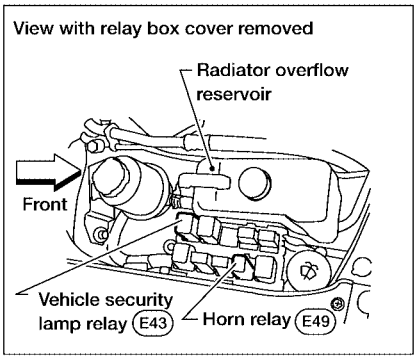


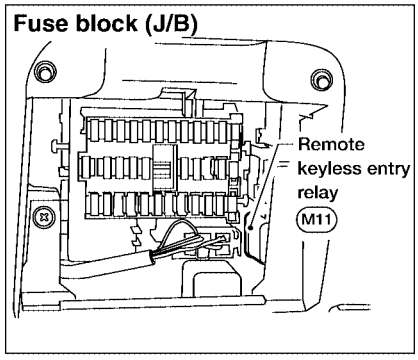












WIIA0007E

System Description

EIS00155

INPUTS

Power is supplied at all times:

- to key switch terminal 2
- through 10A fuse [No. 12, located in the fuse block (J/B)].

When the key switch is ON (ignition key is inserted in key cylinder), power is supplied:

- through key switch terminal 1
- to smart entrance control unit terminal 32.

When the front door switch LH is ON (door is OPEN), ground is supplied:

- to smart entrance control unit terminal 29
- through front door switch LH terminal 2
- to front door switch LH terminal 3
- through body grounds B13 and B19.

When the front door switch RH and rear door switches are ON (doors are OPEN), ground is supplied:

- to smart entrance control unit terminal 28
- through front door switch RH terminal 1 and rear door switches terminal +
- to front door switch RH case ground and rear door switches case grounds.

When main power window and door lock/unlock switch is LOCKED, ground is supplied:

- to smart entrance control unit terminal 23
- through main power window and door lock/unlock switch terminal 14 and
- through body grounds M28 and M54.

When main power window and door lock/unlock switch is UNLOCKED, ground is supplied:

- to smart entrance control unit terminal 35
- through main power window and door lock/unlock switch terminal 7 and
- through body grounds M28 and M54.

When front door unlock sensor LH is UNLOCKED, ground is supplied:

- to smart entrance control unit terminal 36
- through front door unlock sensor LH terminal 2
- to front door unlock sensor LH terminal 4
- through body grounds M28 and M54.

Keyfob signal is input to smart entrance control unit (the antenna of the system is combined with smart entrance control unit).
The remote keyless entry system controls operation of the:

- power door locks
- trunk lid opener
- interior lamp
- panic alarm
- hazard and horn reminder.

OPERATED PROCEDURE

Power Door Lock Operation

Smart entrance control unit receives a LOCK signal from keyfob. Smart entrance control unit locks all doors with input of LOCK signal from keyfob.
When an UNLOCK signal is sent from keyfob once, driver door will be unlocked.
Then, if an UNLOCK signal is sent from keyfob again within 5 seconds, all other doors will be unlocked.

Hazard and Horn Reminder

Power is supplied at all times:

- to remote keyless entry relay terminals 1, 3 and 6
- through 15A fuse [No. 5, located in the fuse block (J/B)], and
- to horn relay terminals 1 and 5

- through 10A fuse (No. 33, located in the fuse and fusible link box).

When smart entrance control unit receives LOCK or UNLOCK signal from keyfob, ground is supplied:

- to remote keyless entry relay terminal 2
- through smart entrance control unit terminal 7, and
- to horn relay terminal 2
- through smart entrance control unit terminal 19.

Remote keyless entry relay and horn relay are now energized, and hazard warning lamp flashes and horn sounds as a reminder.
The hazard and horn reminder has C mode (horn chirp mode) and S mode (non-horn chirp mode).

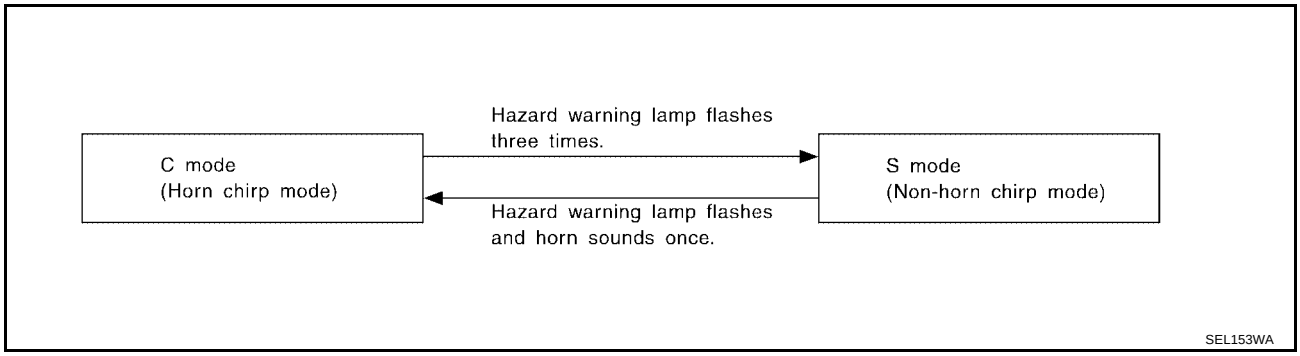
Operating function of hazard and horn reminder

	C mode (Horn chirp mode)		S mode (Non-horn chirp mode)	
	Hazard warning lamp flash	Horn sound	Hazard warning lamp flash	Horn sound
Lock	Twice	Once	Twice	—
Unlock	Once	—	—	—

How to change hazard and horn reminder mode

With CONSULT-II
Hazard and horn reminder can be changed using “WORK SUPPORT” mode in “MULTI REMOTE ENT”.

Without CONSULT-II
When LOCK and UNLOCK signals are sent from the keyfob for more than 2 seconds at the same time, the hazard and horn reminder mode is changed and hazard warning lamp flashes and horn sounds as follows:



Interior Lamp Operation

When the following input signals are both supplied:

- front door switch LH CLOSED (when driver door is closed);
- driver door LOCKED;

remote keyless entry system turns on interior lamp (for 30 seconds) with input of UNLOCK signal from keyfob.
For detailed description, refer to LT-36, "INTERIOR, MAP, VANITY AND TRUNK ROOM LAMPS" .

Panic Alarm Operation

When key switch is OFF (when ignition key is not inserted in key cylinder), remote keyless entry system turns on and off horn and headlamp intermittently with input of PANIC ALARM signal from keyfob.
The alarm automatically turns off after 25 seconds or when smart entrance control unit receives any signal from keyfob.
For detailed description, refer to BL-70, "PANIC ALARM OPERATION" .

Trunk Lid Operation

Power is supplied at all times:

- through 10A fuse [No. 6, located in the fuse block (J/B)]
- to trunk lid opener actuator terminal +.

When a TRUNK OPEN signal is sent with key OFF (ignition key removed from key cylinder) from keyfob, ground is supplied:

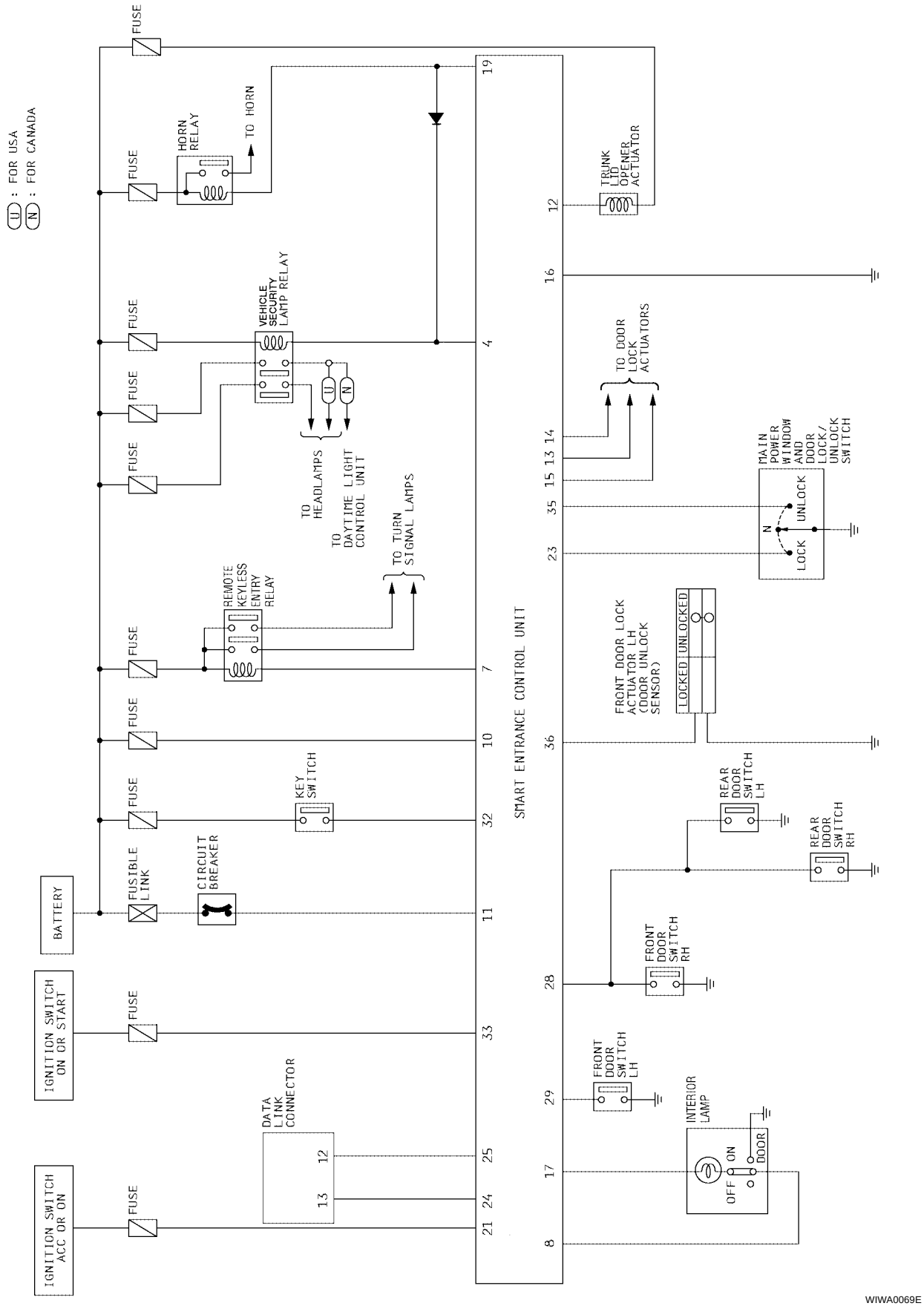
- to trunk lid opener actuator terminal -

- through smart entrance control unit terminal 12.

Then power and ground are supplied, trunk lid opener actuator opens trunk lid.

Schematic

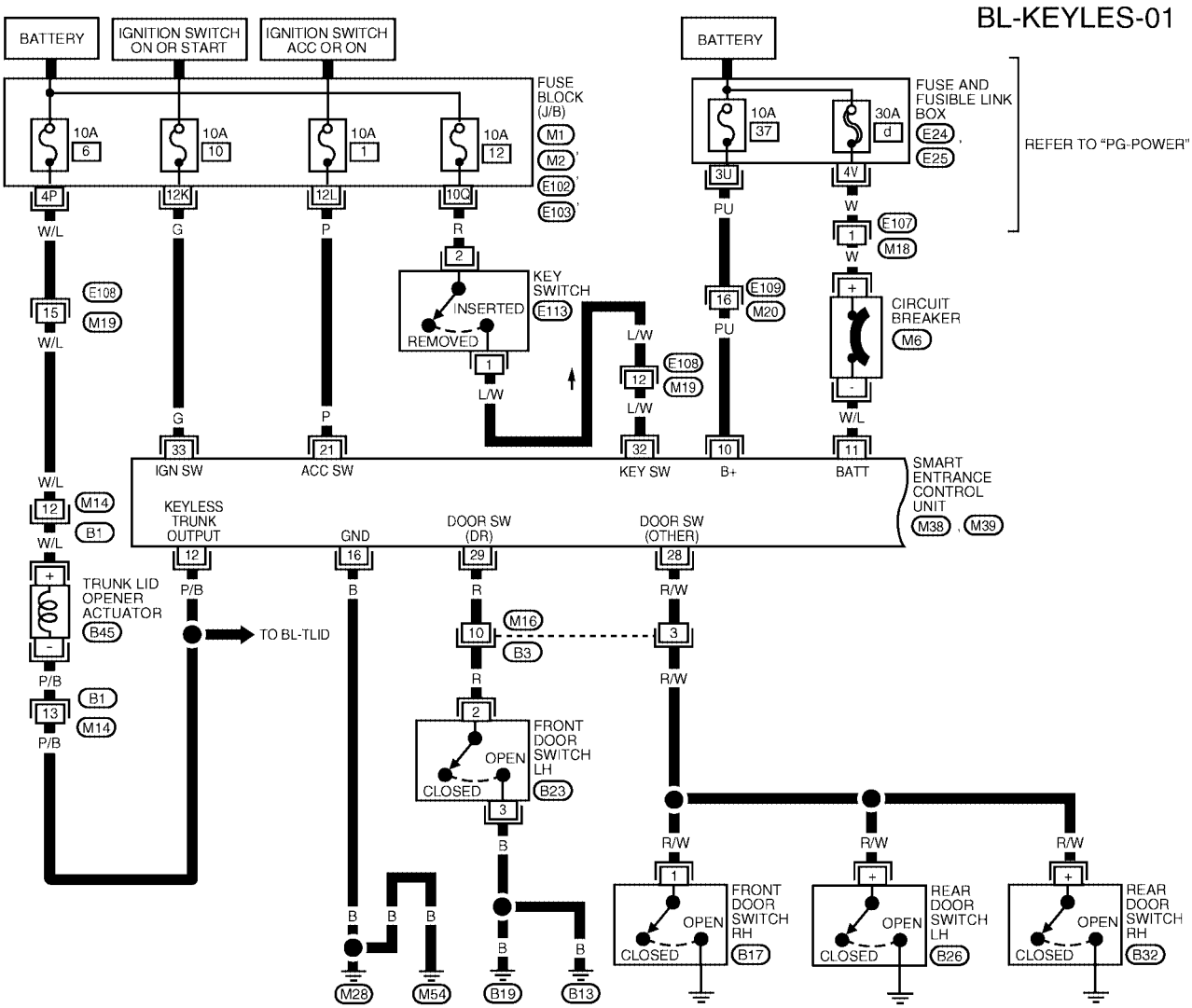
EIS00156

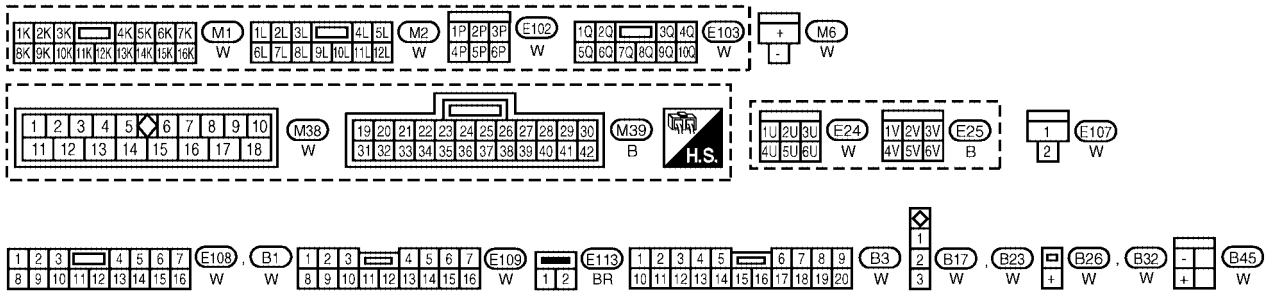


Wiring Diagram — KEYLES —

EIS00157

FIG. 1





WIWA0313E

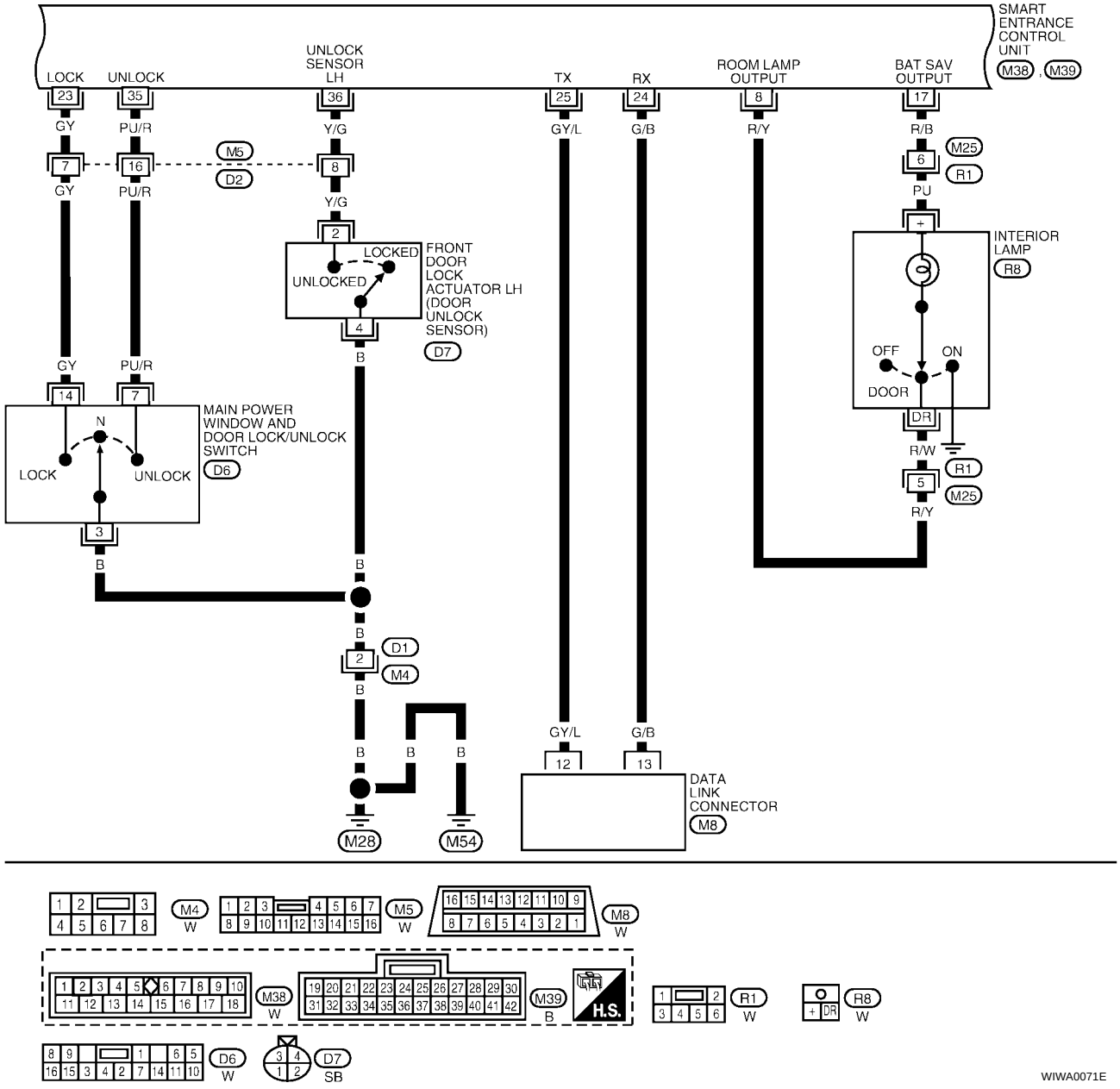
SMART ENTRANCE CONTROL UNIT AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	PU	POWER SOURCE (FUSE)	—	12V
11	W/L	POWER SOURCE (CIRCUIT BREAKER)	—	12V
12	P/B	TRUNK LID OPENER ACTUATOR	ON (OPEN)	0V
			OFF (CLOSED)	12V
16	B	GROUND	—	—
21	P	IGNITION SWITCH (ACC, ON)	ACC OR ON POSITION	12V
28	R/W	OTHER DOOR SWITCHES	OFF (CLOSED)	5V
			ON (OPEN)	0V
29	R	FRONT DOOR SWITCH LH	OFF (CLOSED)	5V
			ON (OPEN)	0V
32	L/W	IGNITION KEY SWITCH (INSERT)	IGNITION KEY IS INSERTED	12V
			IGNITION KEY IS REMOVED	0V
33	G	IGNITION SWITCH (ON)	IGNITION KEY IS IN ON POSITION	12V
		IGNITION SWITCH (START)	IGNITION KEY IS IN START POSITION	12V

LEL610

FIG. 2

BL-KEYLES-02

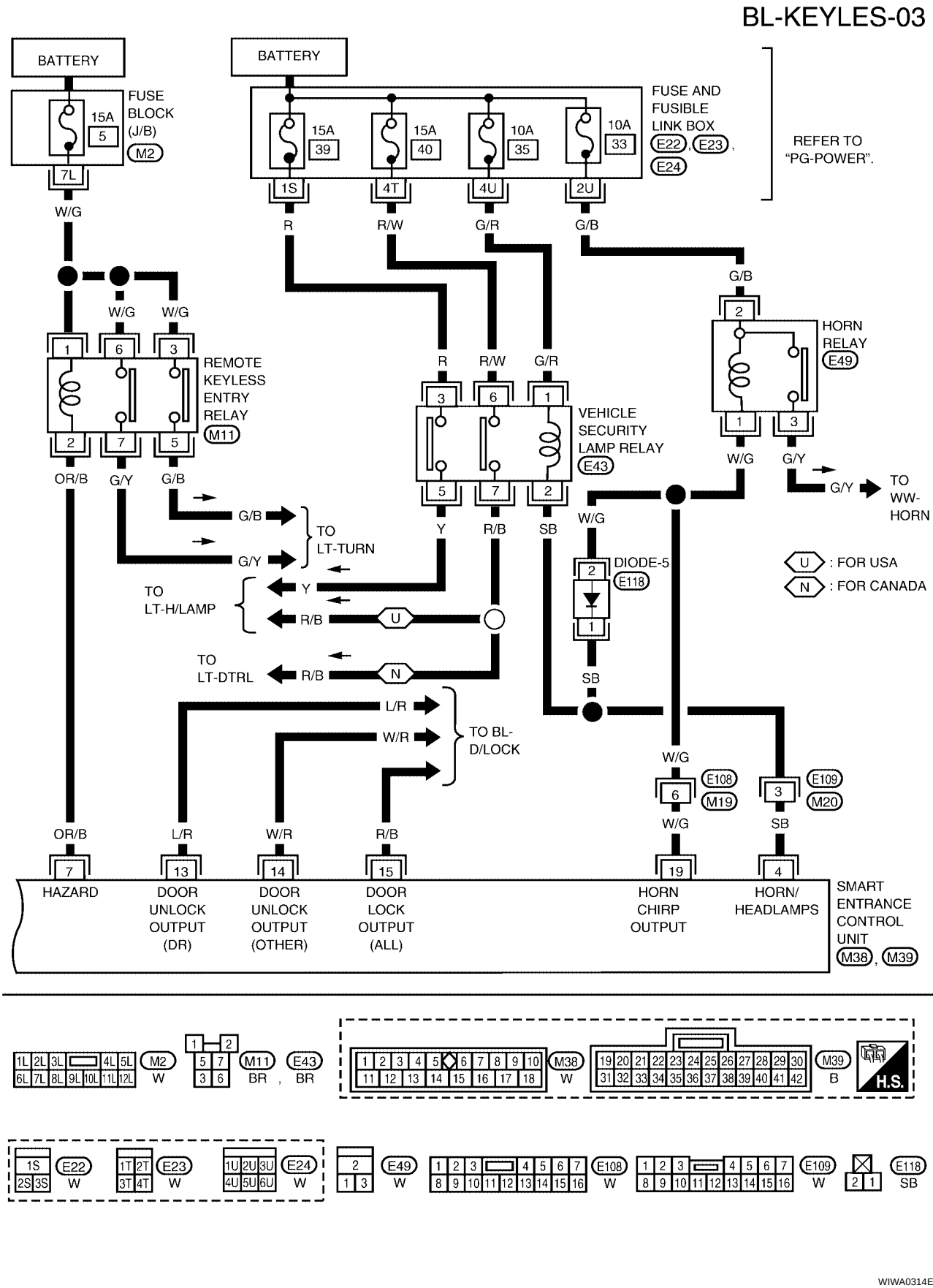


SMART ENTRANCE CONTROL UNIT TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
8	R/Y	INTERIOR LAMP	LAMP SWITCH IN DOOR POSITION	12V
17	R/B	BATTERY SAVER (INTERIOR LAMP)	BATTERY SAVER DOES NOT OPERATE	12V
			BATTERY SAVER OPERATES	0V
23	GY	DOOR LOCK & UNLOCK SWITCHES	NEUTRAL	5V
			LOCKS	0V
35	PU/R	DOOR LOCK & UNLOCK SWITCHES	NEUTRAL	5V
			UNLOCKS	0V
36	Y/G	DOOR UNLOCK SENSOR LH	DRIVER DOOR: LOCKED	5V
			DRIVER DOOR: UNLOCKED	0V

LEL611

FIG. 3


BL-KEYLES-03
BATTERY
BATTERY
FUSE BLOCK (J/B) M2
15A 5
7L
W/G
15A 39
15A 40
10A 35
10A 33
1S
4T
4U
2U
R
R/W
G/R
G/B
FUSE AND FUSIBLE LINK BOX E22, E23, E24
REFER TO "PG-POWER".
W/G
W/G
G/B
HORN RELAY E49
REMOTE KEYLESS ENTRY RELAY M11
VEHICLE SECURITY LAMP RELAY E43
OR/B
G/Y
G/B
W/G
G/Y
TO WW-HORN
G/B
G/Y
TO LT-TURN
Y
R/B
SB
W/G
DIODE-5 E118
U : FOR USA
N : FOR CANADA
TO LT-H/LAMP
Y
R/B
U
TO LT-DTRL
R/B
N
SB
L/R
W/R
TO BL-D/LOCK
W/G
E108 M19
E109 M20
W/G
SB
OR/B
L/R
W/R
R/B
7
13
14
15
19
4
HAZARD
DOOR UNLOCK OUTPUT (DR)
DOOR UNLOCK OUTPUT (OTHER)
DOOR LOCK OUTPUT (ALL)
HORN CHIRP OUTPUT
HORN/ HEADLAMPS
SMART ENTRANCE CONTROL UNIT M38, M39
M2 W
M11 BR , BR
E43
M38 W
M39 B
H.S.
E22 W
E23 W
E24 W
E49 W
E108 W
E109 W
E118 SB
WIWA0314E

SMART ENTRANCE CONTROL UNIT TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
4	SB	VEHICLE SECURITY HORN RELAY AND VEHICLE SECURITY LAMP RELAY	WHEN PANIC ALARM IS OPERATED USING REMOTE CONTROLLER OR WHEN ALARM IS ACTIVATED	12V TO 0V
7	OR/B	MULTI-REMOTE CONTROL RELAY	WHEN DOORS ARE LOCKED USING REMOTE CONTROLLER	12V TO 0V
19	W/G	HORN RELAY	WHEN DOORS ARE LOCKED USING REMOTE CONTROLLER WITH HORN CHIRP MODE	12V TO OV

WEL104A

CONSULT-II Function (SMART ENTRANCE)

EIS00158

CONSULT-II can display each diagnostic item using the diagnostic test modes shown following.

SMART ENTRANCE diagnostic test item	Diagnostic mode	Descriptiont
Inspection by part	DATA MONITOR	Displays smart entrance control unit input/output data in real time.
	ACTIVE TEST	Operation of electrical loads can be checked by sending drive signal to them.

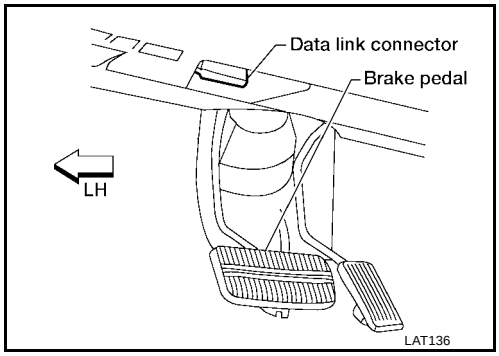
CONSULT-II INSPECTION PROCEDURE

MULTI REMOTE ENT

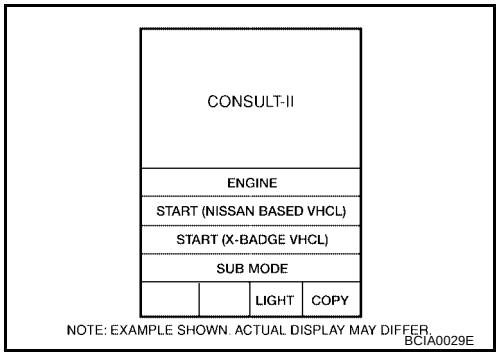
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carries out CAN communication.

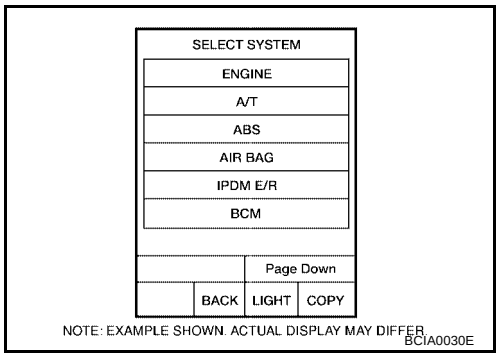
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to the data link connector.



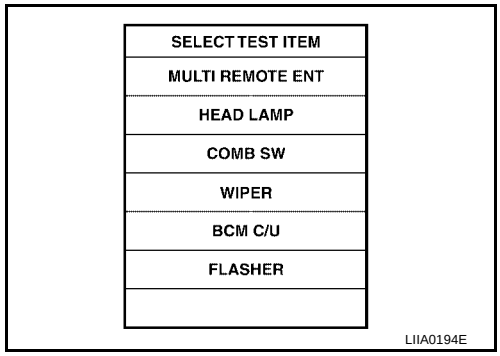
3. Turn ignition switch ON.
4. Touch “START (NISSAN BASED VHCL)”.



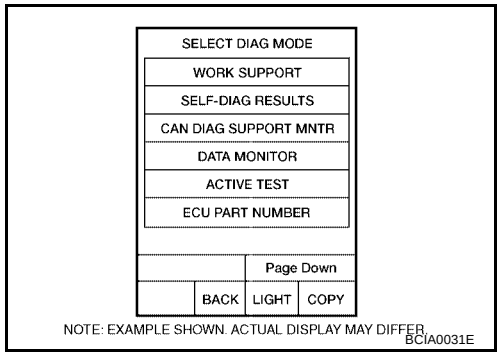
5. Touch “SMART ENTRANCE”.
   If “SMART ENTRANCE” is not indicated, refer to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Touch “MULTI REMOTE ENT”.



7. Select diagnosis mode.
“DATA MONITOR”, “ACTIVE TEST” and “WORK SUPPORT” are available.



CONSULT-II Application Items

EIS00159

MULTI REMOTE ENT

Data Monitor

Monitored Item	Description
ACC ON SW	Indicates [ON/OFF] condition of ignition switch in ACC position.
KEY ON SW	Indicates [ON/OFF] condition of key switch.
DOOR SW-DR	Indicates [ON/OFF] condition of front door switch LH.
DOOR SW-ALL	Indicates [ON/OFF] condition of door switch (All).
LOCK SW DR/AS	Indicates [ON/OFF] condition of lock signal from lock/unlock switch LH and RH.
UNLK SW DR/AS	Indicates [ON/OFF] condition of unlock signal from lock/unlock switch LH and RH.
KEY CYL LK SW	Indicates [ON/OFF] condition of lock signal from key cylinder switch.
LK BUTTON/SIG	Indicates [ON/OFF] condition of lock signal from keyfob.
UN BUTTON/SIG	Indicates [ON/OFF] condition of unlock signal from keyfob.
TRUNK BTN/SIG	Indicates [ON/OFF] condition of trunk open signal from keyfob.
PANIC BTN	Indicates [ON/OFF] condition of panic signal from keyfob.
UN BUTTON ON	Indicates [ON/OFF] condition of second unlock signal from keyfob within 5 seconds after first unlock operation.
LK/UN BTN ON	Indicates [ON/OFF] condition of lock/unlock signal at the same time from keyfob.

Active Test

Test Item	Description
INT/IGN ILLUM	This test is able to check interior lamp operation. The interior lamp is turned on when “ON” on CONSULT-II screen is touched.
HAZARD	This test is able to check hazard reminder operation. The hazard lamps turn on when “ON” on CONSULT-II screen is touched.
ALARM	This test is able to check panic alarm operation. The alarm activates for 0.5 seconds after “ON” on CONSULT-II screen is touched.

Test Item	Description
MULTI REM HRN	This test is able to check horn reminder operation. The horn sounds for 0.02 seconds after “ON” on CONSULT-II screen is touched.
TRUNK OUTPUT	This test is able to check trunk lid opener actuator operation. The trunk is unlocked when “ON” on CONSULT-II screen is touched.

Work Support

Test Item	Description
REMO CONT ID CONFIR	It can be checked whether keyfob ID code is registered or not in this mode.
REMO CONT ID REGIST	Keyfob ID code can be registered.
REMO CONT ID ERASUR	Keyfob ID code can be erased.
HZRD REM SET	Hazard and horn reminder mode can be changed in this mode. The reminder mode will be changed when “MODE SET” on CONSULT-II screen is touched.

Trouble Diagnoses

EIS0015A

SYMPTOM CHART

NOTE:

- Always check keyfob battery before replacing keyfob.
- The panic alarm operation and trunk lid opener operation of remote keyless entry system do not activate with the ignition key inserted in the ignition key cylinder.
- Use Remote Keyless Entry Tester J-43241 (follow instructions on tester) to check operation of keyfob before replacing keyfob.

Symptom	Diagnoses/service procedure	Reference page (BL-)
All functions of remote keyless entry system do not operate.	1. Keyfob battery and function check Keyfob check (use Remote Keyless Entry Tester J-43241).	BL-48
	2. Power supply and ground circuit for smart entrance control unit check	BL-49
	3. Replace keyfob. Refer to ID Code Entry Procedure. NOTE: If the result of keyfob function check with CONSULT-II is OK, keyfob is not malfunctioning. Keyfob check (use Remote Keyless Entry Tester J-43241).	BL-62
The new ID of keyfob cannot be entered.	1. Keyfob battery and function check Keyfob check (use Remote Keyless Entry Tester J-43241).	BL-48
	2. Key switch (insert) check	BL-52
	3. Door switch check	BL-51
	4. Door lock/unlock switch LH check	BL-53
	5. Power supply and ground circuit for smart entrance control unit check	BL-49
	6. Replace keyfob. Refer to ID Code Entry Procedure. NOTE: If the result of keyfob function check with CONSULT-II is OK, keyfob is not malfunctioning. Keyfob check (use Remote Keyless Entry Tester J-43241).	BL-62
Door lock or unlock does not function. [If the power door lock system does not operate manually, check power door lock system. Refer to BL-22, "Trouble Diagnoses" .)	1. Keyfob battery and function check Keyfob check (use Remote Keyless Entry Tester J-43241).	BL-48
	2. Replace keyfob. Refer to ID Code Entry Procedure. NOTE: If the result of keyfob function check with CONSULT-II is OK, keyfob is not malfunctioning. Keyfob check (use Remote Keyless Entry Tester J-43241).	BL-62

Symptom	Diagnoses/service procedure	Reference page (BL-)
Hazard and horn reminder does not activate properly when pressing lock or unlock button of keyfob.	1. Keyfob battery and function check Keyfob check (use Remote Keyless Entry Tester J-43241).	BL-48
	2. Hazard reminder check	BL-58
	3. Horn reminder check* *: Horn chirp can be activated or deactivated. First check the horn chirp setting. Refer to BL-35, "Hazard and Horn Reminder" .	BL-60
	4. Door switch check	BL-51
	5. Replace keyfob. Refer to ID Code Entry Procedure. NOTE: If the result of keyfob function check with CONSULT-II is OK, keyfob is not malfunctioning. Keyfob check (use Remote Keyless Entry Tester J-43241).	BL-62
Interior lamp illumination operations do not activate properly.	1. Interior lamp operation check	BL-61
	2. Door switch check	BL-51
	3. Front LH door unlock sensor check	BL-55
Panic alarm (horn and headlamp) does not activate when panic alarm button is continuously pressed. Keyfob check (use Remote Keyless Entry Tester J-43241).	1. Keyfob battery and function check	BL-48
	2. Vehicle security operation check. Refer to BL-81, "PRELIMINARY CHECK" .	BL-81
	3. Key switch (insert) check	BL-52
	4. Replace keyfob. Refer to ID Code Entry Procedure. NOTE: If the result of keyfob function check with CONSULT-II is OK, keyfob is not malfunctioning. Keyfob check (use Remote Keyless Entry Tester J-43241).	BL-62
Trunk lid does not open when trunk opener button is continuously pressed.	1. Keyfob battery and function check	BL-48
	2. Trunk lid opener actuator check	BL-57
	3. Key switch (insert) check	BL-52
	4. Replace keyfob. Refer to ID Code Entry Procedure. NOTE: If the result of keyfob function check with CONSULT-II is OK, keyfob is not malfunctioning. Keyfob check (use Remote Keyless Entry Tester J-43241).	BL-62

KEYFOB BATTERY AND FUNCTION CHECK

1. CHECK KEYFOB BATTERY

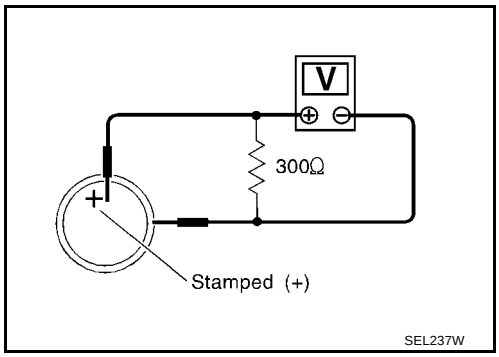
Remove battery (refer to BL-65, "Keyfob Battery Replacement") and measure voltage across battery positive and negative terminals, (+) and (–).

Voltage [V] : 2.5 - 3.0

NOTE:
Keyfob does not function if battery is not set correctly.

OK or NG

OK >> GO TO 2.
NG >> Replace battery.

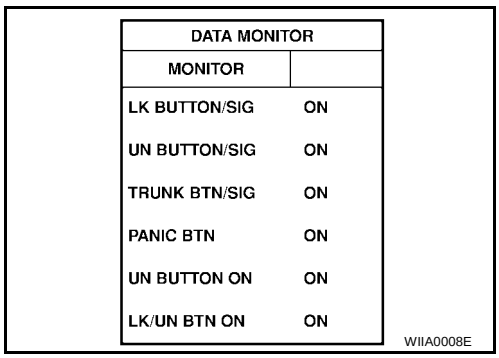


2. CHECK KEYFOB FUNCTION

With CONSULT-II

Check keyfob function (“LK BUTTON/SIG”, “UN BUTTON/SIG”, “TRUNK BTN/SIG”, “PANIC BTN”, “UN BUTTON ON” and “LK/UN BTN ON”) in “DATA MONITOR” mode with CONSULT-II. When pushing each button of keyfob, the corresponding monitor item should be turned as follows.

Condition	Monitor item	
Pushing LOCK	LK BUTTON/SIG	ON
Pushing UNLOCK	UN BUTTON/SIG	ON
Pushing TRUNK	TRUNK BTN/SIG	ON
Pushing PANIC	PANIC BTN/SIG	ON
Pushing UNLOCK within 5 seconds after pushing UNLOCK	UN BUTTON ON	ON
Pushing LOCK and UNLOCK at the same time	LK/UN BTN ON	ON



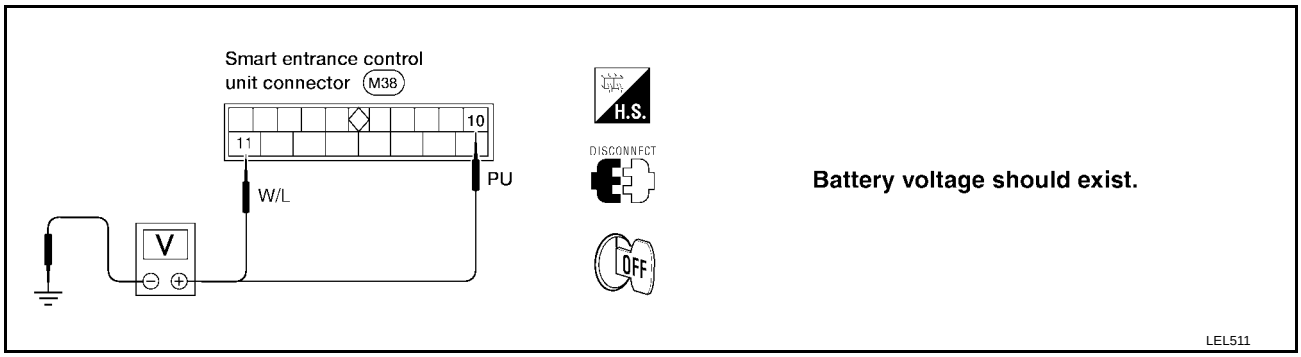
OK or NG

OK >> Keyfob is OK. Further inspection is necessary. Refer to BL-46, "SYMPTOM CHART" .
NG >> Replace keyfob. Refer to BL-62, "ID Code Entry Procedure" .

POWER SUPPLY AND GROUND CIRCUIT CHECK

1. CHECK MAIN POWER SUPPLY CIRCUIT FOR SMART ENTRANCE CONTROL UNIT

1. Disconnect smart entrance control unit harness connector.
2. Check voltage between smart entrance control unit harness connector terminals 10, 11 and ground.



Refer to BL-39, "FIG. 1" .

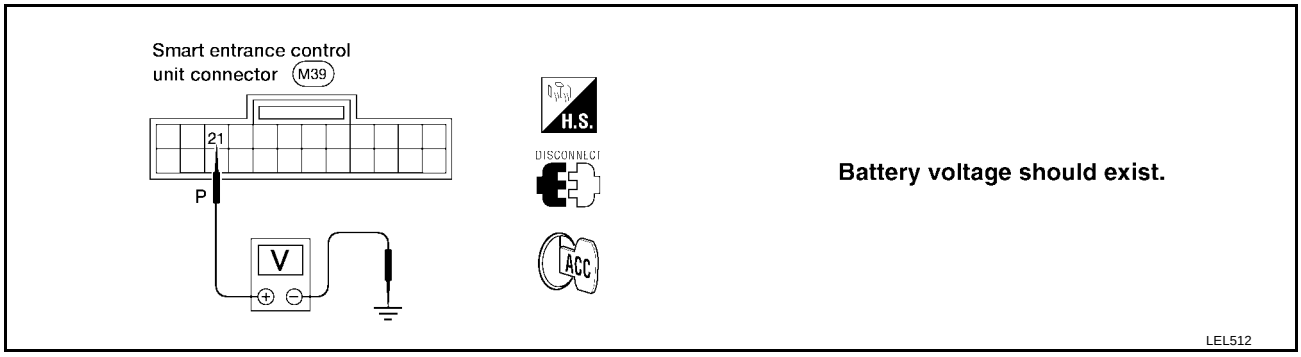
OK or NG

OK >> GO TO 2.
NG >> Check the following.

- 30A fusible link (letter **d** , located in fuse and fusible link box)
- 10A fuse (No. 37, located in fuse and fusible link box)
- M6 circuit breaker
- Harness for open or short between smart entrance control unit and fuse

2. CHECK IGNITION SWITCH ACC CIRCUIT

1. Disconnect smart entrance control unit harness connector.
2. Check voltage between smart entrance control unit harness connector terminal 21 and ground while ignition switch is in ACC.



Refer to BL-39, "FIG. 1" .

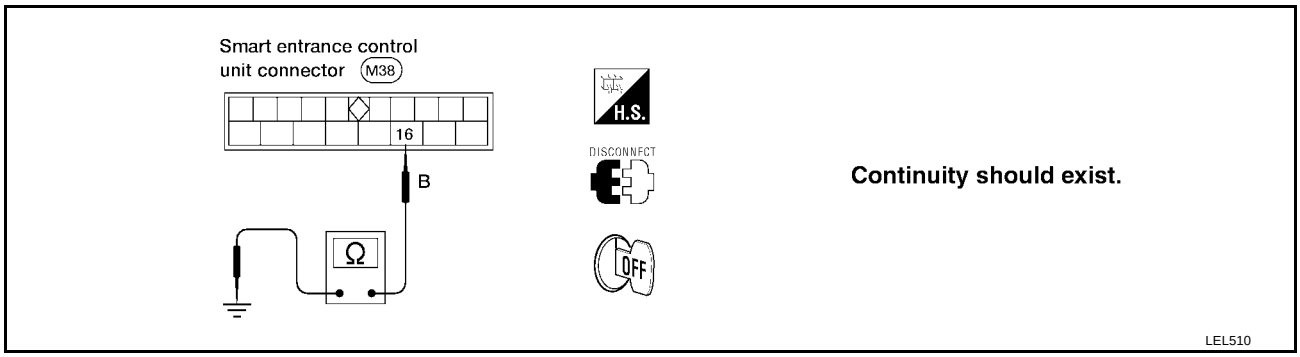
OK or NG

OK >> GO TO 3.
NG >> Check the following.

- 10A fuse [No. 1, located in fuse block (J/B)]
- Harness for open or short between smart entrance control unit and fuse

3. CHECK GROUND CIRCUIT FOR SMART ENTRANCE CONTROL UNIT

Check continuity between smart entrance control unit harness connector terminal 16 and ground.



Refer to BL-39, "FIG. 1" .

OK or NG

OK >> Power supply and ground circuits are OK.
NG >> Repair or replace harness.

DOOR SWITCH CHECK

1. CHECK DOOR SWITCH INPUT SIGNAL

With CONSULT-II

Check door switches (“DOOR SW-ALL”) in “DATA MONITOR” mode with CONSULT-II.

DATA MONITOR	
MONITOR	
DOOR SW-ALL	OFF

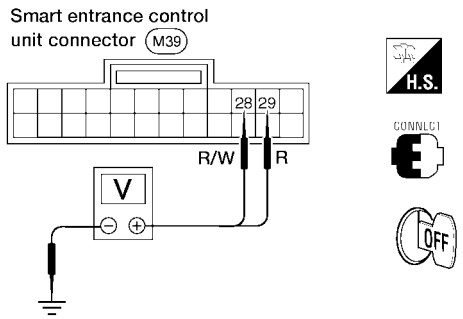
When any doors are open:
DOOR SW-ALL ON

When all doors are closed:
DOOR SW-ALL OFF

SEL323W

Without CONSULT-II

Check voltage between smart entrance control unit harness connector terminals 28 or 29 and ground.



	Terminals		Condition	Voltage [V]
	(+)	(−)		
Front door switch LH	29	Ground	Open	0
			Closed	Approx. 5
Other door switches	28	Ground	Open	0
			Closed	Approx. 5

WEL500

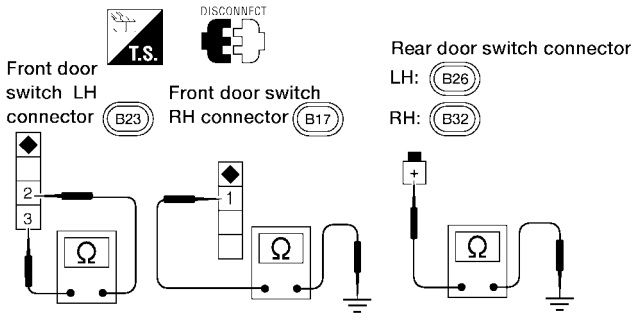
Refer to BL-39, "FIG. 1" .

OK or NG

OK >> Door switch is OK.
NG >> GO TO 2.

2. CHECK DOOR SWITCH

1. Disconnect door switch harness connector.
2. Check continuity between door switch terminals.



	Terminals	Condition	Continuity
Front door switch LH	2 - 3	Closed	No
		Open	Yes
Front door switch RH	1 - Ground	Closed	No
		Open	Yes
Rear door switches	(+) - Ground	Closed	No
		Open	Yes

WEL491

OK or NG

OK >> Check the following.
- Door switch ground circuit or door switch ground condition
- Harness for open or short between smart entrance control unit and door switch

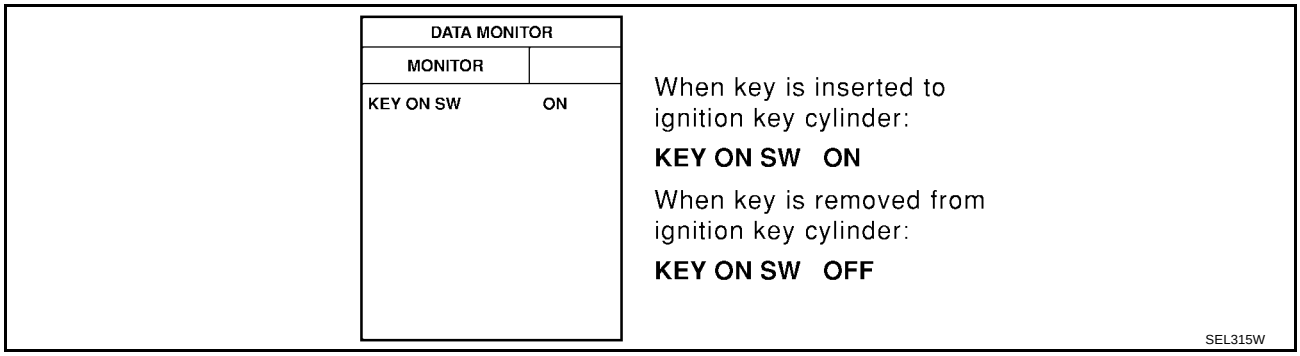
NG >> Replace door switch.

KEY SWITCH (INSERT) CHECK

1. CHECK KEY SWITCH INPUT SIGNAL

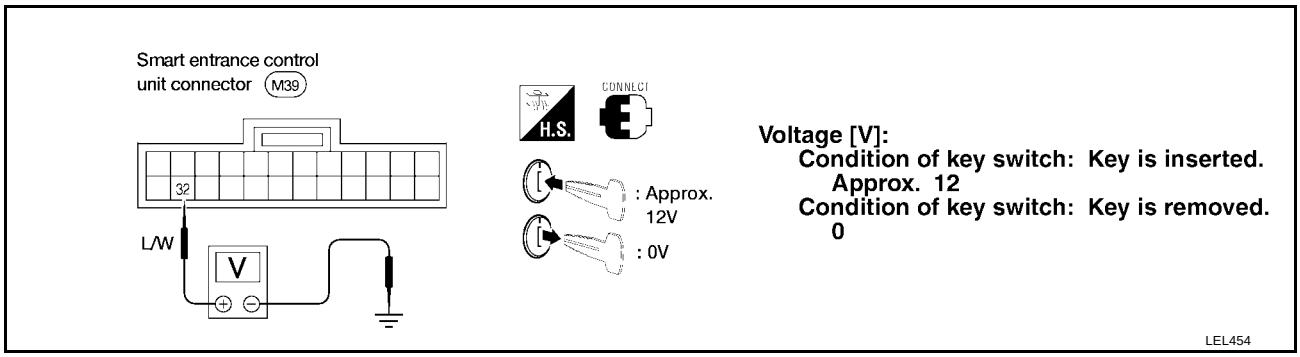
With CONSULT-II

Check key switch (“KEY ON SW”) in “DATA MONITOR” mode with CONSULT-II.



Without CONSULT-II

Check voltage between control unit terminal 32 and ground.



Refer to BL-39, "FIG. 1" .

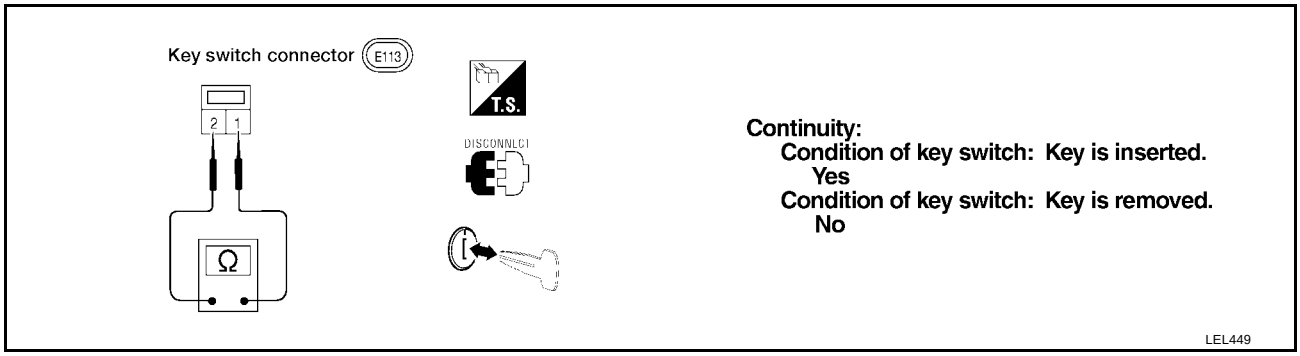
OK or NG

OK >> Key switch is OK.

NG >> GO TO 2.

2. CHECK KEY SWITCH

Check continuity between key switch terminals 1 and 2.



OK or NG

OK >> Check the following.

- 10A fuse [No. 12, located in fuse block (J/B)]
- Harness for open or short between key switch and fuse
- Harness for open or short between smart entrance control unit and key switch

NG >> Replace key switch.

DOOR LOCK/UNLOCK SWITCH LH CHECK

1. CHECK DOOR LOCK/UNLOCK SWITCH INPUT SIGNAL

With CONSULT-II

Check door lock/unlock switch (“LOCK SW DR/AS”/“UNLK SW DR/AS”) in “DATA MONITOR” mode with CONSULT-II.

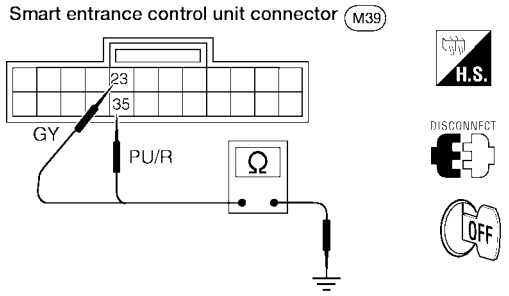
DATA MONITOR	
MONITOR	
LOCK SW DR/AS	OFF
UNLK SW DR/AS	OFF

When lock/unlock switch is turned to LOCK:
LOCK SW DR/AS ON
When lock/unlock switch is turned to UNLOCK:
UNLK SW DR/AS ON

SEL341W

Without CONSULT-II

1. Disconnect smart entrance control unit harness connector.
2. Check continuity between smart entrance control unit harness connector terminal 23 or 35 and ground.



Terminals	Door lock/unlock switch (LH or RH) condition	Continuity
23 - Ground	Lock	Yes
	N and Unlock	No
35 - Ground	Unlock	Yes
	N and Lock	No

WEL501

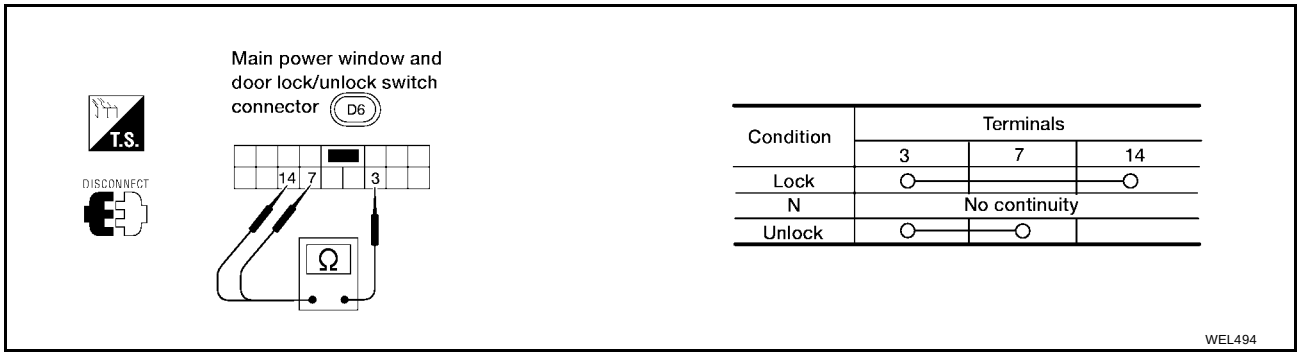
Refer to BL-41, "FIG. 2" .

OK or NG

OK >> Door lock/unlock switch is OK.
NG >> GO TO 2.

2. CHECK DOOR LOCK/UNLOCK SWITCH

1. Disconnect door lock/unlock switch harness connector.
2. Check continuity between door lock/unlock switch LH terminals.



Condition	Terminals		
	3	7	14
Lock	○		○
N	No continuity		
Unlock	○	○	

OK or NG

OK >> Check the following.
- Ground circuit for door lock/unlock switch
- Harness for open or short between door lock/unlock switch and smart entrance control unit connector

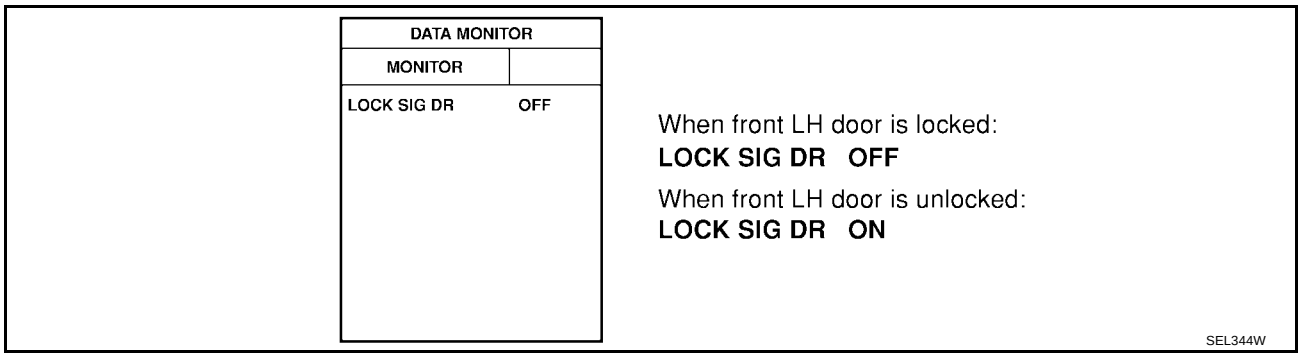
NG >> Replace door lock/unlock switch.

FRONT LH DOOR UNLOCK SENSOR CHECK

1. CHECK FRONT LH DOOR UNLOCK SENSOR INPUT SIGNAL

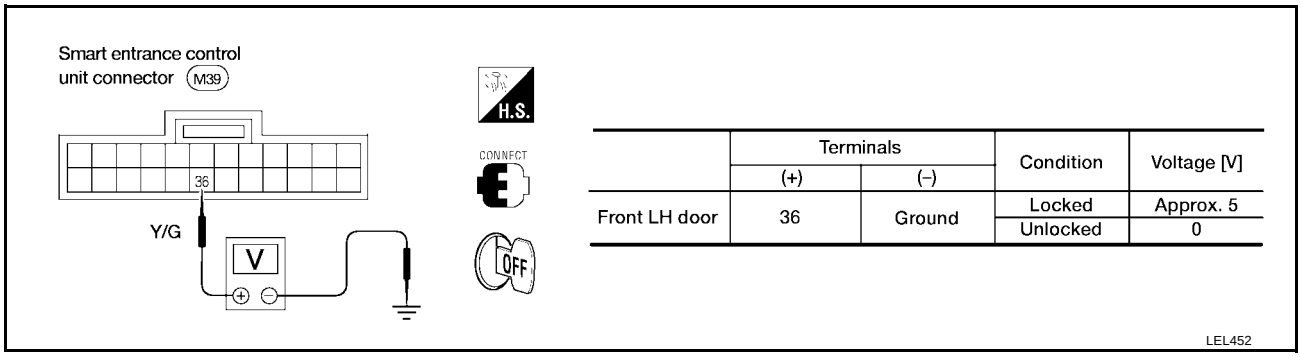
With CONSULT-II

1. Select “DATA MONITOR” mode in “INT LAMP” with CONSULT-II.
2. Check front LH door unlock sensor (“LOCK SIG DR”) in “DATA MONITOR” mode.



Without CONSULT-II

Check voltage between smart entrance control unit harness connector terminal 36 and ground.



	Terminals (+)	Terminals (–)	Condition	Voltage [V]
Front LH door	36	Ground	Locked	Approx. 5
			Unlocked	0

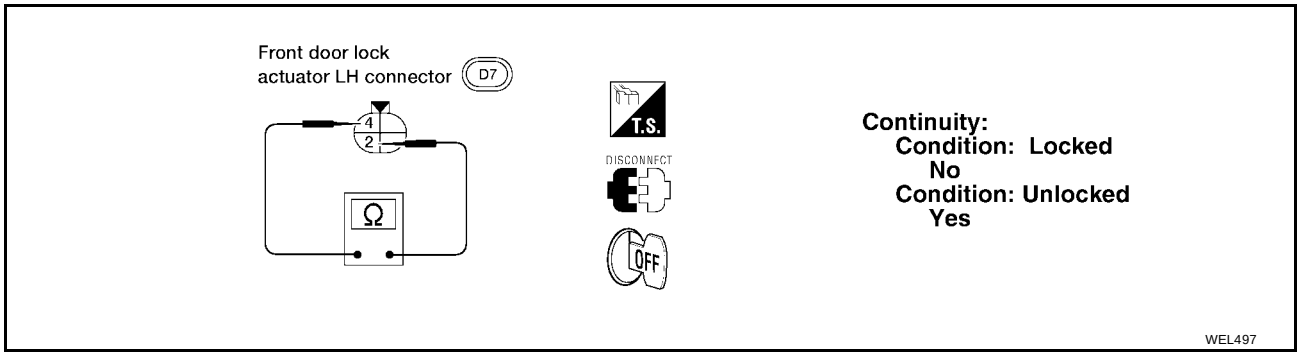
Refer to BL-41, "FIG. 2" .

OK or NG

OK >> Door unlock sensor is OK.
NG >> GO TO 2.

2. CHECK FRONT LH DOOR UNLOCK SENSOR

1. Disconnect front LH door unlock sensor harness connector.
2. Check continuity between door unlock sensor terminals.



OK or NG

OK >> Check the following.
- Door unlock sensor ground circuit
- Harness for open or short between smart entrance control unit and door unlock sensor

NG >> Replace door unlock sensor.

TRUNK LID OPENER ACTUATOR CHECK

1. CHECK TRUNK LID OPENER

Check trunk lid opener operation with trunk lid opener switch.
NOTE: First check trunk lid opener cancel lever position.

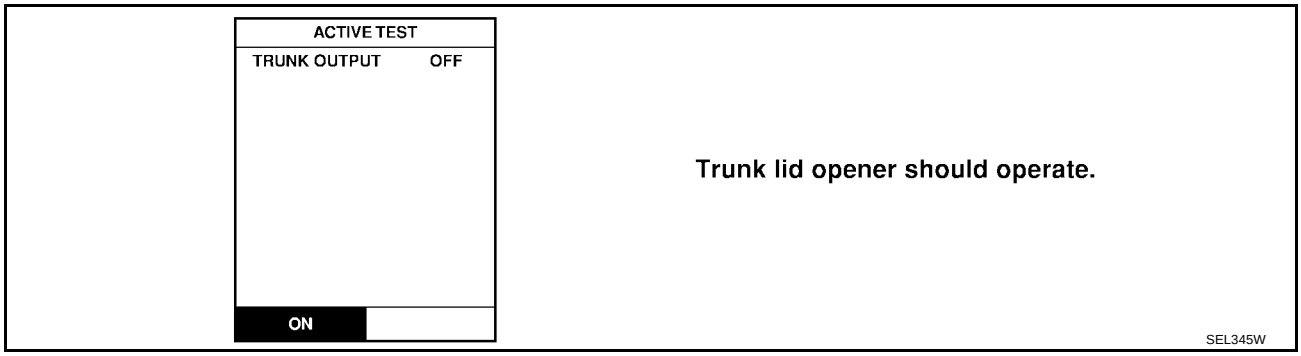
Does trunk lid open?

Yes >> GO TO 2.
No >> Check trunk lid opener actuator and the circuit.

2. CHECK TRUNK LID OPENER ACTUATOR OPERATION

With CONSULT-II

1. Select “ACTIVE TEST” in “MULTI REMOTE ENT” with CONSULT-II.
2. Select “TRUNK OUTPUT” and touch “ON”.



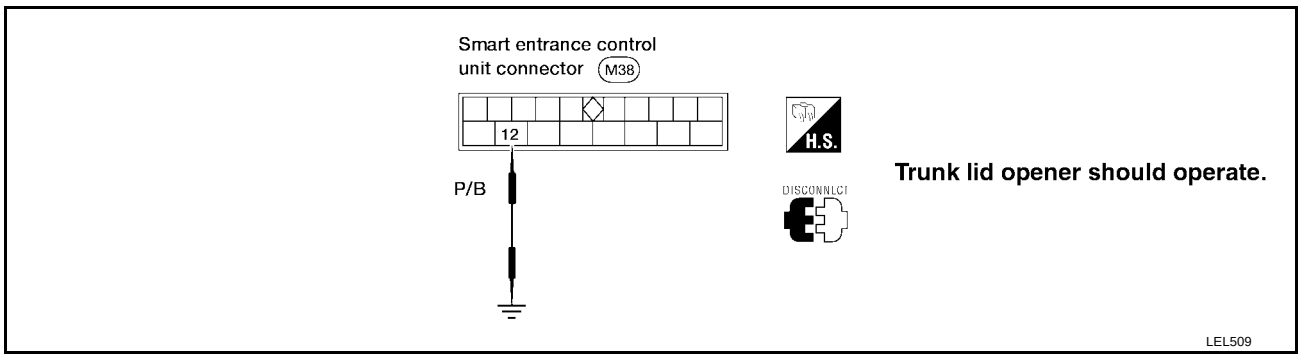
NOTE: If CONSULT-II is not available, skip this procedure and go to the next step.

OK or NG

OK >> Trunk lid opener actuator circuit is OK.
NG >> GO TO 3.

3. CHECK TRUNK LID OPENER ACTUATOR CIRCUIT

1. Disconnect smart entrance control unit harness connector.
2. Apply ground to smart entrance control unit harness connector terminal 12.



Refer to BL-39, "FIG. 1" .

Does trunk lid open?

Yes >> Replace smart entrance control unit.
No >> Check harness for open or short between smart entrance control unit and trunk lid opener actuator.

HAZARD REMINDER CHECK

1. CHECK HAZARD INDICATOR

Check if hazard indicator flashes with hazard switch.

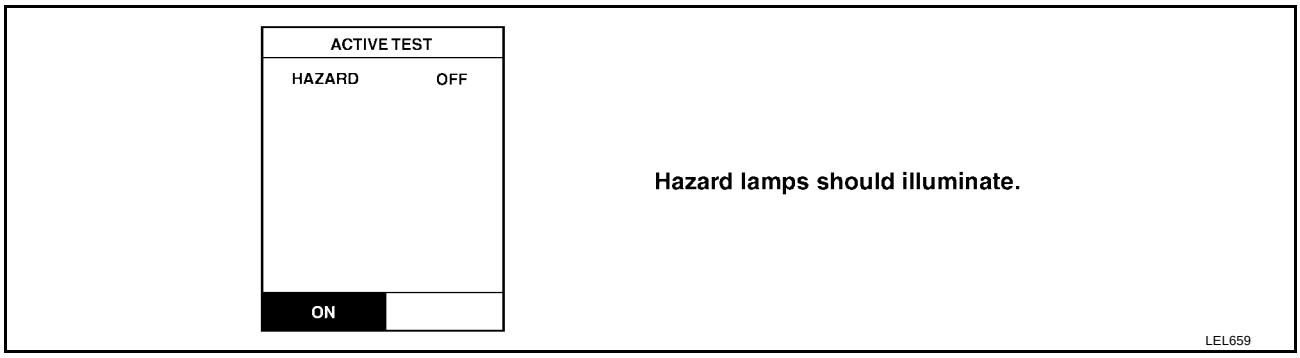
Does hazard indicator operate?

Yes >> GO TO 2.
No >> Check hazard indicator circuit.

2. CHECK HAZARD REMINDER OPERATION

With CONSULT-II

1. Select “ACTIVE TEST” in “MULTI REMOTE ENT” with CONSULT-II.
2. Select “HAZARD” and touch “ON”.



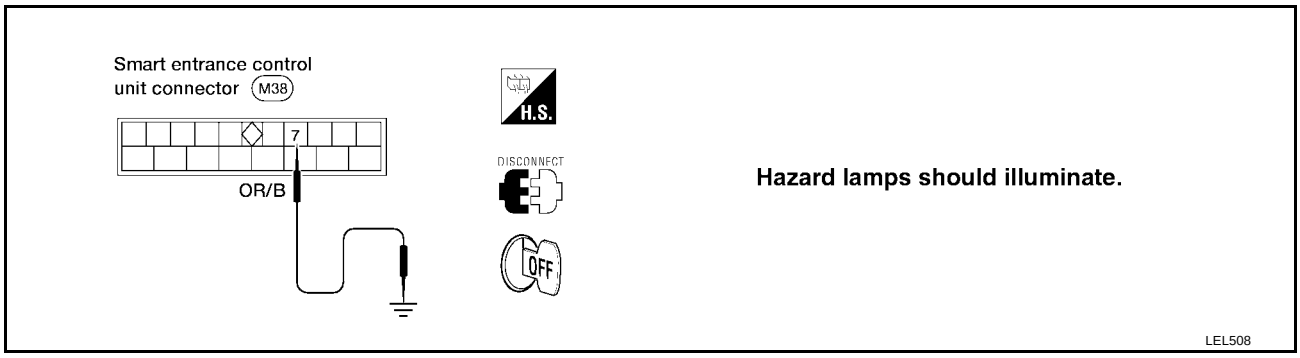
NOTE: If CONSULT-II is not available, skip this procedure and go to the next step.

OK or NG

OK >> Hazard reminder operation is OK.
NG >> GO TO 3.

3. CHECK HAZARD REMINDER OPERATION

1. Disconnect smart entrance control unit harness connector.
2. Apply ground to smart entrance control unit harness connector terminal 7.



Refer to BL-42, "FIG. 3" .

OK or NG

OK >> Replace smart entrance control unit.
NG >> GO TO 4.

4. CHECK REMOTE KEYLESS ENTRY RELAY

Check remote keyless entry relay.

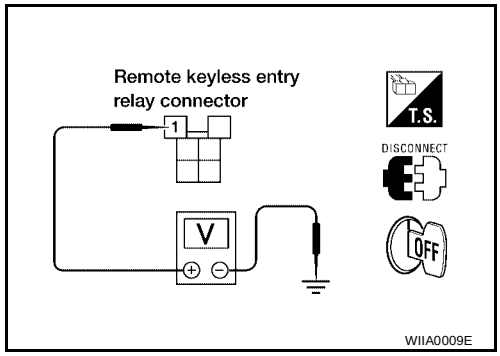
OK or NG

OK >> GO TO 5.
NG >> Replace remote keyless entry relay.

5. CHECK POWER SUPPLY FOR REMOTE KEYLESS ENTRY RELAY

1. Disconnect remote keyless entry relay harness connector.
2. Check voltage between remote keyless entry relay harness connector M11 terminal 1 (W/G) and ground.

Battery voltage should exist.



OK or NG

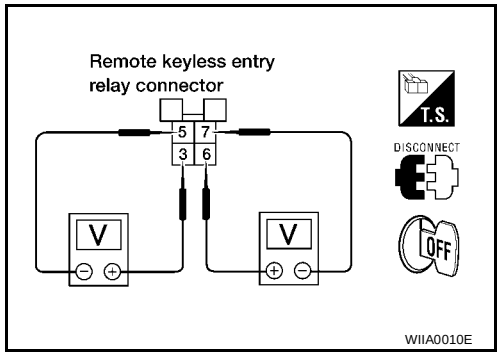
OK >> GO TO 6.
NG >> Check the following.

- 15A fuse [No. 5, located in fuse block (J/B)]
- Harness for open or short between remote keyless entry relay and fuse

6. CHECK REMOTE KEYLESS ENTRY RELAY CIRCUIT

1. Disconnect remote keyless entry relay harness connector.
2. Check voltage between remote keyless entry relay harness connector M11 terminals 3 (W/G) and 5 (G/B).
3. Check voltage between remote keyless entry relay harness connector M11 terminals 6 (W/G) and 7 (G/Y).

Battery voltage should exist.



OK or NG

OK >> Check harness for open or short between smart entrance control unit and remote keyless entry relay.
NG >> Check the following.

- Harness for open or short between remote keyless entry relay and fuse
- Harness for open or short between remote keyless entry relay and turn signal lamps

HORN REMINDER CHECK

1. CHECK HORN

Check if horn sounds with horn switch.

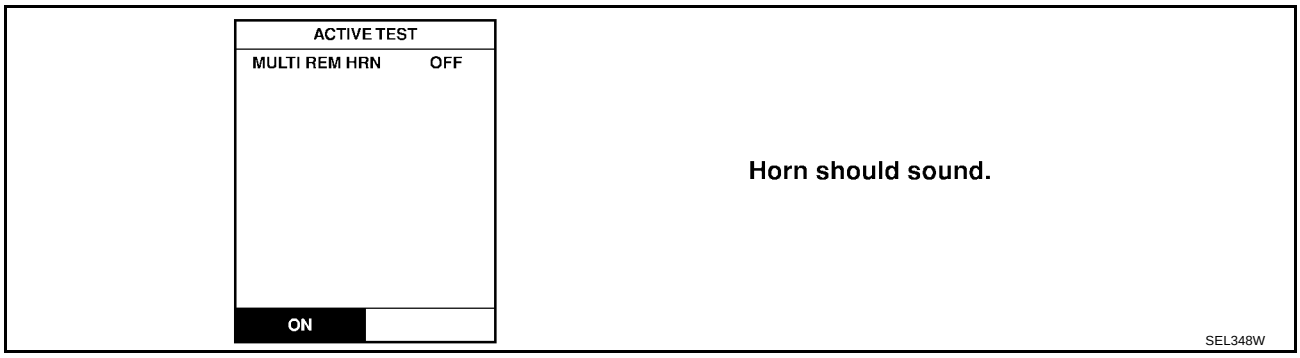
Does horn operate?

Yes >> GO TO 2.
No >> Check horn circuit.

2. CHECK HORN REMINDER OPERATION

With CONSULT-II

1. Select “ACTIVE TEST” in “MULTI REMOTE ENT” with CONSULT-II.
2. Select “MULTI REM HRN” and touch “ON”.



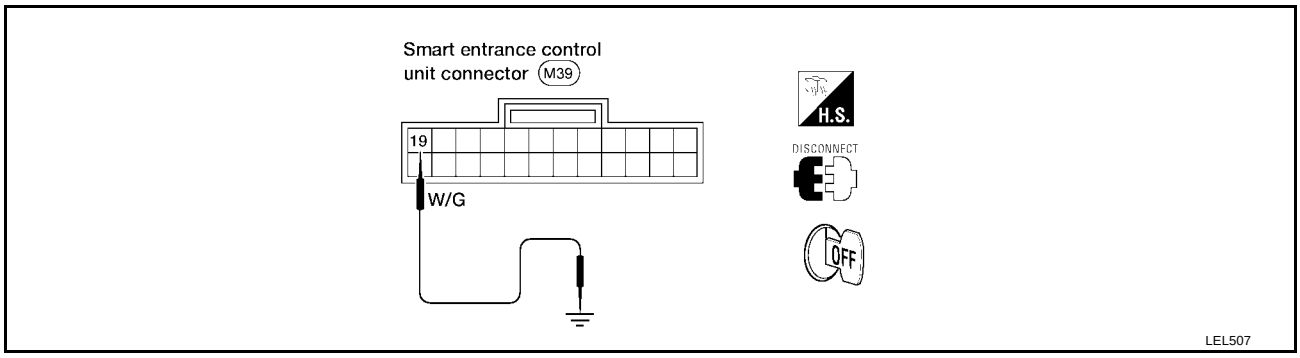
NOTE: If CONSULT-II is not available, skip this procedure and go to the next step.

OK or NG

OK >> Horn reminder operation is OK.
NG >> GO TO 3.

3. CHECK HORN REMINDER OPERATION

1. Disconnect smart entrance control unit harness connector.
2. Apply ground to smart entrance control unit harness connector terminal 19.



Refer to BL-42, "FIG. 3" .

Does horn sound?

Yes >> Replace smart entrance control unit.
No >> Check harness for open or short between smart entrance control unit and horn relay.

INTERIOR LAMP OPERATION CHECK

1. CHECK INTERIOR LAMP

Check if the interior lamp switch is in the “ON” position and the lamp illuminates.

Does interior lamp illuminate?

Yes >> GO TO 2.

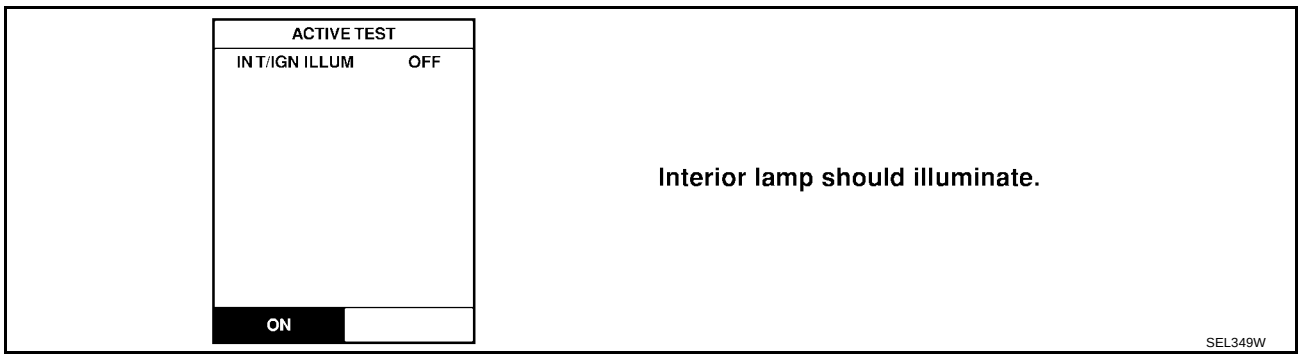
No >> Check the following.

- Harness for open or short between smart entrance control unit and interior lamp
- Interior lamp

2. CHECK INTERIOR LAMP OPERATION

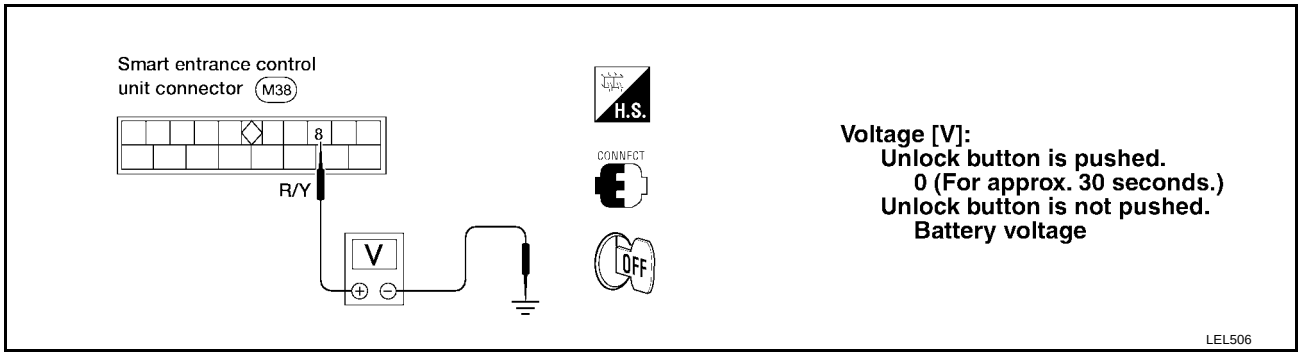
With CONSULT-II

1. Select “ACTIVE TEST” in “MULTI REMOTE ENT” with CONSULT-II.
2. Select “INT/IGN ILLUM” and touch “ON”.



Without CONSULT-II

Push unlock button of keyfob with all doors closed, and check voltage between smart entrance control unit harness connector terminal 8 and ground.



Refer to BL-41, "FIG. 2" .

OK or NG

OK >> System is OK.

NG >> Check harness open or short between smart entrance control unit and interior lamp.

ID Code Entry Procedure

EIS0015B

KEYFOB ID SET UP WITH CONSULT-II

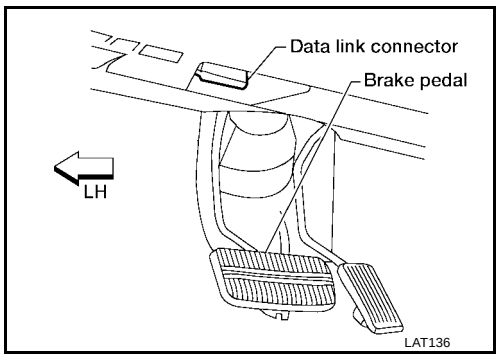
NOTE:

If a keyfob is lost, the ID code of the lost keyfob must be erased to prevent unauthorized use. When the ID code of a lost keyfob is not known, all keyfob ID codes should be erased. After all ID codes are erased, the ID codes of all remaining and/or new keyfobs must be re-registered.

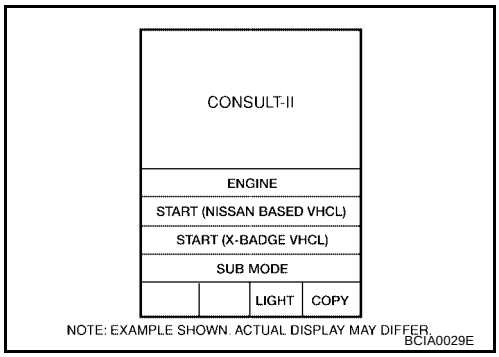
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carries out CAN communication.

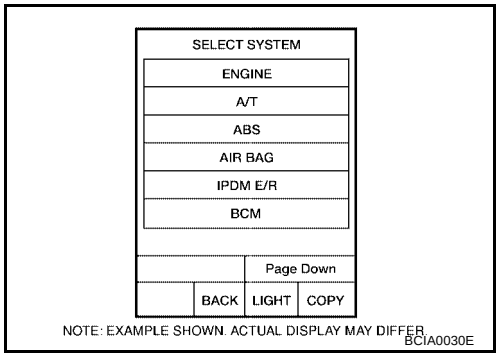
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to the data link connector.



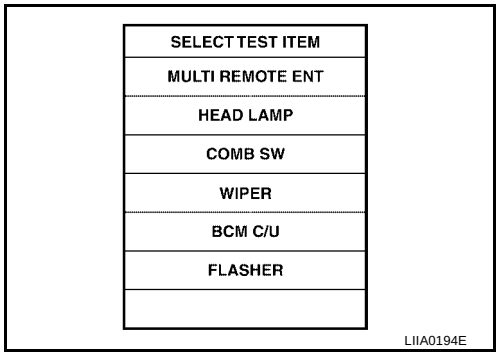
3. Turn ignition switch ON.
4. Touch “START (NISSAN BASED VHCL)”.



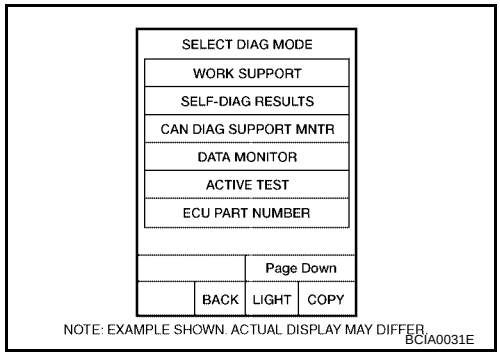
5. Touch “SMART ENTRANCE”.
   If “SMART ENTRANCE” is not indicated, refer to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Touch “MULTI REMOTE ENT”.



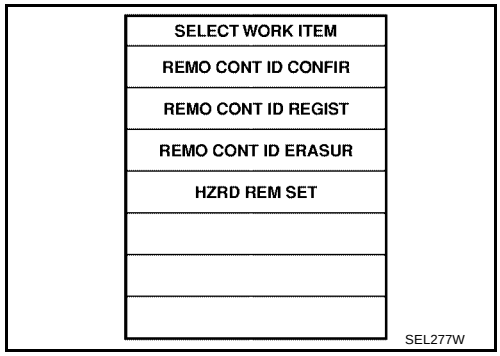
7. Touch “WORK SUPPORT”.



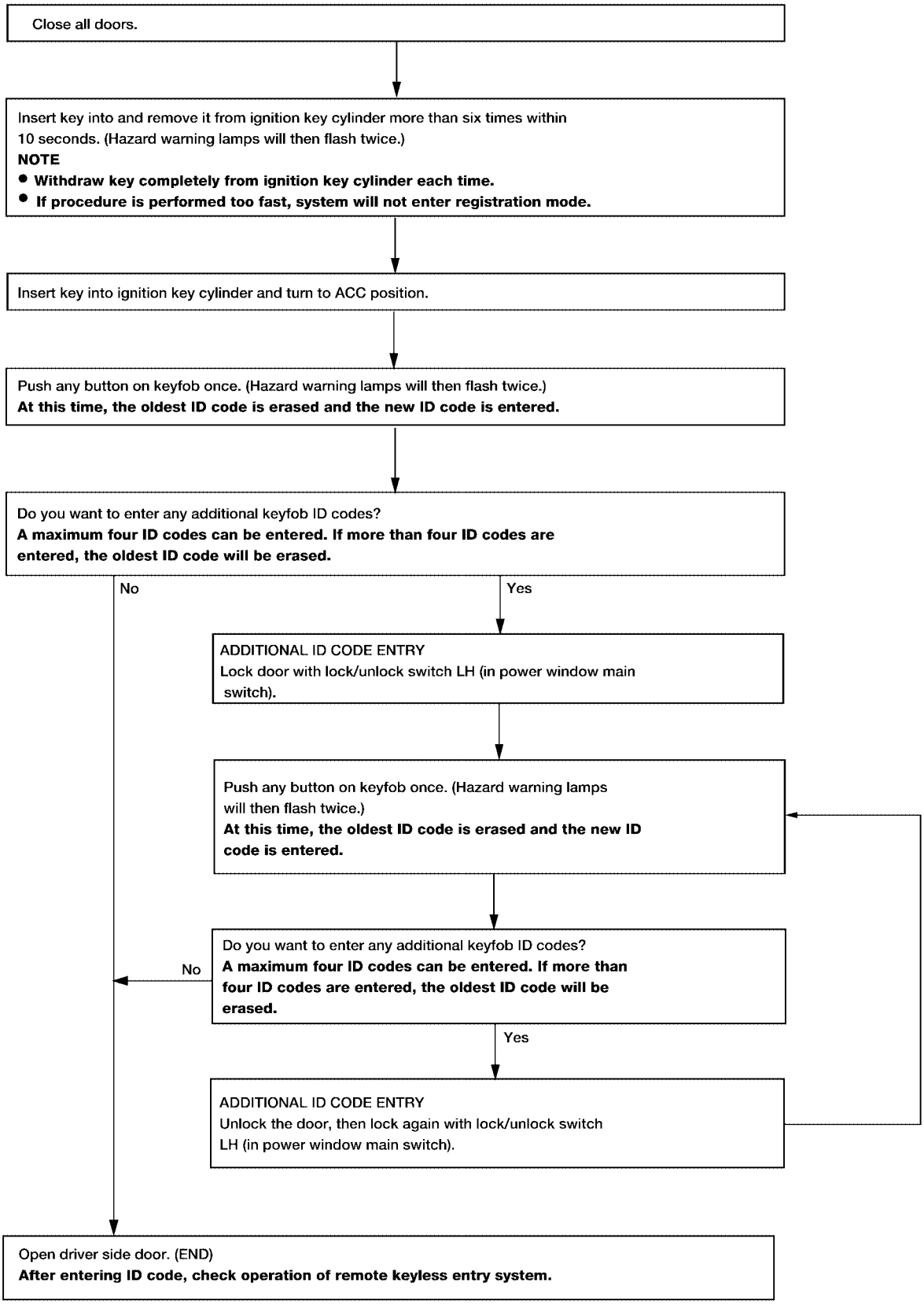
8. The items are shown that can be set up.
   - “REMO CONT ID CONFIR”
     Use this mode to confirm if a keyfob ID code is registered or not.
   - “REMO CONT ID REGIST”
     Use this mode to register a keyfob ID code.

   NOTE:
   Register the ID code when keyfob or smart entrance control unit is replaced, or when additional keyfob is required.

   - “REMO CONT ID ERASUR”
     Use this mode to erase a keyfob ID code.
   - “HZRD REM SET”
     Use this mode to activate or deactivate the hazard and horn reminder.



KEYFOB ID SET UP WITHOUT CONSULT-II



WIIA0011E

NOTE:

- If a keyfob is lost, the ID code of the lost keyfob must be erased to prevent unauthorized use. A specific ID code can be erased with CONSULT-II. However, when the ID code of a lost keyfob is not known, all keyfob ID codes should be erased. After all ID codes are erased, the ID codes of all remaining and/or new keyfobs must be re-registered.
  To erase all ID codes in memory, register one ID code (keyfob) four times. After all ID codes are erased, the ID codes of all remaining and/or new keyfobs must be re-registered.
- When registering an additional keyfob, the existing ID codes in memory may or may not be erased. If four ID codes are stored in memory, when an additional code is registered, only the oldest code is erased. If less than four ID codes are stored in memory, when an additional ID code is registered, the new ID code is added and no ID codes are erased.
- If you need to activate more than two additional new keyfobs, repeat the procedure “Additional ID code entry” for each new keyfob.
- Entry of maximum four ID codes is allowed. When more than four ID codes are entered, the oldest ID code will be erased.
- Even if same ID code that is already in the memory is input, the same ID code can be entered. The code is counted as an additional code.

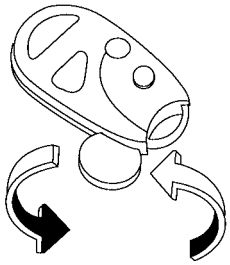
Keyfob Battery Replacement

EIS0015C

NOTE:

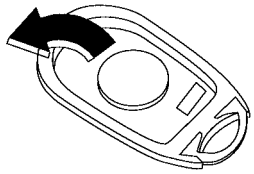
- Be careful not to touch the circuit board or the battery terminal.
- The keyfob is water-resistant. However, if it does get wet, immediately wipe it dry.

1.



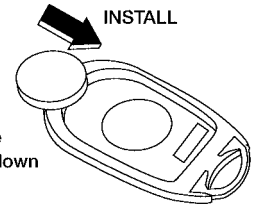
Open the lid using a coin.

2.



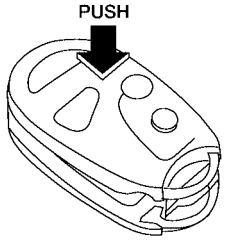
Remove the battery.

3.



Insert the new battery.

4.



Close the lid securely.
Push the keyfob button two or three times to check its operation.

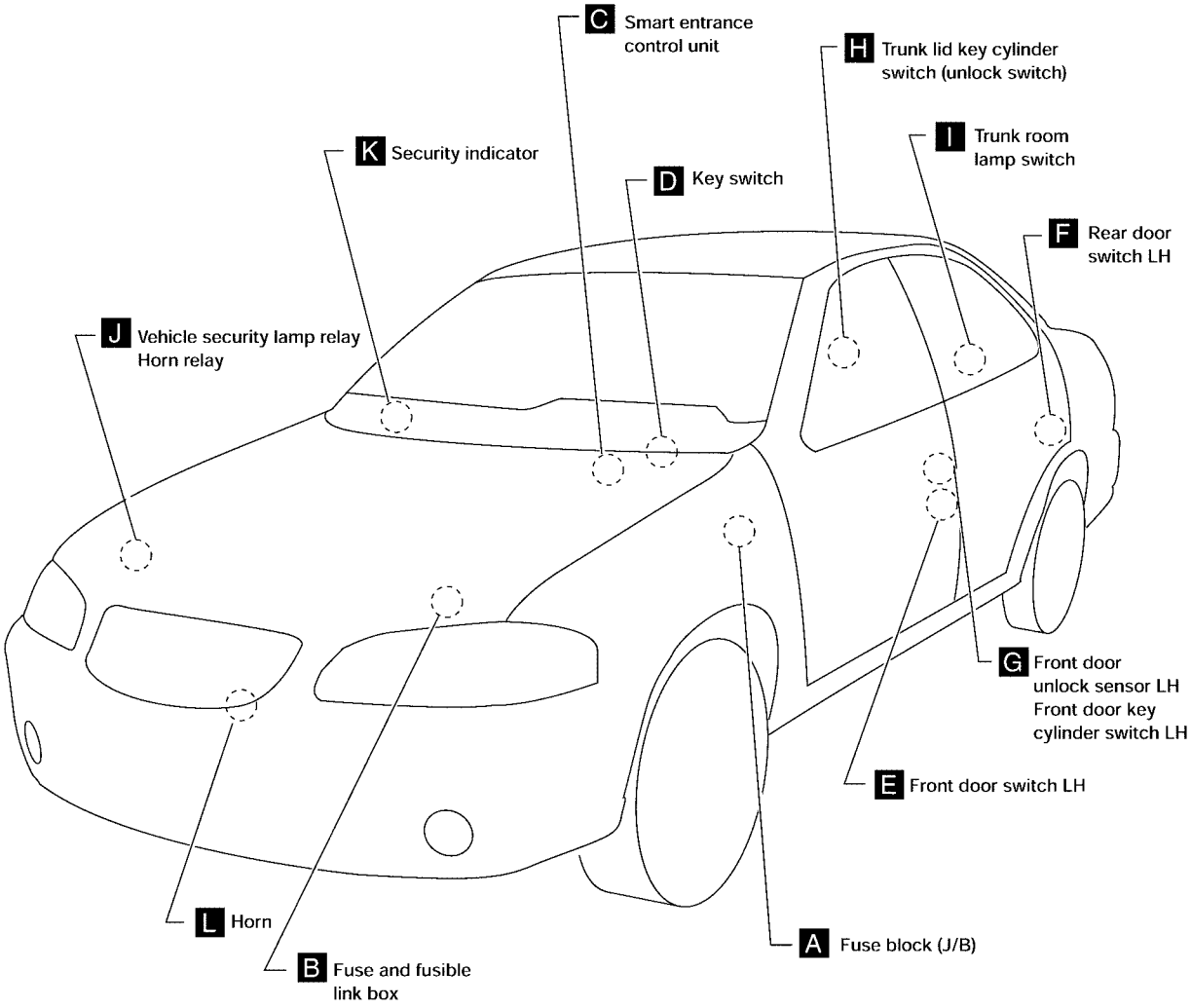
WIIA0012E

VEHICLE SECURITY (THEFT WARNING) SYSTEM

PFP:00100

Component Parts and Harness Connector Location

EIS0015D



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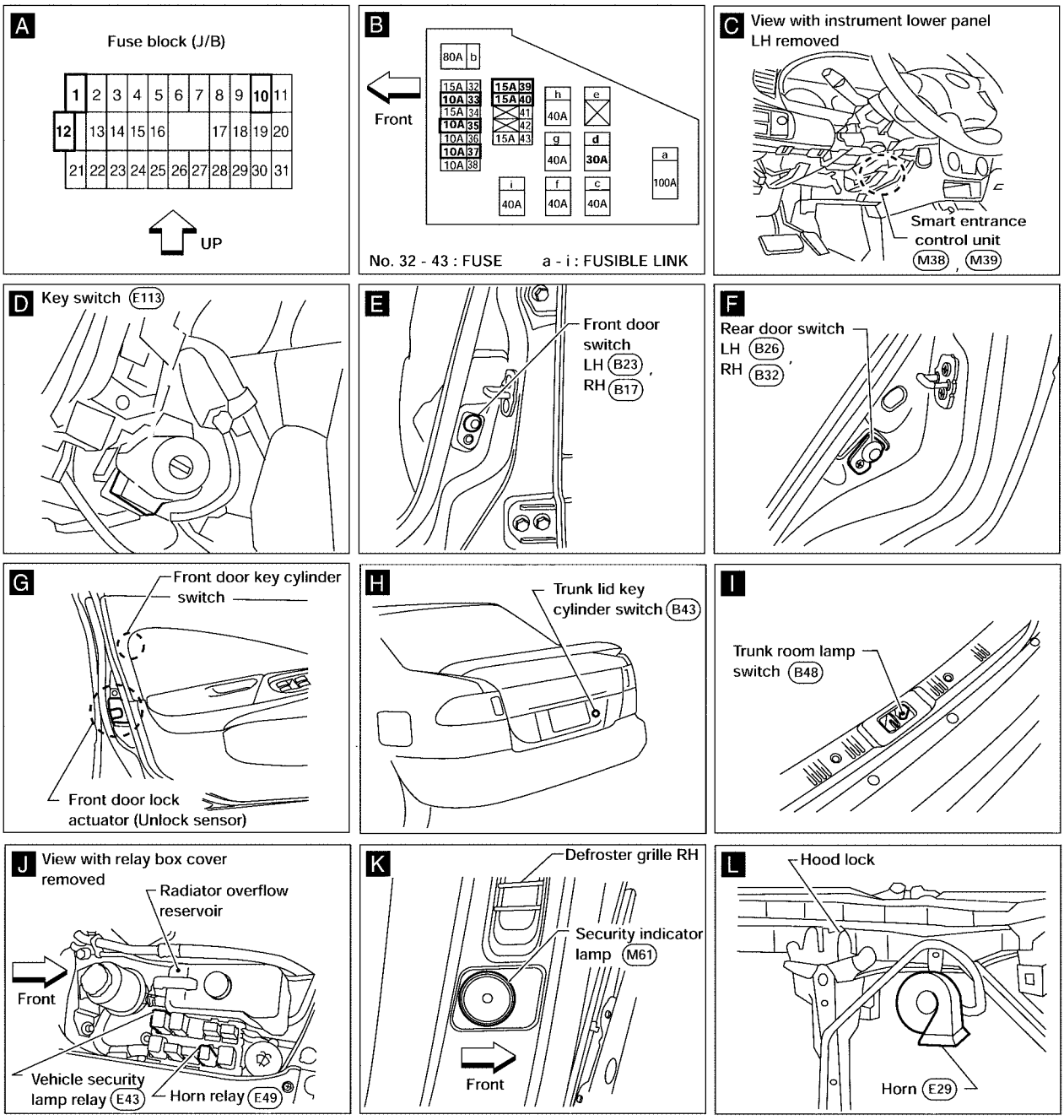

A
Fuse block (J/B)
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30 31
UP
B
Front
80A b
15A 32
10A 33
15A 34
10A 35
10A 36
10A 37
10A 38
15A 39
15A 40
41
42
15A 43
h
40A
e
g
40A
d
30A
a
100A
i
40A
f
40A
c
40A
No. 32 - 43 : FUSE
a - i : FUSIBLE LINK
C
View with instrument lower panel LH removed
Smart entrance control unit
M38 , M39
D
Key switch E113
E
Front door switch
LH B23 ,
RH B17
F
Rear door switch
LH B26 ,
RH B32
G
Front door key cylinder switch
Front door lock actuator (Unlock sensor)
H
Trunk lid key cylinder switch B43
I
Trunk room lamp switch B48
J
View with relay box cover removed
Radiator overflow reservoir
Front
Vehicle security lamp relay E43
Horn relay E49
K
Defroster grille RH
Security indicator lamp M61
Front
L
Hood lock
Horn E29

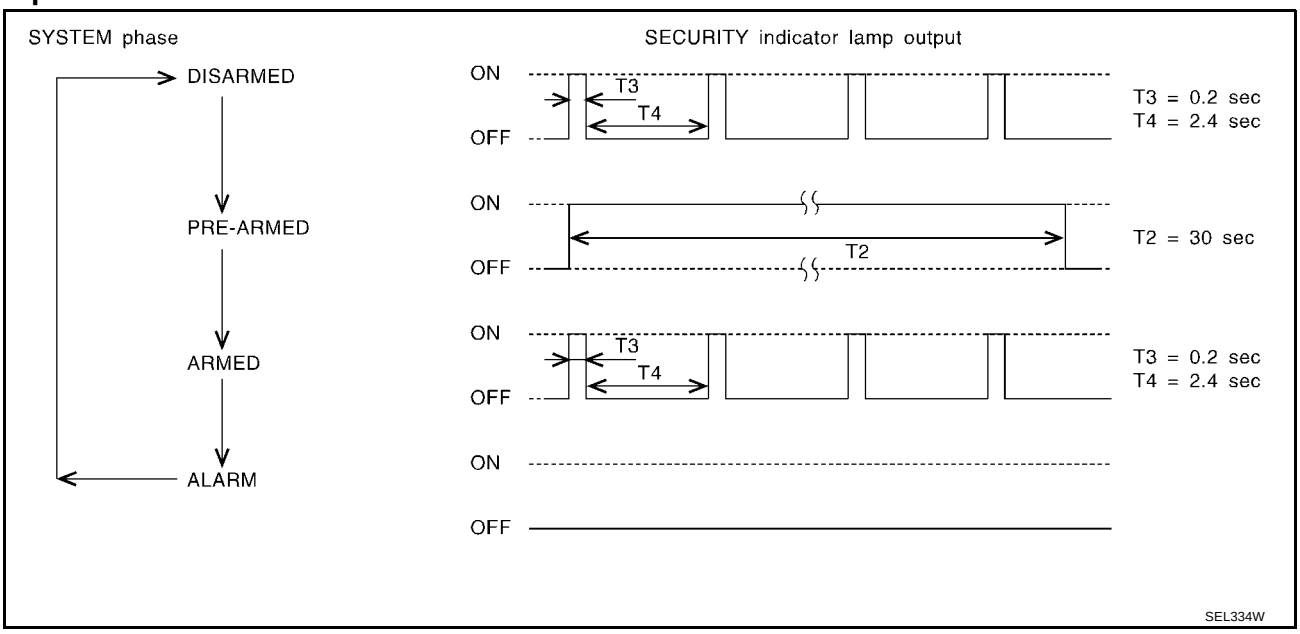
LIIA0846E

System Description

EIS0015E

DESCRIPTION

1. Operation Flow



2. Setting The Vehicle Security System

Initial condition

1. Ignition switch is in OFF position.

Disarmed phase

When the vehicle security system is in the disarmed phase, the security indicator lamp blinks every 2.6 seconds.

Pre-armed phase and armed phase

When the following operation 1 or 2 is performed, the vehicle security system turns into the “pre-armed” phase. (The security indicator lamp illuminates.)

1. Smart entrance control unit receives LOCK signal from key cylinder switch or keyfob after hood, trunk lid and all doors are closed.
2. Trunk lid and all doors are closed after front doors are locked by key, lock/unlock switch or keyfob.

After about 30 seconds, the system automatically shifts into the “armed” phase (the system is set). (The security indicator lamp blinks every 2.6 seconds.)

3. Canceling The Set Vehicle Security System

When the following 1 or 2 operation is performed, the armed phase is canceled.

1. Unlock the doors with the key or keyfob.
2. Open the trunk lid with the key or keyfob.

4. Activating The Alarm Operation of The Vehicle Security System

Make sure the system is in the armed phase. (The security indicator lamp blinks every 2.6 seconds.)
When the following operation 1 or 2 is performed, the system sounds the horns and flashes the headlamps for about 50 seconds.

1. Trunk lid or any door is opened during armed phase.
2. Disconnecting and connecting the battery connector before canceling armed phase.

POWER SUPPLY AND GROUND

Power is supplied at all times:

- through 10A fuse [No. 12, located in the fuse block (J/B)]
- to security indicator lamp terminal 1 and
- to key switch terminal 2.

Power is supplied at all times:

- through 10A fuse (No. 37, located in the fuse and fusible link box)

- to smart entrance control unit terminal 10.

With the ignition switch in the ON or START position, power is supplied:

- through 10A fuse [No. 10, located in the fuse block (J/B)]
- to smart entrance control unit terminal 33.

With the ignition switch in the ACC or ON position, power is supplied:

- through 10A fuse [No. 1, located in the fuse block (J/B)]
- to smart entrance control unit terminal 21.

Ground is supplied:

- to smart entrance control unit terminal 16
- through body grounds M28 and M54.

INITIAL CONDITION TO ACTIVATE THE SYSTEM

The operation of the vehicle security system is controlled by the doors, hood and trunk lid.

Pattern A

To activate the vehicle security system, the smart entrance control unit must receive signals indicating the doors, hood and trunk lid are closed.
When a door is open, smart entrance control unit terminal 28 or 29 receives a ground signal from each door switch.
When the trunk lid is open, smart entrance control unit terminal 38 receives a ground signal:

- from terminal + of the trunk room lamp switch
- to terminal - of the trunk room lamp switch
- through body grounds B13 and B19.

When smart entrance control unit receives LOCK signal from key cylinder switch or keyfob and none of the described conditions exist, the vehicle security system will automatically shift to armed mode.

Pattern B

To activate the vehicle security system, the smart entrance control unit must receive signal indicating any door (including trunk lid) is opened.
When the front doors are locked with key, lock/unlock switch or keyfob and then all doors are closed, the vehicle security system will automatically shift to armed mode.

VEHICLE SECURITY SYSTEM ACTIVATION

Pattern A

With all doors closed (including trunk lid), if the key is used to lock doors, smart entrance control unit terminal 41 receives a ground signal:

- from terminal L of the front door key cylinder switch LH
- to terminal E of the front door key cylinder switch LH
- through body grounds M28 and M54.

If this signal, or lock signal from keyfob is received by the smart entrance control unit, the vehicle security system will activate automatically.

NOTE:
Vehicle security system can be set even though all doors are not locked.

Pattern B

With any door open, if lock/unlock switch is used to lock doors, smart entrance control unit terminal 23 receives a ground signal:

- from terminal 14 of main power window and door lock/unlock switch
- to terminal 3 of main power window and door lock/unlock switch, or
- from terminal 1 of door lock/unlock switch RH
- to terminal 5 of door lock/unlock switch RH
- through body grounds M28 and M54.

With any door open, if the key is used to lock doors, smart entrance control unit terminal 41 receives a ground signal:

- from terminal L of the front door key cylinder switch LH

- to terminal E of the front door key cylinder switch LH
- through body grounds M28 and M54.

If these signals and lock signal from keyfob are received by the smart entrance control unit and ground signals of terminals 36 and 37 are interrupted (both front doors locked), the vehicle security system will activate automatically.

NOTE:
Vehicle security system can be set even though the rear door is not locked.
Once the vehicle security system has been activated, smart entrance control unit terminal 31 supplies ground to terminal 2 of the security indicator lamp.
The security indicator lamp will illuminate for approximately 30 seconds and then blink every 2.6 seconds.
Now the vehicle security system is in armed phase.

VEHICLE SECURITY SYSTEM ALARM OPERATION

The vehicle security system is triggered by:

- opening a door
- opening the trunk lid
- detection of battery disconnect and connect.

Once the vehicle security system is in armed phase, if the smart entrance control unit receives a ground signal at terminal 28 or 29 (door switch) or 38 (trunk room lamp switch), the vehicle security system will be triggered.
The headlamps flash and the horn sounds intermittently.
Power is supplied at all times:

- through 15A fuse (No. 39, located in fuse and fusible link box)
- to vehicle security lamp relay terminal 3,
- through 15A fuse (No. 40, located in fuse and fusible link box)
- to vehicle security lamp relay terminal 6,
- through 10A fuse (No, 35 located in fuse and fusible link box)
- to vehicle security lamp relay terminal 1
- through 10A fuse (No. 33, located in fuse and fusible link box)
- to horn relay terminals 1 and 5.

When the vehicle security system is triggered, ground is supplied intermittently:

- from smart entrance control unit terminal 4
- to horn relay terminal 2 and
- to vehicle security lamp relay terminal 2.

The headlamps flash and the horn sounds intermittently.
The alarm automatically turns off after about 50 seconds but will reactivate if the vehicle is tampered with again.

VEHICLE SECURITY SYSTEM DEACTIVATION

To deactivate the vehicle security system, a door or trunk lid must be unlocked with the key or keyfob.
When the key is used to unlock the door, smart entrance control unit terminal 30 receives a ground signal:

- from terminal U of front door key cylinder switch LH
- to terminal E of front door key cylinder switch LH
- through body grounds M28 and M54.

When the key is used to open the trunk lid, smart entrance control unit terminal 42 receives a ground signal:

- from terminal + of the trunk lid key cylinder switch (unlock switch)
- to terminal - of the trunk lid key cylinder switch (unlock switch)
- through body grounds B13 and B19.

When the smart entrance control unit receives either one of these signals or unlock signal from keyfob, the vehicle security system is deactivated. (Disarmed phase)

PANIC ALARM OPERATION

When the remote keyless entry system (panic alarm) is triggered, ground is supplied intermittently:

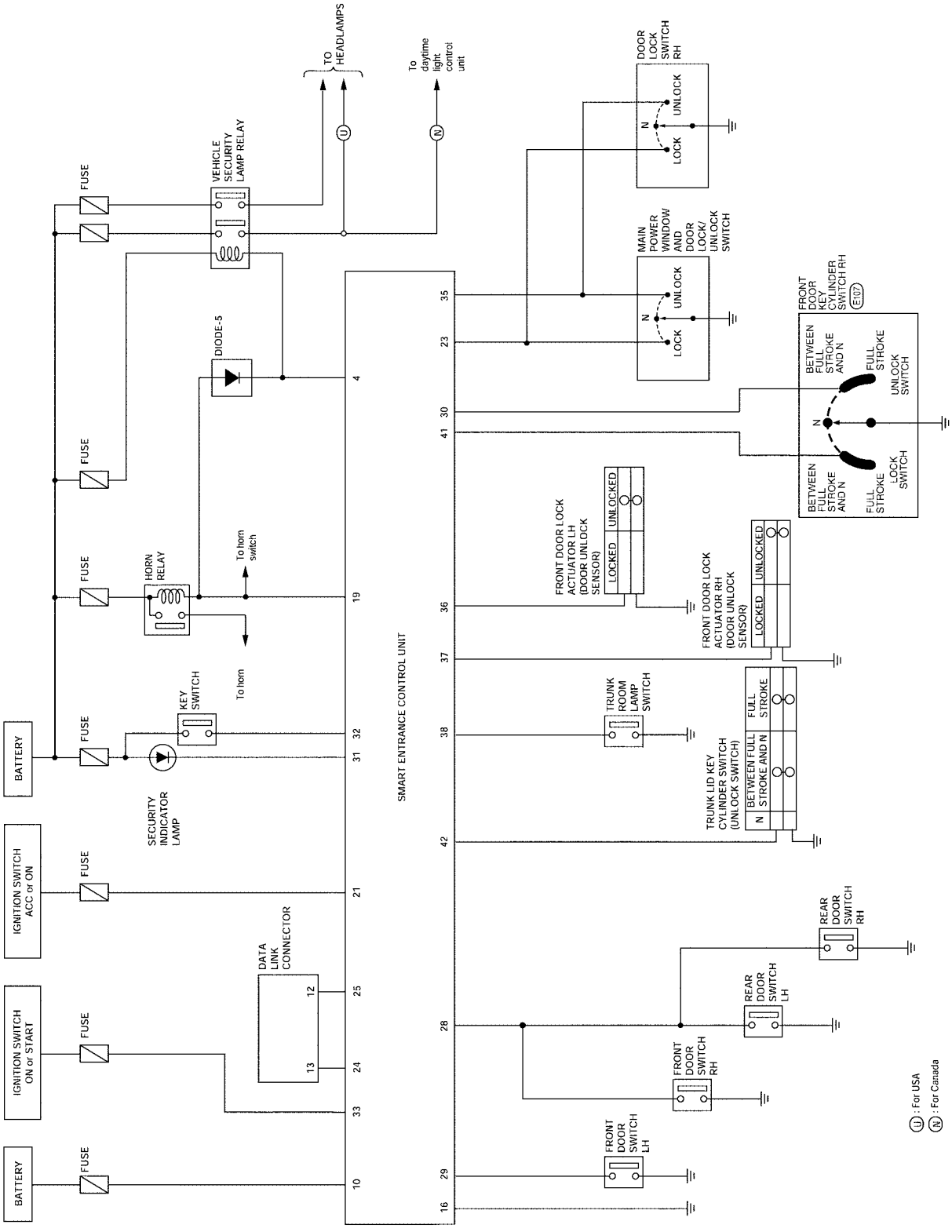
- from smart entrance control unit terminal 4
- to vehicle security lamp relay terminal 2 and

- to horn relay terminal 2.

The headlamp flashes and the horn sounds intermittently.
The alarm automatically turns off after 25 seconds or when smart entrance control unit receives any signal from keyfob.

Schematic

EIS0015F

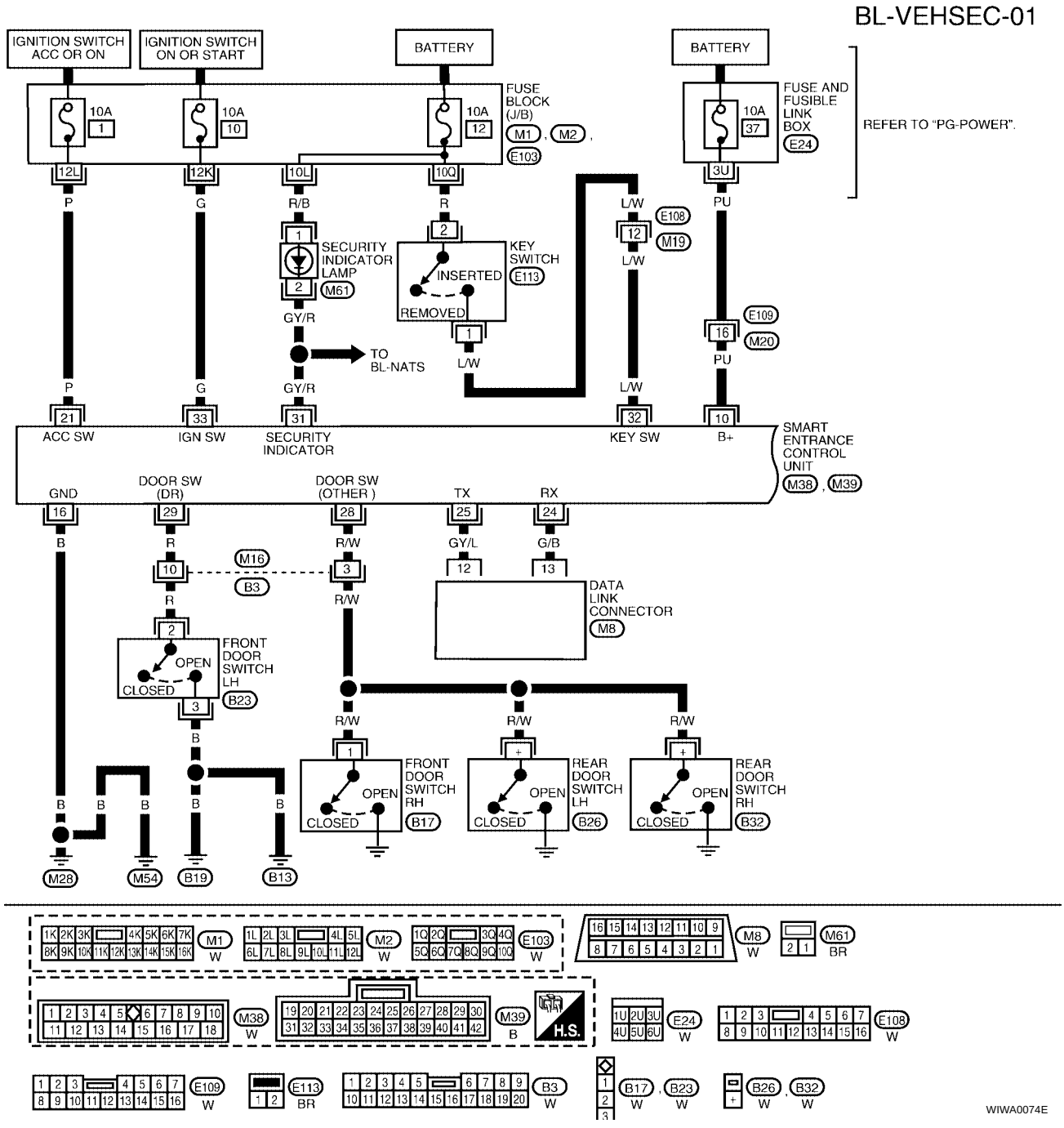


LIWA0197E

Wiring Diagram — VEHSEC —

EIS0015G

FIG. 1



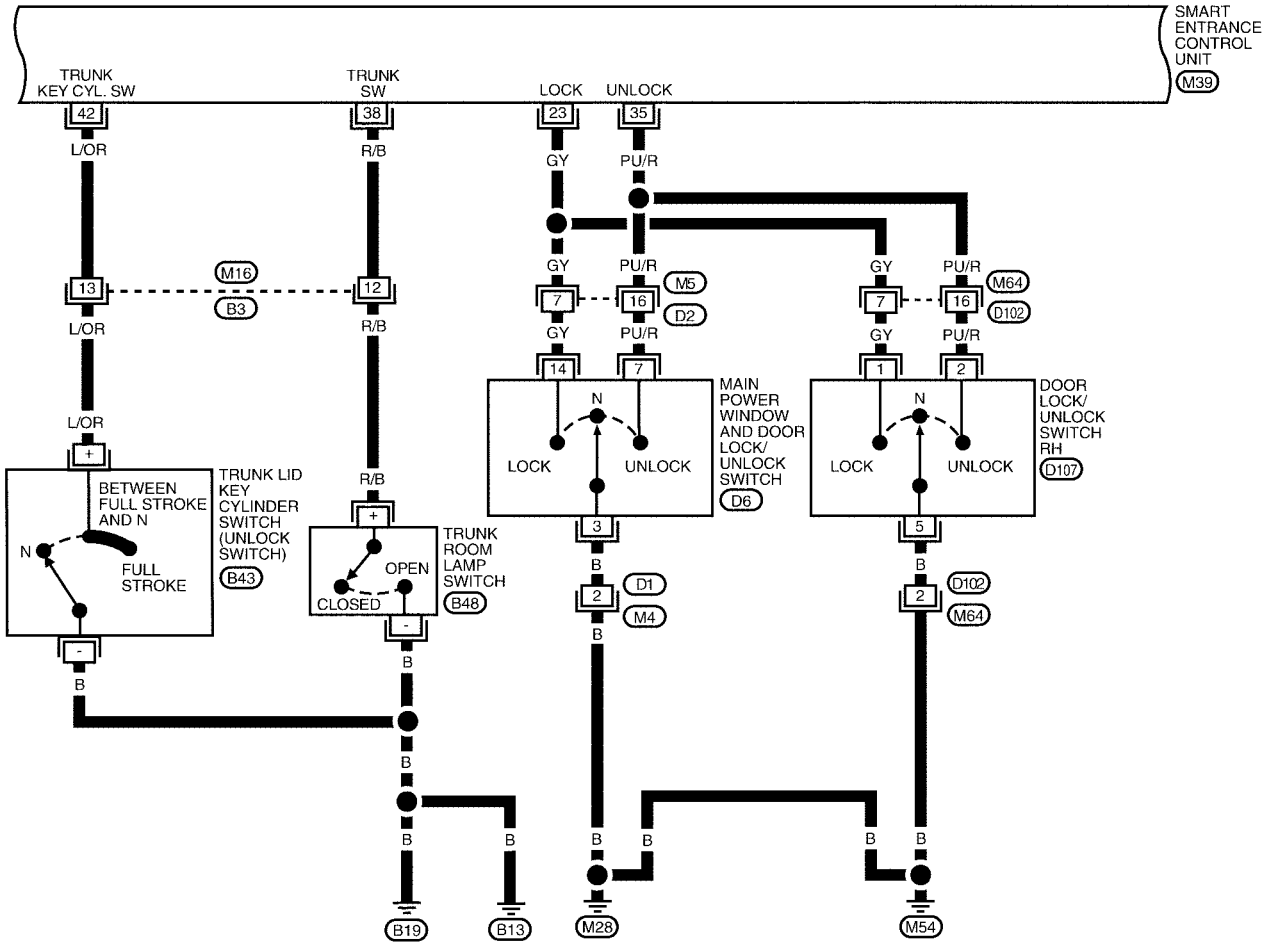
SMART ENTRANCE CONTROL UNIT TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

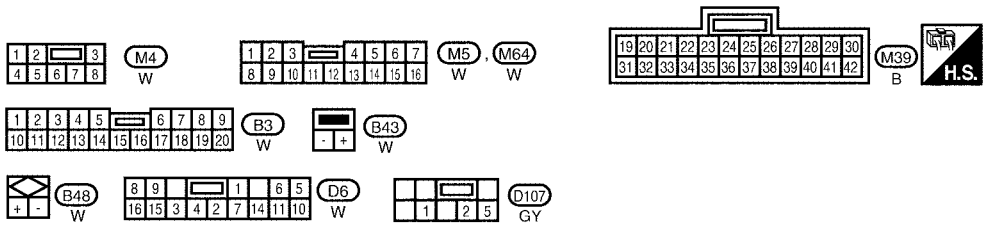
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
10	PU	POWER SOURCE (FUSE)	—	12V
16	B	GROUND	-------	-------
21	P	IGNITION SWITCH (ACC, ON)	ACC OK ON POSITION	12V
28	R/W	OTHER DOOR SWITCHES	OFF (CLOSED)	5V
			ON (OPEN)	0V
29	R	FRONT DOOR SWITCH LH	OFF (CLOSED)	5V
			ON (OPEN)	0V
32	L/W	IGNITION KEY SWITCH (INSERT)	IGNITION KEY IS INSERTED	12V
			IGNITION KEY IS REMOVED	0V
31	GY/R	VEHICLE SECURITY INDICATOR	GOES OFF	12V
			ILLUMINATES	0V
33	G	IGNITION SWITCH (ON)	IGNITION KEY IS IN ON POSITION	12V
		IGNITION SWITCH (START)	IGNITION KEY IS IN START POSITION	12V

WEL109A

FIG. 2

BL-VEHSEC-02





LIWA0198E

SMART ENTRANCE CONTROL UNIT TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
23	GY	DOOR LOCK & UNLOCK SWITCHES	NEUTRAL	5V
			LOCKS	0V
35	PU/R	DOOR LOCK & UNLOCK SWITCHES	NEUTRAL	5V
			UNLOCKS	0V
38	R/B	TRUNK ROOM LAMP SWITCH	ON (OPEN)	0V
			OFF (CLOSED)	12V
42	L/OR	TRUNK LID KEY CYLINDER SWITCH	OFF (NEUTRAL)	5V
			ON (UNLOCK)	0V

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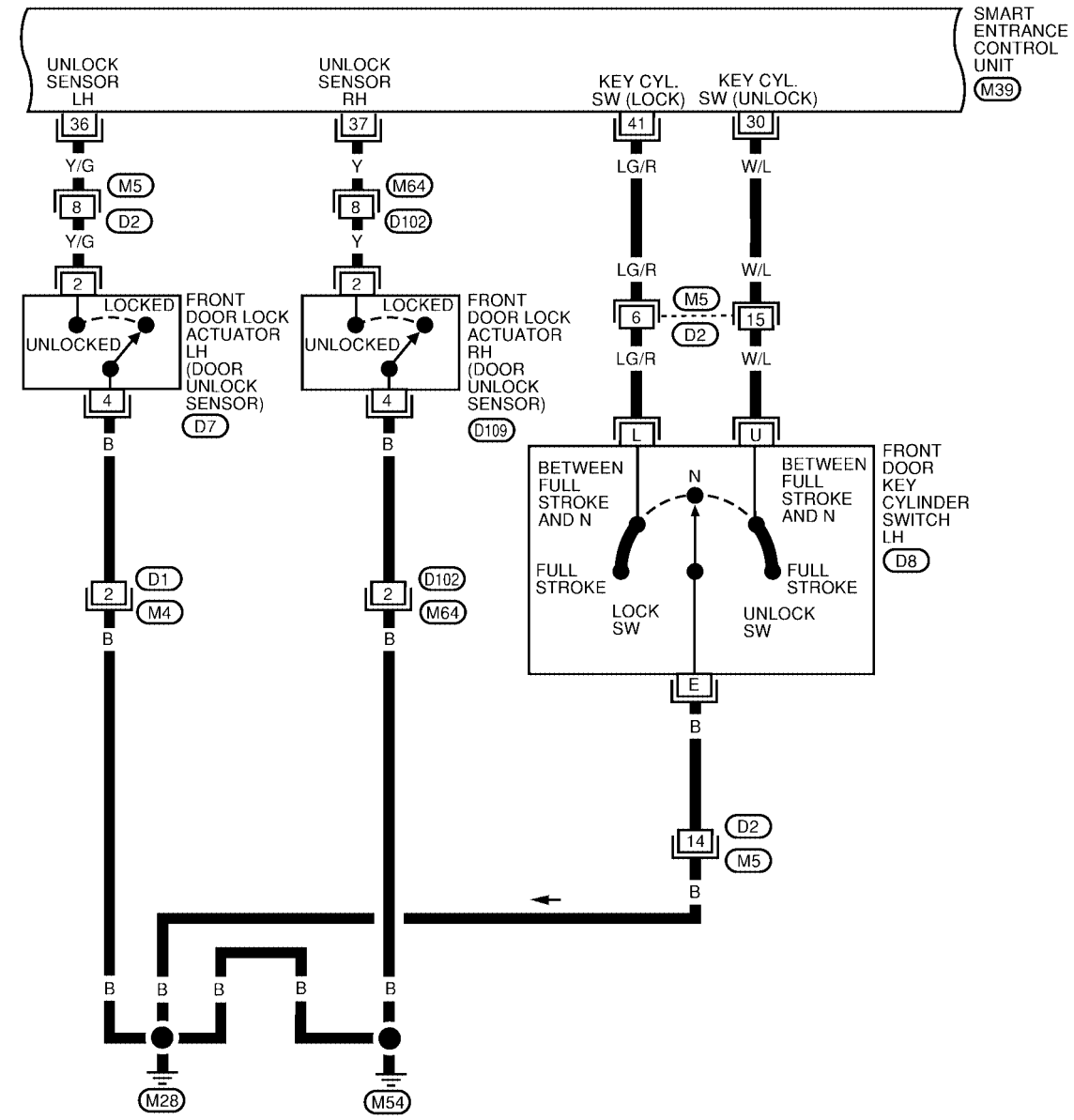
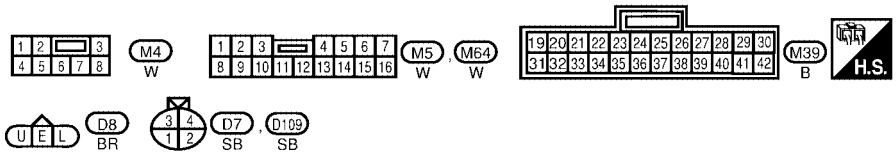
FIG. 3

BL-VEHSEC- 03





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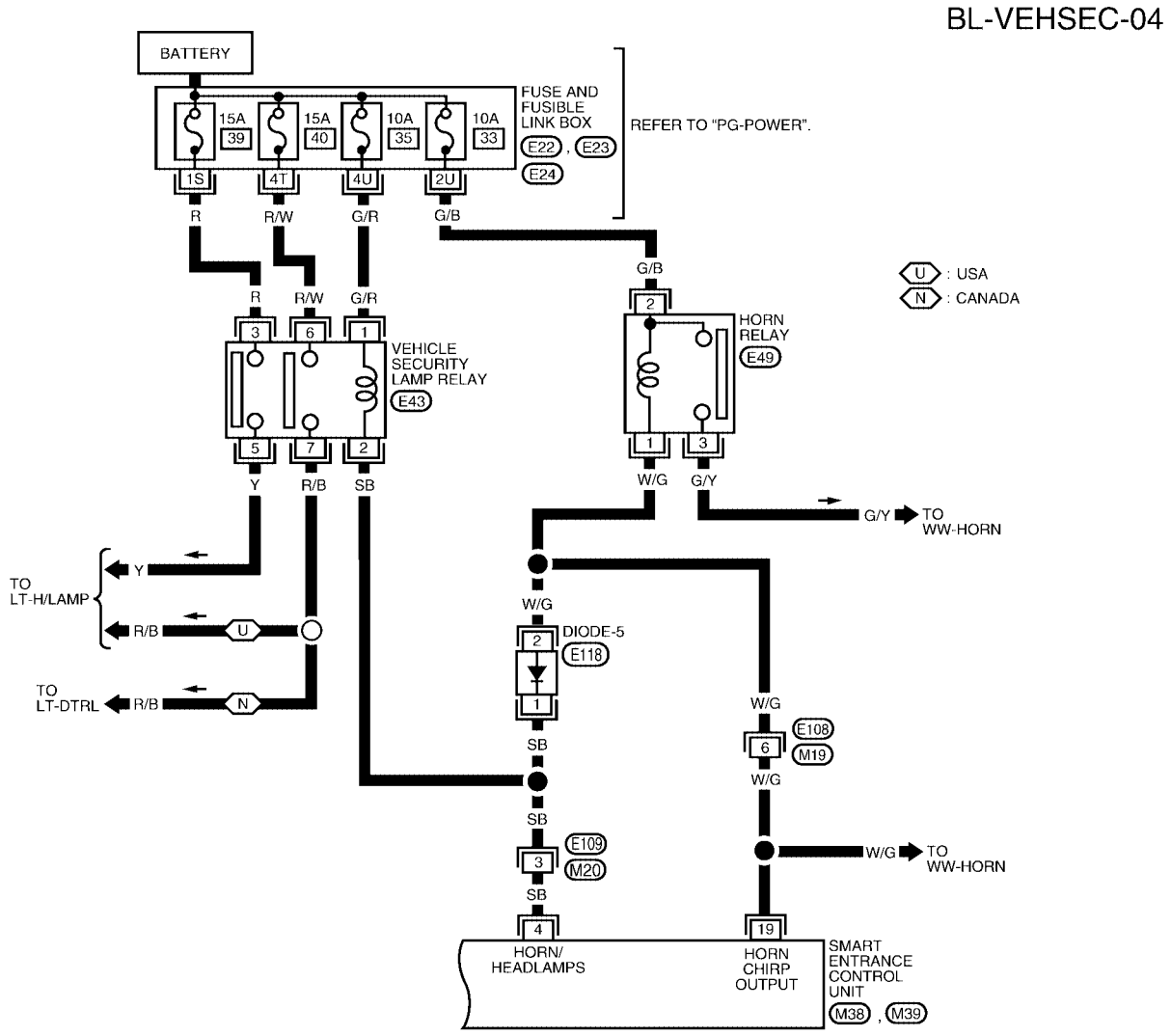
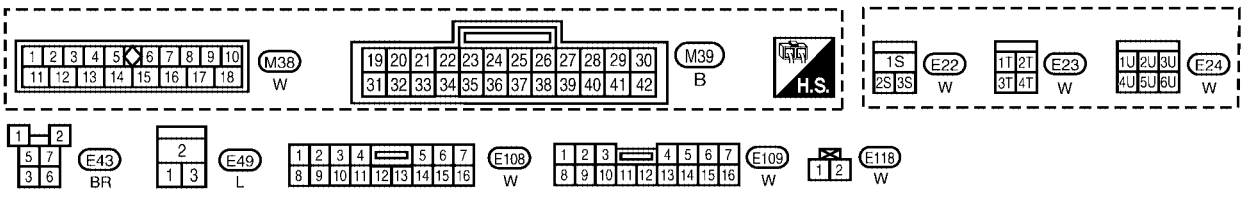
SMART ENTRANCE CONTROL UNIT TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
30	W/L	DOOR KEY CYLINDER UNLOCK SWITCH	OFF (NEUTRAL)	5V
			ON (UNLOCKED)	0V
36	Y/G	DOOR UNLOCK SENSOR LH	DRIVER DOOR: LOCKED	5V
			DRIVER DOOR: UNLOCKED	0V
37	Y	DOOR UNLOCK SENSOR RH	PASSENGER DOOR: LOCKED	5V
			PASSENGER DOOR: UNLOCKED	0V
41	LG/R	DOOR KEY CYLINDER LOCK SWITCH	OFF (NEUTRAL)	5V
			ON (LOCKED)	0V

LEL615

FIG. 4





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SMART ENTRANCE CONTROL UNIT TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
4	SB	VEHICLE SECURITY HORN RELAY AND VEHICLE SECURITY WARNING LAMP RELAY	WHEN PANIC ALARM IS OPERATED USING REMOTE CONTROLLER OR WHEN ALARM IS ACTIVATED	12V TO 0V

WEL114A

CONSULT-II Function (SMART ENTRANCE)

EIS0015H

CONSULT-II can display each diagnostic item using the diagnostic test modes shown following.

SMART ENTRANCE diagnostic test item	Diagnostic mode	Descriptiont
Inspection by part	DATA MONITOR	Displays smart entrance control unit input/output data in real time.
	ACTIVE TEST	Operation of electrical loads can be checked by sending drive signal to them.

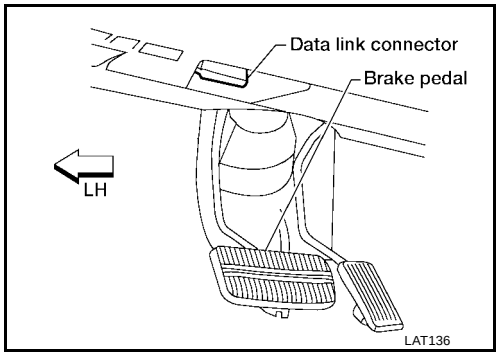
CONSULT-II INSPECTION PROCEDURE

THEFT WAR ALM

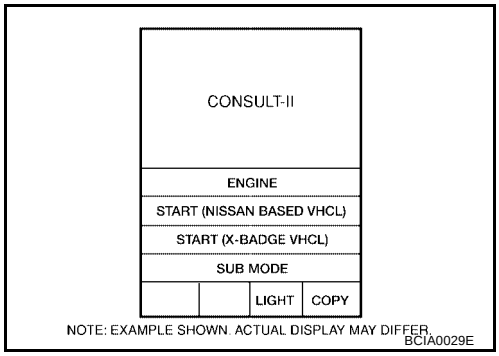
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carries out CAN communication.

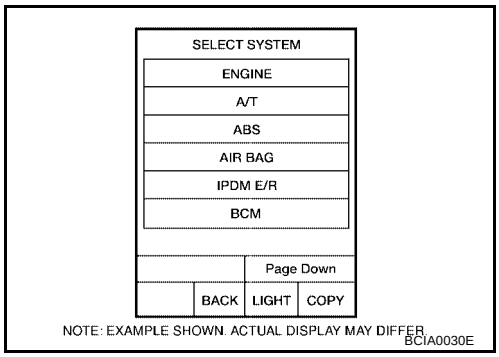
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to the data link connector.



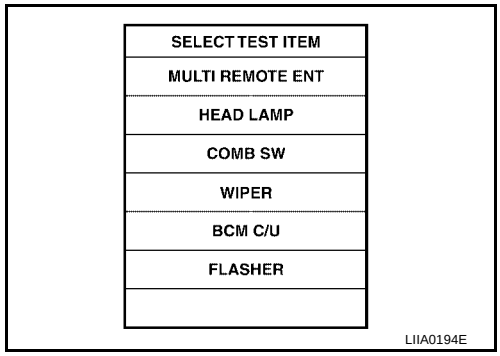
3. Turn ignition switch ON.
4. Touch “START (NISSAN BASED VHCL)”.



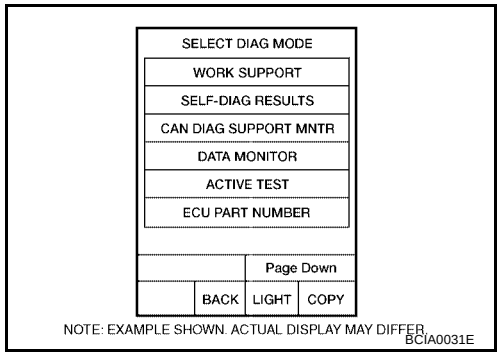
5. Touch “SMART ENTRANCE”.
   If “SMART ENTRANCE” is not indicated, refer to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Touch “THEFT ALM” on the “SELECT TEST ITEM” screen.



7. Select diagnosis mode.
“DATA MONITOR”, “ACTIVE TEST” and “WORK SUPPORT” are available.



CONSULT-II Application Item

EIS0015I

THEFT WAR ALM

Data Monitor

Monitored Item	Description
IGN ON SW	Indicates [ON/OFF] condition of ignition switch.
ACC ON SW	Indicates [ON/OFF] condition of ignition switch in ACC position.
KEY CYL LK SW	Indicates [ON/OFF] condition of lock signal from key cylinder switch.
KEY CYL UN SW	Indicates [ON/OFF] condition of unlock signal from key cylinder switch.
DOOR SW-ALL	Indicates [ON/OFF] condition of door switch (All).
LOCK SIG DR	Indicates [ON/OFF] condition of front door unlock sensor LH.
LOCK SIG AS	Indicates [ON/OFF] condition of front door unlock sensor RH.
TRUNK SW	Indicates [ON/OFF] condition of trunk switch.
TRUNK KEY SW	Indicates [ON/OFF] condition of trunk key cylinder switch.
LOCK SW DR/AS	Indicates [ON/OFF] condition of lock signal from door lock/unlock switch LH and RH.
UNLK SW DR/AS	Indicates [ON/OFF] condition of unlock signal from door lock/unlock switch LH and RH.
LK BUTTON/SIG	Indicates [ON/OFF] condition of lock signal from keyfob.
UN BUTTON/SIG	Indicates [ON/OFF] condition of unlock signal from keyfob.
TRUNK BTN/SIG	Indicates [ON/OFF] condition of trunk open signal from keyfob.

Active Test

Test Item	Description
THEFT IND	This test is able to check security indicator lamp operation. The lamp will be turned on when “ON” on CONSULT-II screen is touched.
THEFT WAR ALM	This test is able to check theft warning alarm operation. The alarm will be activated for 0.5 seconds after “ON” on CONSULT-II screen is touched.

Work Support

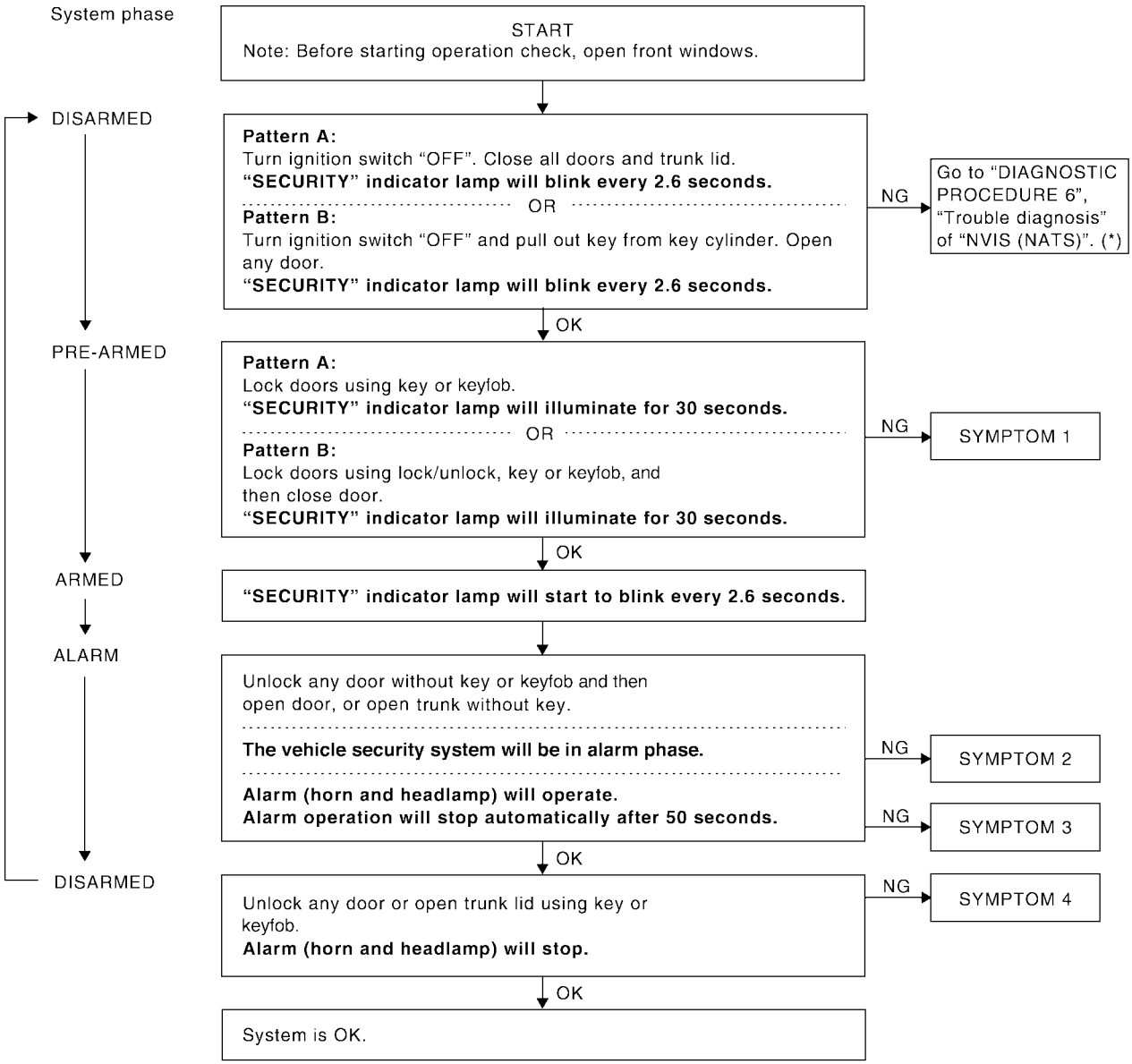
Test Item	Description
THEFT ALM TRG	The switch which triggered theft warning alarm is recorded. This mode is able to confirm and erase the record of theft warning alarm. The trigger data can be erased by touching “CLEAR” on CONSULT-II screen.

Trouble Diagnoses

EIS0015J

PRELIMINARY CHECK

The system operation is canceled by turning ignition switch to ACC at any step between START and ARMED in the following flow chart.



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For details of "Pattern A" and "Pattern B" vehicle security system settings, refer to BL-69, "INITIAL CONDITION TO ACTIVATE THE SYSTEM" .

*: Refer to BL-97, "NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)" .

After performing preliminary check, go to symptom chart on next page.

SYMPTOM CHART

REFERENCE PAGE (BL-)			BL-81	BL-83	BL-84	BL-87	BL-89	BL-90	BL-91	BL-92	BL-94	BL-34
SYMPTOM			PRELIMINARY CHECK	POWER SUPPLY AND GROUND CIRCUIT CHECK	DOOR AND TRUNK ROOM LAMP SWITCH CHECK	SECURITY INDICATOR LAMP CHECK	FRONT DOOR UNLOCK SENSOR CHECK	DOOR KEY CYLINDER SWITCH CHECK	TRUNK LID KEY CYLINDER SWITCH CHECK	DOOR LOCK/UNLOCK SWITCH CHECK	VEHICLE SECURITY HORN AND HEADLAMP ALARM CHECK	Check "REMOTE KEYLESS ENTRY SYSTEM" system.
	Security indicator lamp does not illuminate for 30 seconds.		X	X		X						
1	Vehicle security system cannot be set by....	All items	X	X	X		X					
		Door outside key	X					X				
		Lock/unlock switch	X							X		
		Keyfob	X									X
2	*1 Vehicle security system does not alarm when...	One of the doors is opened	X		X							
3	Vehicle security alarm does not activate.	Horn or headlamp alarm	X		X						X	
4	Vehicle security system cannot be canceled by....	Door outside key	X					X				
		Trunk lid key	X						X			
		Keyfob	X									X

X: Applicable

*1: Make sure the system is in the armed phase.

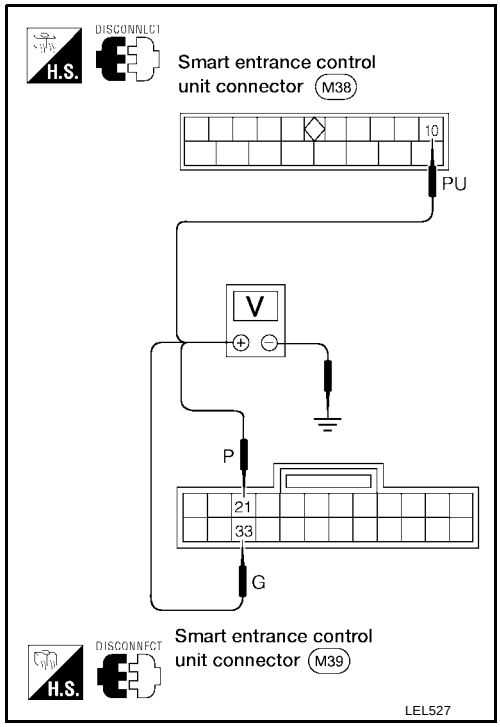
Before starting trouble diagnoses above, perform BL-81, "PRELIMINARY CHECK" .

Symptom numbers in the symptom chart correspond with those of preliminary check.

POWER SUPPLY AND GROUND CIRCUIT CHECK

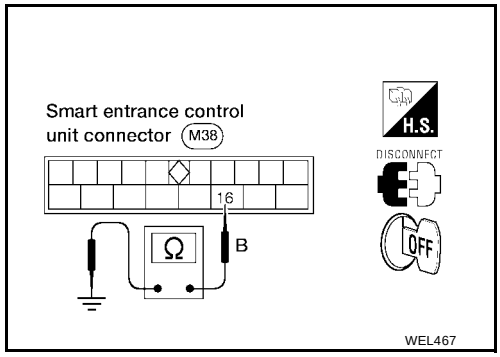
Power Supply Circuit Check

Terminals		Ignition switch position		
(+)	(-)	OFF	ACC	ON
10	Ground	Battery voltage	Battery voltage	Battery voltage
21	Ground	0V	Battery voltage	Battery voltage
33	Ground	0V	0V	Battery voltage



Ground Circuit Check

Terminals	Continuity
16 - Ground	Yes

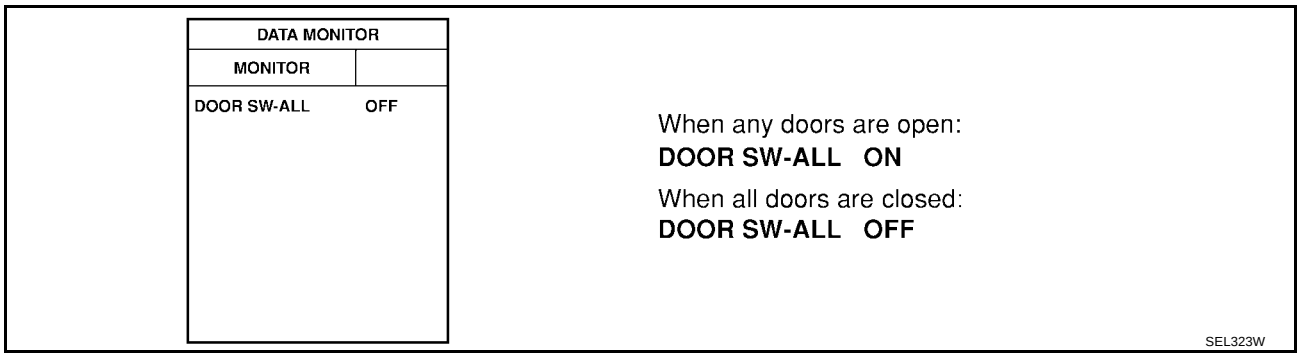


DOOR AND TRUNK ROOM LAMP SWITCH CHECK
Door Switch Check

1. CHECK DOOR SWITCH INPUT SIGNAL

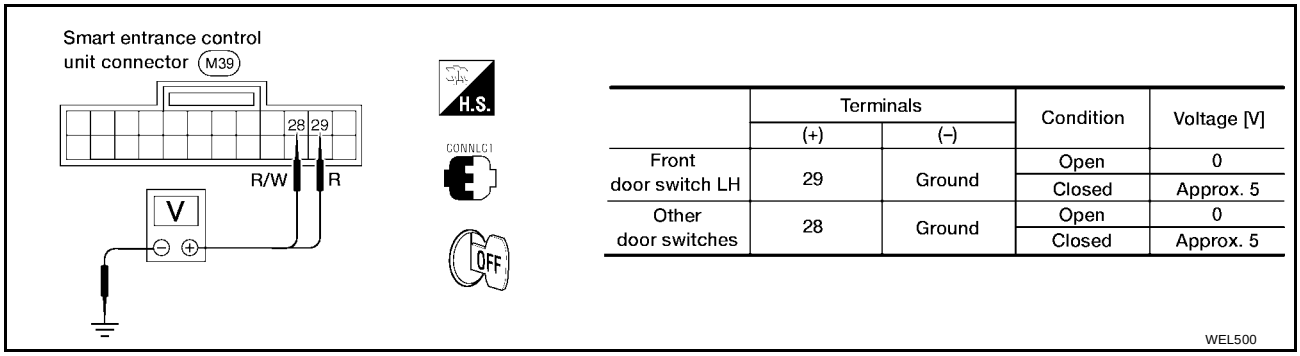
With CONSULT-II

Check door switches (“DOOR SW-ALL”) in “DATA MONITOR” mode with CONSULT-II.



Without CONSULT-II

Check voltage between smart entrance control unit harness connector terminals 28 or 29 and ground.



	Terminals		Condition	Voltage [V]
	(+)	(–)		
Front door switch LH	29	Ground	Open	0
			Closed	Approx. 5
Other door switches	28	Ground	Open	0
			Closed	Approx. 5

Refer to BL-73, "FIG. 1" .

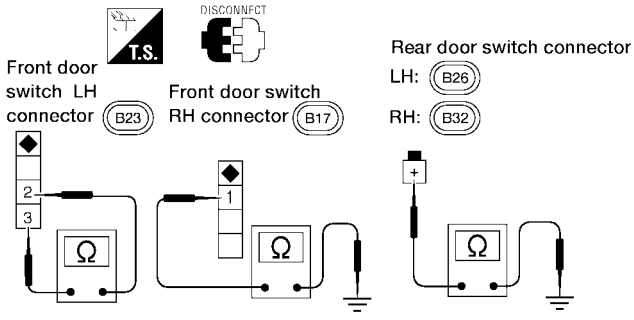
OK or NG

OK >> Door switch is OK. Check hood switch. Refer to BL-86, "Trunk Room Lamp Switch Check" .

NG >> GO TO 2

2. CHECK DOOR SWITCH

1. Disconnect door switch connector.
2. Check continuity between door switch terminals.



	Terminals	Condition	Continuity
Front door switch LH	2 - 3	Closed	No
		Open	Yes
Front door switch RH	1 - Ground	Closed	No
		Open	Yes
Rear door switches	(+) - Ground	Closed	No
		Open	Yes

WEL491

OK or NG

OK >> Check the following.
- Door switch ground circuit (Front, rear door) or door switch ground condition
- Harness for open or short between smart entrance control unit and door switch

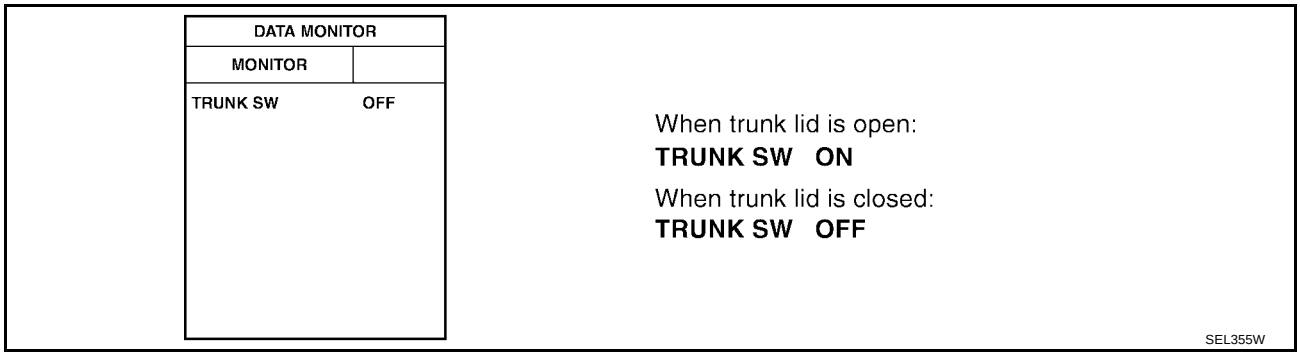
NG >> Replace door switch.

Trunk Room Lamp Switch Check

1. CHECK TRUNK ROOM LAMP SWITCH INPUT SIGNAL

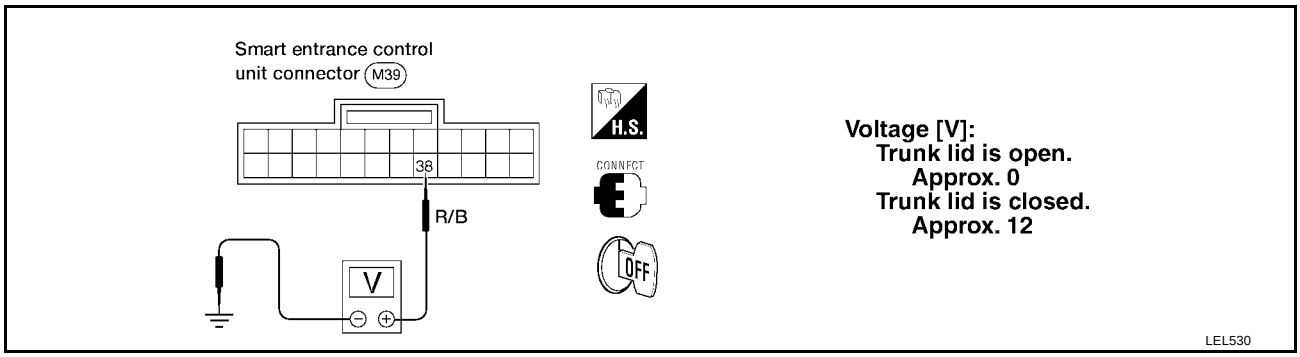
With CONSULT-II

Check trunk room lamp switch (“TRUNK SW”), in “DATA MONITOR” mode with CONSULT-II.



Without CONSULT-II

Check voltage between smart entrance control unit harness connector terminal 38 and ground.



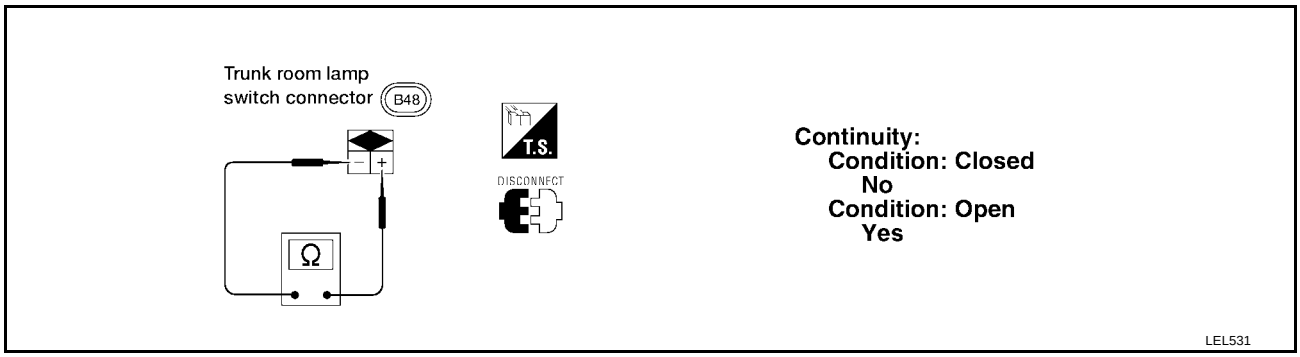
Refer to BL-74, "FIG. 2" .

OK or NG

OK >> Trunk room lamp switch is OK.
NG >> GO TO 2.

2. CHECK TRUNK ROOM LAMP SWITCH

1. Disconnect trunk room lamp switch connector.
2. Check continuity between trunk room lamp switch terminals + and –.



OK or NG

OK >> Check the following.
- Trunk room lamp switch ground circuit
- Harness for open or short between smart entrance control unit and trunk room lamp switch

NG >> Replace trunk room lamp switch.

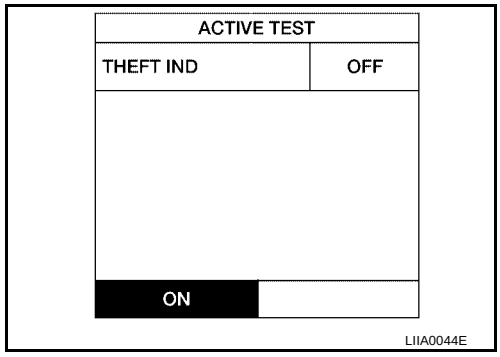
SECURITY INDICATOR LAMP CHECK

1. CHECK INDICATOR LAMP OPERATION

With CONSULT-II

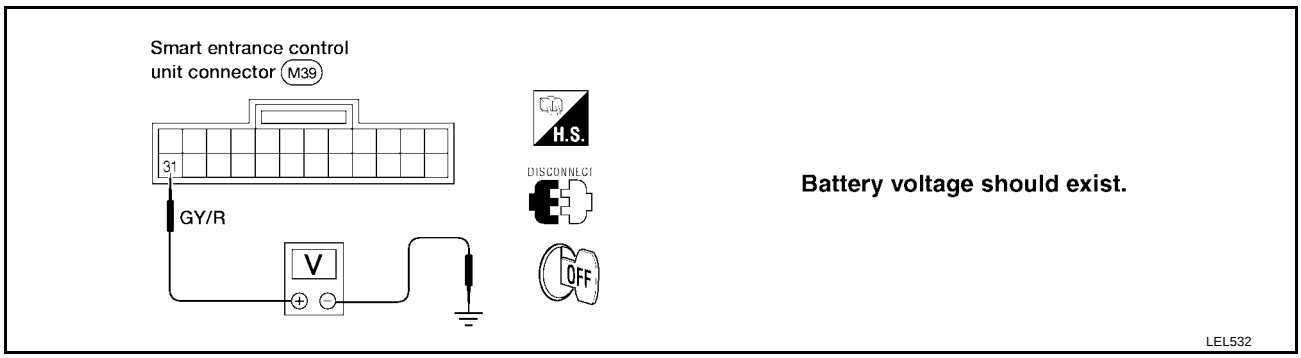
1. Select “ACTIVE TEST” in “THEFT WAR ALM” with CONSULT-II.
2. Select “THEFT IND” and touch “ON”.

Security indicator lamp should illuminate.



Without CONSULT-II

1. Disconnect smart entrance control unit harness connector.
2. Check voltage between smart entrance control unit harness connector terminal 31 and ground.



Refer to BL-73, "FIG. 1" .

OK or NG

OK >> Security indicator lamp is OK.
NG >> GO TO 2.

2. CHECK SECURITY INDICATOR LAMP

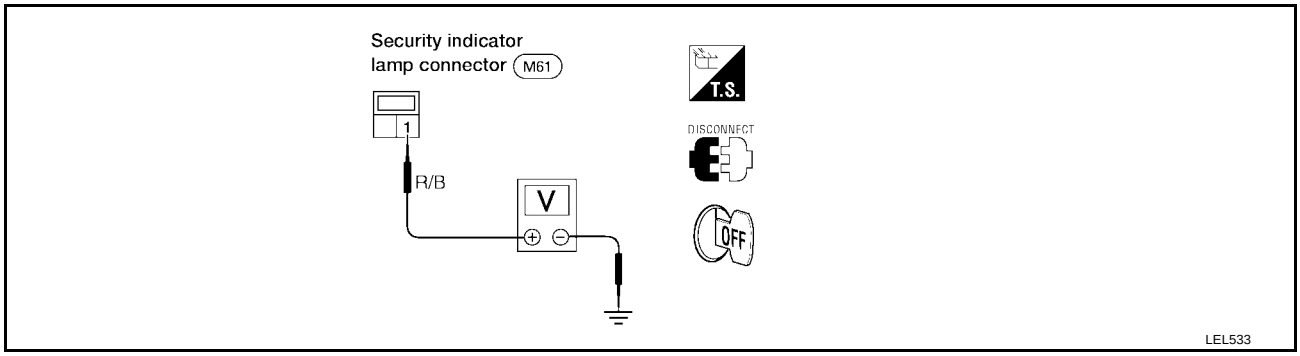
Refer to BL-73, "FIG. 1" .

OK or NG

OK >> GO TO 3.
NG >> Replace security indicator lamp.

3. CHECK POWER SUPPLY CIRCUIT FOR SECURITY INDICATOR LAMP

1. Disconnect security indicator lamp connector.
2. Check voltage between security indicator lamp terminal 1 and ground.



Does battery voltage exist?

Yes >> Check harness for open or short between security indicator lamp and smart entrance control unit.
No >> Check the following.

- 10A fuse [No. 12, located in fuse block (J/B)]
- Harness for open or short between security indicator lamp and fuse

FRONT DOOR UNLOCK SENSOR CHECK

1. CHECK FRONT DOOR UNLOCK SENSOR INPUT SIGNAL

With CONSULT-II

Check front unlock sensor (“LOCK SIG DR”, “LOCK SIG AS”) in “DATA MONITOR” with CONSULT-II.

DATA MONITOR	
MONITOR	
LOCK SIG DR	OFF
LOCK SIG AS	OFF

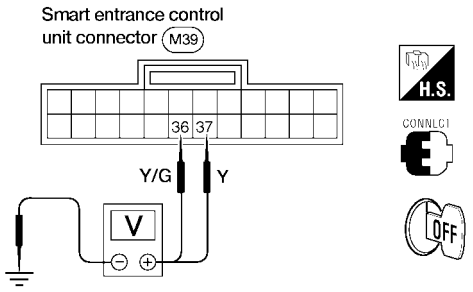
When door is locked:
LOCK SIG DR OFF
LOCK SIG AS OFF

When door is unlocked:
LOCK SIG DR ON
LOCK SIG AS ON

SEL357W

Without CONSULT-II

Check voltage between smart entrance control unit harness connector terminal 36 or 37 and ground.



	Terminals		Condition	Voltage [V]
	(+)	(–)		
Front door LH	36	Ground	Locked	Approx. 5
			Unlocked	0
Front door RH	37	Ground	Locked	Approx. 5
			Unlocked	0

LEL534

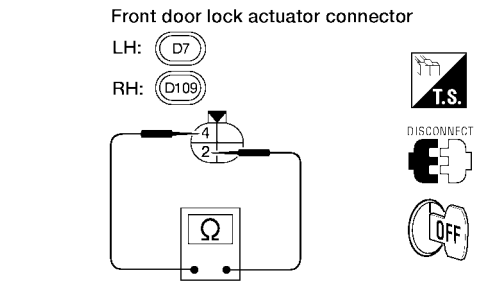
Refer to BL-75, "FIG. 3" .

OK or NG

OK >> Door unlock sensor is OK.
NG >> GO TO 2.

2. CHECK FRONT DOOR UNLOCK SENSOR

1. Disconnect door lock actuator connector.
2. Check continuity between door lock actuator terminals.



Continuity:
Condition: Locked
No
Condition: Unlocked
Yes

LEL535

OK or NG

OK >> Check the following.
- Door unlock sensor ground circuit
- Harness for open or short between smart entrance control unit and door unlock sensor

NG >> Replace door lock actuator.

DOOR KEY CYLINDER SWITCH CHECK

1. CHECK DOOR KEY CYLINDER SWITCH INPUT SIGNAL (LOCK/UNLOCK SIGNAL)

With CONSULT-II

Check front door key cylinder switch (“KEY CYL LK-SW”/“KEY CYL UN-SW”) in “DATA MONITOR” mode with CONSULT-II.

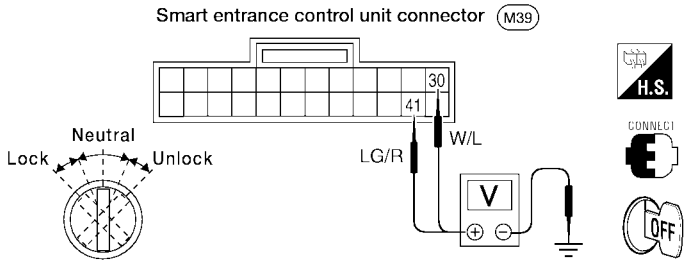
DATA MONITOR	
MONITOR	
KEY CYL LK-SW	OFF
KEY CYL UN-SW	OFF

When key inserted in front key cylinder is turned to LOCK:
KEY CYL LK-SW ON
When key inserted in front key cylinder is turned to UNLOCK:
KEY CYL UN-SW ON

SEL342W

Without CONSULT-II

Check voltage between smart entrance control unit harness connector terminal 30 or 41 and ground.



Terminals (+)	Terminals (–)	Key position	Voltage [V]
41	Ground	Neutral/Unlock	Approx. 5
		Lock	0
30	Ground	Neutral/Lock	Approx. 5
		Unlock	0

WEL502

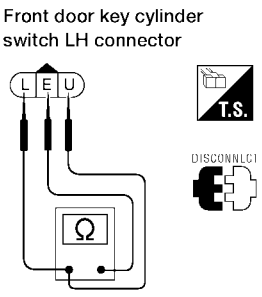
Refer to BL-75, "FIG. 3" .

OK or NG

OK >> Door key cylinder switch is OK.
NG >> GO TO 2.

2. CHECK DOOR KEY CYLINDER SWITCH

1. Disconnect door key cylinder switch connector.
2. Check continuity between door key cylinder switch connector D8 terminals.



Ⓔ : Ground terminal
Ⓤ : Door unlock switch terminal
Ⓛ : Door lock switch terminal

Terminals	Key position	Continuity
Ⓛ - Ⓔ	Neutral/Unlock	No
	Lock	Yes
Ⓤ - Ⓔ	Neutral/Lock	No
	Unlock	Yes

LEL101A

OK or NG

OK >> Check the following.
- Door key cylinder switch ground circuit
- Harness for open or short between smart entrance control unit and door key cylinder switch

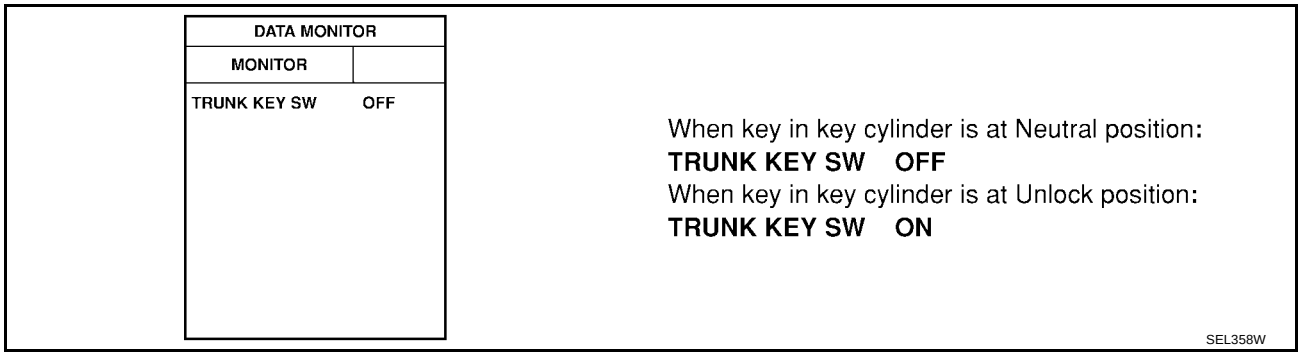
NG >> Replace door key cylinder switch.

TRUNK LID KEY CYLINDER SWITCH CHECK

1. CHECK TRUNK LID KEY CYLINDER SWITCH INPUT SIGNAL (UNLOCK SIGNAL)

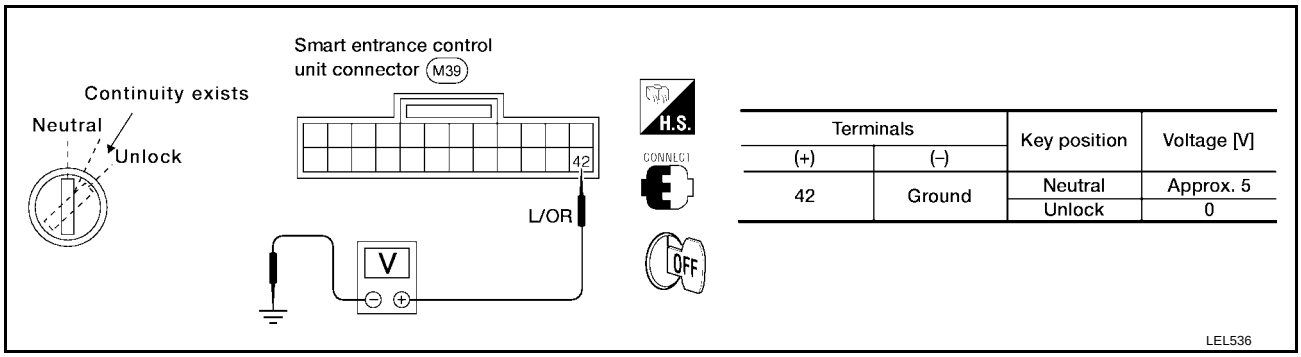
With CONSULT-II

Check trunk lid key cylinder switch (“TRUNK KEY SW”) in “DATA MONITOR” mode with CONSULT-II.



Without CONSULT-II

Check voltage between smart entrance control unit harness connector terminal 42 and ground.



Terminals		Key position	Voltage [V]
(+)	(–)		
42	Ground	Neutral	Approx. 5
		Unlock	0

Refer to BL-74, "FIG. 2" .

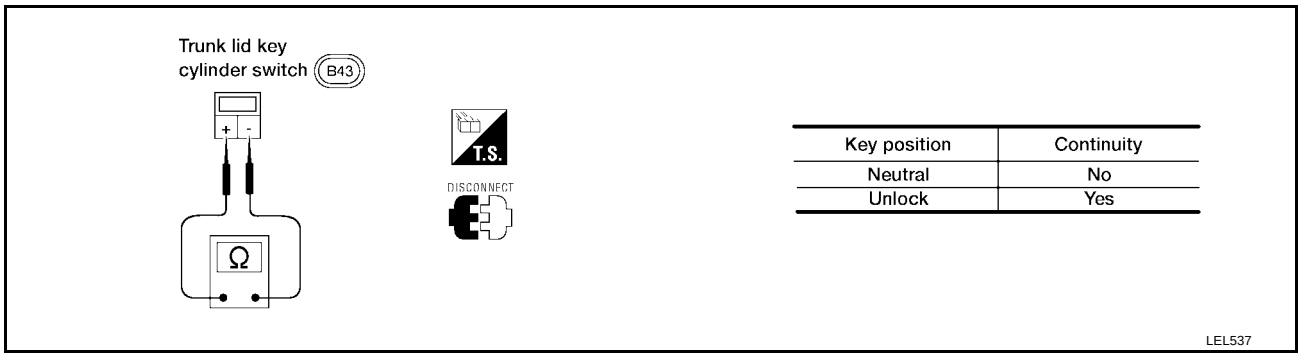
OK or NG

OK >> Trunk lid key cylinder switch is OK.

NG >> GO TO 2.

2. CHECK TRUNK LID KEY CYLINDER SWITCH

1. Disconnect trunk lid key cylinder switch connector.
2. Check continuity between trunk lid key cylinder switch terminals.



Key position	Continuity
Neutral	No
Unlock	Yes

OK or NG

OK >> Check the following.

- Trunk lid key cylinder switch ground circuit
- Harness for open or short between smart entrance control unit and trunk lid key cylinder switch

NG >> Replace trunk lid key cylinder switch.

DOOR LOCK/UNLOCK SWITCH CHECK

1. CHECK DOOR LOCK/UNLOCK SWITCH INPUT SIGNAL

With CONSULT-II

Check door lock/unlock switch (“LOCK SW DR/AS”/“UNLK SW DR/AS”) in “DATA MONITOR” mode with CONSULT-II.

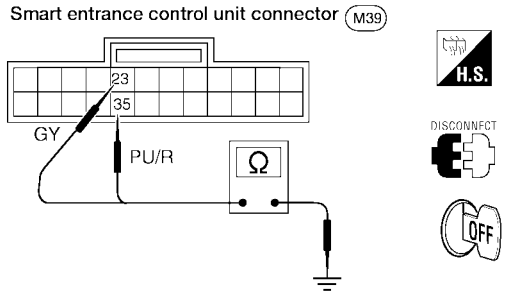
DATA MONITOR	
MONITOR	
LOCK SW DR/AS	OFF
UNLK SW DR/AS	OFF

When lock/unlock switch is turned to LOCK:
LOCK SW DR/AS ON
When lock/unlock switch is turned to UNLOCK:
UNLK SW DR/AS ON

SEL341W

Without CONSULT-II

1. Disconnect smart entrance control unit harness connector.
2. Check continuity between smart entrance control unit harness connector terminal 23 or 35 and ground.



Terminals	Door lock/unlock switch (LH or RH) condition	Continuity
23 - Ground	Lock	Yes
	N and Unlock	No
35 - Ground	Unlock	Yes
	N and Lock	No

WEL501

Refer to BL-74, "FIG. 2" .

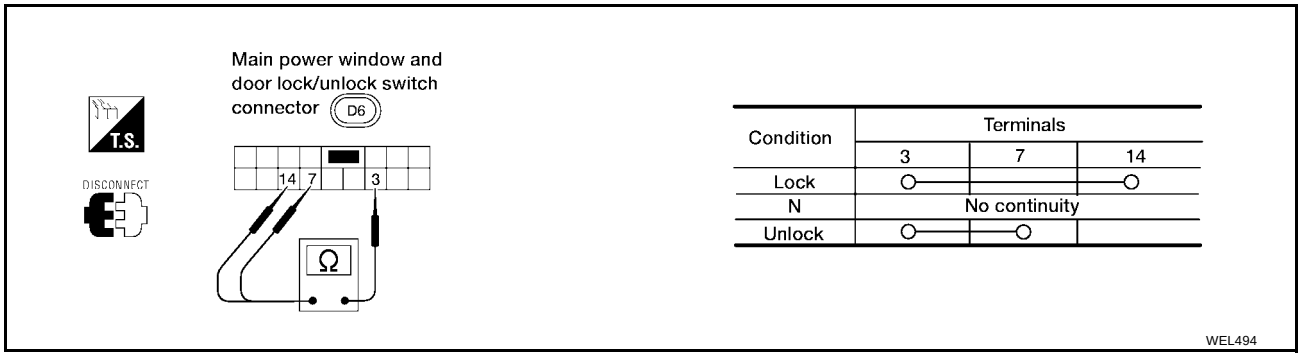
OK or NG

OK >> Door lock/unlock switch is OK.
NG >> GO TO 2.

2. CHECK DOOR LOCK/UNLOCK SWITCH

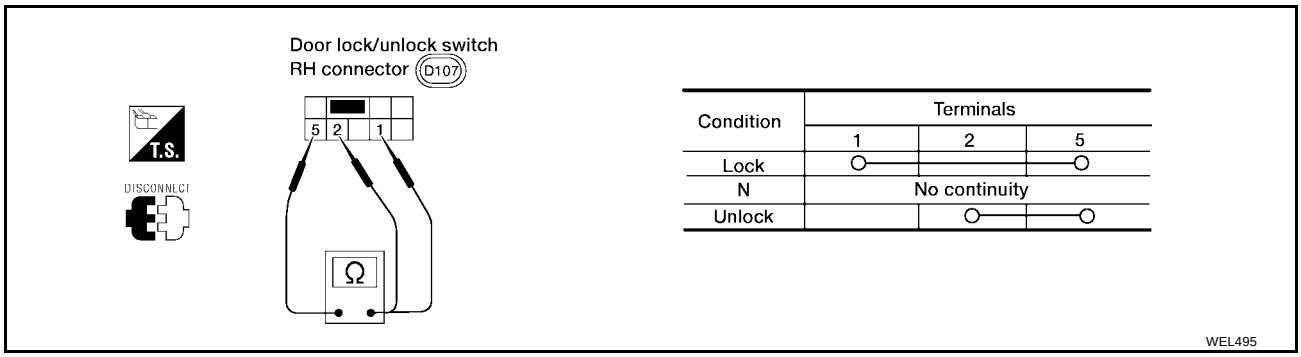
1. Disconnect door lock/unlock switch harness connector.
2. Check continuity between each door lock/unlock switch terminal.

– Main power window and door lock/unlock switch



Condition	Terminals		
	3	7	14
Lock	○		○
N	No continuity		
Unlock	○	○	

– Door lock/unlock switch RH



Condition	Terminals		
	1	2	5
Lock	○		○
N	No continuity		
Unlock		○	○

OK or NG

OK >> Check the following.
- Ground circuit for door lock/unlock switch
- Harness for open or short between door lock/unlock switch and smart entrance control unit

NG >> Replace door lock/unlock switch.

HORN AND HEADLAMP ALARM CHECK

1. CHECK BASE HORN SYSTEM OPERATION

Operate vehicle horn.

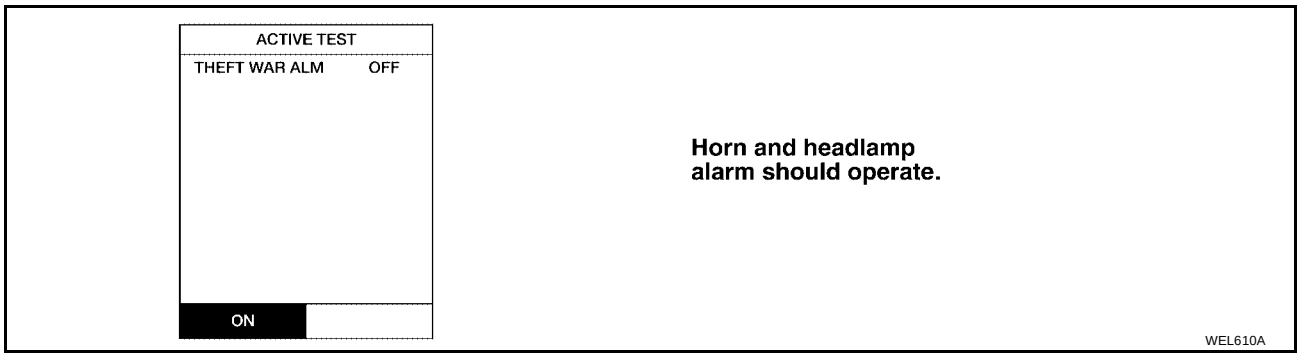
OK or NG

OK >> GO TO 2.
NG >> Check base horn system. Refer to WW-9, "Wiring Diagram — HORN —" .

2. CHECK HORN AND HEADLAMP ALARM OPERATION

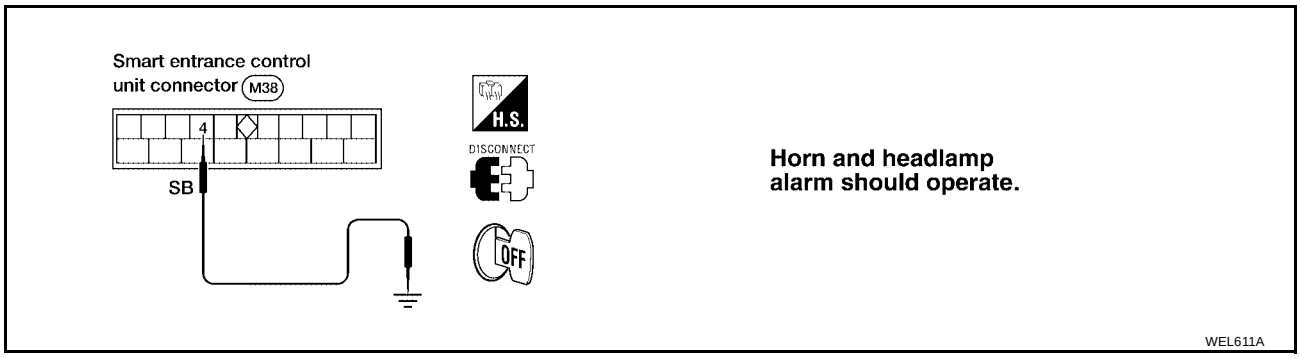
With CONSULT-II

1. Select “ACTIVE TEST” in “THEFT WAR ALM” with CONSULT-II.
2. Select “THEFT WAR ALM” and touch “ON”.



Without CONSULT-II

1. Disconnect smart entrance control unit harness connector.
2. Apply ground to smart entrance control unit harness connector terminal 4.



Refer to BL-76, "FIG. 4" .

OK or NG

OK >> Horn and headlamp alarm is OK.
NG >> GO TO 3.

3. CHECK VEHICLE SECURITY LAMP RELAY

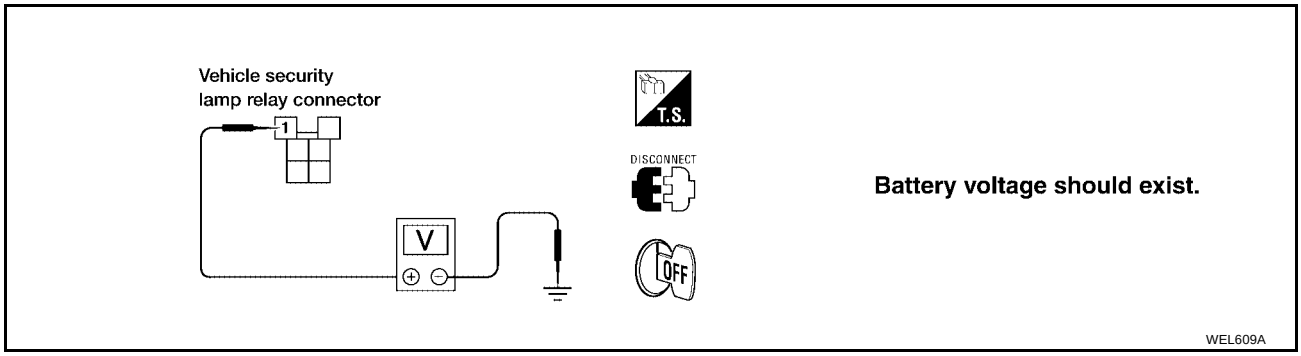
Check vehicle security lamp relay. Refer to BL-96, "VEHICLE SECURITY LAMP RELAY" .

OK or NG

OK >> GO TO 4.
NG >> Replace relay.

4. CHECK POWER SUPPLY FOR VEHICLE SECURITY LAMP RELAY

1. Disconnect vehicle security lamp relay connector.
2. Check voltage between vehicle security lamp relay connector E43 terminal 1 (G/R) and ground.



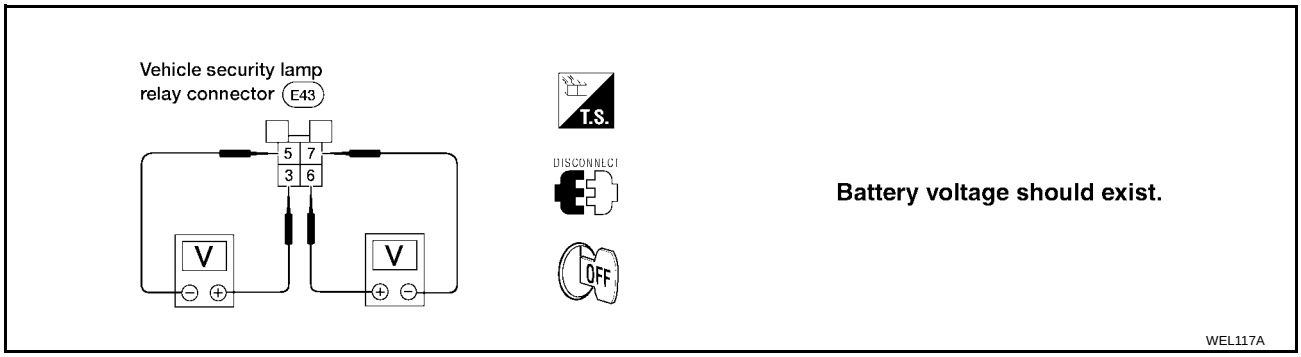
Does battery voltage exist?

Yes >> GO TO 5.
No >> Check the following.

- 10A fuse (No. 35 located in the fuse and fusible link box)
- Harness for open or short between relay and fuse

5. CHECK VEHICLE SECURITY LAMP RELAY CIRCUIT

1. Check voltage between terminals of vehicle security lamp relay connector E43.



OK or NG

OK >> Check the following.

- Harness for open between smart entrance control unit terminal 4 and relay
- Harness for open or short between smart entrance control unit terminal 4 and horn relay
- Diode-4 for open
- Replace smart entrance control unit

NG >> Check the following.

- Harness for open or short between vehicle security lamp relay and fuses
- Harness for open or short between vehicle security lamp relay and headlamp system

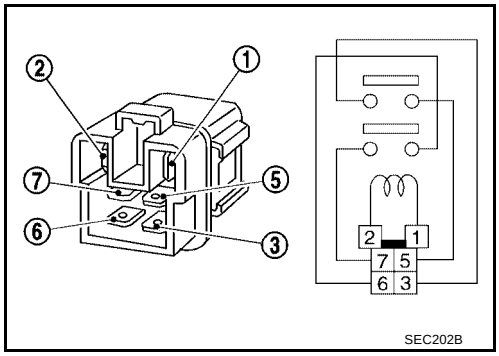
Electrical Components Inspection

EIS0015K

VEHICLE SECURITY LAMP RELAY

Check continuity between terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

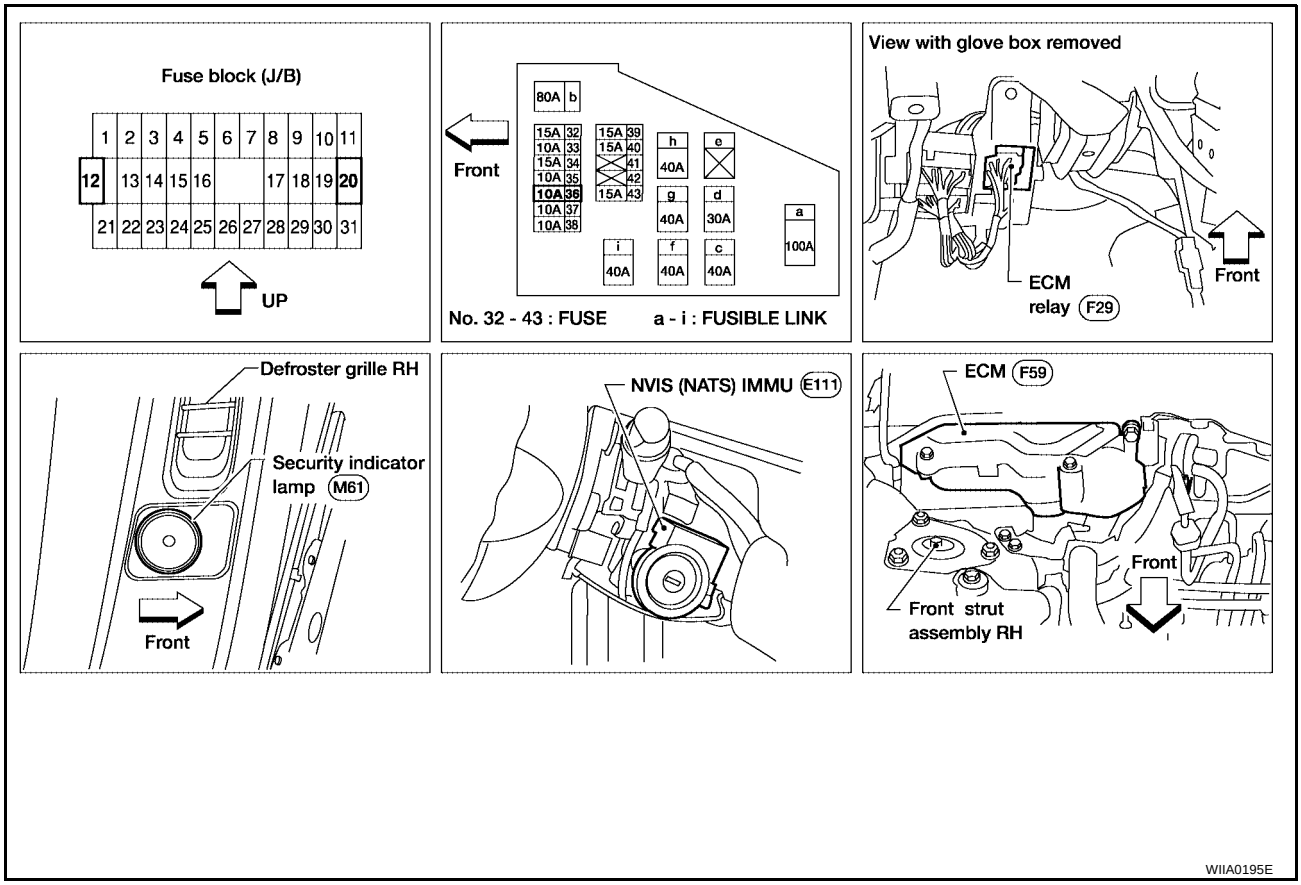


NVIS (NISSAN VEHICLE IMMOBILIZER SYSTEM — NATS)

PFP:25386

Component Parts and Harness Connector Location

EIS0015L



NOTE:
If the customer reports a “No Start” condition, request ALL KEYS be brought to Dealer in case of NATS malfunction.

System Description

EIS0015M

NVIS (Nissan Vehicle Immobilizer System—NATS) has the following immobilizer functions:

- Since only NVIS (NATS) ignition keys, whose ID nos. have been registered into the ECM and IMMU of NVIS (NATS), allow the engine to run, operation of a stolen vehicle without a NVIS (NATS) registered key is prevented by NVIS (NATS).
  That is to say, NVIS (NATS) will immobilize the engine if someone tries to start it without the registered key of NVIS (NATS).
- All of the originally supplied ignition key IDs have been NVIS (NATS) registered.
  If requested by the vehicle owner, a maximum of five key IDs can be registered into the NVIS (NATS) components.
- The security indicator lamp blinks when the ignition switch is in “OFF” or “ACC” position. Therefore, NVIS (NATS) warns outsiders that the vehicle is equipped with the system.
- When NVIS (NATS) detects trouble, the security indicator lamp lights up while ignition key is in the “ON” position.
- NVIS (NATS) trouble diagnoses, system initialization and additional registration for other NVIS (NATS) ignition key IDs must be carried out using CONSULT-II hardware and CONSULT-II NVIS (NATS) software. Regarding the procedures for NVIS (NATS) initialization and NVIS (NATS) ignition key ID registration, refer to CONSULT-II OPERATION MANUAL IVIS/NVIS.
- **When servicing a malfunction of the NVIS (indicated by lighting up of Security Indicator Lamp) or registering another NVIS ignition key ID no., it is necessary to re-register original key identification.**

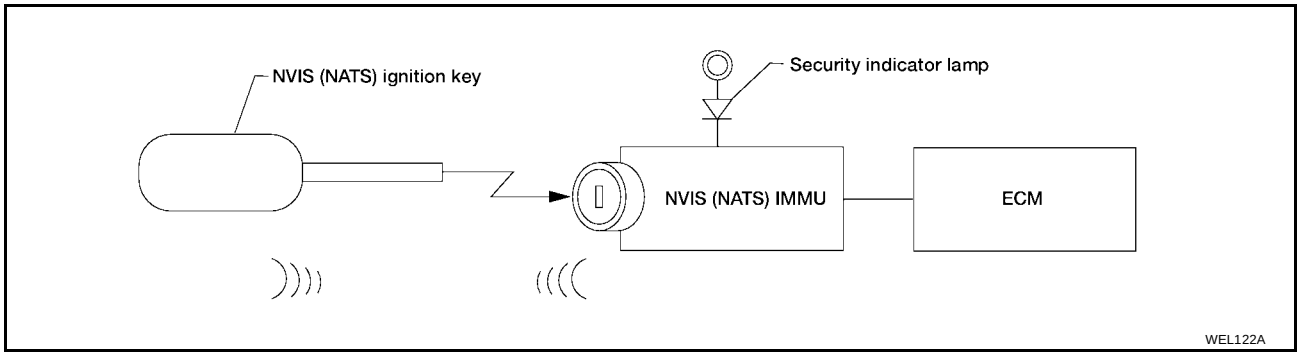
Therefore, be sure to receive ALL KEYS from vehicle owner.

System Composition

EIS0015N

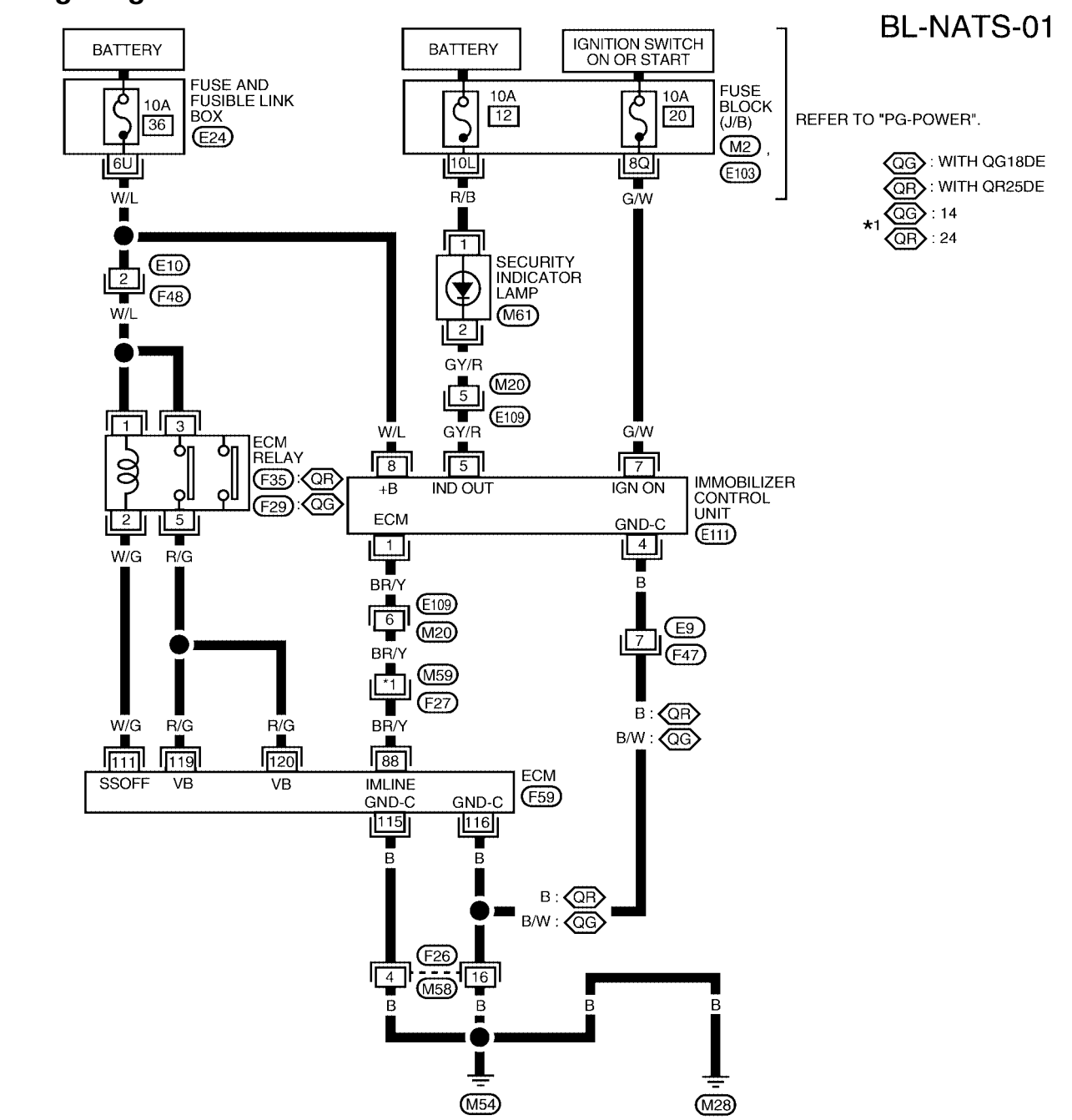
The immobilizer function of the NVIS (NATS) consists of the following:

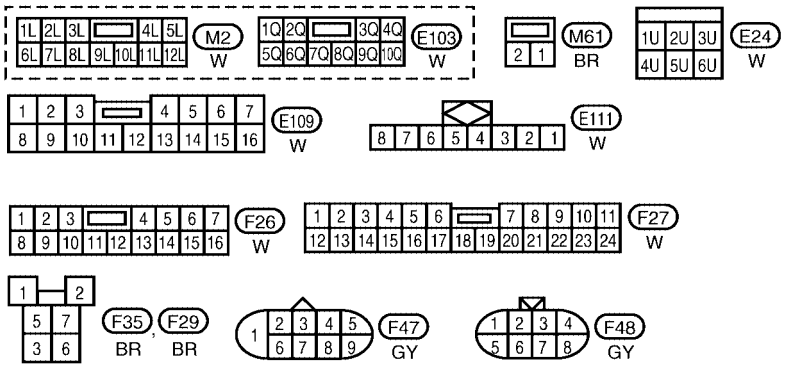
- NVIS (NATS) ignition key
- NVIS (NATS) immobilizer control unit (IMMU) located in the ignition key cylinder
- ECM
- Security indicator lamp



Wiring Diagram — NATS —

EIS0015P





REFER TO THE FOLLOWING.
F59 - SUPER MULTIPLE JUNCTION (SMJ)

WIWA0316E

IMMOBILIZER CONTROL UNIT TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	VOLTAGE (V) (Approx.)
1	BR/Y	ECM	—	—
4	B	GROUND	—	—
5	GY/R	VEHICLE SECURITY INDICATOR	GOES OFF	12
			ILLUMINATES	0
7	G/W	IGNITION SWITCH (ON)	IGNITION KEY IS IN ON POSITION	12
		IGNITION SWITCH (START)	IGNITION KEY IS IN START POSITION	12
8	W/L	POWER SOURCE (FUSE)	—	12

CONSULT-II

EIS0015Q

CONSULT-II INSPECTION PROCEDURE

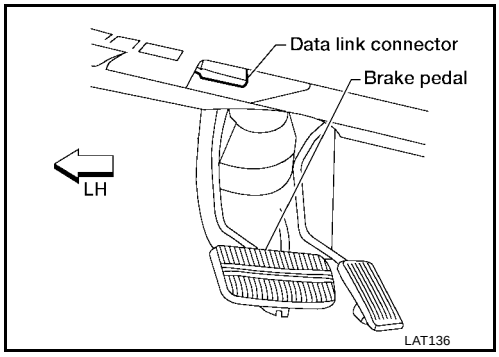
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carries out CAN communication.

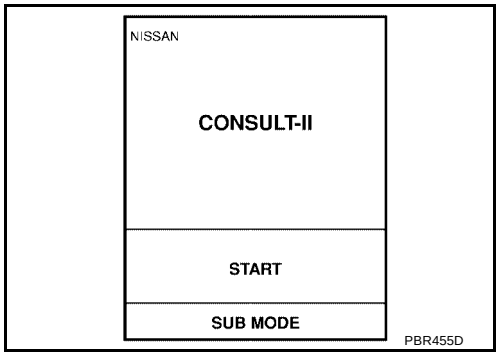
1. Turn ignition switch OFF.
2. Insert NVIS (NATS) program card into CONSULT-II.

   Program card : NATS (AEN02C-1)

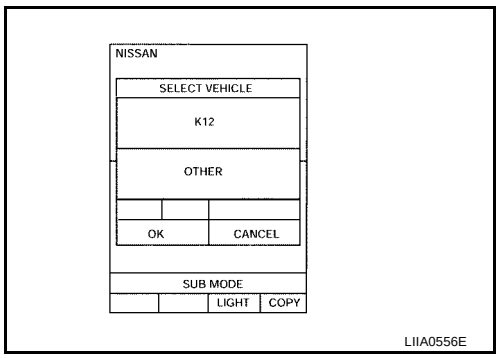
3. Connect CONSULT-II and CONSULT-II CONVERTER to data link connector.



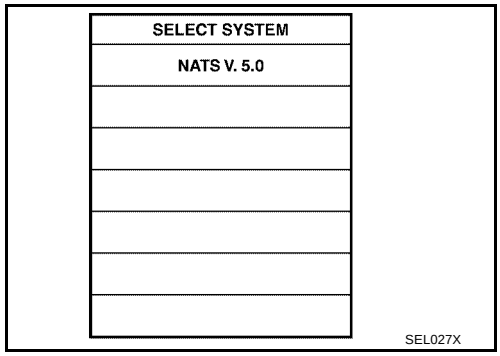
4. Turn ignition switch ON.
5. Touch “START”.



6. Touch “OTHER”

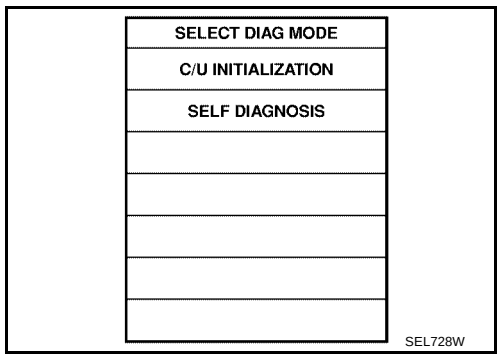


7. Select “NATS V.5.0”.
If “NATS V5.0” is not indicated, go to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



8. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual NATS-IVIS/NVIS.



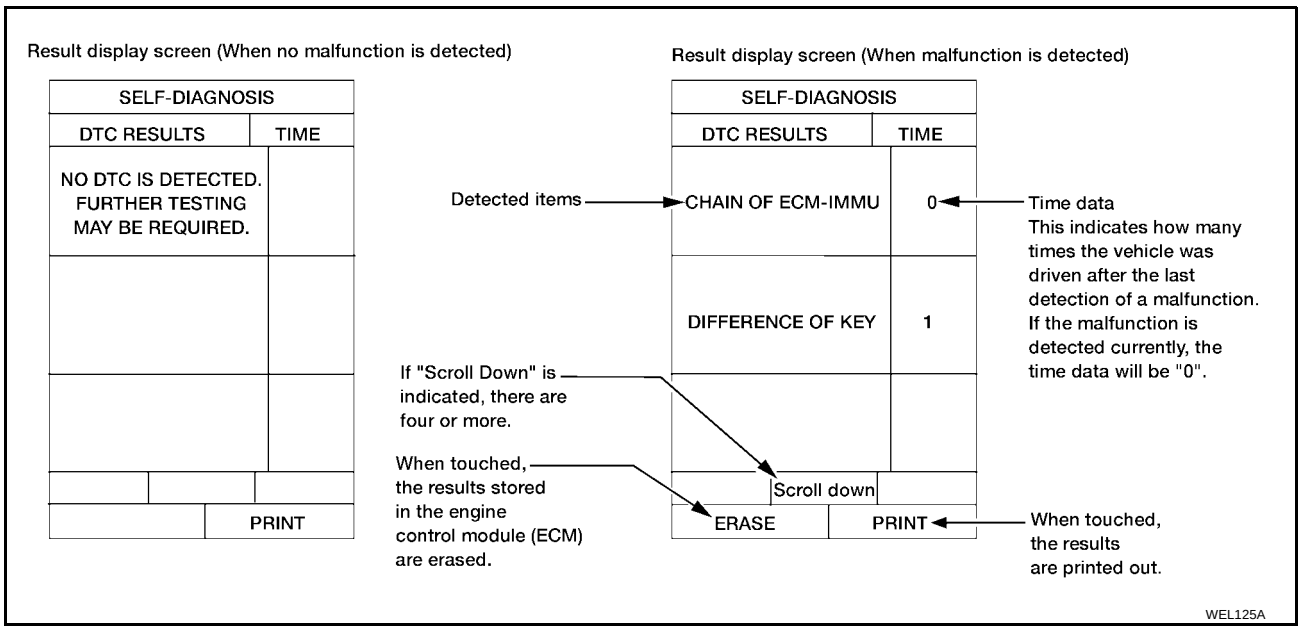
CONSULT-II DIAGNOSTIC TEST MODE FUNCTION

CONSULT-II DIAGNOSTIC TEST MODE	Description
C/U INITIALIZATION	When replacing any of the following three components, C/U initialization is necessary. [NVIS (NATS) ignition key/IMMU/ECM]
SELF DIAGNOSIS	Detected items (screen terms) are as shown in the chart below.

NOTE:

- When any initialization is performed, all IDs previously registered will be erased and all NVIS (NATS) ignition keys must be registered again.
- The engine cannot be started with an unregistered key. In this case, the system may show “DIFFERENCE OF KEY” or “LOCK MODE” as a self-diagnostic result on the CONSULT-II screen.
- In rare cases, “CHAIN OF ECM-IMMU” might be stored as a self-diagnostic result during key registration procedure, even if the system is not malfunctioning.

HOW TO READ SELF-DIAGNOSTIC RESULTS



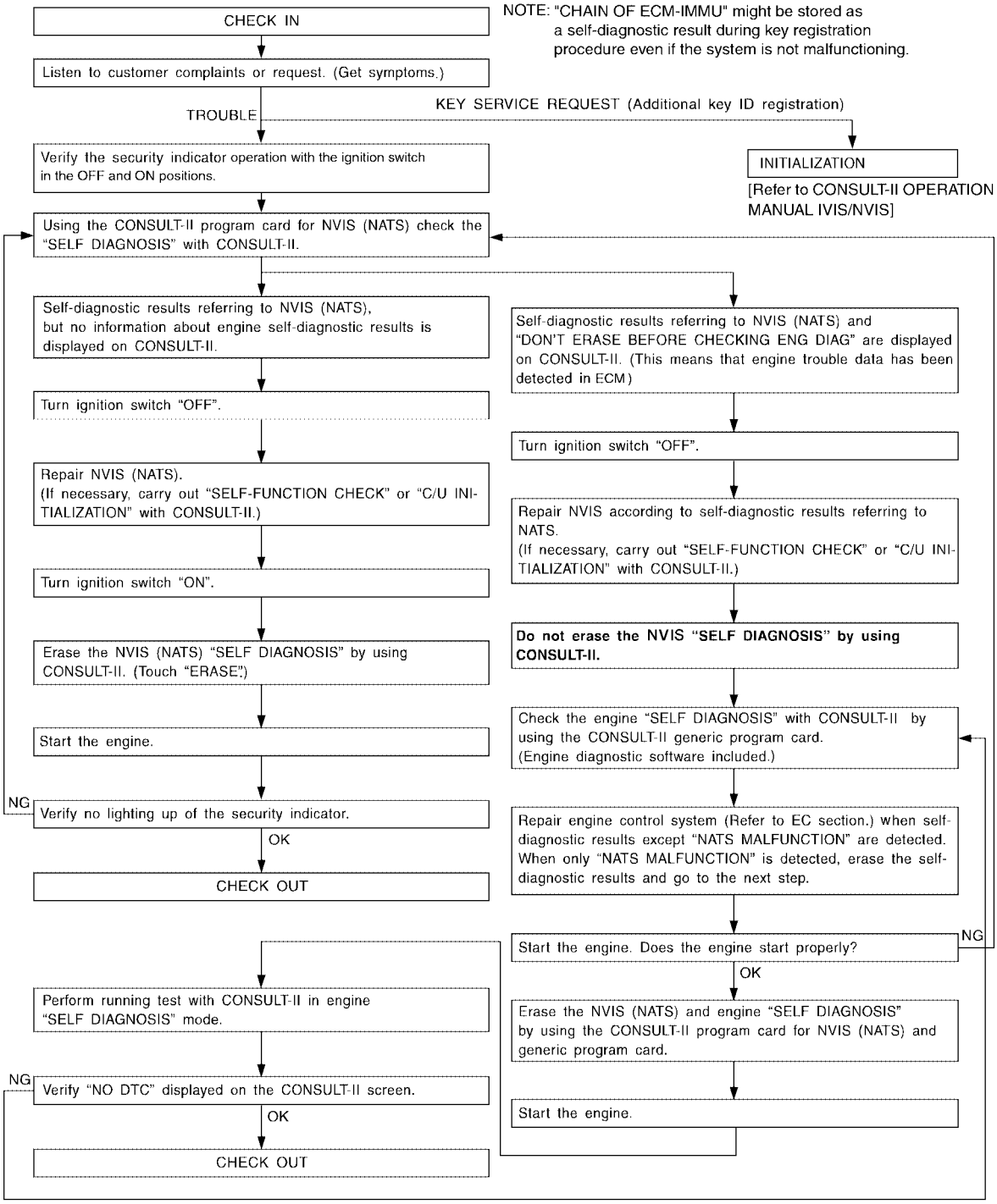
NVIS (NATS) SELF-DIAGNOSTIC RESULTS ITEM CHART

Detected items (NATS program card screen terms)	P No. Code (Self-diagnostic result of "ENGINE"	Malfunction is detected when.....	Reference page
ECM INT CIRC-IMMU	NATS MALFUNCTION P1613	The malfunction of ECM internal circuit of IMMU communication line is detected.	BL-105
CHAIN OF ECM-IMMU	NATS MALFUNCTION P1612	Communication impossible between ECM and IMMU (In rare cases, "CHAIN OF ECM-IMMU" might be stored during key registration procedure, even if the system is not malfunctioning.)	BL-106
DIFFERENCE OF KEY	NATS MALFUNCTION P1615	IMMU can receive the key ID signal but the result of ID verification between key ID and IMMU is NG.	BL-110
CHAIN OF IMMU-KEY	NATS MALFUNCTION P1614	IMMU cannot receive the key ID signal.	BL-111
ID DISCORD, IMM-ECM	NATS MALFUNCTION P1611	The result of ID verification between IMMU and ECM is NG. System initialization is required.	BL-112
LOCK MODE	NATS MALFUNCTION P1610	When the starting operation is carried out five or more times consecutively under the following conditions, NVIS (NATS) will shift the mode to one which prevents the engine from being started. ● Unregistered ignition key is used. ● IMMU or ECM is malfunctioning.	BL-115
DON'T ERASE BEFORE CHECKING ENG DIAG	—	Any engine trouble codes except NVIS (NATS) trouble codes have been detected in ECM.	BL-103

Trouble Diagnoses

EIS0015R

WORK FLOW



WEL126A

SYMPTOM MATRIX CHART 1 (SELF-DIAGNOSIS RELATED ITEM)

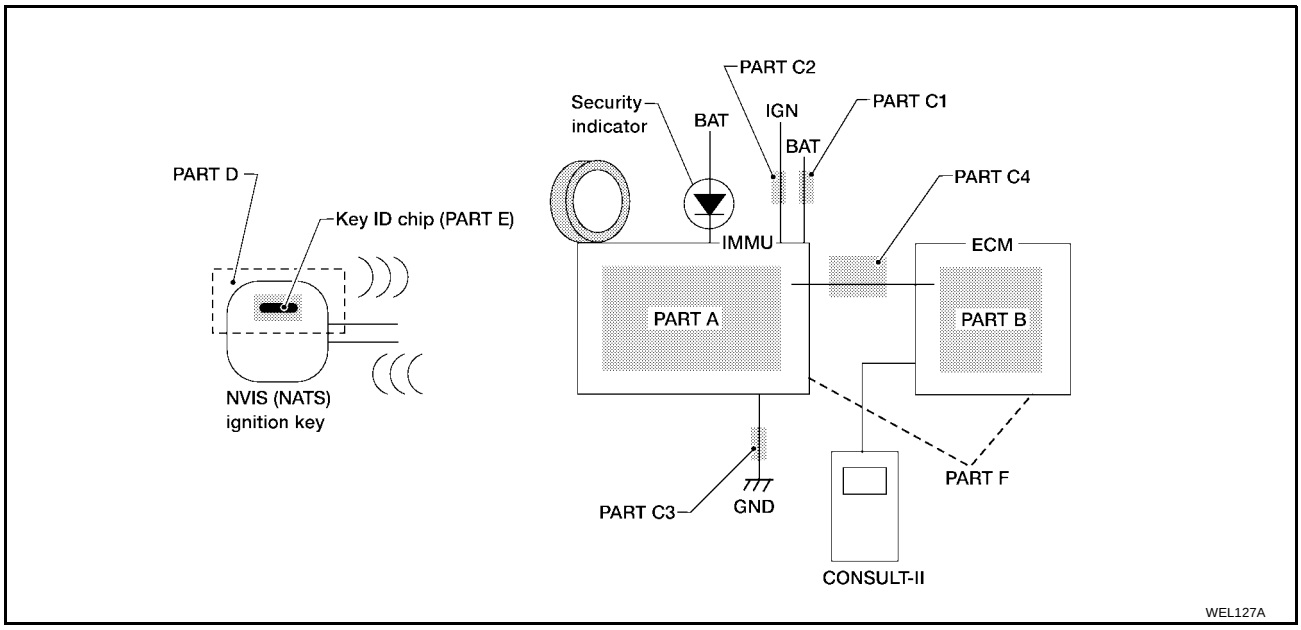
SYMPTOM	Displayed "SELF-DIAG RESULTS" on CONSULT-II screen.	DIAGNOSTIC PROCEDURE (Reference page)	SYSTEM (Malfunctioning part or mode)	REFERENCE PART NO. OF ILLUSTRATION ON NEXT PAGE
	ECM INT CIRC-IMMU	PROCEDURE 1 BL-105	ECM	B
● Security indicator lighting up* ● Engine hard to start			In rare cases, "CHAIN OF ECM-IMMU" might be stored during key registration procedure, even if the system is not malfunctioning.	—
	CHAIN OF ECM-IMMU	PROCEDURE 2 BL-106	Open circuit in battery voltage line of IMMU circuit	C1
			Open circuit in ignition line of IMMU circuit	C2
			Open circuit in ground line of IMMU circuit	C3
			Open circuit in communication line between IMMU and ECM	C4
			Short circuit between IMMU and ECM communication line and battery voltage line	C4
			Short circuit between IMMU and ECM communication line and ground line	C4
			ECM	B
			IMMU	A
	DIFFERENCE OF KEY	PROCEDURE 3 BL-110	Unregistered key	D
			IMMU	A
	CHAIN OF IMMU-KEY	PROCEDURE 4 BL-111	Malfunction of key ID chip	E
			IMMU	A
	ID DISCORD, IMM-ECM	PROCEDURE 5 BL-112	System initialization has not yet been completed.	F
			ECM	F
	LOCK MODE	PROCEDURE 7 BL-115	LOCK MODE	D
● MIL staying ON ● Security indicator lighting up*	DON'T ERASE BEFORE CHECKING ENG DIAG	WORK FLOW BL-103	Engine trouble data and NVIS (NATS) trouble data have been detected in ECM	—

*: When NVIS (NATS) detects trouble, the security indicator lights up while ignition key is in the "ON" position.

SYMPTOM MATRIX CHART 2 (NON SELF-DIAGNOSIS RELATED ITEM)

SYMPTOM	DIAGNOSTIC PROCEDURE (Reference page)	SYSTEM (Malfunctioning part or mode)
Security indicator lamp does not light up.	PROCEDURE 6 BL-113	Security indicator lamp
		Open circuit between fuse and IMMU
		Continuation of initialization mode
		IMMU

DIAGNOSTIC SYSTEM DIAGRAM



DIAGNOSTIC PROCEDURE 1

Self-diagnostic results:
"ECM INT CIRC-IMMU" displayed on CONSULT-II screen

1. Confirm SELF-DIAGNOSTIC RESULTS "ECM INT CIRC-IMMU" displayed on CONSULT-II screen. Ref. part No. B.
2. Replace ECM.
3. Perform initialization with CONSULT-II.
   For initialization, refer to "CONSULT-II OPERATION MANUAL IVIS/NVIS".

SELF DIAGNOSIS	
DTC RESULTS	TIME
ECM INT CIRC-IMMU	0

SEL314W

DIAGNOSTIC PROCEDURE 2

Self-diagnostic results:
“CHAIN OF ECM-IMMU” displayed on CONSULT-II screen

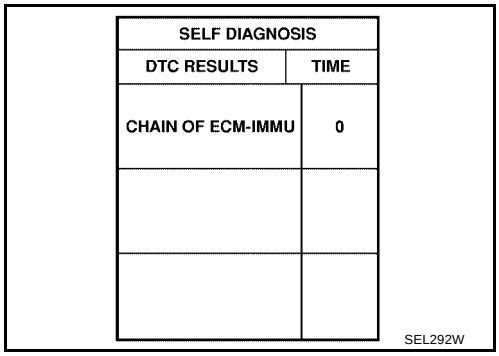
1. CONFIRM SELF-DIAGNOSTIC RESULTS

Confirm SELF-DIAGNOSTIC RESULTS “CHAIN OF ECM-IMMU” displayed on CONSULT-II screen.

NOTE:
In rare cases, “CHAIN OF ECM-IMMU” might be stored during key registration procedure, even if the system is not malfunctioning.

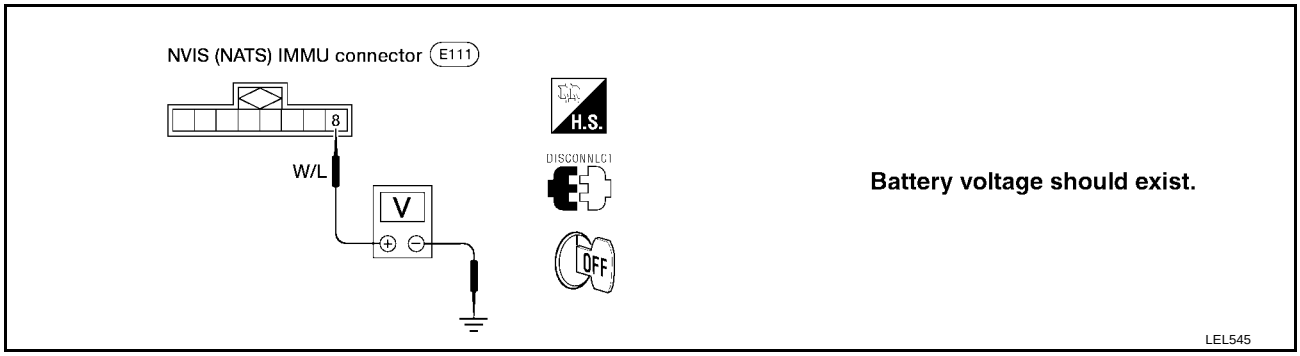
Is CONSULT-II screen displayed as shown?

Yes >> GO TO 2.
No >> GO TO BL-104, "SYMPTOM MATRIX CHART 1 (SELF-DIAGNOSIS RELATED ITEM)" .



2. CHECK POWER SUPPLY CIRCUIT FOR NVIS (NATS) IMMU

1. Disconnect NVIS (NATS) IMMU.
2. Check voltage between terminal 8 of NVIS (NATS) IMMU and ground.



OK or NG

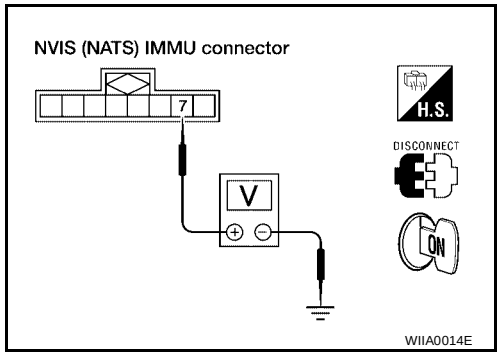
OK >> GO TO 3.
NG >> Check the following

- 10A fuse (No. 36, located in the fuse and fusible link box)
- Harness for open or short between fuse and NVIS (NATS) IMMU connector
  Ref. Part No. C1

3. CHECK IGN SW. ON SIGNAL

1. Turn ignition switch ON.
2. Check voltage between NVIS (NATS) IMMU harness connector E111 terminal 7 (G/W) and ground.

Battery voltage should exist.



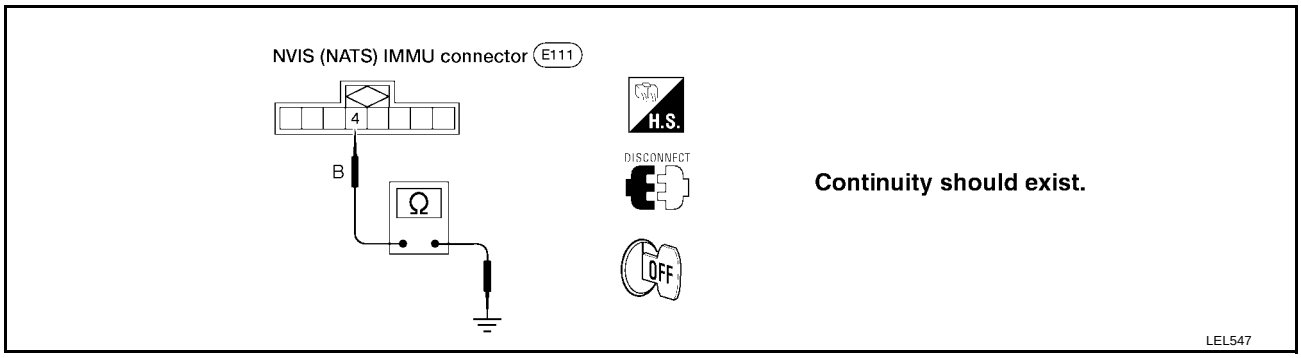
OK or NG

OK >> GO TO 4.
NG >> Check the following

- 10A fuse [No. 20, located in the fuse block (J/B)]
- Harness for open or short between fuse and NVIS (NATS) IMMU connector
  Ref. part No. C2

4. CHECK GROUND CIRCUIT FOR NVIS (NATS) IMMU

1. Turn ignition switch OFF.
2. Check harness continuity between NVIS (NATS) IMMU terminal 4 and ground.



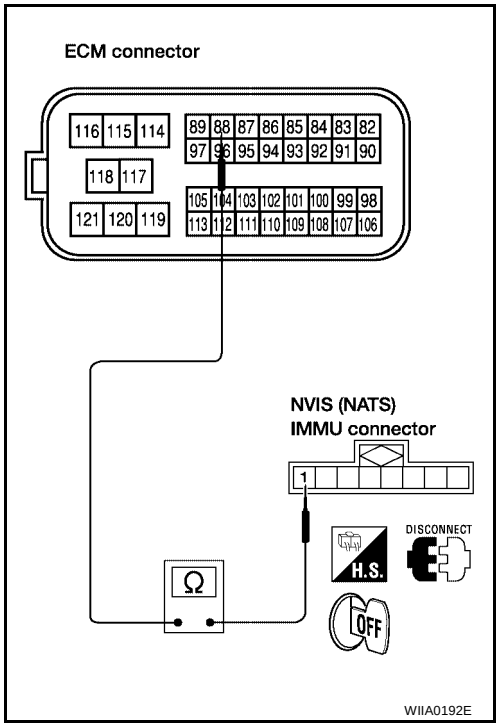
OK or NG

OK >> GO TO 5.
NG >> Repair harness. **Ref. part No. C3**

5. CHECK COMMUNICATION LINE OPEN CIRCUIT

1. Disconnect ECM connector.
2. Check harness continuity between ECM harness connector F59 terminal 88 (BR/Y) and NVIS (NATS) IMMU connector E111 terminal 1 (BR/Y).

Continuity should exist.



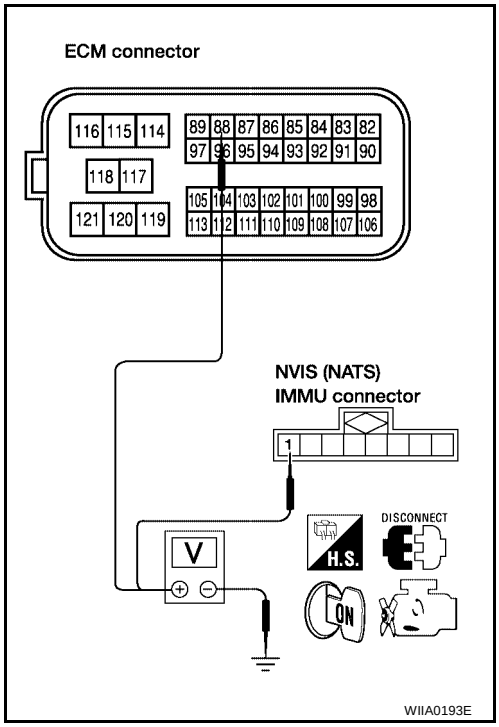
OK or NG

OK >> GO TO 6.
NG >>
- Repair or replace harness.
- **Ref. part No. C4**

6. CHECK COMMUNICATION LINE BATTERY SHORT CIRCUIT

1. Turn ignition switch ON.
2. Check voltage between ECM harness connector F59 terminal 88 (BR/Y) or NVIS (NATS) IMMU harness connector E111 terminal 1 (BR/Y) and ground.

Voltage : 0V



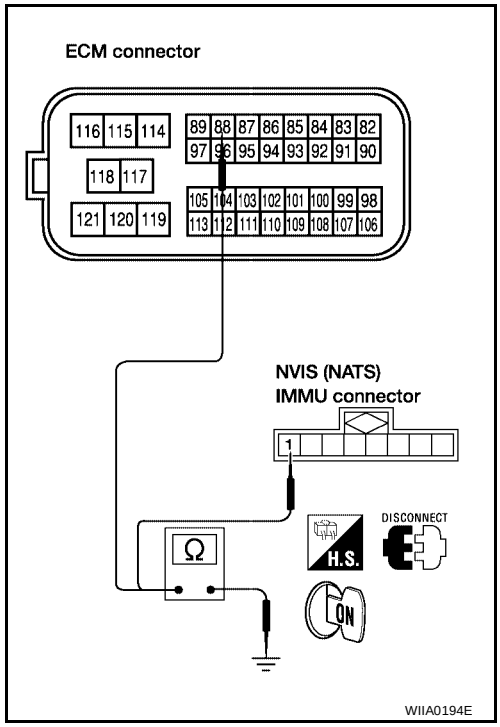
OK or NG

OK >> GO TO 7.
NG >>
- Communication line is short-circuited with battery voltage line or ignition switch ON line.
- Repair or replace harness.
- **Ref. part No. C4**

7. CHECK COMMUNICATION LINE GROUND SHORT CIRCUIT

1. Turn ignition switch OFF.
2. Check continuity between ECM harness connector F59 terminal 88 (BR/Y) or NVIS (NATS) IMMU connector E111 terminal 1 (BR/Y) and ground.

Continuity should not exist.



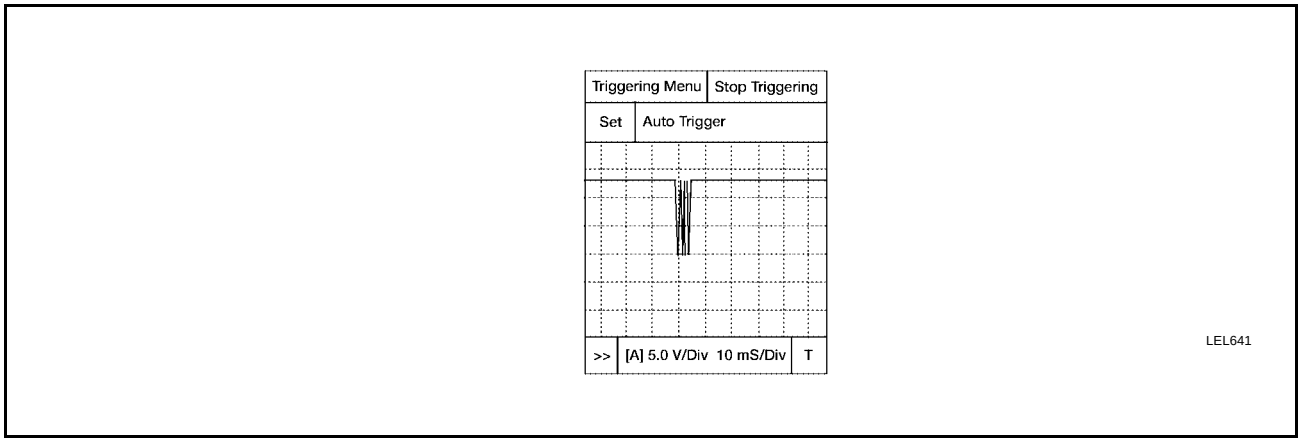
OK or NG

OK >> GO TO 8.

NG >>
- Communication line is short-circuited with ground line.
- Repair or replace harness.
- **Ref. part No. C4**

8. SIGNAL FROM ECM TO NVIS (NATS) IMMU CHECK

1. Check the signal between ECM terminal 88 and ground with CONSULT-II or oscilloscope when ignition switch is turned ON.
2. Make sure signals which are shown in the figure below can be detected during 750 msec. just after ignition switch is turned ON.



OK or NG

OK >>
- NVIS (NATS) IMMU is malfunctioning.
- Replace NVIS (NATS) IMMU. **Ref. part No. A**
- Perform initialization with CONSULT-II.
- For the operation of initialization, refer to “CONSULT-II OPERATION MANUAL IVIS/NVIS”.

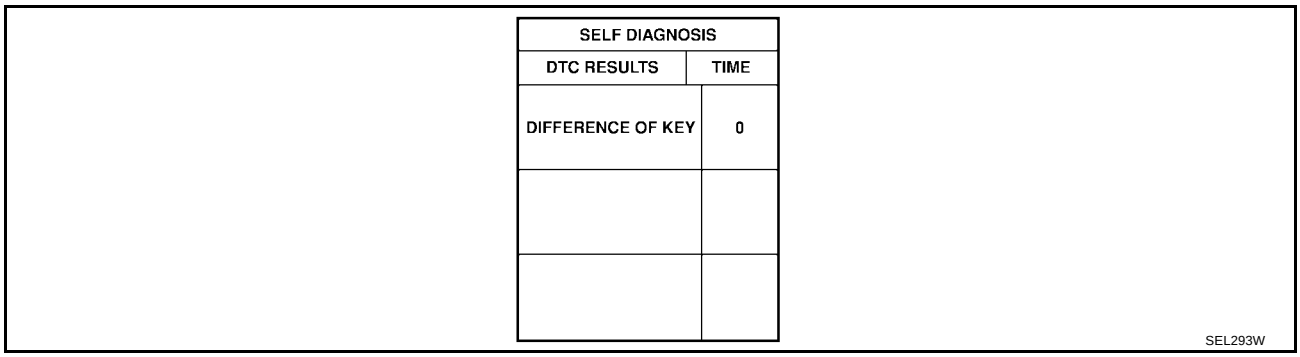
NG >>
- ECM is malfunctioning.
- Replace ECM. **Ref. part No. B**
- Perform initialization with CONSULT-II.
- For the operation of initialization, refer to “CONSULT-II OPERATION MANUAL IVIS/NVIS”.

DIAGNOSTIC PROCEDURE 3

Self-diagnostic results:
“DIFFERENCE OF KEY” displayed on CONSULT-II screen

1. CONFIRM SELF-DIAGNOSTIC RESULTS

Confirm SELF-DIAGNOSTIC RESULTS “DIFFERENCE OF KEY” displayed on CONSULT-II screen.

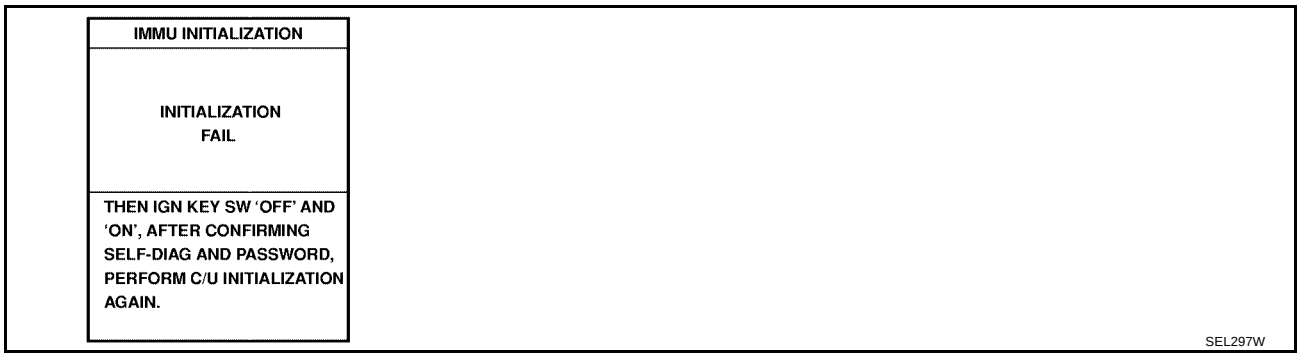


Is CONSULT-II screen displayed as above?

Yes >> GO TO 2.
No >> GO TO SYMPTOM MATRIX CHART 1.

2. PERFORM INITIALIZATION WITH CONSULT-II

Perform initialization with CONSULT-II. Re-register all NVIS (NATS) ignition key IDs.
For initialization, refer to “CONSULT-II OPERATION MANUAL IVIS/NVIS”.



NOTE:
If the initialization is not completed or fails, CONSULT-II shows above message on the screen.

Can the system be initialized?

Yes >>
- Start engine. (END)
- (Ignition key ID was unregistered. **Ref. part No. D**)

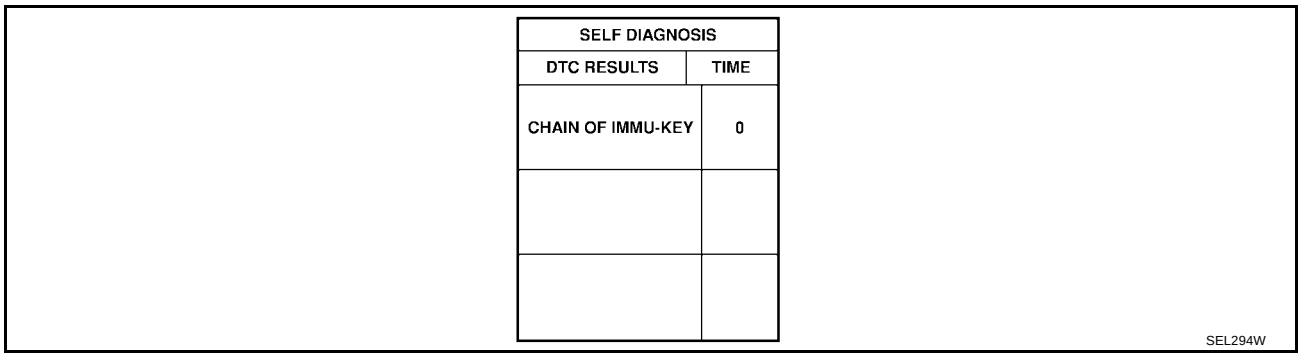
No >>
- NVIS (NATS) IMMU is malfunctioning.
- Replace NVIS (NATS) IMMU. **Ref. part No. A**
- Perform initialization with CONSULT-II.
- For initialization, refer to “CONSULT-II OPERATION MANUAL IVIS/NVIS”.

DIAGNOSTIC PROCEDURE 4

Self-diagnostic results:
“CHAIN OF IMMU-KEY” displayed on CONSULT-II screen

1. CONFIRM SELF-DIAGNOSTIC RESULTS

Confirm SELF-DIAGNOSTIC RESULTS “CHAIN OF IMMU-KEY” displayed on CONSULT-II screen.



Is CONSULT-II screen displayed as above?

Yes >> GO TO 2.
No >> GO TO BL-104, "SYMPTOM MATRIX CHART 1 (SELF-DIAGNOSIS RELATED ITEM)" .

2. CHECK NVIS (NATS) IGNITION KEY ID CHIP

Start engine with another registered NVIS (NATS) ignition key.
Does the engine start?

Yes >>
- Ignition key ID chip is malfunctioning.
- Replace the ignition key.
- **Ref. part No. E**
- Perform initialization with CONSULT-II.
- For initialization, refer to “CONSULT-II OPERATION MANUAL IVIS/NVIS”.

No >> GO TO 3.

3. CHECK NVIS (NATS) IMMU INSTALLATION

Check NVIS (NATS) IMMU installation.
Refer to BL-116, "How to Replace NVIS (NATS) IMMU" .

OK or NG

OK >>
- NVIS (NATS) IMMU is malfunctioning.
- Replace NVIS (NATS) IMMU. **Ref. part No. A**
- Perform initialization with CONSULT-II.
- For initialization, refer to “CONSULT-II OPERATION MANUAL IVIS/NVIS”.

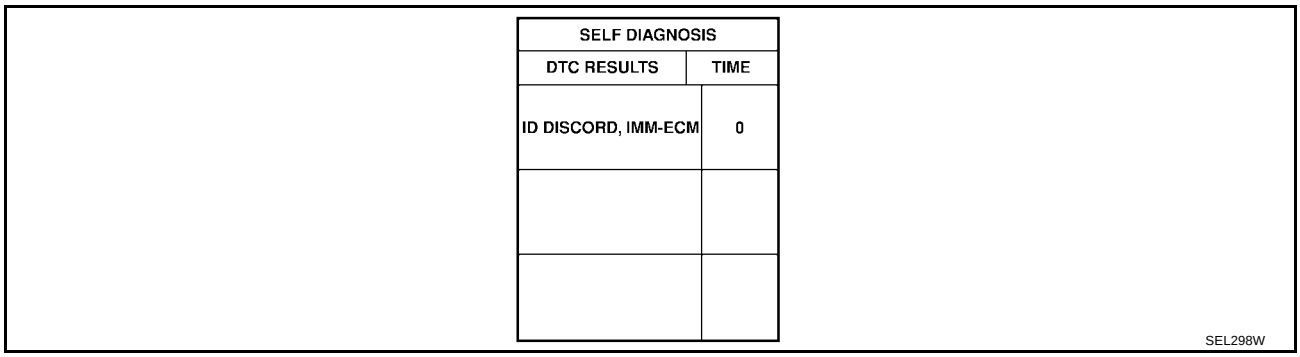
NG >> Reinstall NVIS (NATS) IMMU correctly.

DIAGNOSTIC PROCEDURE 5

Self-diagnostic results:
“ID DISCORD, IMM-ECM” displayed on CONSULT-II screen

1. CONFIRM SELF-DIAGNOSTIC RESULTS

Confirm SELF-DIAGNOSTIC RESULTS “ID DISCORD, IMM-ECM” displayed on CONSULT-II screen.



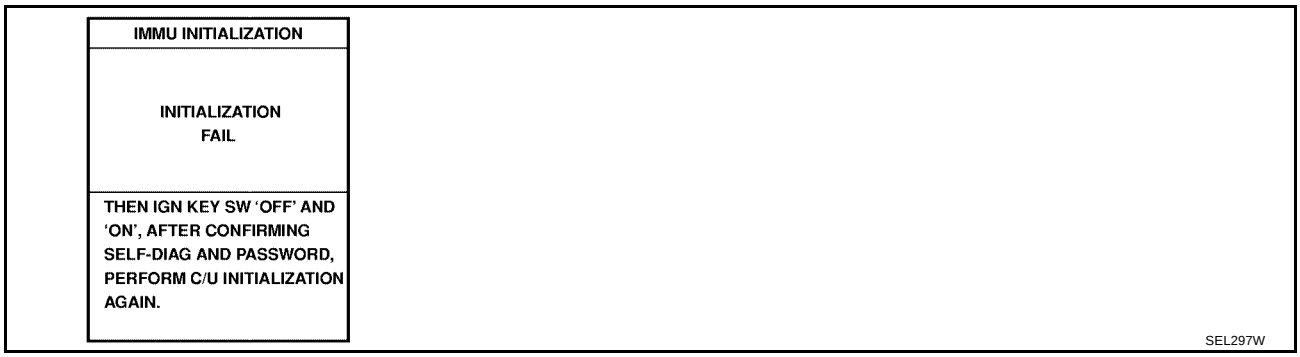
NOTE:
“ID DISCORD IMM-ECM”:
Registered ID of NVIS (NATS) IMMU is in discord with that of ECM.

Is CONSULT-II screen displayed as above?

Yes >> GO TO 2.
No >> GO TO BL-104, "SYMPTOM MATRIX CHART 1 (SELF-DIAGNOSIS RELATED ITEM)" .

2. PERFORM INITIALIZATION WITH CONSULT-II

Perform initialization with CONSULT-II. Re-register all NVIS (NATS) ignition key IDs.
For initialization, refer to “CONSULT-II OPERATION MANUAL IVIS/NVIS”.



NOTE:
If the initialization is not completed or fails, CONSULT-II shows above message on the screen.

Can the system be initialized?

Yes >> ● Start engine. (END)
● (System initialization had not been completed. **Ref. part No. F**)

No >> ● ECM is malfunctioning.
● Replace ECM. **Ref. part No. F**
● Perform initialization with CONSULT-II.
● For initialization, refer to “CONSULT-II OPERATION MANUAL IVIS/NVIS”.

DIAGNOSTIC PROCEDURE 6

“SECURITY INDICATOR LAMP DOES NOT LIGHT UP”

1. CHECK FUSE

Check 10A fuse [No. 12, located in the fuse block (J/B)].

Is 10A fuse OK?

Yes >> GO TO 2.
No >> Replace fuse.

2. CHECK SECURITY INDICATOR LAMP

1. Install 10A fuse.
2. Perform initialization with CONSULT-II.
   For initialization, refer to “CONSULT-II OPERATION MANUAL IVIS/NVIS”.
3. Turn ignition switch OFF.
4. Start engine and turn ignition switch OFF.
5. Check the security indicator lamp lighting.

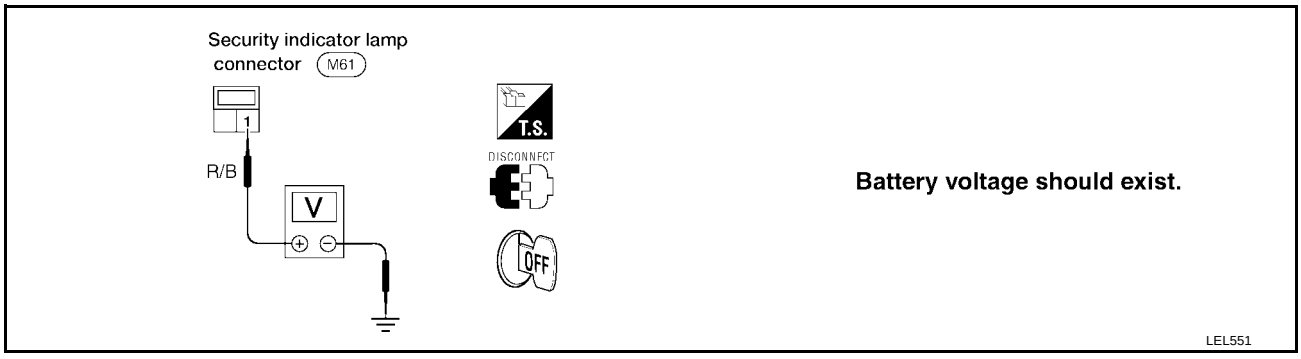
Security indicator lamp should light up.

OK or NG

OK >> INSPECTION END
NG >> GO TO 3.

3. CHECK SECURITY INDICATOR LAMP POWER SUPPLY CIRCUIT

1. Disconnect security indicator lamp connector.
2. Check voltage between security indicator lamp connector terminal 1 and ground.



OK or NG

OK >> GO TO 4.
NG >> Check harness for open or short between fuse and security indicator lamp.

4. CHECK SECURITY INDICATOR LAMP

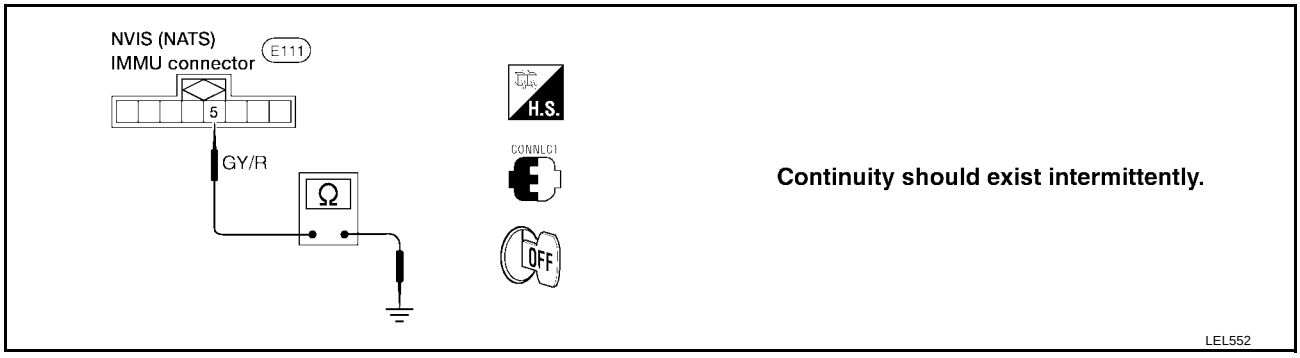
Check security indicator lamp.

Is security indicator lamp OK?

Yes >> GO TO 5.
No >> Replace security indicator lamp.

5. CHECK NVIS (NATS) IMMU FUNCTION

1. Connect NVIS (NATS) IMMU connector.
2. Disconnect security indicator lamp connector.
3. Check continuity between NVIS (NATS) IMMU terminal 5 and ground.



OK or NG

OK >> Check harness for open or short between security indicator lamp and NVIS (NATS) IMMU.

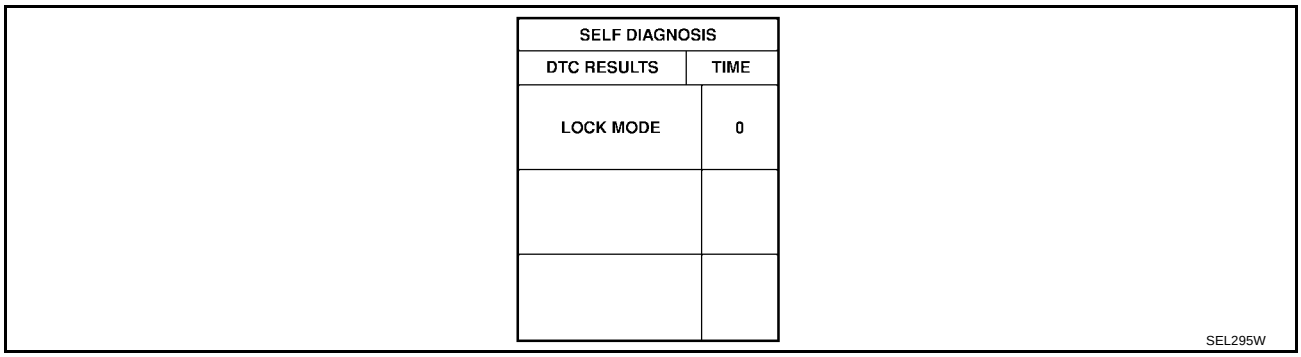
NG >>
- NVIS (NATS) IMMU is malfunctioning.
- Replace NVIS (NATS) IMMU.
- Perform initialization with CONSULT-II.
- For initialization, refer to “CONSULT-II OPERATION MANUAL IVIS/NVIS”.

DIAGNOSTIC PROCEDURE 7

Self-diagnostic results:
“LOCK MODE” displayed on CONSULT-II screen

1. CONFIRM SELF-DIAGNOSTIC RESULTS

Confirm SELF-DIAGNOSTIC RESULTS “LOCK MODE” is displayed on CONSULT-II screen.



Is CONSULT-II screen displayed as above?

Yes >> GO TO 2.
No >> GO TO BL-104, "SYMPTOM MATRIX CHART 1 (SELF-DIAGNOSIS RELATED ITEM)" .

2. ESCAPE FROM LOCK MODE

1. Turn ignition switch OFF.
2. Turn ignition switch ON with registered key. (Do not start engine.) Wait 5 seconds.
3. Return the key to OFF position.
4. Repeat steps 2 and 3 twice (total of three cycles).
5. Start the engine.

Does engine start?

Yes >> ● System is OK.
● (Now system is escaped from “LOCK MODE”.)
No >> GO TO 3.

3. CHECK NVIS (NATS) IMMU INSTALLATION

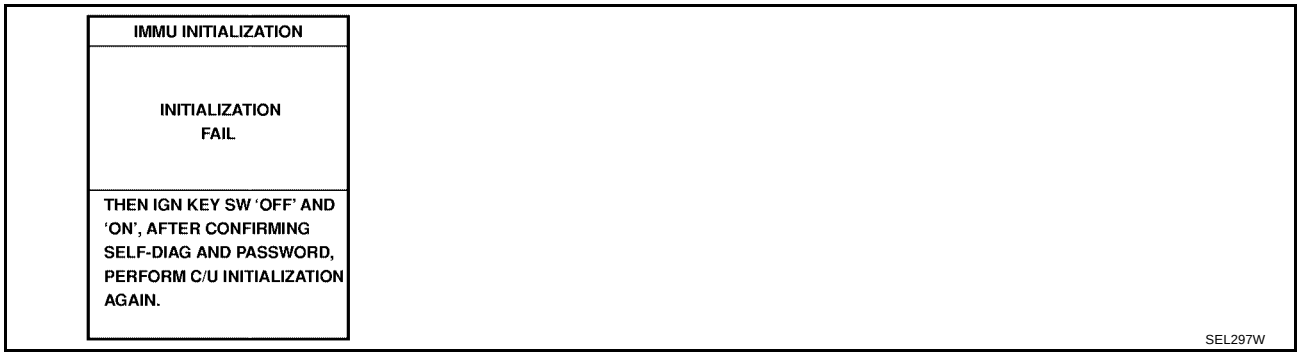
Check NVIS (NATS) IMMU installation. Refer to BL-116, "How to Replace NVIS (NATS) IMMU" .

OK or NG

OK >> GO TO 4.
NG >> Reinstall NVIS (NATS) IMMU correctly.

4. PERFORM INITIALIZATION WITH CONSULT-II

Perform initialization with CONSULT-II.
For initialization, refer to “CONSULT-II OPERATION MANUAL IVIS/NVIS”.



NOTE:
If the initialization is not completed or fails, CONSULT-II shows the above message on the screen.

Can the system be initialized?

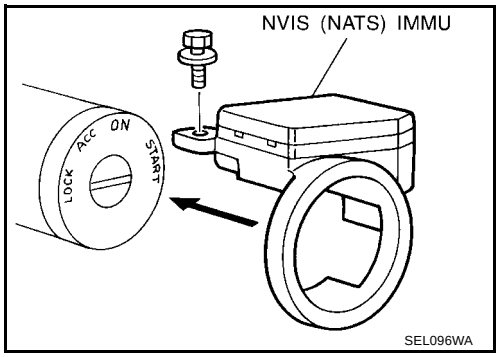
Yes >> System is OK.
No >> Check “CHAIN OF IMMU-KEY”. Refer to BL-111, "DIAGNOSTIC PROCEDURE 4" .

How to Replace NVIS (NATS) IMMU

EIS0015S

NOTE:

- **If NVIS (NATS) IMMU is not installed correctly, NVIS (NATS) system will not operate properly and SELF-DIAG RESULTS on CONSULT-II screen will show “LOCK MODE” or “CHAIN OF IMMU-KEY”.**



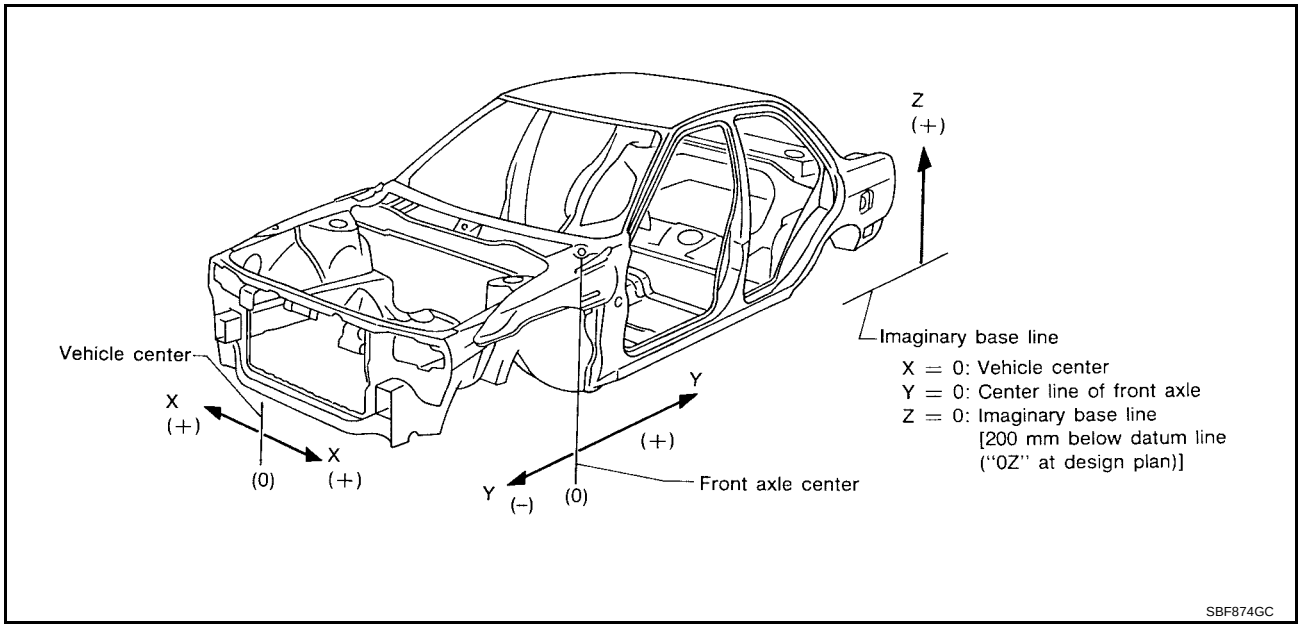
BODY (ALIGNMENT)

PFP:74312

Alignment

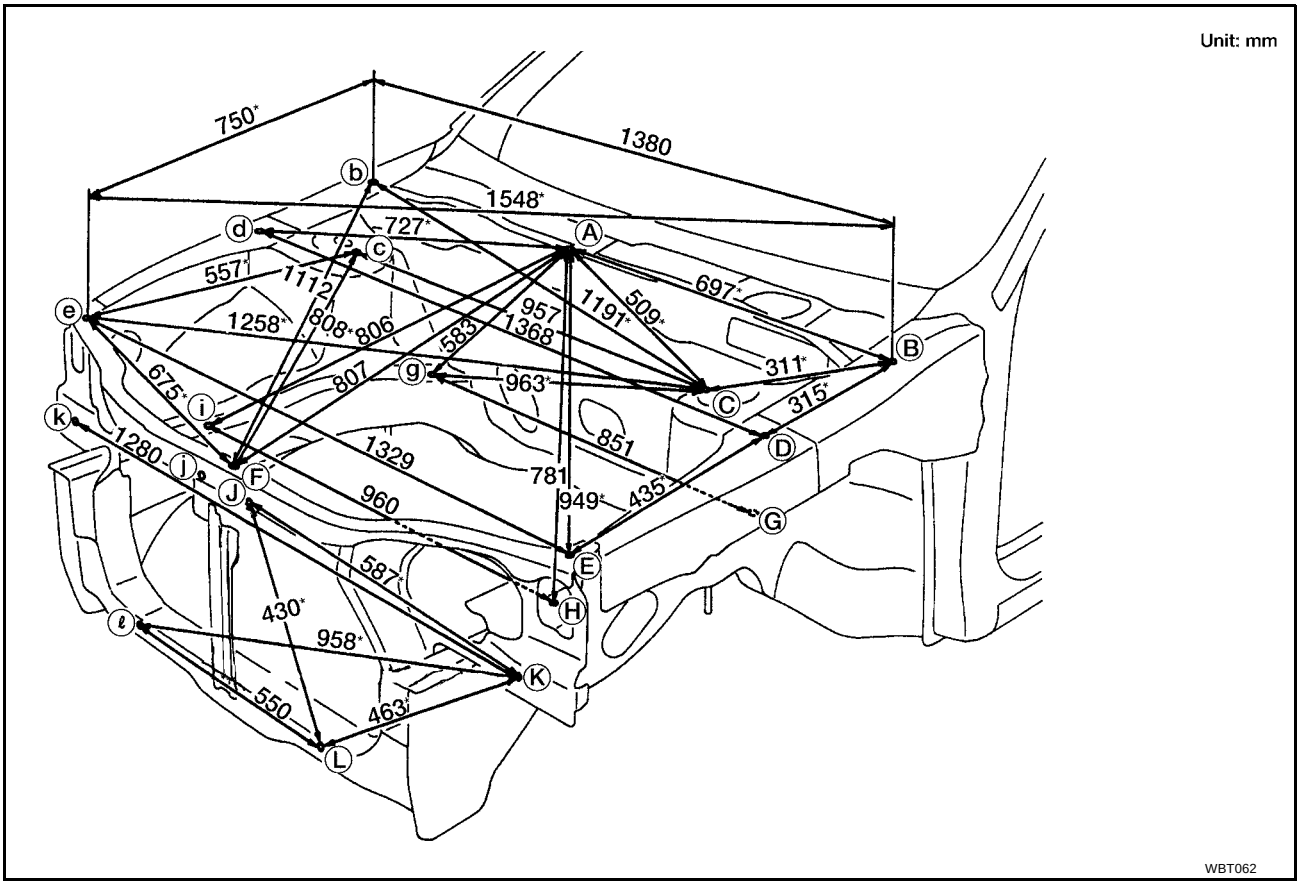
EIS0015T

- All dimensions indicated in figures are actual ones.
- When using a tracking gauge, adjust both pointers to equal length. Then check the pointers and gauge itself to make sure there is no free play.
- When a measuring tape is used, check to be sure there is no elongation, twisting or bending.
- Measurements should be taken at the center of the mounting holes.
- An asterisk (*) indicates the measuring point value is the same on both sides.
- The coordinates of the measurement points are the distances measured from the standard line of “X”, “Y” and “Z”.

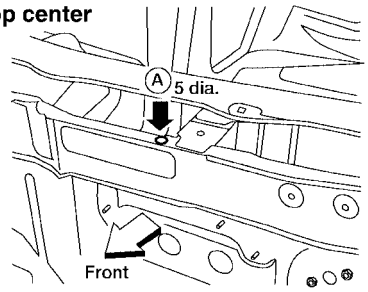


ENGINE COMPARTMENT

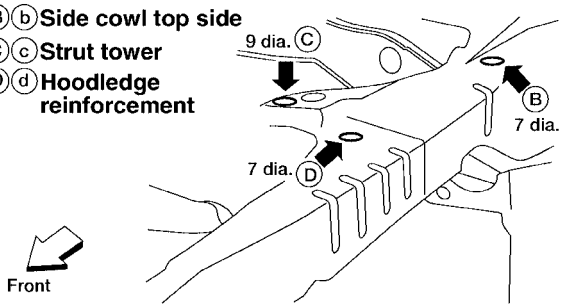
Measurement



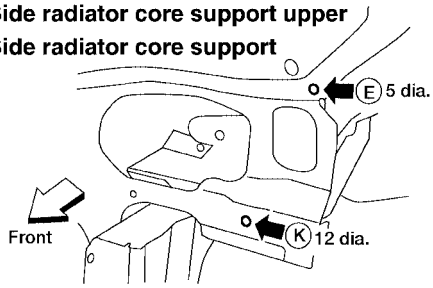
Ⓐ Cowl top center



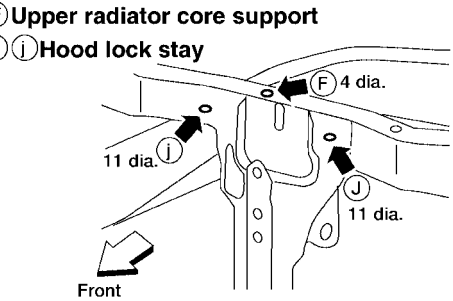
Ⓑ ⓑ Side cowl top side
Ⓒ ⓒ Strut tower
Ⓓ ⓓ Hoodledge reinforcement



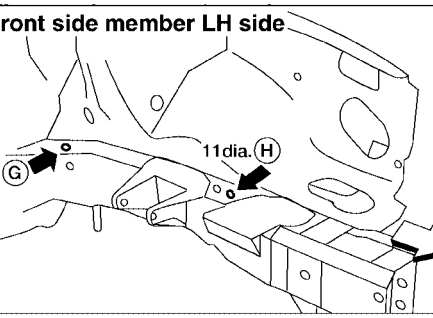
Ⓔ ⓔ Side radiator core support upper
Ⓚ ⓚ Side radiator core support



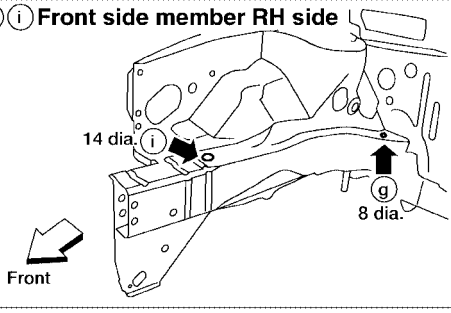
Ⓕ Upper radiator core support
Ⓙ ⓙ Hood lock stay



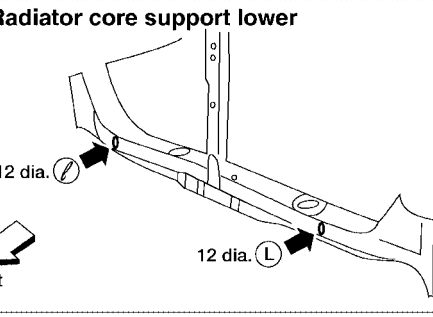
Ⓖ Ⓗ Front side member LH side



ⓖ ⓘ Front side member RH side



Ⓛ Ⓛ Radiator core support lower



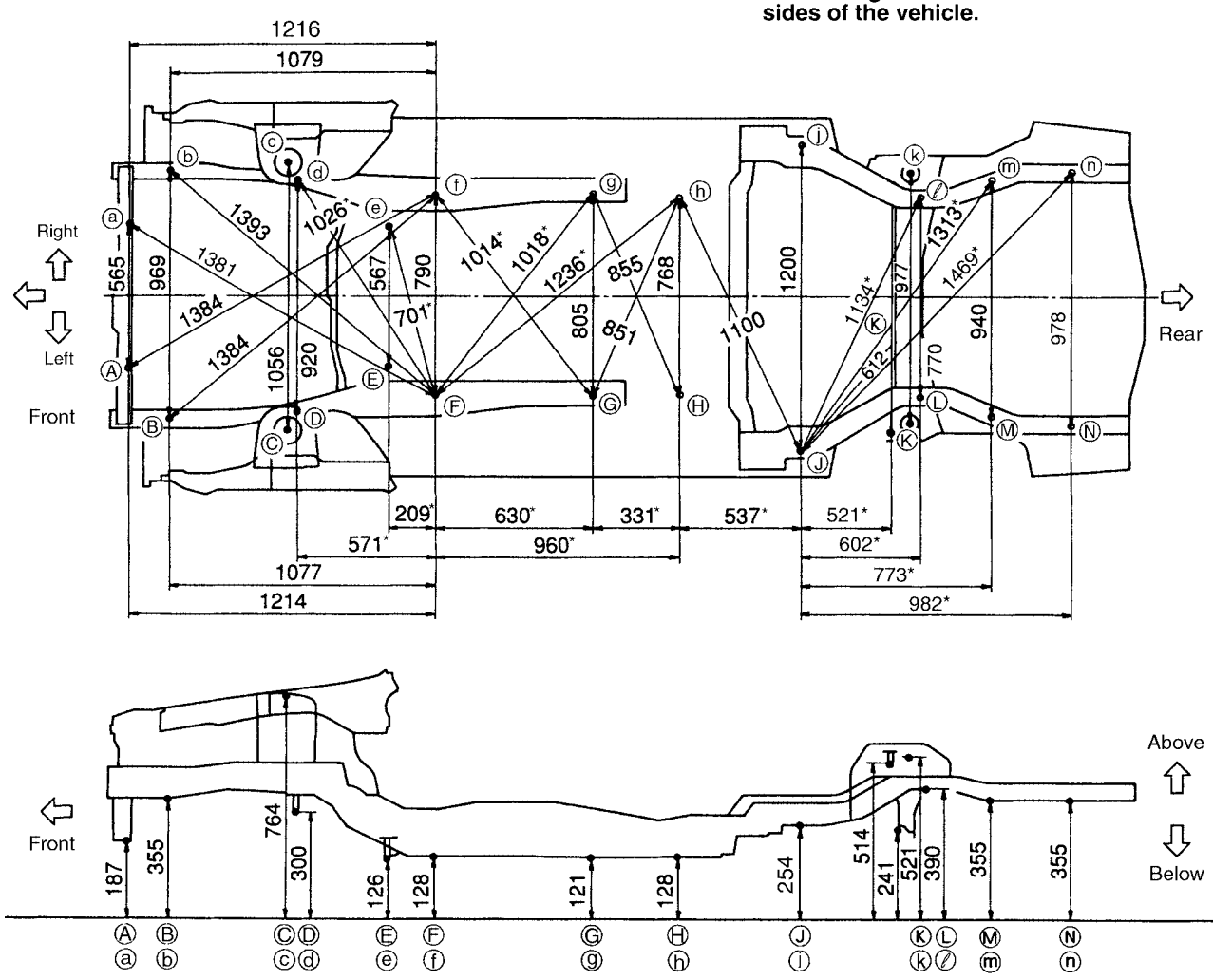
Unit: mm

WBT071

Measurement Points

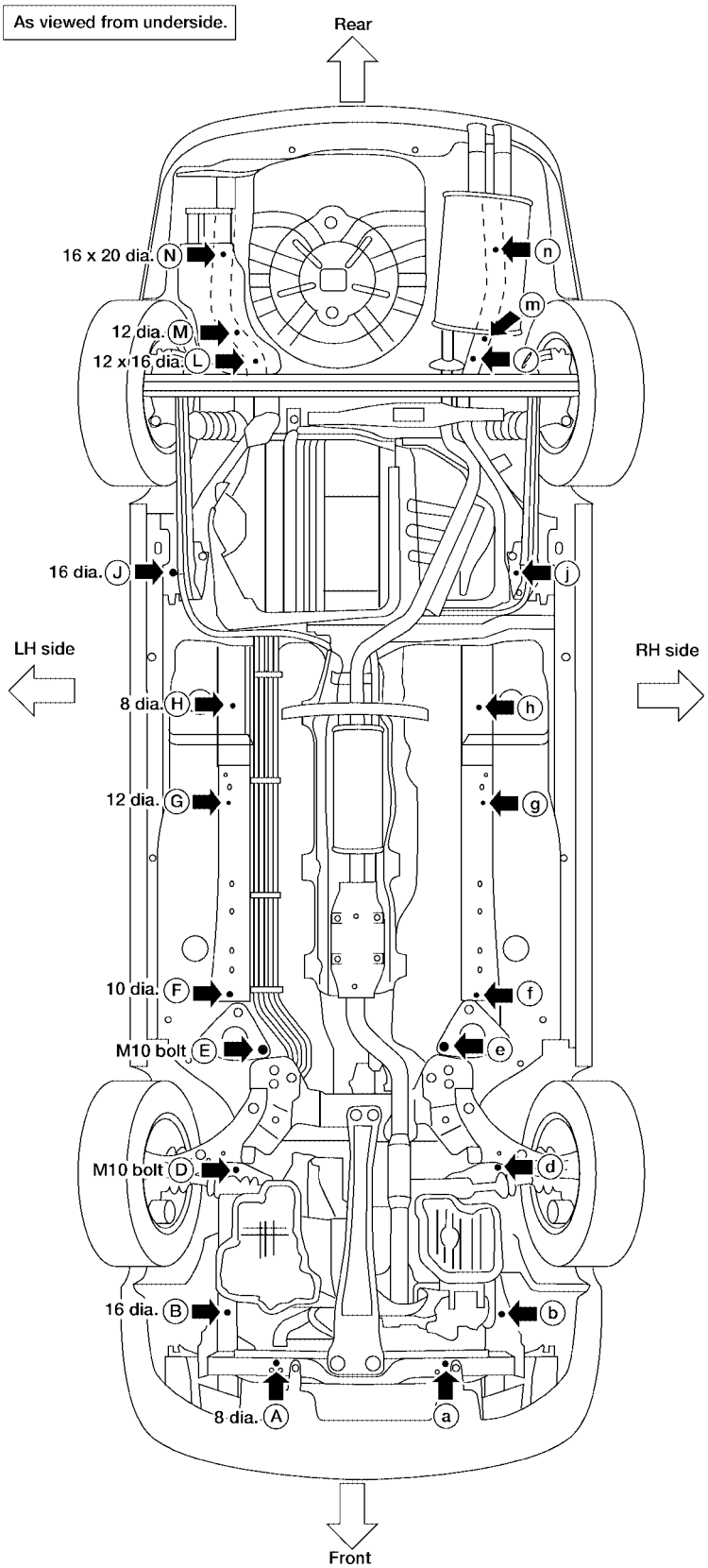
As viewed from underside.

* Figures marked with an * indicates symmetrically identical dimensions on both right- and left-hand sides of the vehicle.



WBT063

UNDERBODY
Measurement



Unit: mm

Coordinates:

Ⓐ, ⓐ
X: 280, -285
Y: 607, -609
Z: 186.8

Ⓑ, ⓑ
X: 477, -492
Y: -450
Z: 355

Ⓒ, ⓒ
X: 528
Y: 18
Z: 764

Ⓓ, ⓓ
X: 460
Y: 60
Z: 300.3

Ⓔ, ⓔ
X: 283.5
Y: 423
Z: 126.5

Ⓕ, ⓕ
X: 395
Y: 600
Z: 127.8

Ⓖ, ⓖ
X: 400, -405
Y: 1230
Z: 120.6

Ⓗ, ⓗ
X: 384
Y: 1560
Z: 128

Ⓙ, ⓙ
X: 600
Y: 2035
Z: 254

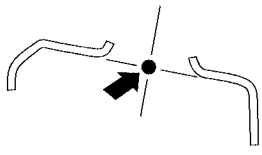
Ⓚ, ⓚ
X: 488.3
Y: 2467.8
Z: 520.6

Ⓛ, ⓛ
X: 385
Y: 2580
Z: 390

Ⓜ, ⓜ
X: 470
Y: 2790
Z: 355

Ⓝ, ⓝ
X: 489
Y: 3016
Z: 355

Front and rear strut tower centers
Ⓒ, ⓒ Ⓚ, ⓚ



Front: 30 dia.
Rear: 68 dia.

WBT064

SECTION GW

GLASSES, WINDOW SYSTEM & MIRRORS

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EIS0015U

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**

WINDSHIELD AND WINDOWS

PFP:72700

Removal and Installation

EIS0015V

REMOVAL

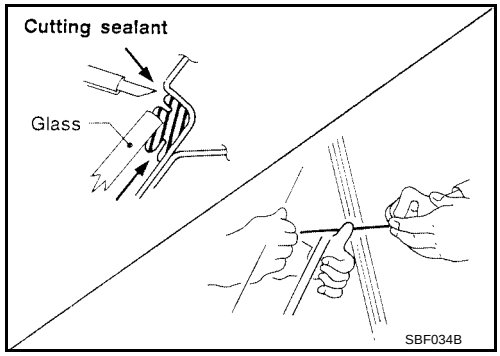
After removing interior moldings and trim to access edge of glass, remove glass using piano wire or power cutting tool and an inflatable pump bag.

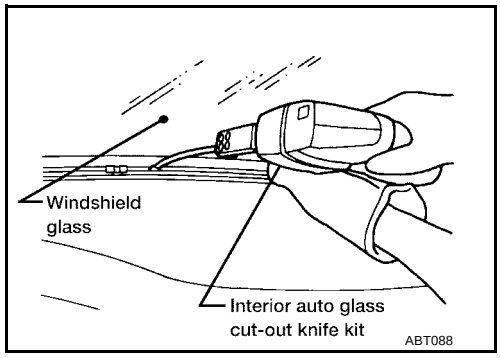
WARNING:

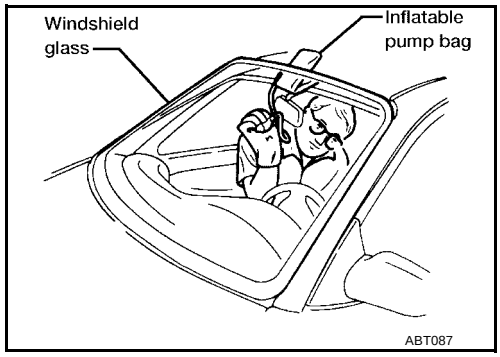
When removing the glass from the vehicle, always wear safety glasses and heavy gloves to help prevent glass splinters from entering your eyes or cutting your hands.

CAUTION:

- **Be careful not to scratch the glass when removing.**
- **Do not set or stand the glass on its edge. Small chips may develop into cracks.**







INSTALLATION

- Use genuine Nissan Urethane Adhesive Kit or equivalent and follow the instructions furnished with it.
- While the urethane adhesive is curing, open a door window. This will prevent the glass from being forced out by passenger compartment air pressure when a door is closed.
- The molding must be installed securely so that it is in position and leaves no gap.
- Inform the customer that the vehicle should remain stationary until the urethane adhesive has completely cured (preferably 24 hours). Curing time varies with temperature and humidity.

WARNING:

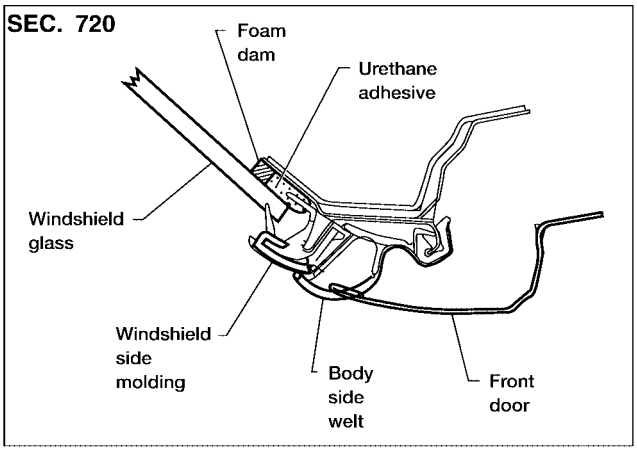
- **Keep heat and open flames away as primers and adhesive are flammable.**
- **The materials contained in the kit are harmful if swallowed, and may irritate skin and eyes. Avoid contact with the skin and eyes.**
- **Use in an open, well ventilated location. Avoid breathing the vapors. They can be harmful if inhaled. If affected by vapor inhalation, immediately move to an area with fresh air.**
- **Driving the vehicle before the urethane adhesive has completely cured may affect the performance of the windshield in case of an accident.**

CAUTION:

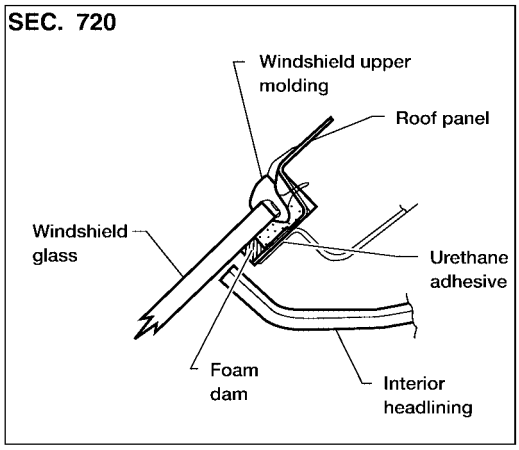
- **Do not use an adhesive which is past its usable term. Shelf life of this product is limited to six months after the date of manufacture. Carefully adhere to the expiration or manufacture date printed on the box.**
- **Keep primers and adhesive in a cool, dry place. Ideally, they should be stored in a refrigerator.**
- **Do not leave primers or adhesive cartridge unattended with their caps open or off.**
- **The vehicle should not be driven for at least 24 hours or until the urethane adhesive has completely cured. Curing time varies depending on temperature and humidities. The curing time will increase under lower temperatures and lower humidities.**

WINDSHIELD AND REAR WINDOW

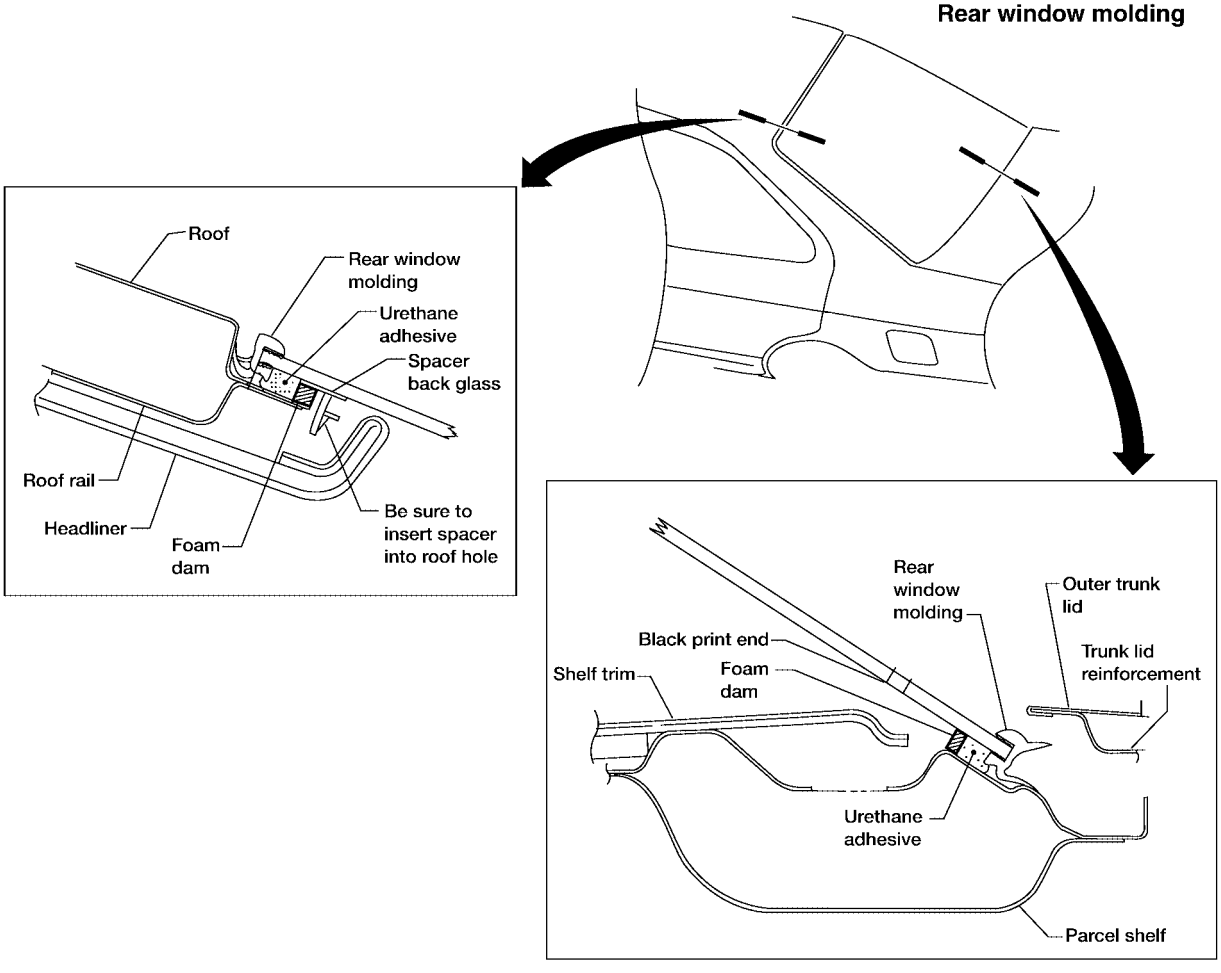
Windshield side molding



Windshield upper molding



Rear window molding



WBT114

Repairing Water Leaks for Windshield

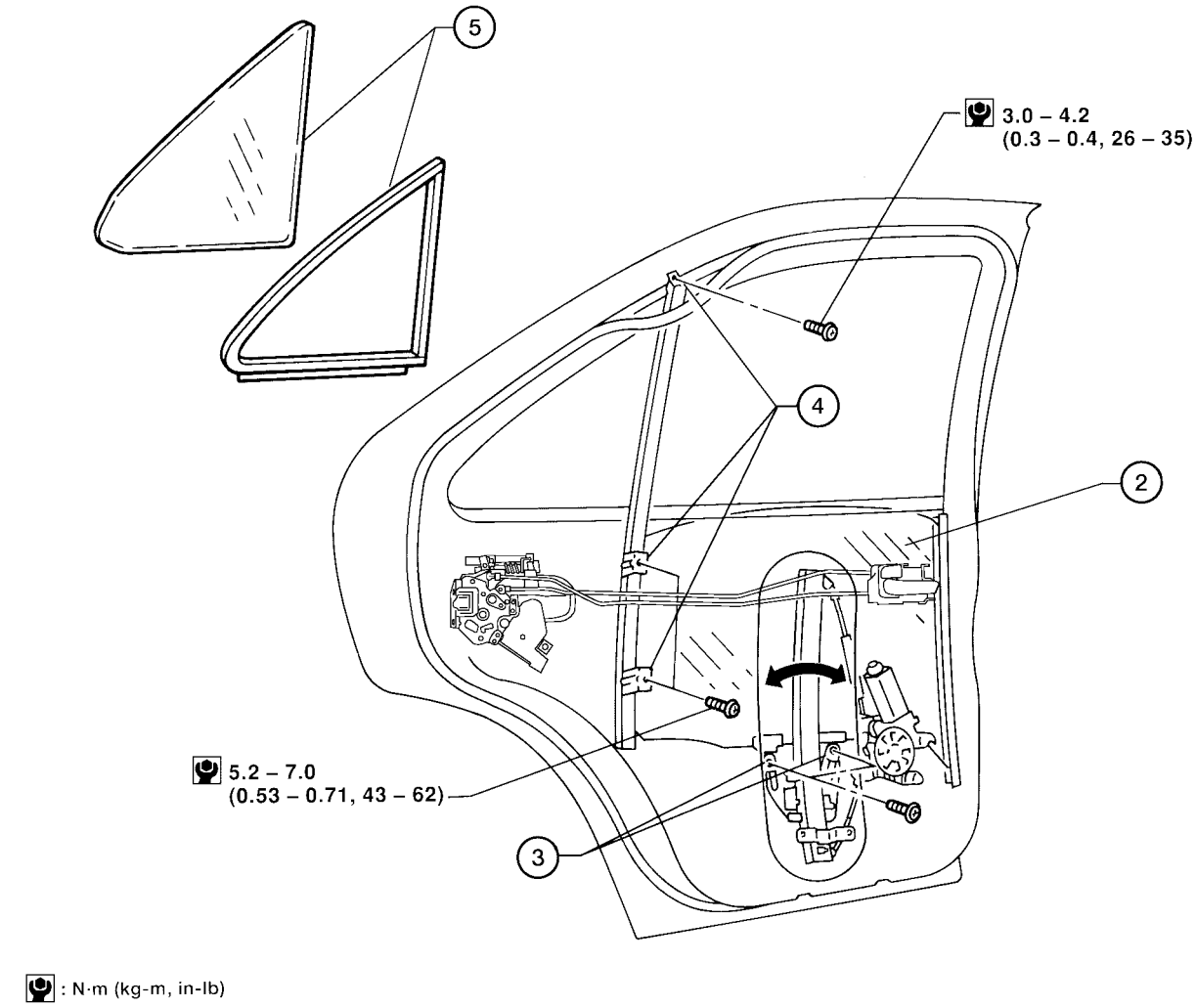
Leaks can be repaired without removing and reinstalling glass.

If water is leaking between caulking material and body or glass, determine the extent of leakage. This can be determined by applying water while pushing glass outward.

To stop the leak, apply primer and then sealant to the leak point.

QUARTER WINDOW

SEC. 820•823•825



: N·m (kg-m, in-lb)

WBT074

1. Remove the rear door finisher. Refer to EI-31, "Removal and Installation" .
2. Lower the rear window.
3. Remove two screws securing rear glass, then remove rear glass.
4. Remove two bolts and one top screw securing rear door center sash, then remove rear door center sash.
5. Remove quarter glass and rubber seal.

POWER WINDOW

PFP:25401

System Description

EIS0015W

Power is supplied at all times:

- from 30A fusible link (letter **d** , located in the fuse and fusible link box)
- to circuit breaker terminal +,
- through circuit breaker terminal -,
- to power window relay terminal 5.

With ignition switch in ON or START position, power is supplied:

- through 10A fuse [No. 10, located in the fuse block (J/B)],
- to power window relay terminal 1.

Ground is supplied:

- to power window relay terminal 2
- through body grounds M28 and M54.

The power window relay is energized and power is supplied:

- through power window relay terminal 3,
- to main power window and door lock/unlock switch terminal 1,
- to front power window switch RH terminal 5,
- to rear power window switch LH and RH terminal 5.

MANUAL OPERATION

Front Door LH

Ground is supplied:

- to main power window and door lock/unlock switch terminal 3,
- through body grounds M28 and M54.

WINDOW UP

When the front LH switch in the main power window and door lock/unlock switch is pressed in the up position, power is supplied:

- to front power window motor LH terminal UP,
- through main power window and door lock/unlock switch terminal 9.

Ground is supplied:

- to front power window motor LH terminal DN,
- through main power window and door lock/unlock switch terminal 8.

Then, the motor raises the window until the switch is released, or until the window reaches the end of its travel.

WINDOW DOWN

When the LH switch in the main power window and door lock/unlock switch is pressed in the down position, power is supplied:

- to front power window motor LH terminal DN,
- through main power window and door lock/unlock switch terminal 8.

Ground is supplied:

- to front power window motor LH terminal UP,
- through main power window and door lock/unlock switch terminal 9.

Then, the motor lowers the window until the switch is released, or until the window reaches the end of its travel.

Front Door RH

Ground is supplied:

- to main power window and door lock/unlock switch terminal 3,
- through body grounds M28 and M54.

NOTE:

Numbers in parentheses are terminal numbers, when power window switch is pressed in the UP and DOWN positions respectively.

MAIN SWITCH OPERATION
Power is supplied:

- through main power window and door lock/unlock switch (5, 6),
- to front power window switch RH (3, 4).

The subsequent operation is the same as the sub-switch operation.
SUB-SWITCH OPERATION
Power is supplied:

- through front power window switch RH (1, 2),
- to front power window motor RH (UP, DN).

Ground is supplied:

- to front power window motor RH (DN, UP),
- through front power window switch RH (2, 1),
- to front power window switch RH (4, 3),
- through main power window and door lock/unlock switch (6, 5).

Then, the motor raises or lowers the window until the switch is released.

Rear Door

Rear door windows will raise and lower in the same manner as front door RH window.

AUTO OPERATION

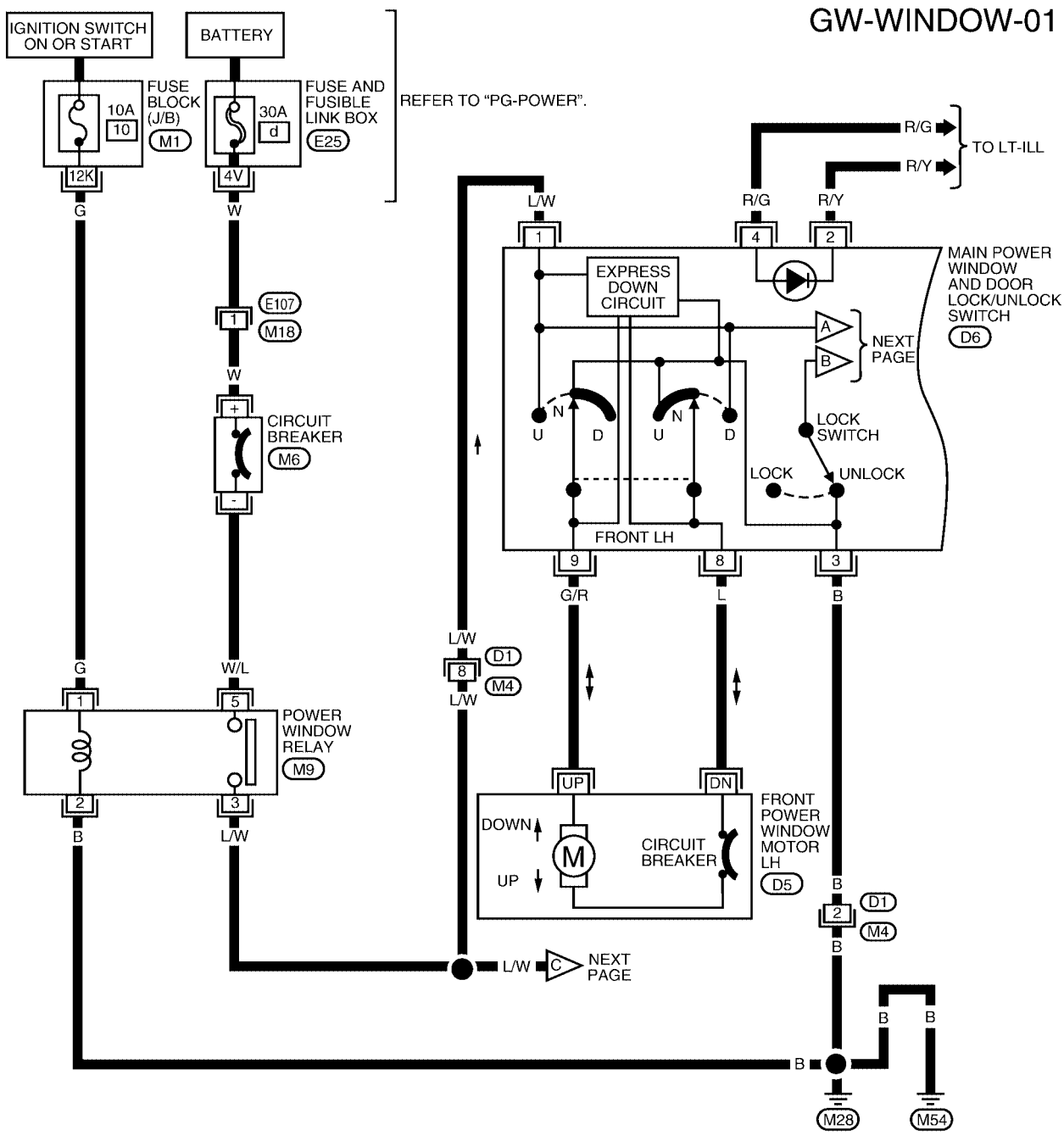
The power window AUTO feature enables the driver to open the driver's window without holding the window switch in the down or up position.
The AUTO feature only operates on the driver's window.

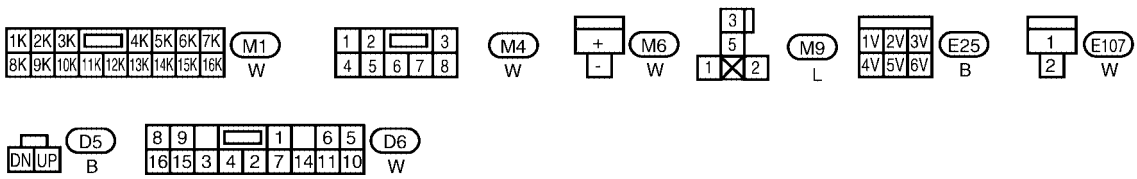
POWER WINDOW LOCK

The power window lock is designed to lock operation of all windows except for driver's door window.
When the lock switch is pressed to lock position, ground of the sub-switches in the main power window and door lock/unlock switch is disconnected. This prevents the power window motors from operating.

Wiring Diagram — WINDOW —

EIS0015X





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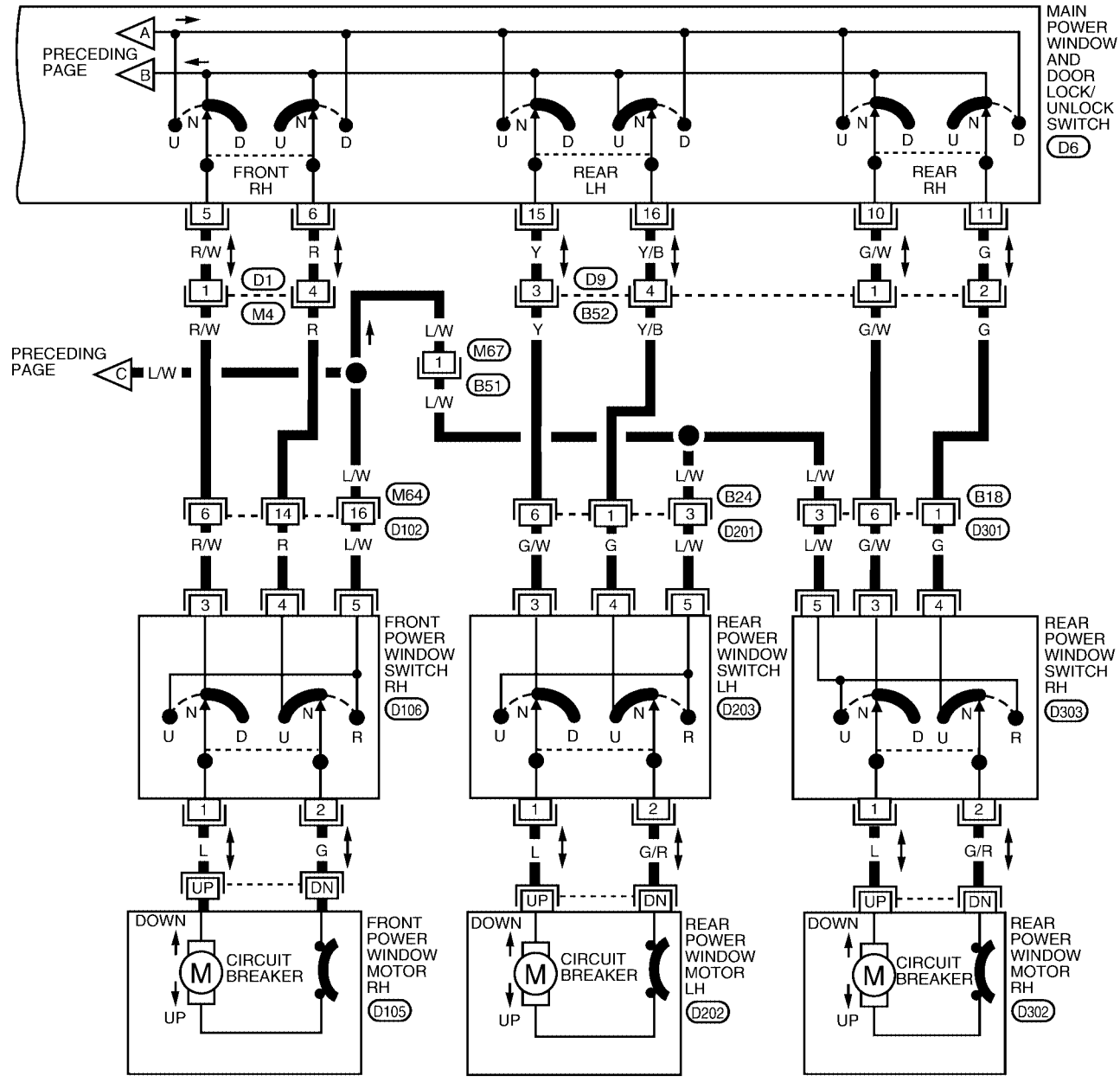
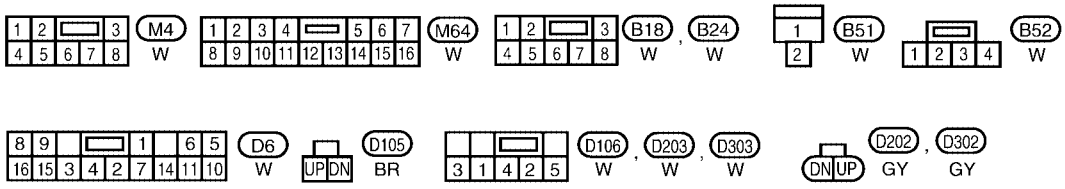
GW-WINDOW-02





WIWA0309E

Trouble Diagnoses

EIS0015Y

Symptom	Possible cause	Repair order
None of the power windows can be operated using any switch.	1. 10A fuse, 30A fusible link 2. M6 circuit breaker 3. Power window relay 4. M6 circuit breaker and power window relay related wiring 5. Ground circuit 6. Main power window and door lock/unlock switch	1. Check 10A fuse [No. 10, located in fuse block (J/B)], 30A fusible link (letter **d** , located in fuse and fusible link box). 2. Check M6 circuit breaker. 3. Check power window relay. 4. Check the following. – Check harness between M6 circuit breaker and 30A fusible link (letter **d** , located in fuse and fusible link box). – Check harness between M6 circuit breaker and power window relay. – Check harness between power window relay and power window relay main power window and door lock/unlock switch. – Check harness between 10A fuse [No. 10, located in fuse block (J/B)] and power window relay. 5. Check the following. – Check ground circuit of main power window and door lock/unlock switch terminal 3. – Check power window relay ground circuit. 6. Check main power window and door lock/unlock switch.
Driver side power window cannot be operated but other windows can be operated.	1. Driver side power window regulator circuit 2. Driver side power window regulator 3. Main power window and door lock/unlock switch circuit 4. Main power window and door lock/unlock switch	1. Check harness between main power window and door lock/unlock switch and driver side power window regulator for open or short circuit. 2. Check driver side power window regulator. 3. Check harness between power window relay and main power window and lock/unlock switch. 4. Check main power window and door lock/unlock switch.
One or more power windows except driver's side window cannot be operated.	1. Power window sub-switches 2. Power window regulators 3. Main power window and door lock/unlock switch 4. Power window circuit	1. Check power window sub-switch. 2. Check power window regulator. 3. Check main power window and door lock/unlock switch. 4. Check the following. – Check harness between the power window sub switch terminal 5 and power window relay. – Check harnesses between main power window and door lock/unlock switch and power window sub-switch for open/short circuit. – Check harnesses between power window sub-switch and power window regulator for open/short circuit.
Power windows except driver's side window cannot be operated using main power window and door lock/unlock switch but can be operated by power window sub-switch.	1. Main power window and door lock/unlock switch	1. Check main power window and door lock/unlock switch.

FRONT DOOR GLASS AND REGULATOR

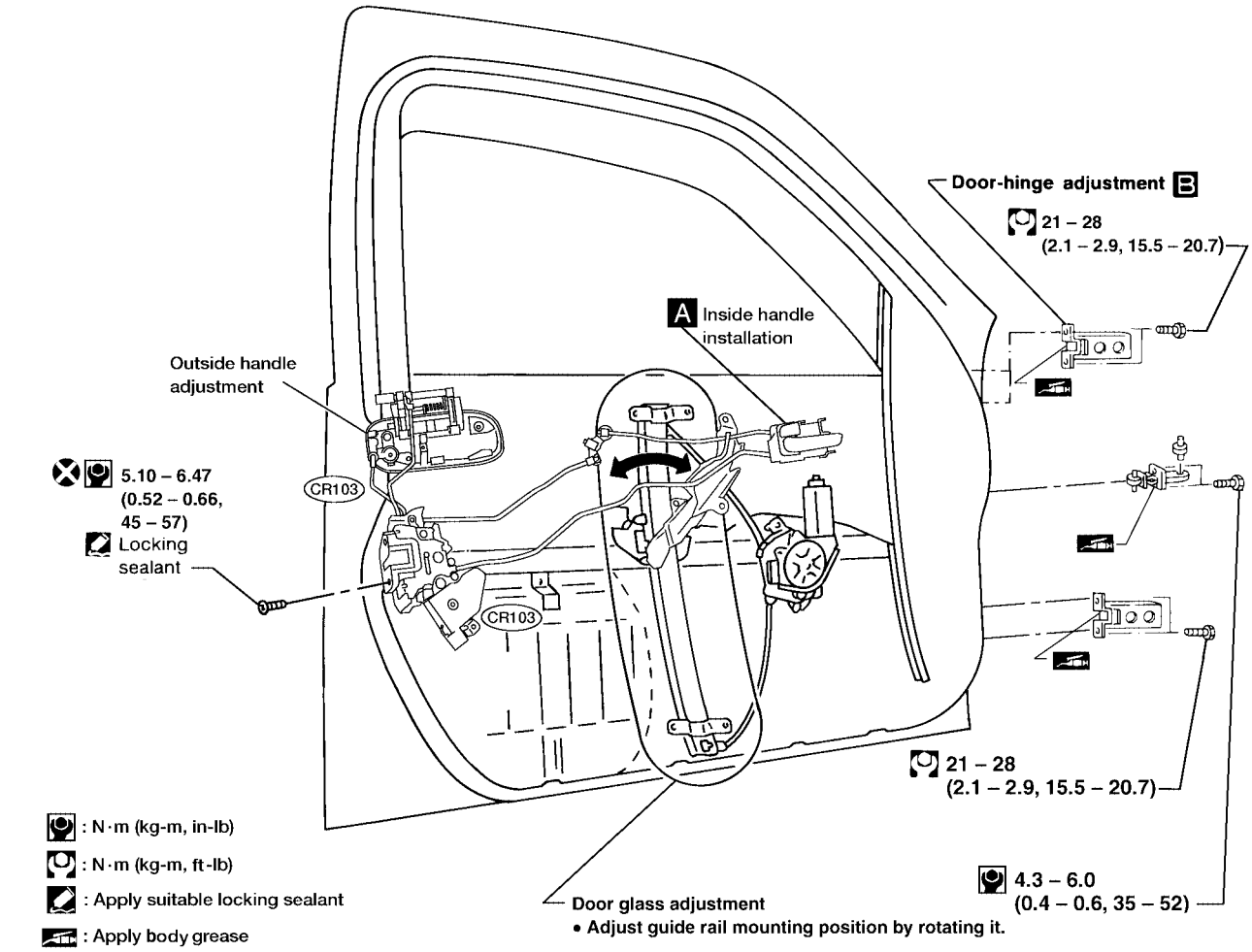
PFP:80300

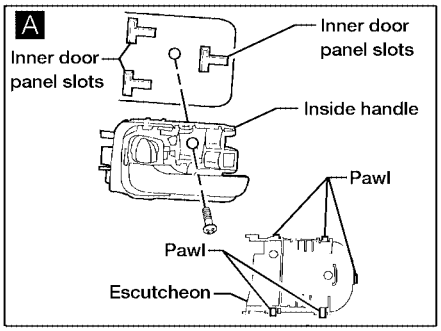
Front Door

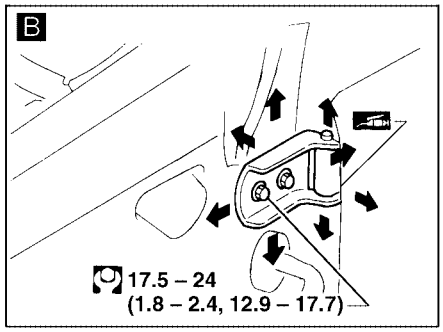
EIS0015Z

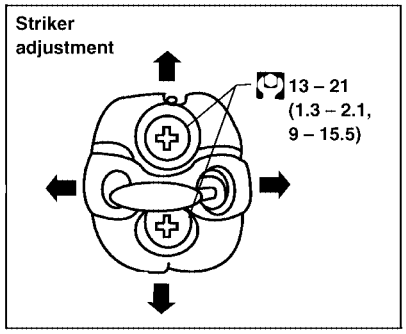
- For removal of door finisher, refer to EI-31, "Removal and Installation" .
- After adjusting the door or door lock, check the door lock operation.

SEC. 800•803•805









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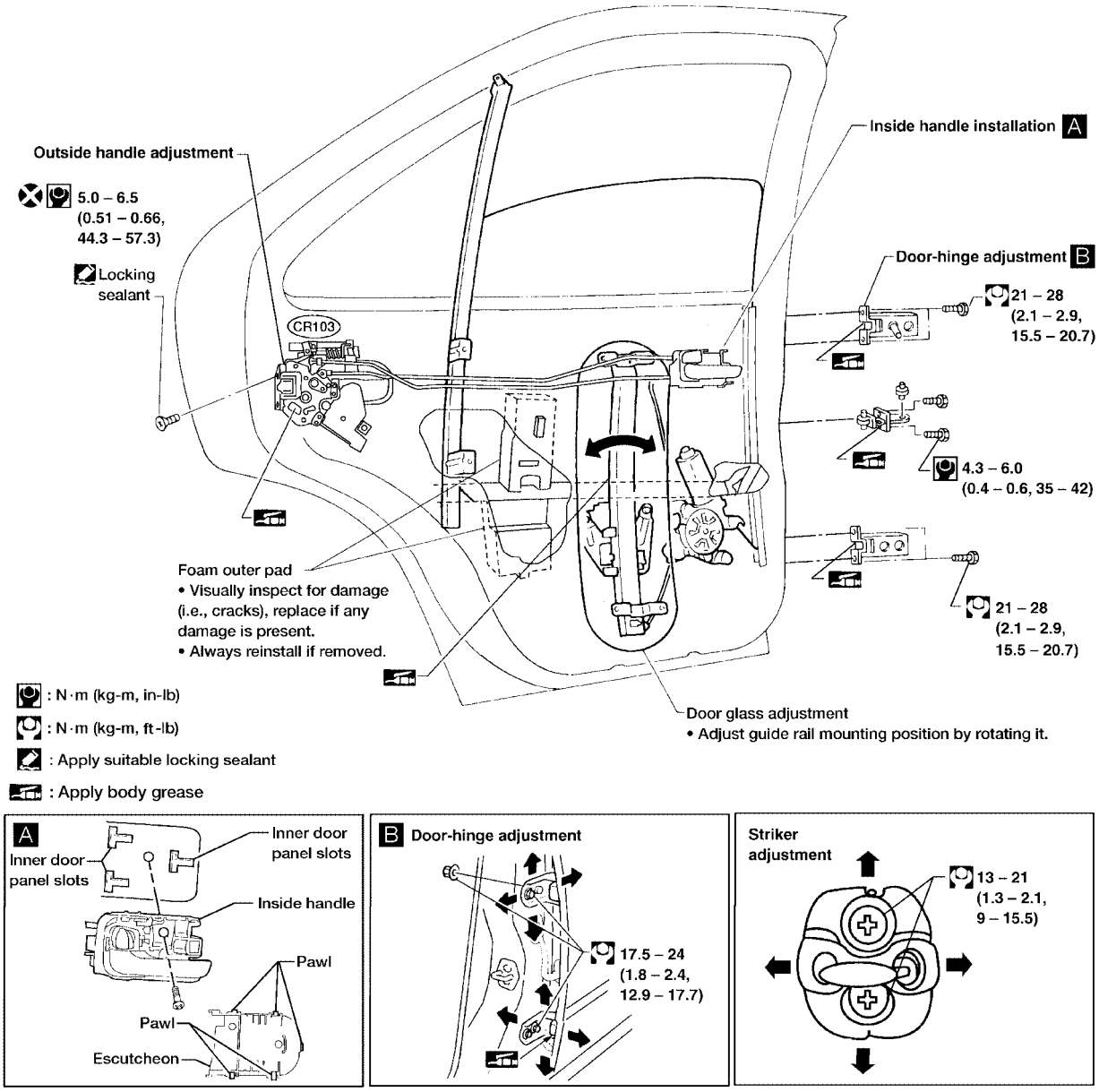
REAR DOOR GLASS AND REGULATOR

PFP:82300

Rear Door

EIS00160



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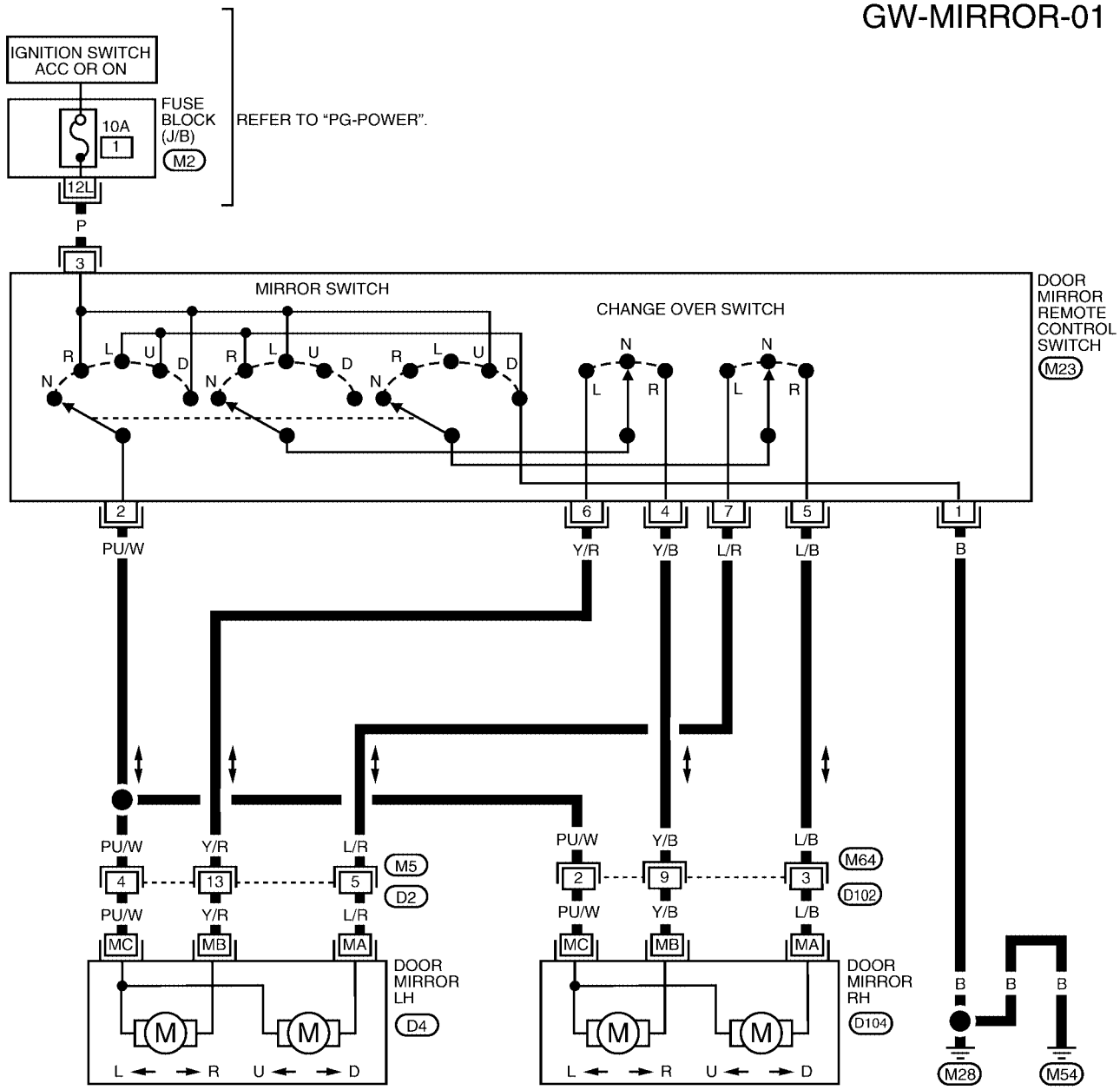
DOOR MIRROR

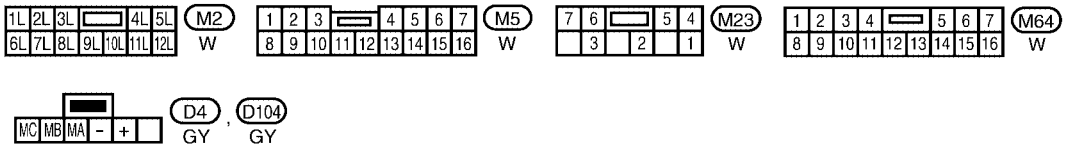
PFP:96301

Wiring Diagram — MIRROR —

EIS00161

GW-MIRROR-01

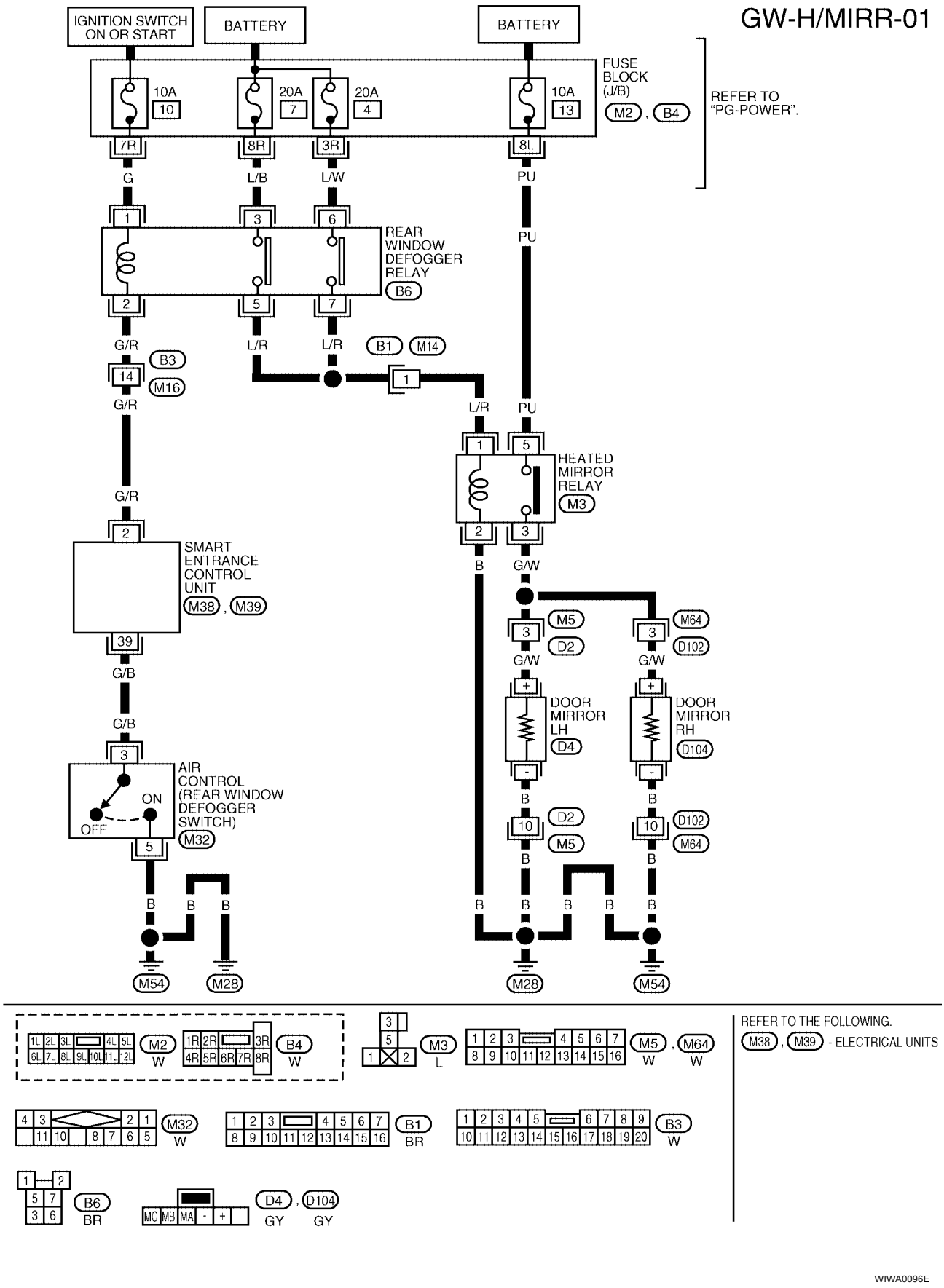




WIWA0310E

Wiring Diagram — H/MIRR —

EIS00162



WIWA0096E

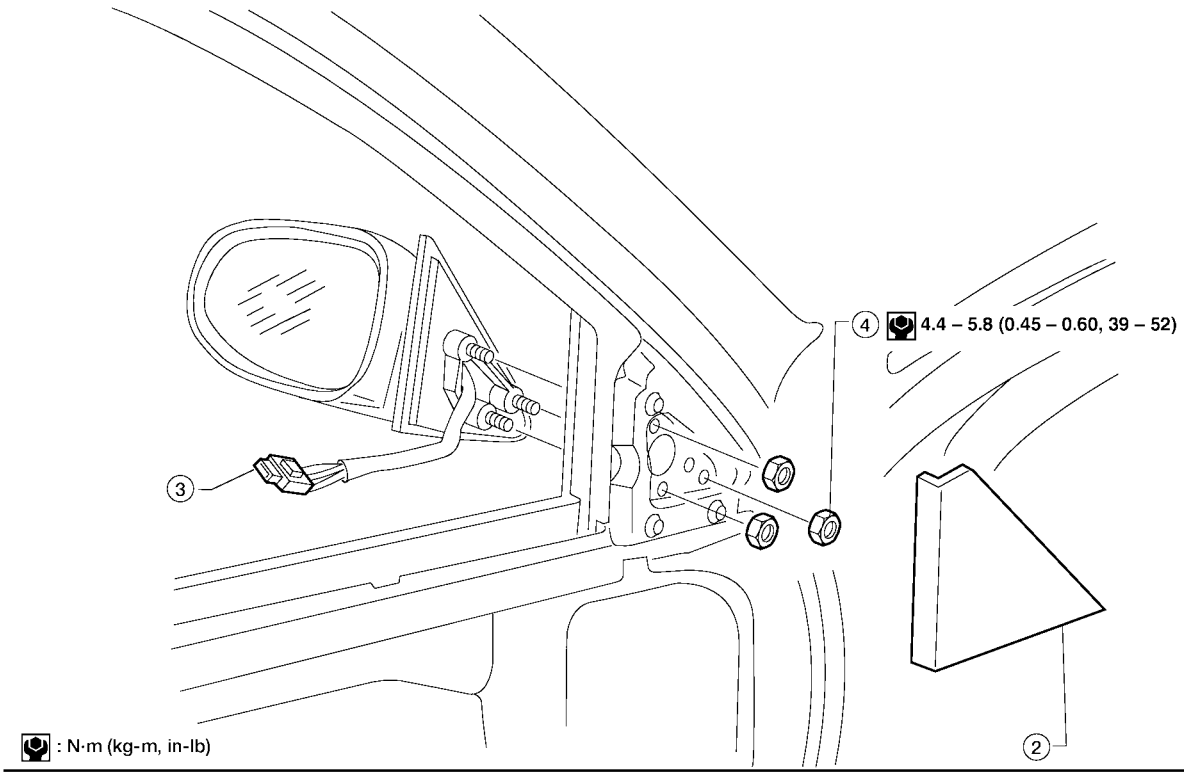
Removal and Installation

EIS00163

CAUTION:

Be careful not to scratch door mirror body.

1. Remove door finisher. Refer to EI-31, "Removal and Installation" .
2. Remove inner cover from front corner of door.
3. Disconnect door mirror harness connector.
4. Remove three nuts securing door mirror assembly.



Mirror glass replacement

CAUTION:

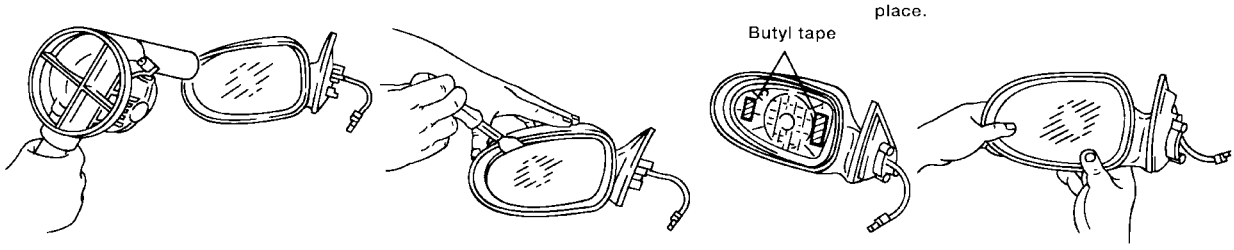
Do not exceed specified temperature or time limit. Excess heat or duration may cause damage to the mirror housing.

- **Removal**

1. Use a heat lamp (at least 500 watts) to thoroughly warm the frame edge of the door mirror glass to approximately 70°C (159°F) for three minutes.
2. Insert a stiff blade scraper between the mirror glass and the frame. Pry the glass loose.
3. Remove any remaining adhesive (butyl tape) from the mounting surface on the frame.

- **Installation**

1. Install butyl/adhesive tape (2 pieces) on the frame.
2. Warm the mirror glass frame edge thoroughly with a heat lamp.
3. Position mirror glass on frame. Carefully press on the mirror glass to seat it in place.

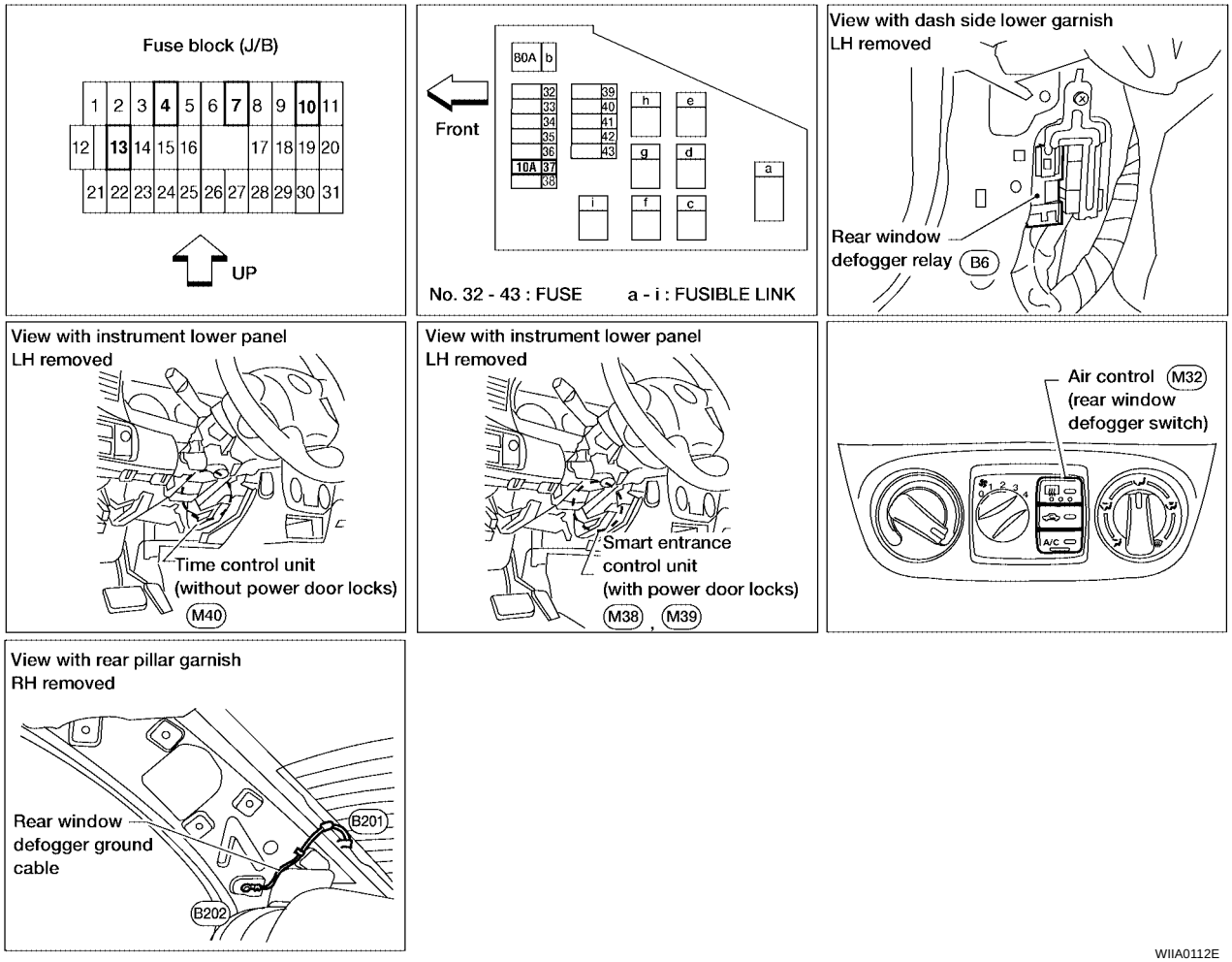


REAR WINDOW DEFOGGER

PFP:25350

Component Parts and Harness Connector Location

EIS00164



System Description

EIS00165

WITHOUT POWER DOOR LOCKS

The rear window defogger system is controlled by the time control unit. The rear window defogger operates for approximately 15 minutes.
Power is supplied at all times:

- to rear window defogger relay terminal 3
- through 20A fuse [No. 7, located in the fuse block (J/B)],
- to rear window defogger relay terminal 6
- through 20A fuse [No. 4, located in the fuse block (J/B)], and
- to time control unit terminal 7
- through 10A fuse [No. 13, located in the fuse block (J/B)].

With the ignition switch in the ON or START position, power is supplied:

- through 10A fuse [No. 10, located in the fuse block (J/B)]
- to the rear window defogger relay terminal 1, and
- to time control unit terminal 9.

Ground is supplied to terminal 5 of the rear window defogger switch (built into the air control) through body grounds M28 and M54.
When the rear defogger switch is turned ON, ground is supplied:

- through terminal 3 of the rear window defogger switch
- to time control unit terminal 3.

Terminal 10 of the time control unit then supplies ground to the rear window defogger relay terminal 2.
With power and ground supplied, the rear window defogger relay is energized.
Power is supplied:

- through terminals 5 and 7 of the rear window defogger relay
- to the rear window defogger.

The rear window defogger has an independent ground.
With power and ground supplied, the rear window defogger filaments heat and defog the rear window.
When the system is activated, the rear window defogger indicator illuminates in the rear window defogger switch.
Power is supplied:

- to terminal 4 of the rear window defogger switch
- from terminals 5 and 7 of the rear window defogger relay.

Terminal 5 of the rear window defogger switch is grounded through body grounds M28 and M54.

WITH POWER DOOR LOCKS

The rear window defogger system is controlled by the smart entrance control unit. The rear window defogger operates for approximately 15 minutes.
Power is supplied at all times:

- to rear window defogger relay terminal 3
- through 20A fuse [No. 7, located in the fuse block (J/B)],
- to rear window defogger relay terminal 6
- through 20A fuse [No. 4, located in the fuse block (J/B)], and
- to smart entrance control unit terminal 10
- through 10A fuse (No. 37, located in the fuse and fusible link box).

With the ignition switch in the ON or START position, power is supplied:

- through 10A fuse [No. 10, located in the fuse block (J/B)]
- to the rear window defogger relay terminal 1, and
- to smart entrance control unit terminal 33.

Ground is supplied to terminal 5 of the rear window defogger switch (built into the air control) through body grounds M28 and M54.
When the rear defogger switch is turned ON, ground is supplied:

- through terminal 3 of the rear window defogger switch

- to smart entrance control unit terminal 39.

Terminal 2 of the smart entrance control unit then supplies ground to the rear window defogger relay terminal 2.
With power and ground supplied, the rear window defogger relay is energized.
Power is supplied:

- through terminals 5 and 7 of the rear window defogger relay
- to the rear window defogger.

The rear window defogger has an independent ground.
With power and ground supplied, the rear window defogger filaments heat and defog the rear window.
When the system is activated, the rear window defogger indicator illuminates in the rear window defogger switch.
Power is supplied:

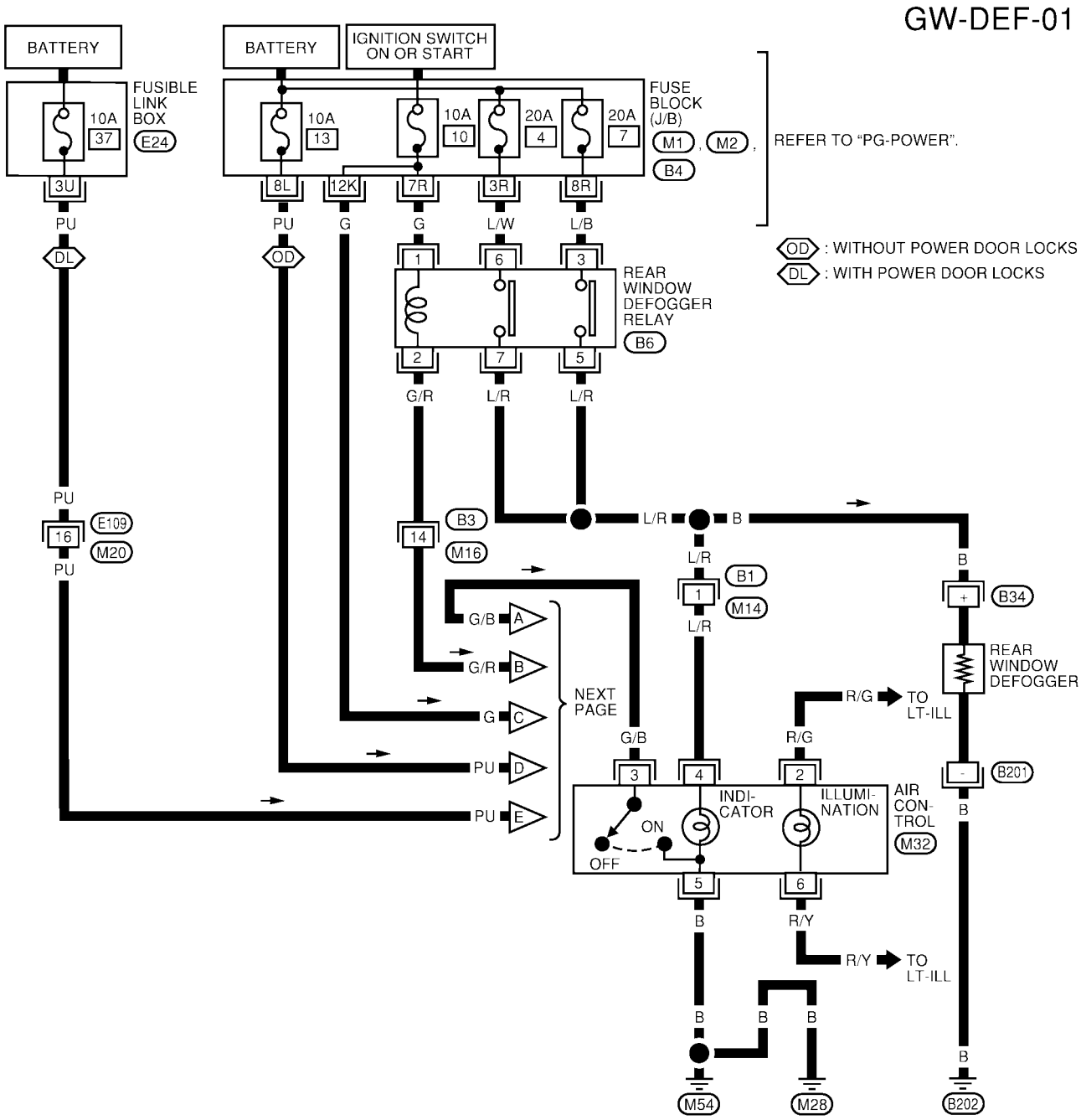
- to terminal 4 of the rear window defogger switch
- from terminals 5 and 7 of the rear window defogger relay.

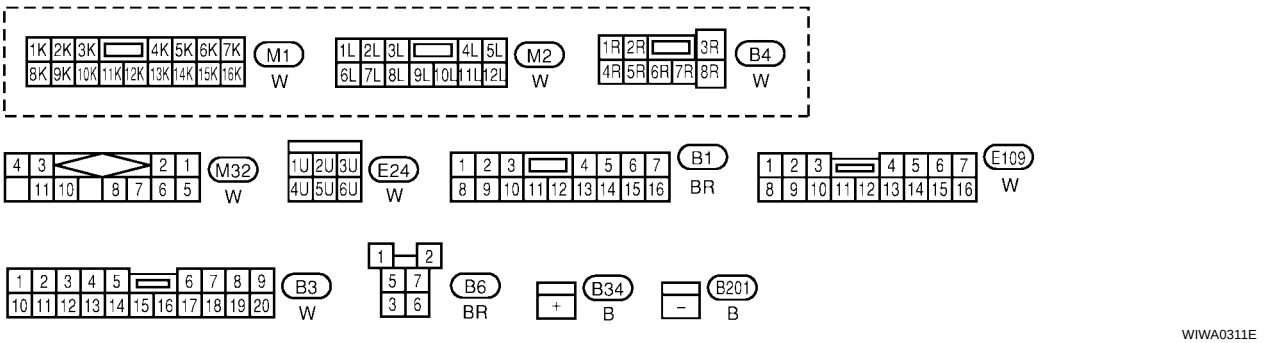
Terminal 5 of the rear window defogger switch is grounded through body grounds M28 and M54.

Wiring Diagram — DEF —

EIS00166

GW-DEF-01

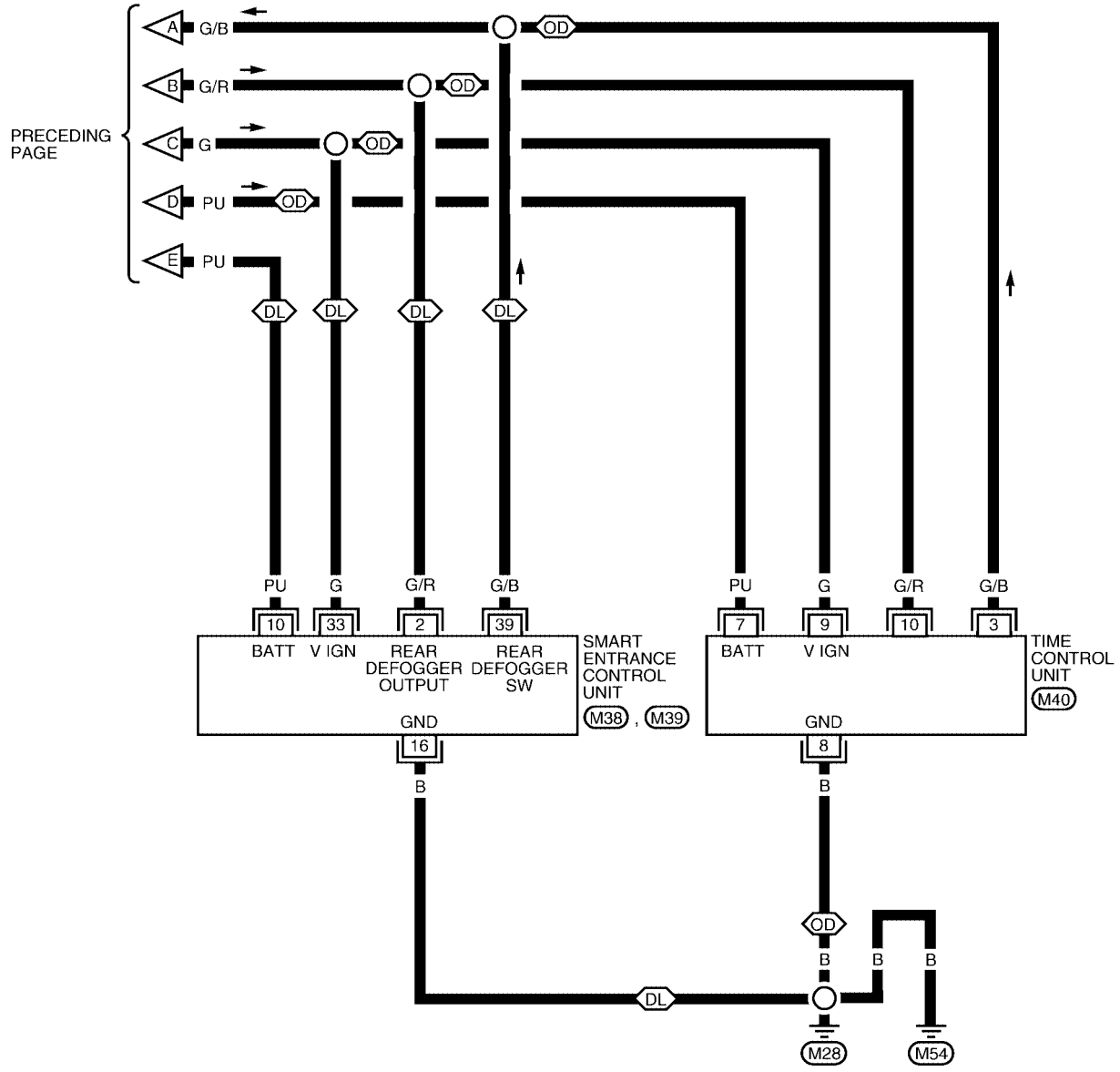


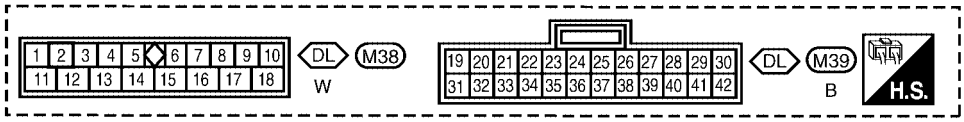


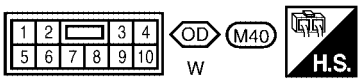
WIWA0311E

GW-DEF-02

OD : WITHOUT POWER DOOR LOCKS
DL : WITH POWER DOOR LOCKS







WIWA0037E

TIME CONTROL UNIT TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND (WITHOUT POWER DOOR LOCKS)

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
3	G/B	AIR CONTROL (REAR WINDOW DEFOGGER SWITCH)	OFF	5V
			ON	0V
7	PU	POWER SOURCE (FUSE)	—	12V
8	B	GROUND	—	—
9	G	IGNITION SWITCH (ON)	IGNITION KEY IN ON POSITION	12V
		IGNITION SWITCH (START)	IGNITION KEY IN START POSITION	12V
10	G/R	REAR WINDOW DEFOGGER RELAY	OFF	0V
			ON (IGNITION KEY IN ON POSITION)	12V

SMART ENTRANCE CONTROL UNIT TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND (WITH POWER DOOR LOCKS)

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
2	G/R	REAR WINDOW DEFOGGER RELAY	OFF	0V
			ON (IGNITION KEY IN ON POSITION)	12V
10	PU	POWER SOURCE (FUSE)	—	12V
16	B	GROUND	—	—
33	G	IGNITION SWITCH (ON)	IGNITION KEY IN ON POSITION	12V
		IGNITION SWITCH (START)	IGNITION KEY IN START POSITION	12V
39	G/B	AIR CONTROL (REAR WINDOW DEFOGGER SWITCH)	OFF	5V
			ON	0V

CONSULT-II Inspection Procedure (With Power Door Locks)

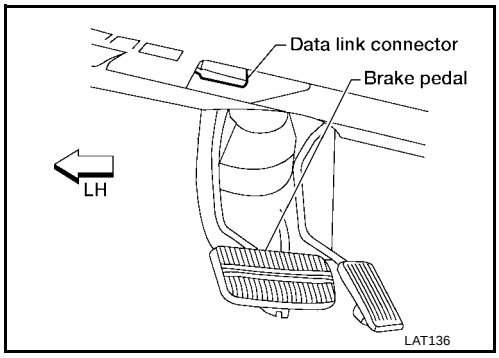
EIS00167

“REAR DEFOGGER”

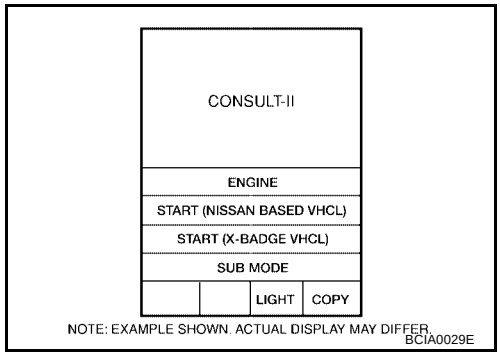
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carry out CAN communication.

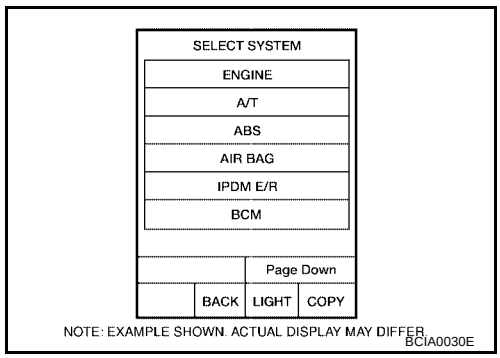
1. Turn ignition switch OFF.
2. Connect “CONSULT-II” and CONSULT-II CONVERTER to data link connector.



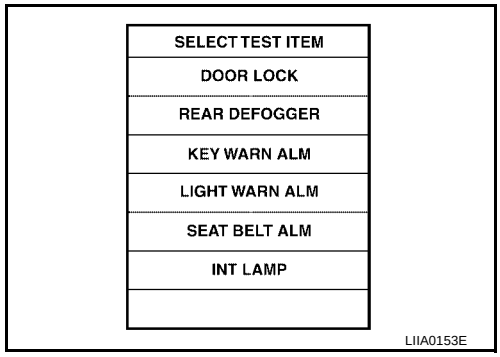
3. Turn ignition switch ON.
4. Touch “START (NISSAN BASED VHCL)”.



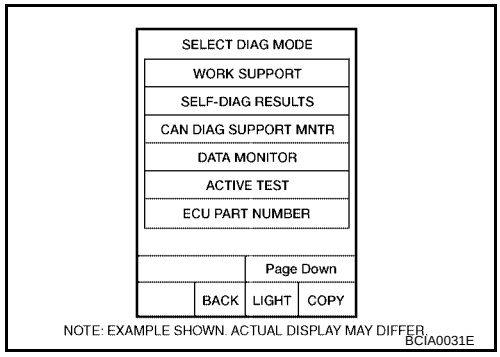
5. Touch “SMART ENTRANCE”.
   If “SMART ENTRANCE” is not indicated, go to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Touch “REAR WINDOW DEFOGGER”.



7. Select diagnosis mode,“DATA MONITOR” and “ACTIVE TEST”.



CONSULT-II Application Items (With Power Door Locks)

EIS00168

“REAR DEFOGGER”

Data Monitor

Monitored Item	Description
IGN ON SW	Indicates [ON/OFF] condition of ignition switch.
REAR DEF SW	Indicates [ON/OFF] condition of rear window defogger switch.

Active Test

Test Item	Description
REAR DEFOGGER	This test is able to check rear window defogger operation. Rear window defogger activates when “ON” on CONSULT-II screen is touched.

Trouble Diagnoses (Without Power Door Locks)

EIS00169

DIAGNOSTIC PROCEDURE

Symptom: Rear Window Defogger Does Not Activate, or Does Not Go Off After Deactivating.

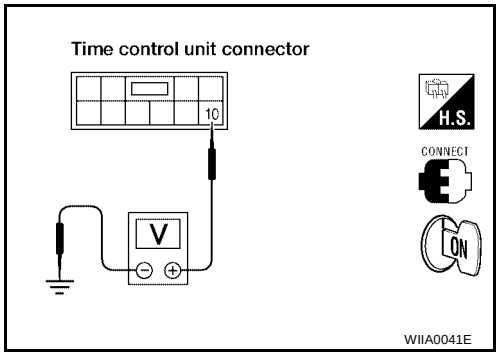
1. CHECK REAR WINDOW DEFOGGER OUTPUT SIGNAL

1. Turn ignition switch to ON position.
2. Check voltage between time control unit harness connector M40 terminal 10 (G/R) and ground.

Voltage (V) Approx.:

Rear window defogger switch is "OFF" : 12V

Rear window defogger switch is "ON" : 0V



OK or NG

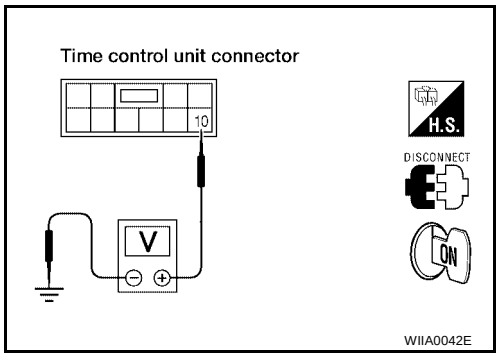
OK >> Check the following.
- Refer to GW-30, "Filament Check" .

NG >> GO TO 2.

2. CHECK DEFOGGER RELAY COIL SIDE CIRCUIT

1. Disconnect time control unit harness connector M40.
2. Turn ignition switch to ON position.
3. Check voltage between time control unit harness connector M40 terminal 10 (G/R) and ground.

Battery voltage should exist.



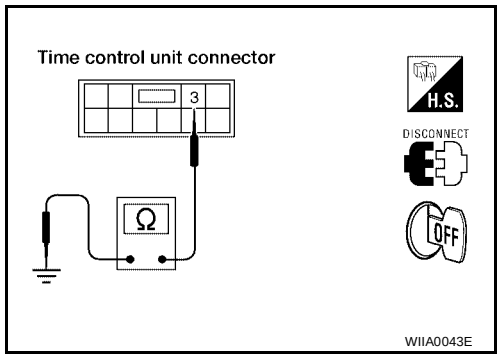
OK or NG

OK >> GO TO 3.

NG >> Check the following.
- 10A fuse [No. 10, located in the fuse block (J/B)]
- Rear window defogger relay
- Harness for open or short between 10A fuse [No. 10, located in the fuse block (J/B)] and rear window defogger relay
- Harness for open or short between rear window defogger relay and time control unit

3. CHECK REAR WINDOW DEFOGGER SWITCH INPUT SIGNAL

Check continuity between time control unit harness connector M40 terminal 3 (G/B) and ground.



Continuity:

Rear window defogger switch is pushed.	**Continuity should exist.**
Rear window defogger switch is released.	**Continuity should not exist.**

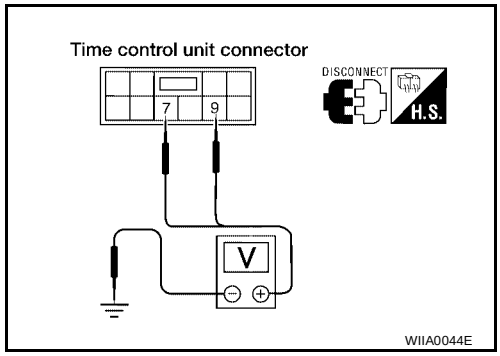
OK or NG

OK >> GO TO 4.
NG >> Check the following.

- Rear window defogger switch
  (Refer to GW-30, "REAR WINDOW DEFOGGER SWITCH" .)
- Harness for open or short between time control unit and rear window defogger switch
- Rear window defogger switch ground circuit

4. CHECK POWER SUPPLY AND IGNITION INPUT SIGNAL

Check voltage between time control unit harness connector M40 terminals 7 (PU), 9 (G) and ground.



Terminals		Ignition switch position		
(+)	(-)	OFF	ACC	ON
7	Ground	Battery voltage	Battery voltage	Battery voltage
9	Ground	0V	0V	Battery voltage

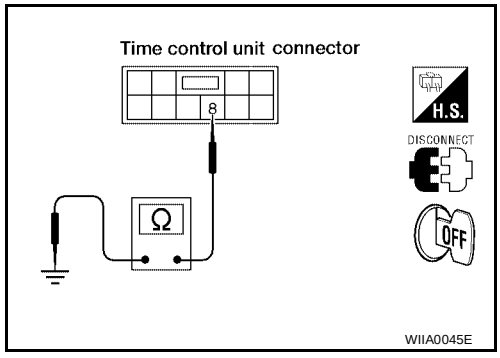
OK or NG

OK >> GO TO 5.
NG >> Check the following.

- 10A fuse [No. 10 or No. 13, located in the fuse block (J/B)]
- Harness for open or short between time control unit and fuse

5. CHECK TIME CONTROL UNIT GROUND CIRCUIT

Check continuity between time control unit harness connector M40 terminal 8 and ground.



Continuity should exist.

Yes >> Replace time control unit.
No >> Repair harness or connectors.

Trouble Diagnoses (With Power Door Locks)

EIS0016A

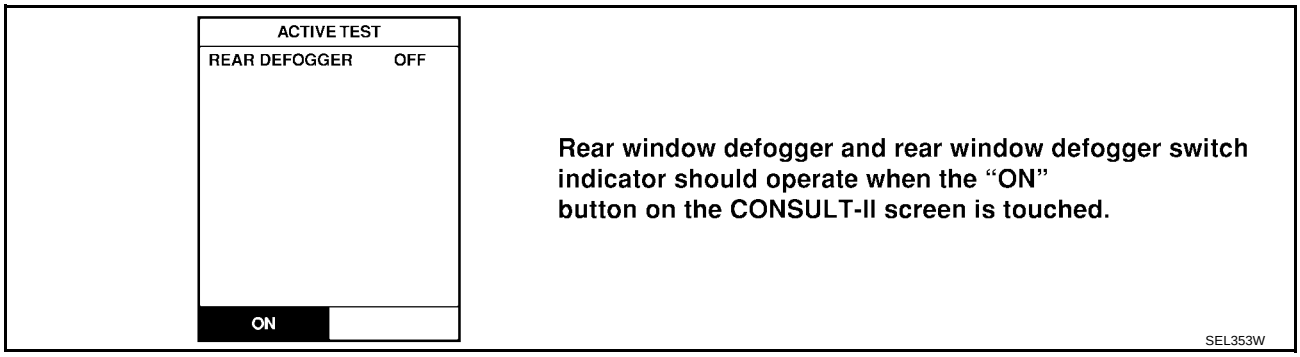
DIAGNOSTIC PROCEDURE

Symptom: Rear Window Defogger Does Not Activate, or Does Not Go Off After Activating.

1. CHECK REAR WINDOW DEFOGGER OUTPUT SIGNAL

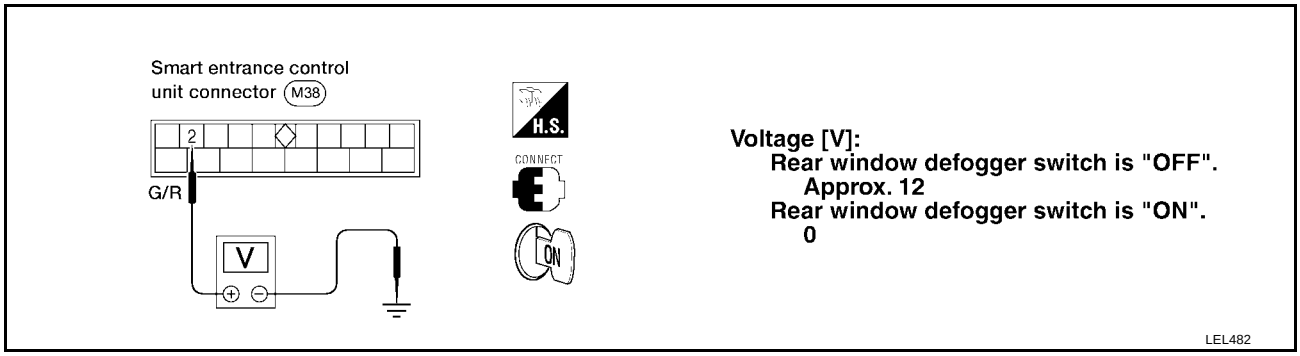
With CONSULT-II

Select “ACTIVE TEST” in “REAR DEFOGGER” with CONSULT-II.



Without CONSULT-II

1. Turn ignition switch to ON position.
2. Check voltage between smart entrance control unit harness terminal 2 and ground.



OK or NG

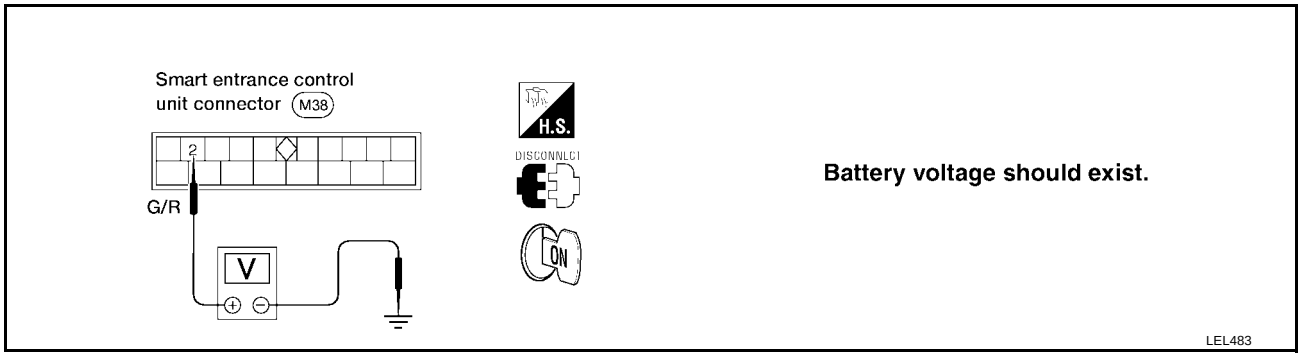
OK >> Check the following.

- Refer to GW-30, "REAR WINDOW DEFOGGER RELAY" .
- Rear window defogger circuit
- Refer to GW-30, "Filament Check" .

NG >> GO TO 2.

2. CHECK DEFOGGER RELAY COIL SIDE CIRCUIT

1. Disconnect control unit connector.
2. Turn ignition switch to ON position.
3. Check voltage between smart entrance control unit terminal 2 and ground.



OK or NG

OK >> GO TO 3.

NG >> Check the following.

- 10A fuse [No. 10, located in the fuse block (J/B)]
- Rear window defogger relay
- Harness for open or short between 10A fuse [No. 10, located in the fuse block (J/B)] and rear window defogger relay
- Harness for open or short between rear window defogger relay and smart entrance control unit

3. CHECK REAR WINDOW DEFOGGER SWITCH INPUT SIGNAL

With CONSULT-II

Select “REAR DEF SW” in “DATA MONITOR” mode with CONSULT-II.

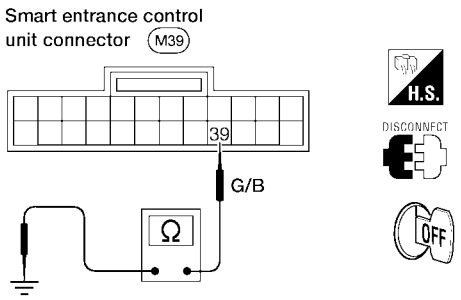
DATA MONITOR	
MONITOR	
REAR DEF SW	ON

When rear window defogger switch is pushed:
REAR DEF SW should be ON.

SEL352W

Without CONSULT-II

Check continuity between smart entrance control unit terminal 39 and ground.



Continuity:
Rear window defogger switch is pushed.
Continuity should exist.
Rear window defogger switch is released.
Continuity should not exist.

LEL484

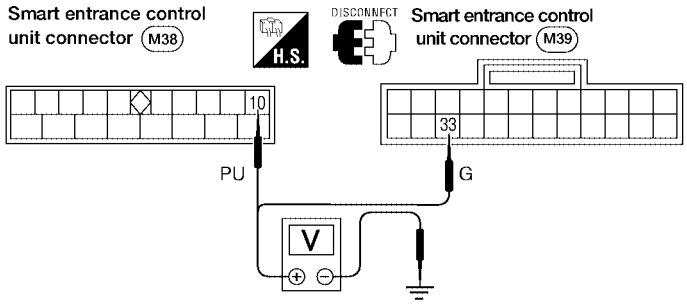
OK or NG

OK >> GO TO 4.
NG >> Check the following.

- Refer to GW-30, "REAR WINDOW DEFOGGER SWITCH" .
- Harness for open or short between smart entrance control unit and rear window defogger switch
- Rear window defogger switch ground circuit

4. CHECK POWER SUPPLY AND IGNITION INPUT SIGNAL

Check voltage between smart entrance control unit terminals 10 and 33 and ground.



Terminals		Ignition switch position		
(+)	(−)	OFF	ACC	ON
10	Ground	Battery voltage	Battery voltage	Battery voltage
33	Ground	0V	0V	Battery voltage

LEL485

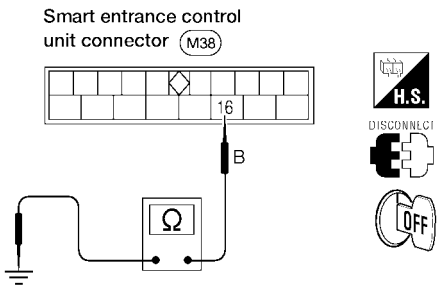
OK or NG

OK >> GO TO 5.
NG >> Check the following.

- 10A fuse [No. 10 or No. 37, located in the fuse block (J/B)]
- Harness for open or short between smart entrance control unit and fuse

5. CHECK SMART ENTRANCE CONTROL UNIT GROUND CIRCUIT

Check continuity between smart entrance control unit terminal 16 and ground.



Continuity should exist.

LEL486

Yes >> Replace smart entrance control unit.
No >> Repair harness or connectors.

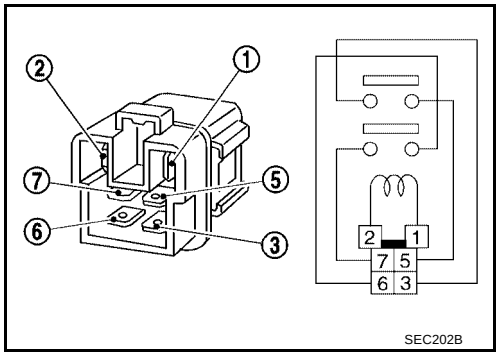
Electrical Components Inspection

EIS0016B

REAR WINDOW DEFOGGER RELAY

Check continuity between terminals 3 and 5, 6 and 7.

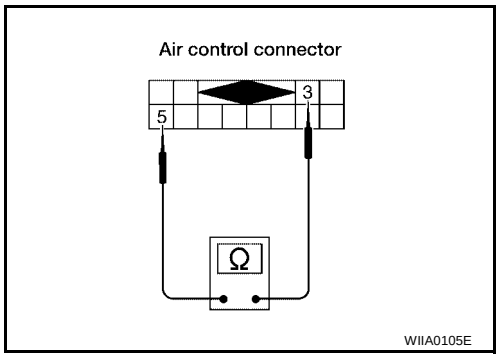
Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No



REAR WINDOW DEFOGGER SWITCH

With air control (rear window defogger switch) connector M32 disconnected, check continuity between terminals 3 and 5 when rear window defogger switch is pushed and released.

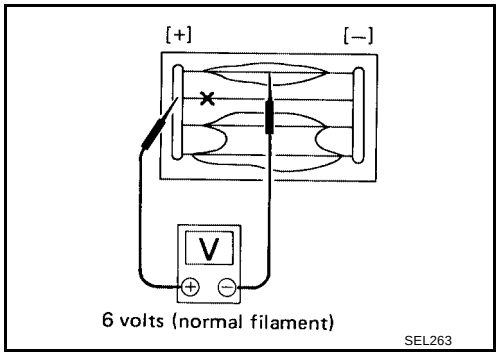
Terminals		Condition	Continuity
(+)	(-)	Switch pushed	Yes
3	5	Switch released	No



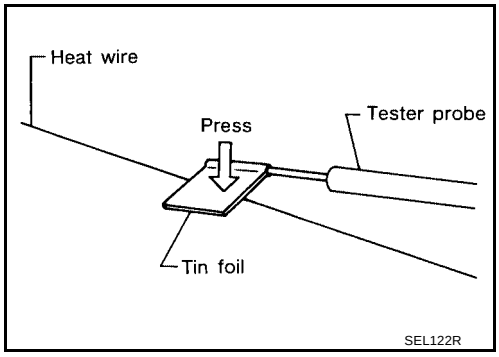
Filament Check

EIS0016C

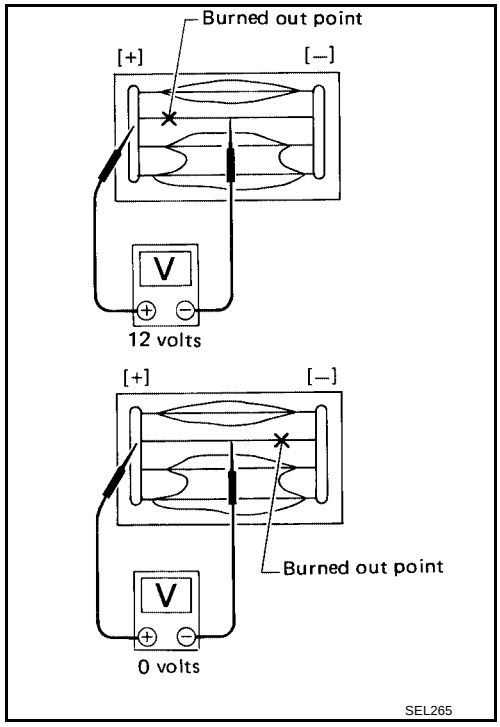
1. Attach probe circuit tester (in volt range) to middle portion of each filament.



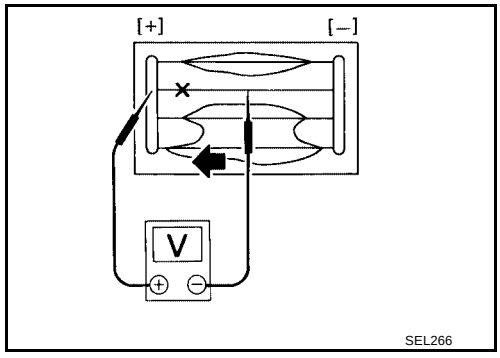
- **When measuring voltage, wrap tin foil around the top of the negative probe. Then press the foil against the wire with your finger.**



2. If a filament is burned out, circuit tester registers 0 or 12 volts.



3. To locate burned out point, move probe to left and right along filament. Test needle will swing abruptly when probe passes the point.



Filament Repair

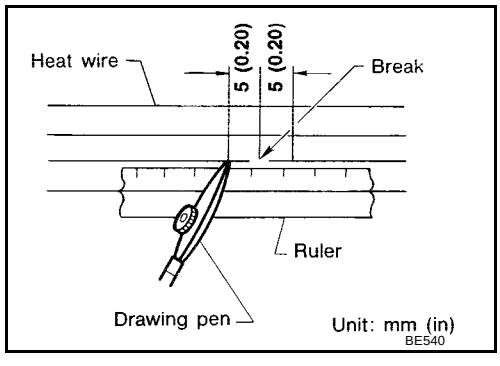
EIS0016D

REPAIR EQUIPMENT

1. Conductive silver composition (Dupont No. 4817 or equivalent)
2. Ruler 30 cm (11.8 in) long
3. Drawing pen
4. Heat gun
5. Alcohol
6. Cloth

REPAIRING PROCEDURE

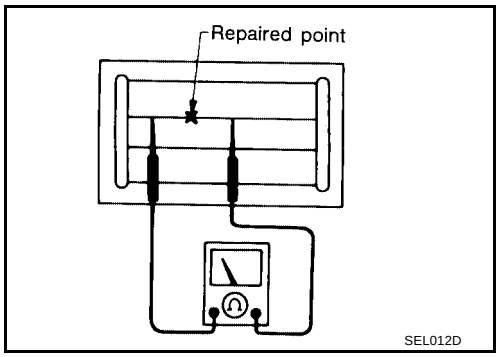
1. Wipe broken heat wire and its surrounding area clean with a cloth dampened in alcohol.



2. Apply a small amount of conductive silver composition to tip of drawing pen.

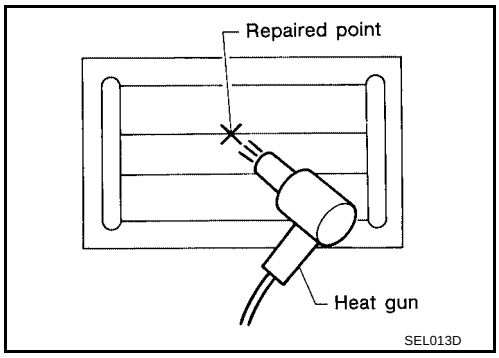
Shake silver composition container before use.

3. Place ruler on glass along broken line. Deposit conductive silver composition on break with drawing pen. Slightly overlap existing heat wire on both sides [preferably 5 mm (0.20 in)] of the break.
4. After repair has been completed, check repaired wire for continuity. This check should be conducted 10 minutes after silver composition is deposited.



Do not touch repaired area while test is being conducted.

5. Apply a constant stream of hot air directly to the repaired area for approximately 20 minutes with a heat gun. A minimum distance of 3 cm (1.2 in) should be kept between repaired area and hot air outlet. If a heat gun is not available, let the repaired area dry for 24 hours.



REAR VIEW MIRROR

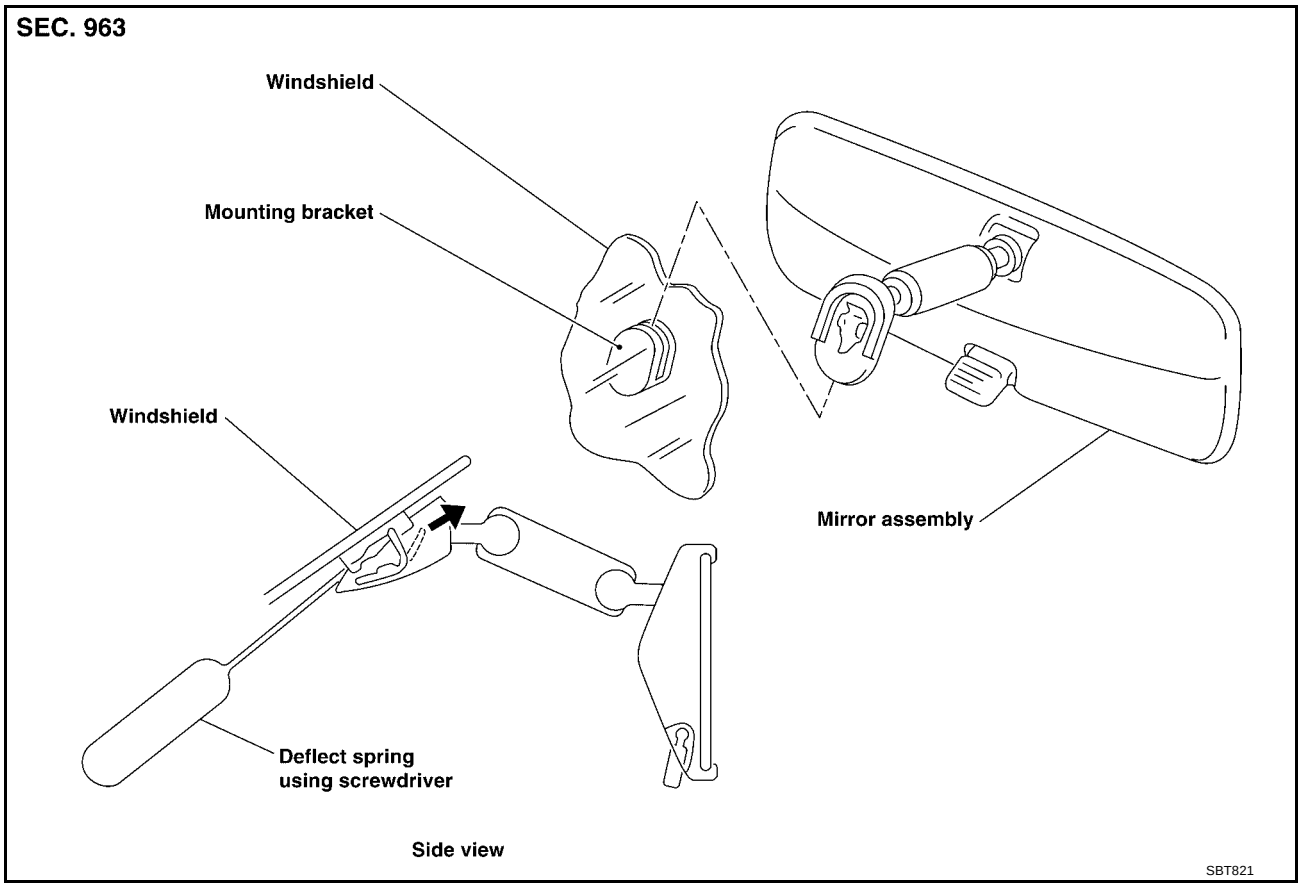
PFP:96321

Removal and Installation

EIS0016E

REMOVAL

Remove rear view mirror by pushing deflect spring with screwdriver as shown in the figure.



INSTALLATION

1. Install mounting bracket as follows:

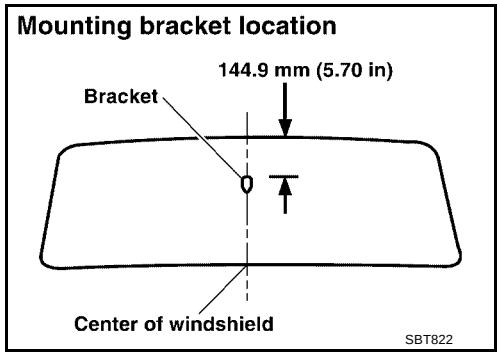
a. Determine mounting bracket position on windshield by measuring from top of windshield to top of mounting bracket as shown in the figure.

b. Mark location on outside of windshield with wax pencil or equivalent.

c. Clean attaching point on inside of windshield with an alcohol-saturated paper towel.

d. Sand bonding surface of mounting bracket with sandpaper (No. 320 or No. 360).

e. Clean bonding surface of mounting bracket with an alcohol-saturated paper towel.



f. Apply Genuine Mirror Adhesive or equivalent to bonding surface of mounting bracket. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .

g. Install mounting bracket at pre-marked position and press mounting bracket against glass for 30 to 60 seconds.

h. After five minutes, wipe off excess adhesive with an alcohol-moistened paper towel.

2. Install rear view mirror.

SECTION SRS

SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EHS000PP

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precautions for SRS “AIR BAG” and “SEAT BELT PRE-TENSIONER” Service

EHS000JE

- Do not use electrical test equipment to check SRS circuits unless instructed to in this Service Manual.
- Before servicing the SRS, turn ignition switch “OFF”, disconnect both battery cables and wait at least 3 minutes.
  For approximately 3 minutes after the cables are removed, it is still possible for the air bag and seat belt pre-tensioner to deploy. Therefore, do not work on any SRS connectors or wires until at least 3 minutes have passed.
- Diagnosis sensor unit must always be installed with their arrow marks “⇐” pointing towards the front of the vehicle for proper operation. Also check diagnosis sensor unit for cracks, deformities or rust before installation and replace as required.
- The spiral cable must be aligned with the neutral position since its rotations are limited. Do not attempt to turn steering wheel or column after removal of steering gear.
- Handle air bag module carefully. Always place driver and front passenger air bag modules with the pad side facing upward and front side air bag module standing with the stud bolt side facing down.
- Conduct self-diagnosis to check entire SRS for proper function after replacing any components.
- After air bag inflates, the front instrument panel assembly should be replaced if damaged.

Wiring Diagrams and Trouble Diagnosis

EHS000JF

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams"
- PG-3, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident"

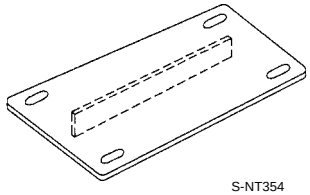
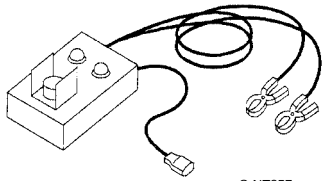
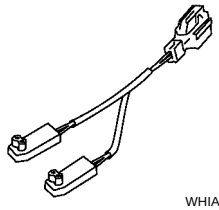
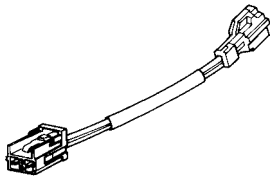
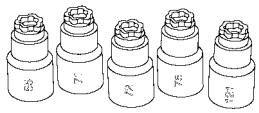
PREPARATION

PFP:00002

Special service tool

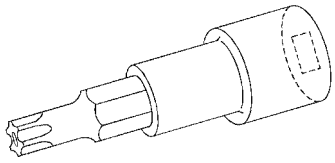
EHS000JG

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
KV99105300 (J-41246) Air bag module bracket  S-NT354	Anchoring air bag module
KV99106400 (J-38381) Deployment tool  S-NT357	Disposing of air bag module and front seat belt pre-tensioner
— (J-38381-80) Deployment tool adapter for front driver air bag module and front seat belt pre-tensioner  WHIA0089E	Connection between the deployment tool and front driver air bag module and front seat belt pre-tensioner
KV9910830 (J-38381-35) Deployment tool adapter for front side air bag modules and front passenger air bag module  ZZA1166D	Connection between the deployment tool and front side air bag modules and front passenger air bag module
— (J-44615) Air bag lock master key set  LRS210	Removing and installing air bag locking bolts

Commercial Service Tool

EHS000JH

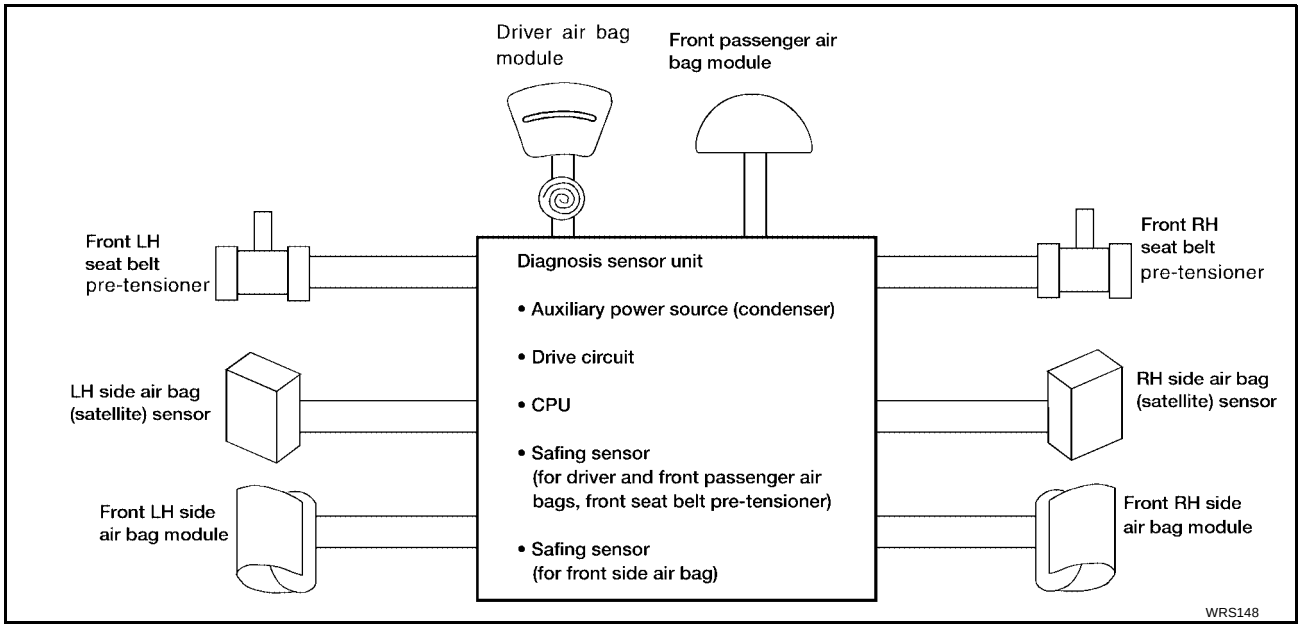
Tool name	Description
Tamper resistant torx socket  S-NT757	Size: T30

SRS CONFIGURATION

PFP:00000

SRS Configuration

EHS000JI



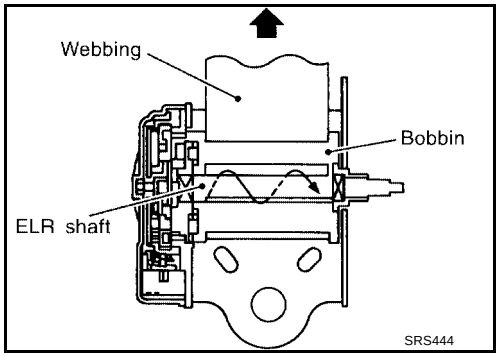
The air bag deploys if the diagnosis sensor unit activates while the ignition switch is in the “ON” or “START” position.
The collision modes for which supplemental restraint systems are activated are different among the SRS systems. For example, the driver air bag module and front passenger air bag module are activated in a frontal collision but not in a side collision.
SRS configurations which are activated for some collision modes are as follows;

SRS configuration	Frontal collision	Left side collision	Right side collision
Driver air bag module	X	—	—
Front passenger air bag module	X	—	—
Front LH seat belt pre-tensioner	X	—	—
Front RH seat belt pre-tensioner	X	—	—
Front LH side air bag module	—	X	—
Front RH side air bag module	—	—	X

Seat Belt Pre-tensioner with Load Limiter

EHS000JJ

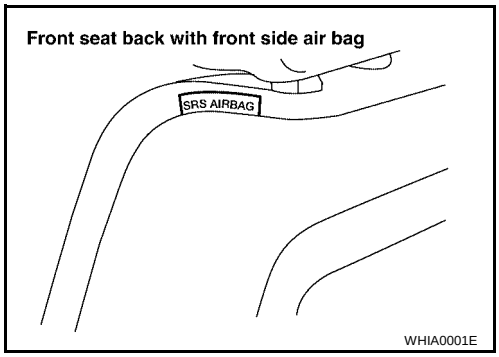
The front seat belt pre-tensioner system with load limiter is installed to both the driver's seat and the front passenger's seat. It operates simultaneously with the SRS air bag system in the event of a frontal collision with an impact exceeding a specified level.
When the frontal collision with an impact exceeding a specified level occurs, seat belt slack resulting from clothing or other factors is immediately taken up by the pre-tensioner. Vehicle passengers are securely restrained.
When passengers in a vehicle are thrown forward in a collision and the restraining force of the seat belt exceeds a specified level, the load limiter permits the specified extension of the seat belt by the twisting of the ELR shaft, and a relaxation of the chest-area seat belt web tension while maintaining force.



Side Air Bag

EHS000JK

Front side air bag is built-in type.
The front seat backs with built-in type side air bag have the label shown in figure at right.



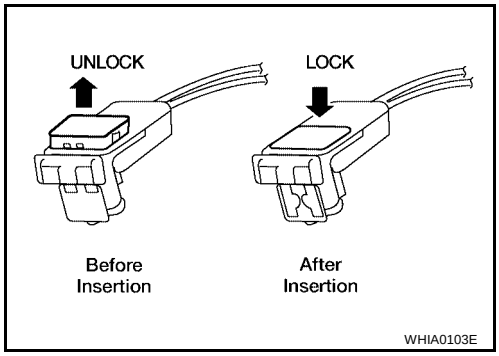
Direct-connect SRS Component Connectors

EHS000LD

The following SRS components use direct-connect style harness connectors.

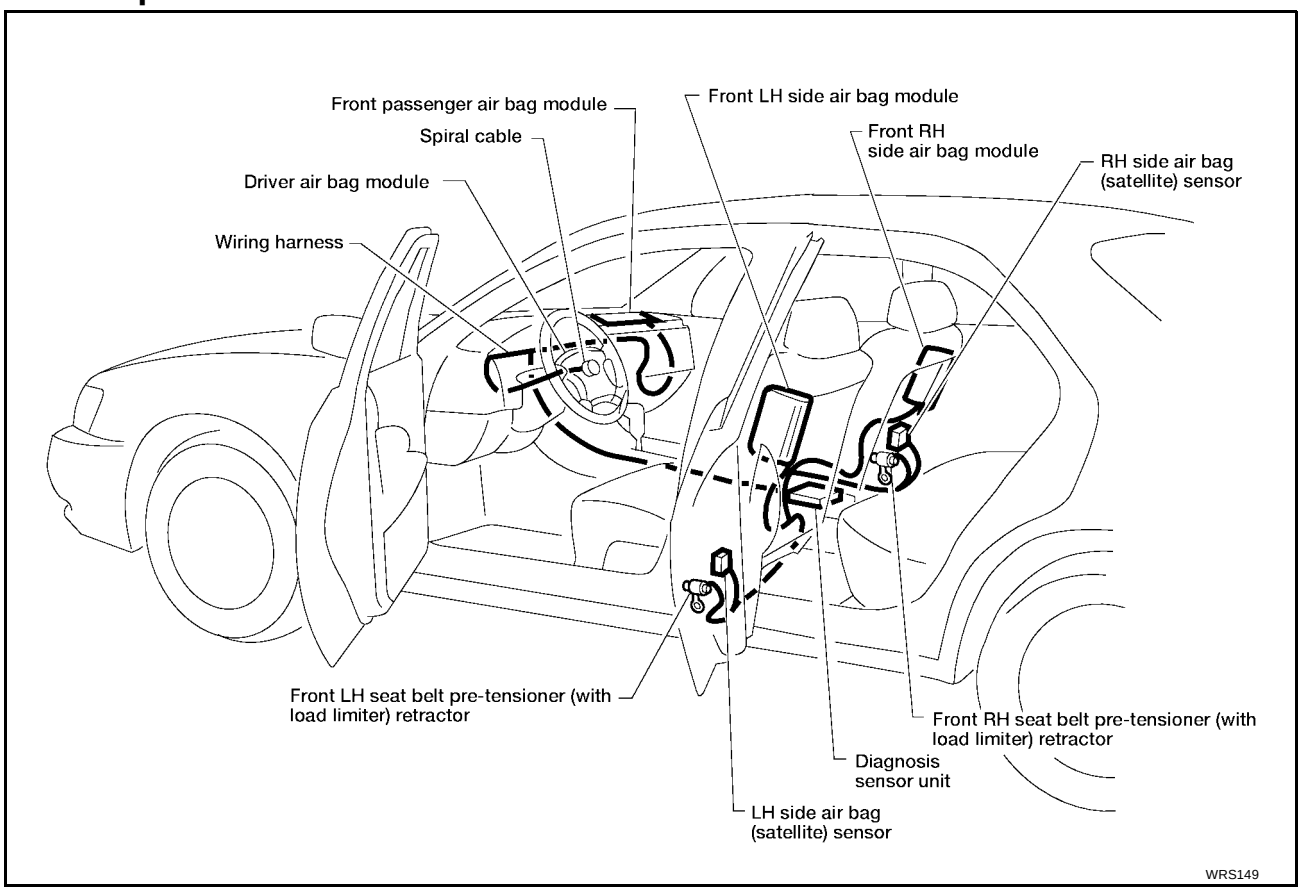
- Driver air bag module
- Front LH seat belt pre-tensioner
- Front RH seat belt pre-tensioner

Always pull up to release black locking tab prior to removing connector from SRS component.
Always push down to lock black locking tab after installing connector to SRS component. When locked, the black locking tab is level with the connector housing.



SRS Component Parts Location

EHS000JL



TROUBLE DIAGNOSIS

PFP:00004

Trouble Diagnoses Introduction

EHS000JM

CAUTION:

- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**
- **Do not attempt to repair, splice or modify the SRS wiring harness. If the harness is damaged, replace it with a new one.**
- **Keep ground portion clean.**

DIAGNOSIS FUNCTION

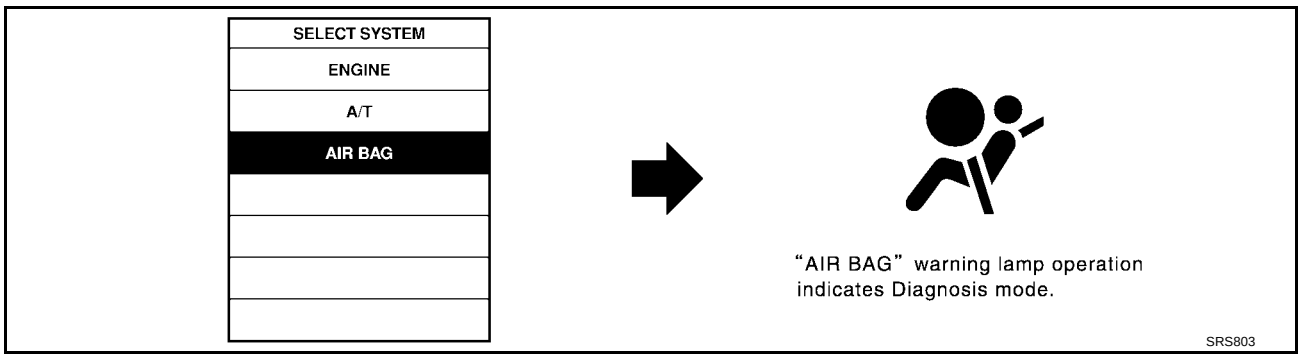
The SRS self-diagnosis results can be read by using “AIR BAG” warning lamp and/or CONSULT-II. The reading of these results is accomplished using one of two modes — “User mode” and “Diagnosis mode”.
The User mode is exclusively prepared for the customer (driver). This mode warns the driver of a system malfunction through the operation of the “AIR BAG” warning lamp.
The Diagnosis mode allows the technician to locate and inspect the malfunctioning part.
The mode applications for the “AIR BAG” warning lamp and CONSULT-II are as follows:

	User mode	Diagnosis mode	Display type
“AIR BAG” warning lamp	X	X	ON-OFF operation
CONSULT-II	—	X	Monitoring

HOW TO CHANGE SELF-DIAGNOSIS MODE WITH CONSULT-II

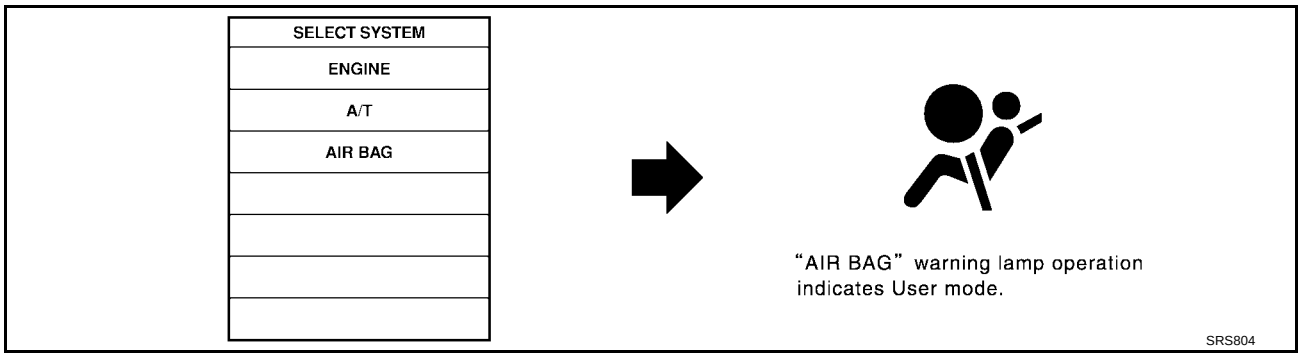
From User Mode to Diagnosis Mode

After selecting “AIR BAG” on the “SELECT SYSTEM” screen, User mode automatically changes to Diagnosis mode.



From Diagnosis Mode to User Mode

To return to User mode from Diagnosis mode, touch “BACK” key of CONSULT-II until “SELECT SYSTEM” appears, Diagnosis mode automatically changes to User mode.



HOW TO CHANGE SELF-DIAGNOSIS MODE WITHOUT CONSULT-II

From User Mode to Diagnosis Mode

Diagnosis mode activates only when a malfunction is detected, by turning ignition switch as follows:

1. Turn ignition switch “ON”.
2. After “AIR BAG” warning lamp lights for 7 seconds, turn ignition switch “OFF” within 1 second.
3. Wait more than 3 seconds.
4. Repeat steps 1 to 3 three times.
5. Turn ignition switch “ON”.

SRS will enter Diagnosis mode, if a malfunction is detected.

From Diagnosis Mode to User Mode

After a malfunction is repaired, turn ignition switch “OFF” for at least one second, then back “ON”. Diagnosis mode is returned to User mode.
If switching Diagnosis mode to User mode is required while malfunction is being detected, turn ignition switch as follows:

1. Turn ignition switch “ON”.
2. After “AIR BAG” warning lamp lights for 7 seconds, turn ignition switch “OFF” within 1 second.
3. Wait more than 3 seconds.
4. Repeat steps 1 to 3 three times.
5. Turn ignition switch “ON”.

HOW TO ERASE SELF-DIAGNOSIS RESULTS

With CONSULT-II

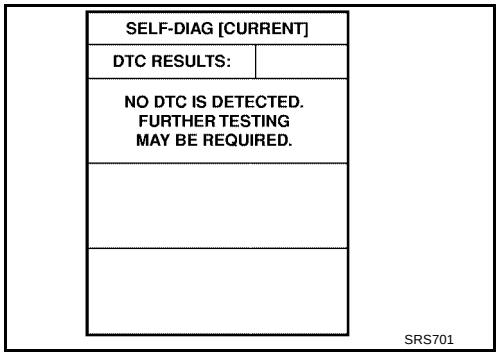
- “SELF-DIAG [CURRENT]”
  A current Self-diagnosis result is displayed on the CONSULT-II screen in real time.

After the malfunction is repaired completely, no malfunction is detected on “SELF-DIAG [CURRENT]”.

- “SELF-DIAG [PAST]”
  Return to the “SELF-DIAG [CURRENT]” CONSULT-II screen by pushing “BACK” key of CONSULT-II and select “SELF-DIAG [CURRENT]” in SELECT DIAG MODE. Touch “ERASE” in “SELF-DIAG [CURRENT]” mode.

  NOTE:
  If the memory of the malfunction in “SELF-DIAG [PAST]” is not erased, the User mode shows the system malfunction by the operation of the warning lamp even if the malfunction is repaired completely.

- “TROUBLE DIAG RECORD”
  The memory of “TROUBLE DIAG RECORD” cannot be erased.



Without CONSULT-II

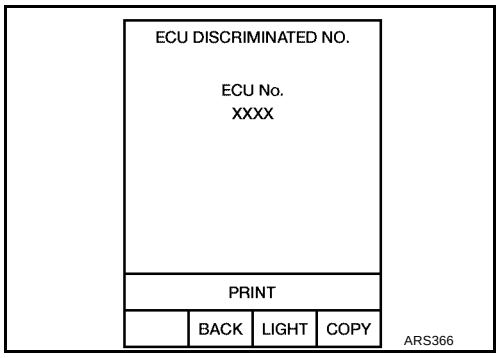
After a malfunction is repaired, switch the ignition “OFF” for at least one second, then back “ON”. Diagnosis mode returns to the User mode. At that time, the self-diagnostic result is cleared.

CONSULT-II Function (AIR BAG)

EHS0017A

CONSULT-II can display each diagnostic item using the diagnostic test modes shown following.

AIR BAG diagnostic mode	Description
SELF-DIAG [CURRENT]	A current Self-diagnosis result (also indicated by the number of warning lamp flashes in the Diagnosis mode) is displayed on the CONSULT-II screen in real time. This refers to a malfunctioning part requiring repairs.
SELF-DIAG [PAST]	Diagnosis results previously stored in the memory are displayed on the CONSULT-II screen. The stored results will remain until memory erasing is executed.
TROUBLE DIAG RECORD	With TROUBLE DIAG RECORD, diagnosis results previously erased by a reset operation can be displayed on the CONSULT-II screen.
ECU DISCRIMINATED NO.	The diagnosis sensor unit for each vehicle model is assigned with its own, individual classification number. This number will be displayed on the CONSULT-II screen, as shown. When replacing the diagnosis sensor unit, refer to the part number for the compatibility. After installation, replacement with a correct unit can be checked by confirming this classification number on the CONSULT-II screen. **For NISSAN MODEL B15, the diagnosis sensor unit discriminated numbers assigned are A616 (for models with side air bags) and A615 (for models without side air bags).**



How to Perform Trouble Diagnoses for Quick and Accurate Repair

EHS000JN

A good understanding of the malfunction conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a malfunction. It is important to fully understand the symptoms or conditions for a customer complaint.

INFORMATION FROM CUSTOMER

WHAT ..... Vehicle model
WHEN ..... Date, Frequencies
WHERE ..... Road conditions
HOW ..... Operating conditions, Symptoms

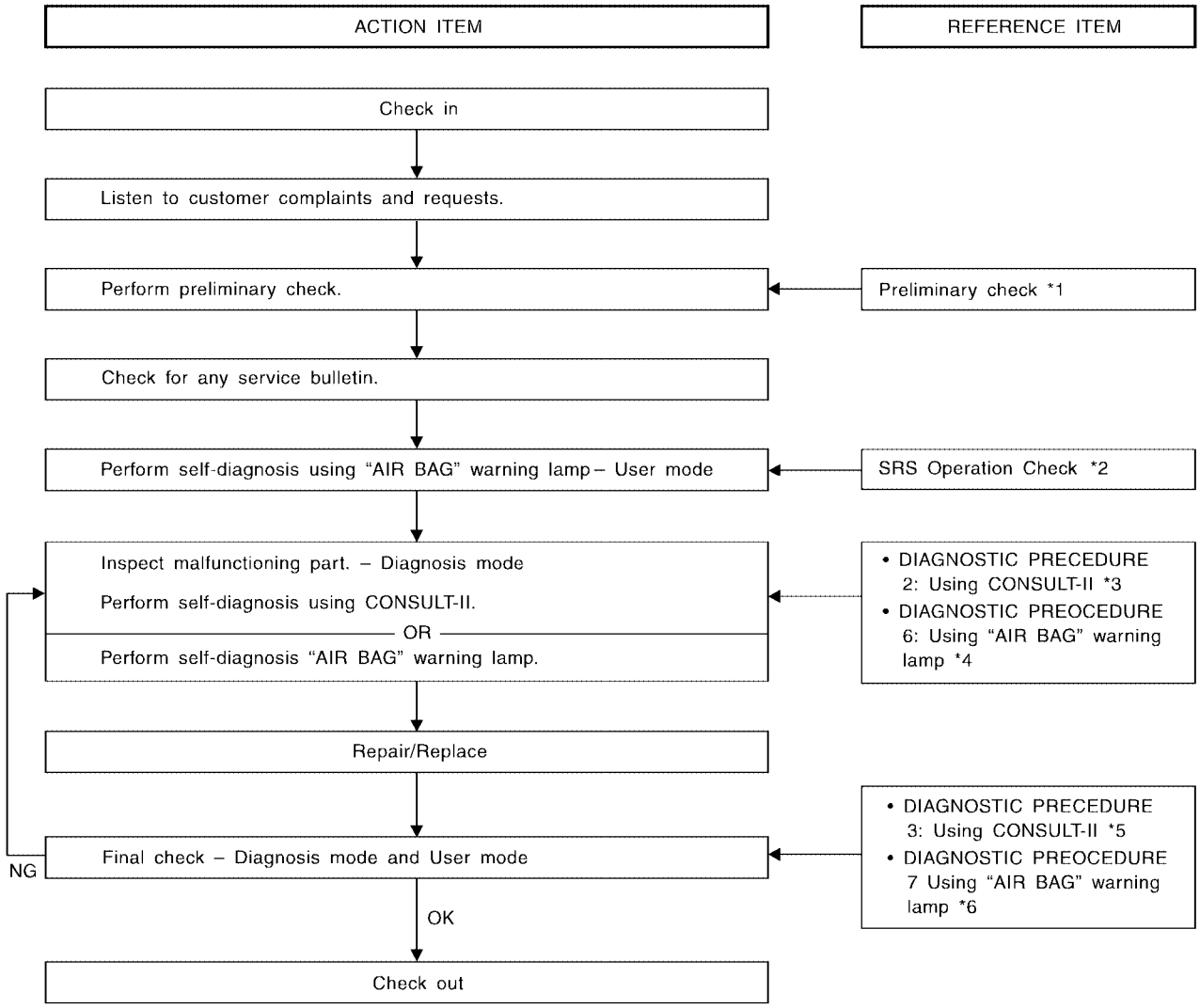
PRELIMINARY CHECK

Check that the following parts are in good order.

- Battery [Refer to SC-4, "BATTERY" .]
- Fuse
- System component-to-harness connections

WORK FLOW

NOTE:
Seat belt pre-tensioner malfunction is indicated by “AIR BAG” warning lamp.

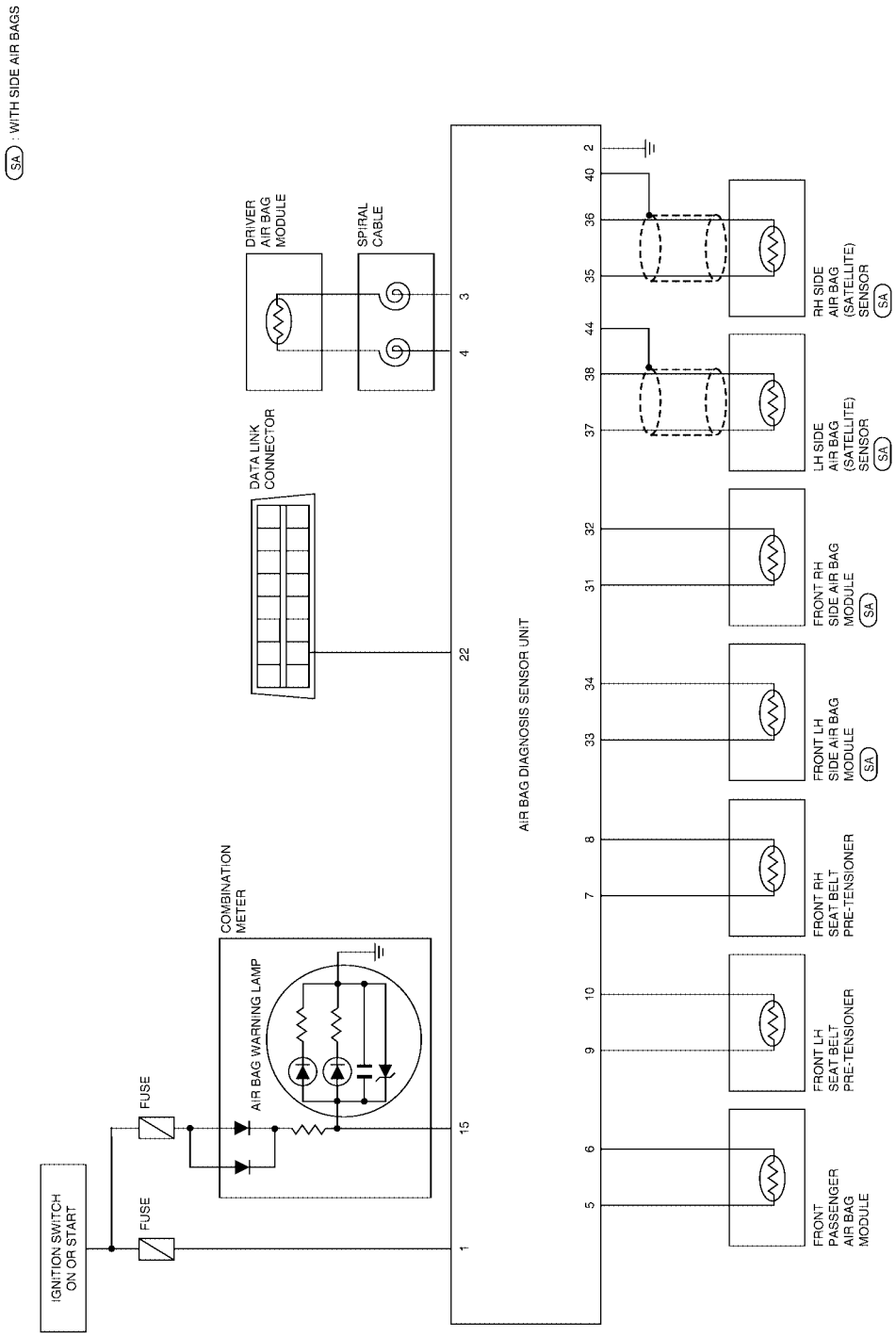


WRS155

*1: SRS-12 *2: SRS-18 *3: SRS-18
*4: SRS-29 *5: SRS-22 *6: SRS-34

Schematic

EHS000JO

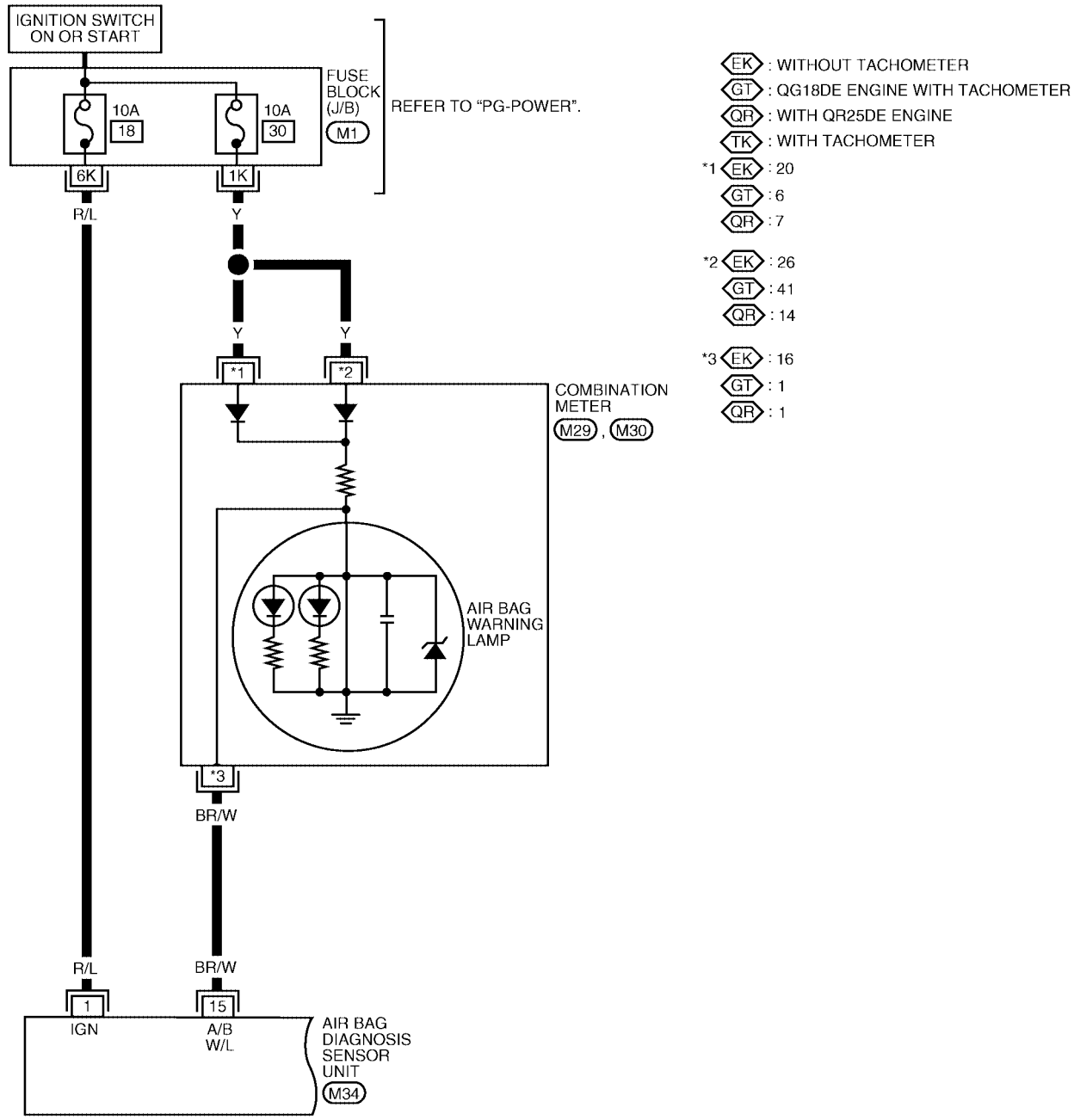


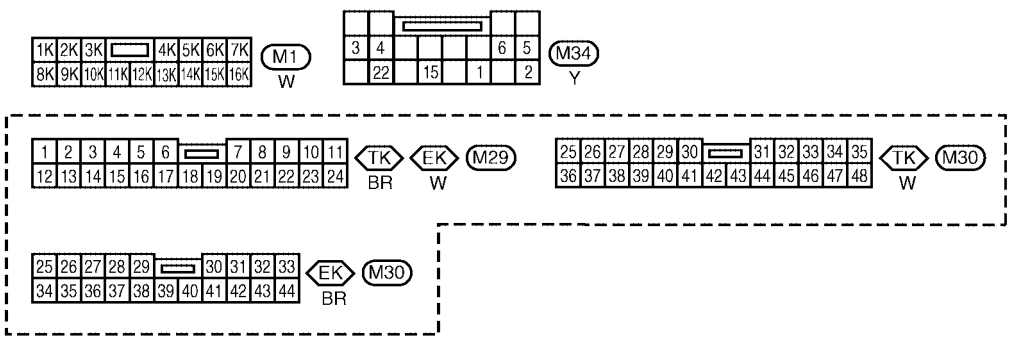
WHWA0045E

Wiring Diagram — SRS —

EHS000JP

SRS-SRS-01

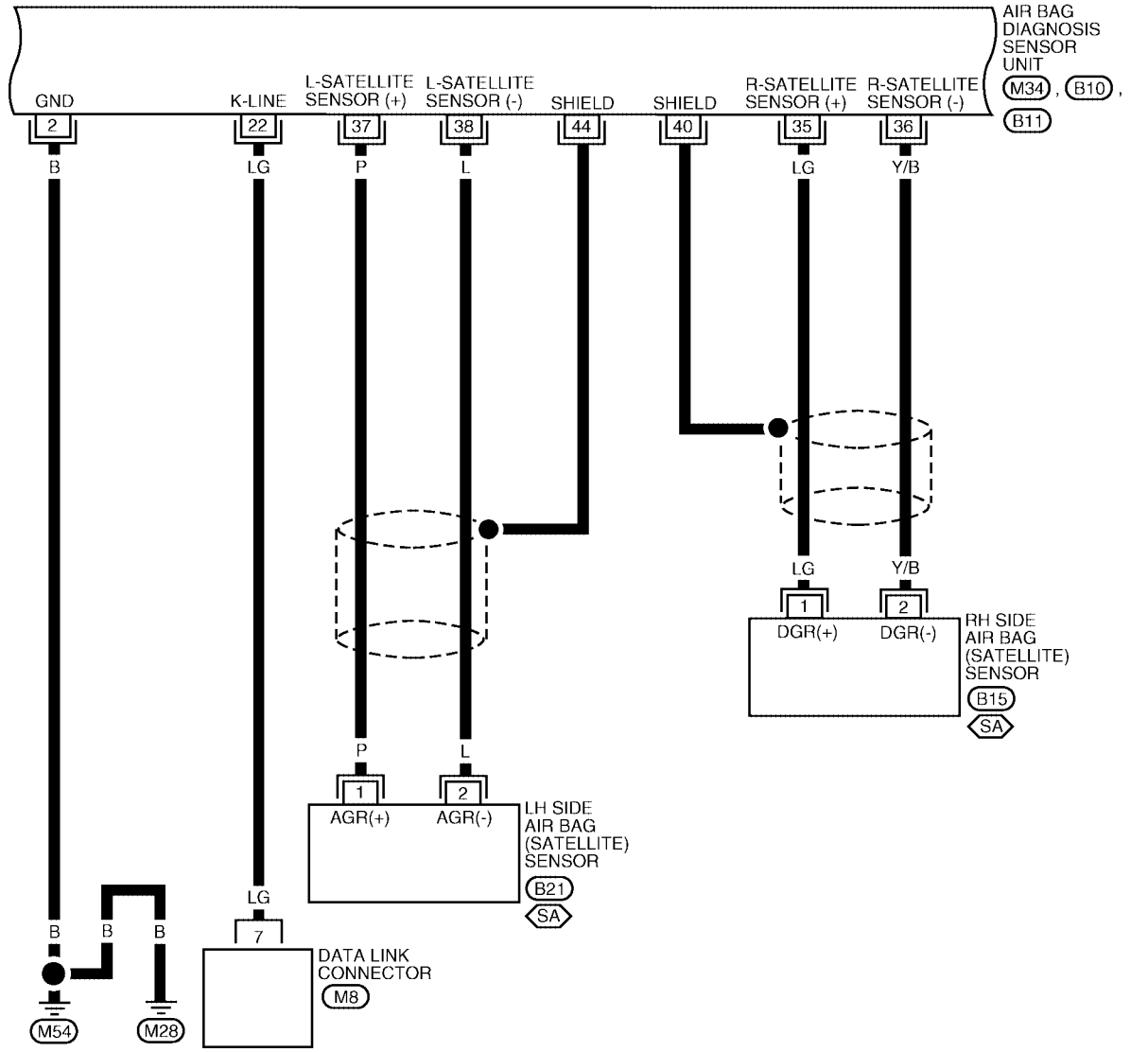


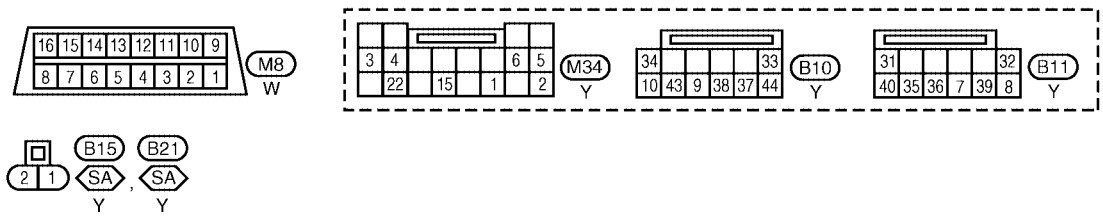


WHWA0085E

SRS-SRS-02

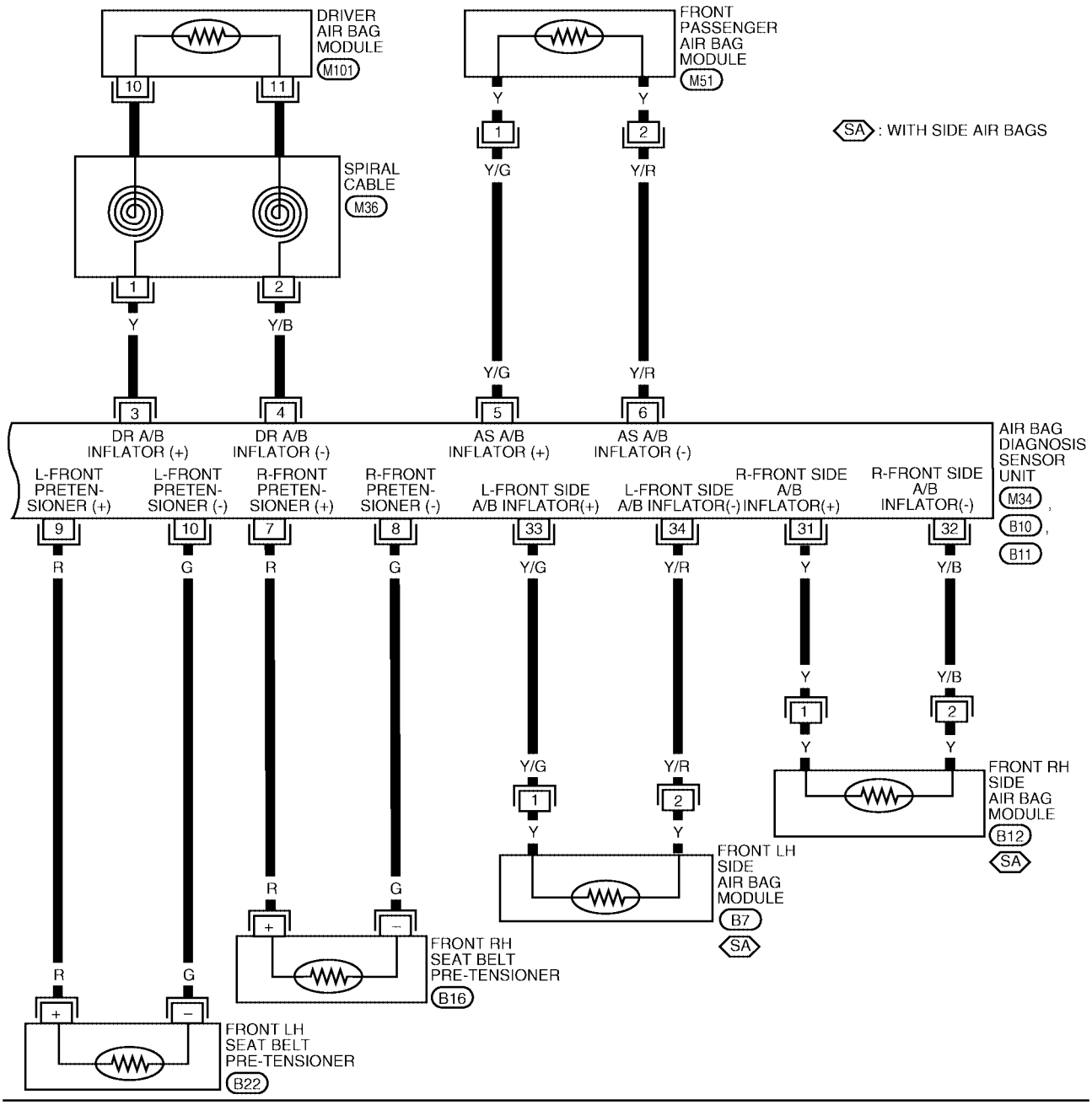
SA : WITH SIDE AIR BAGS

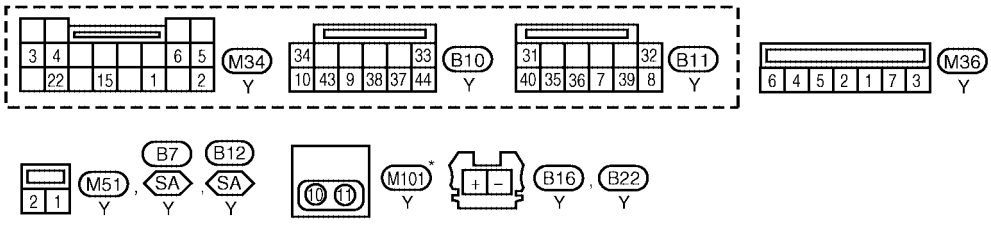




WHWA0086E

SRS-SRS-03





* THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT " OF PG SECTION.

WHWA0087E

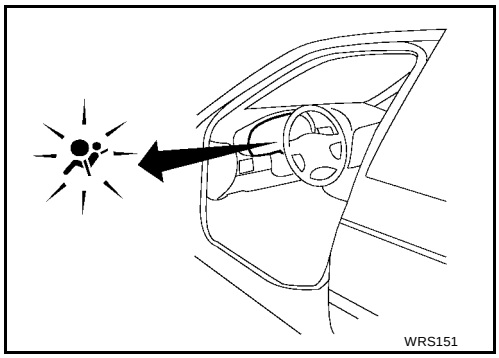
SRS Operation Check

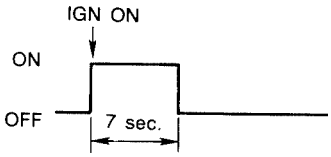
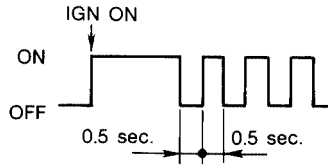
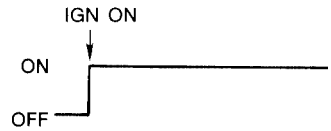
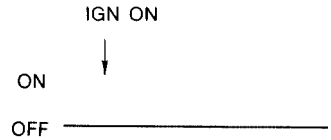
EHS000JQ

DIAGNOSTIC PROCEDURE 1

Checking Air Bag Operation by Using “AIR BAG” Warning Lamp — User Mode

1. After turning ignition switch from “OFF” to “ON”, “AIR BAG” warning lamp operates.
2. Compare “AIR BAG” warning lamp operation to the chart below.



“AIR BAG” warning lamp operation — User mode —	SRS condition	Reference item
 MRS095A	No malfunction is detected. No further action is necessary.	—
 MRS096A	The system is malfunctioning and needs to be repaired as indicated.	Go to SRS-18, "DIAGNOSTIC PROCEDURE 2" or SRS-29, "DIAGNOSTIC PROCEDURE 6" .
 MRS097A	Air bag is deployed. Front seat belt pre-tensioner is deployed.	Go to SRS-54, "COLLISION DIAGNOSIS" .
	Air bag fuse, diagnosis sensor unit or harness is malfunctioning and needs to be repaired.	Go to SRS-36, "DIAGNOSTIC PROCEDURE 9" .
 MRS098A	One of the following has occurred and needs to be repaired. ● Meter fuse is blown. ● “AIR BAG” warning lamp circuit has open or short. ● Diagnosis sensor unit is malfunctioning.	Go to SRS-37, "DIAGNOSTIC PROCEDURE 10" .

Trouble Diagnoses with CONSULT-II

EHS000JR

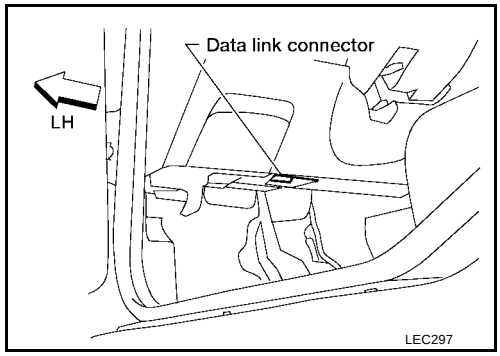
DIAGNOSTIC PROCEDURE 2

Inspecting SRS malfunctioning parts by using CONSULT-II — Diagnosis mode

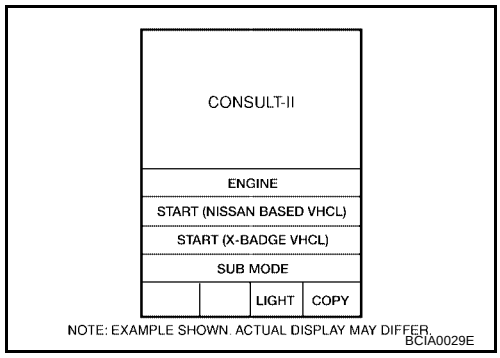
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunction might be detected in self-diagnosis depending on control unit which carry out CAN communication.

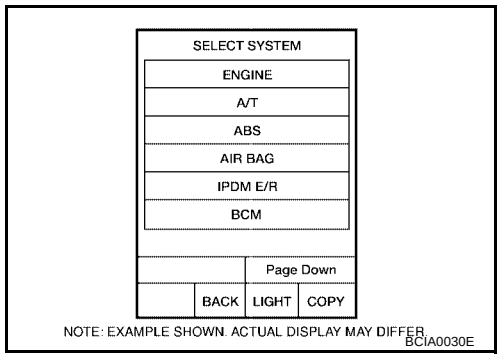
1. Turn ignition switch OFF.
2. Connect CONSULT-II to the data link connector.



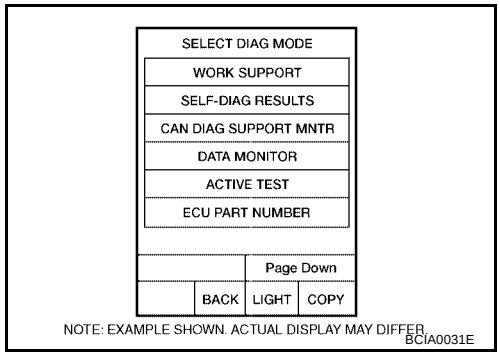
3. Turn ignition switch ON.
4. Touch “START (NISSAN BASED VHCL)”.



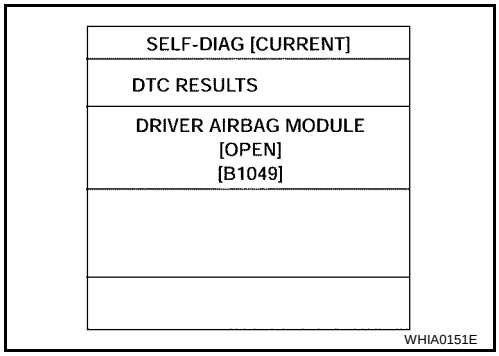
5. Touch “AIR BAG”.
   If "AIR BAG" is not indicated, refer to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Touch "SELF-DIAG [CURRENT]".

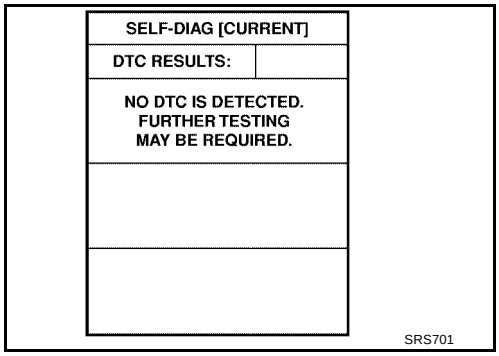


7. Diagnostic code is displayed on "SELF-DIAG [CURRENT]".



If no malfunction is detected on “SELF-DIAG [CURRENT]” even though malfunction is detected in “SRS Operation Check”, refer to SRS-24, "DIAGNOSTIC PROCEDURE 4 (CONTINUED FROM DIAGNOSTIC PROCEDURE 2)" , to diagnose the following cases:

- Self-diagnostic result “SELF-DIAG [PAST]” (previously stored in the memory) might not be erased after repair.
- The SRS system malfunctions intermittently.



8. Touch “PRINT”.
9. Compare diagnostic codes. Refer to SRS-20, "CONSULT-II Diagnostic Code Chart (“SELF-DIAG [CURRENT]”)" .
10. Touch “BACK” key of CONSULT-II until “SELECT SYSTEM” appears in order to return to User mode from Diagnosis mode.
11. Turn ignition switch “OFF”, then turn off and disconnect CONSULT-II and disconnect both battery cables.
12. Repair the system as outlined by the “Repair order” in “CONSULT-II Diagnostic Code Chart”, that corresponds to the self-diagnostic result.
13. After repairing the system, refer to SRS-22, "DIAGNOSTIC PROCEDURE 3" for final checking.

CONSULT-II Diagnostic Code Chart (“SELF-DIAG [CURRENT]”)

Diagnostic item	Explanation		Repair order **Recheck SRS at each replacement.**
NO DTC IS DETECTED.	When malfunction is indicated by the “AIR BAG” warning lamp in User mode	● Self-diagnostic result “SELF-DIAG [PAST]” (previously stored in the memory) might not be erased after repair. ● Intermittent malfunction has been detected in the past.	● Go to SRS-24, "DIAGNOSTIC PROCEDURE 4 (CONTINUED FROM DIAGNOSTIC PROCEDURE 2)" .
		● Low battery voltage (Less than 9V)	● Go to SRS-22, "DIAGNOSTIC PROCEDURE 3" after charging battery.
	● No malfunction is detected.		● Go to SRS-22, "DIAGNOSTIC PROCEDURE 3" .

Diagnostic item	Explanation	Repair order **Recheck SRS at each replacement.**
DRIVER AIR BAG MODULE [OPEN] [B1049]	● Driver air bag module circuit is open. (including the spiral cable)	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the spiral cable. 4. Replace driver air bag module. (Before disposal, it must be deployed.) 5. Replace the diagnosis sensor unit. 6. Replace the related harness.
DRIVER AIR BAG MODULE [VB-SHORT] [B1050]	● Driver air bag module circuit is shorted to some power supply circuit. (including the spiral cable)	
DRIVER AIR BAG MODULE [GND-SHORT] [B1051]	● Driver air bag module circuit is shorted to ground. (including the spiral cable)	
DRIVER AIR BAG MODULE [SHORT] [B1052]	● Driver air bag module circuits are shorted to each other.	
ASSIST A/B MODULE [OPEN] [B1065]	● Front passenger air bag module circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace front passenger air bag module. (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
ASSIST A/B MODULE [VB-SHORT] [B1066]	● Front passenger air bag module circuit is shorted to some power supply circuit.	
ASSIST A/B MODULE [GND-SHORT] [B1067]	● Front passenger air bag module circuit is shorted to ground.	
ASSIST A/B MODULE [SHORT] [B1068]	● Front passenger air bag module circuits are shorted to each other.	
SIDE MODULE LH [OPEN] [B1134]	● Front LH side air bag module circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace front LH seatback assembly. (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
SIDE MODULE LH [VB-SHORT] [B1135]	● Front LH side air bag module circuit is shorted to some power supply circuits.	
SIDE MODULE LH [GND-SHORT] [B1136]	● Front LH side air bag module circuit is shorted to ground.	
SIDE MODULE LH [SHORT] [B1137]	● Front LH side air bag module circuits are shorted to each other.	
SIDE MODULE RH [OPEN] [B1129]	● Front RH side air bag module circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace front RH seatback assembly. (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
SIDE MODULE RH [VB-SHORT] [B1130]	● Front RH side air bag module circuit is shorted to some power supply circuits.	
SIDE MODULE RH [GND-SHORT] [B1131]	● Front RH side air bag module circuit is shorted to ground.	
SIDE MODULE RH [SHORT] [B1132]	● Front RH side air bag module circuits are shorted to each other.	

Diagnostic item	Explanation	Repair order **Recheck SRS at each replacement.**
SATELLITE SENS LH [UNIT FAIL] [B1118] or [B1119] SATELLITE SENS LH [COMM FAIL] [B1120]	● LH side air bag (satellite) sensor	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the LH side air bag (satellite) sensor. 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
SATELLITE SENS RH [UNIT FAIL] [B1113] or [B1114] SATELLITE SENS RH [COMM FAIL] [B1115]	● RH side air bag (satellite) sensor	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the RH side air bag (satellite) sensor. 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
PRE-TEN FRONT LH [OPEN] [B1086]	● The circuit for the front LH pre-tensioner is open to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace the front LH seat belt. (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
PRE-TEN FRONT LH [VB-SHORT] [B1087]	● The circuit for the front LH pre-tensioner is shorted to some power supply circuit.	
PRE-TEN FRONT LH [GND-SHORT] [B1088]	● The circuit for the front LH pre-tensioner is shorted to ground.	
PRE-TEN FRONT LH [SHORT] [B1089]	● The circuits for the front LH pre-tensioner are shorted to each other.	
PRE-TEN FRONT RH [OPEN] [B1081]	● The circuit for the front RH pre-tensioner is open to some power supply circuit.	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace the front RH seat belt. (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.
PRE-TEN FRONT RH [VB-SHORT] [B1082]	● The circuit for the front RH pre-tensioner is shorted to some power supply circuit.	
PRE-TEN FRONT RH [GND-SHORT] [B1083]	● The circuit for the front RH pre-tensioner is shorted to ground.	
PRE-TEN FRONT RH [SHORT] [B1084]	● The circuits for the front RH pre-tensioner are shorted to each other.	
CONTROL UNIT [B1XXX]	● Diagnosis sensor unit is malfunctioning.	1. Visually check wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace diagnosis sensor unit. 4. Replace the related harness.

Follow the procedures in numerical order when repairing malfunctioning parts. Confirm whether malfunction is eliminated using the air bag warning lamp or CONSULT-II each time repair is finished. If malfunction is still observed, proceed to the next step. When malfunction is eliminated, further repair work is not required.

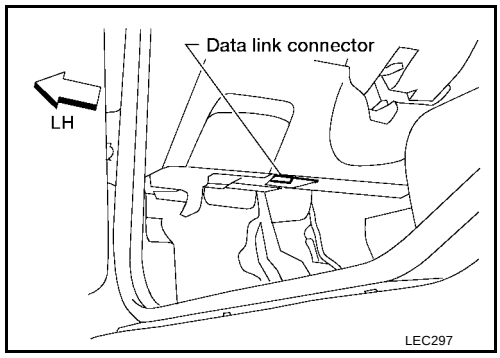
DIAGNOSTIC PROCEDURE 3

Final checking after repairing SRS by using CONSULT-II — Diagnosis mode

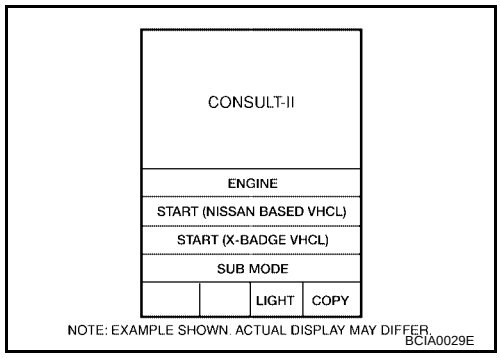
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunction might be detected in self-diagnosis depending on control unit which carry out CAN communication.

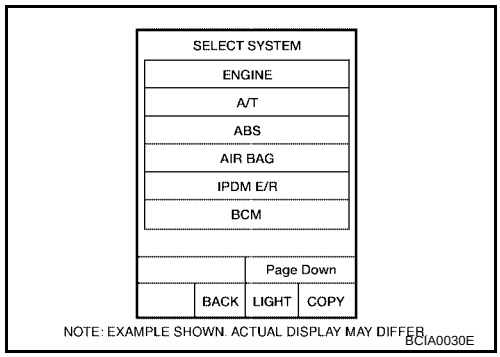
1. After repairing SRS, connect both battery cables.
2. Connect CONSULT-II to data link connector.
3. Turn ignition switch ON.



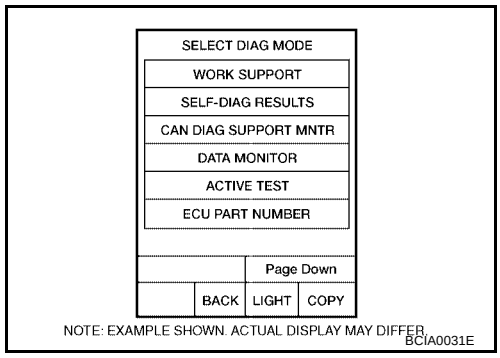
4. Touch “START (NISSAN BASED VHCL)”.



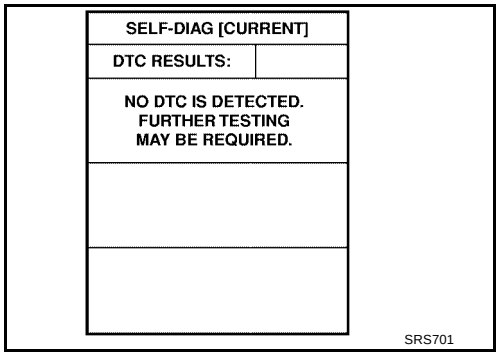
5. Touch “AIR BAG”.
   If "AIR BAG" is not indicated, refer to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Touch “SELF-DIAG [CURRENT]”.

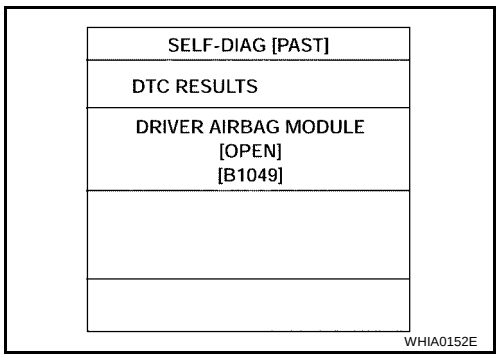


7. If no malfunction is detected on “SELF-DIAG [CURRENT]”, repair of SRS is completed. Go to step 8.
   If any malfunction is detected on “SELF-DIAG [CURRENT]”, the malfunctioning part is not repaired completely or another malfunctioning part is detected. Go to SRS-18, "DIAGNOSTIC PROCEDURE 2" , and repair malfunctioning part completely.

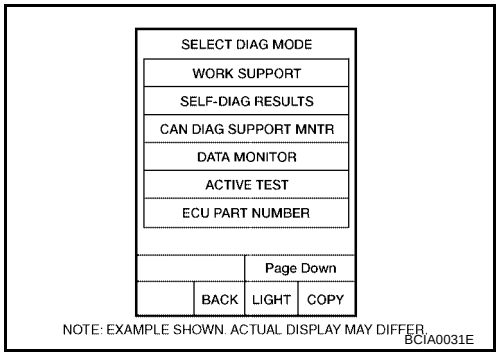


8. Touch “ERASE”.

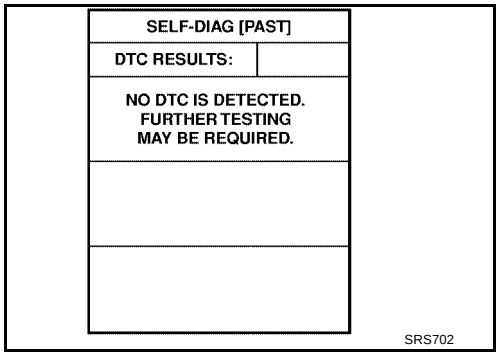
   NOTE:
   Touch “ERASE” to clear the memory of the malfunction (“SELF-DIAG [PAST]”).
   If the memory of the malfunction in “SELF-DIAG [PAST]” is not erased, the User mode shows the system malfunction by the operation of the warning lamp even if the malfunction is repaired completely.



9. Touch “BACK” key of CONSULT-II to “SELECT DIAG MODE” screen. Touch “SELF-DIAG [PAST]”.



10. Check that no malfunction is detected on “SELF-DIAG [PAST]”.
11. Touch “BACK” key of CONSULT-II until “SELECT SYSTEM” appears in order to return to User mode from Diagnosis mode.
12. Turn ignition switch OFF then turn off and disconnect CONSULT-II.
13. Go to SRS-18, "Checking Air Bag Operation by Using “AIR BAG” Warning Lamp — User Mode" .



DIAGNOSTIC PROCEDURE 4 (CONTINUED FROM DIAGNOSTIC PROCEDURE 2)

Inspecting SRS malfunctioning record

1. CONSIDER POSSIBILITY OF NOT ERASING SELF-DIAGNOSTIC RESULT AFTER REPAIRING

Is it the first time for maintenance of SRS?

Yes or No

Yes >> Go to SRS-25, "DIAGNOSTIC PROCEDURE 5" .

No >> Self-diagnostic result “SELF-DIAG [PAST]” (previously stored in the memory) might not be erased after repair. Go to SRS-22, "DIAGNOSTIC PROCEDURE 3" .

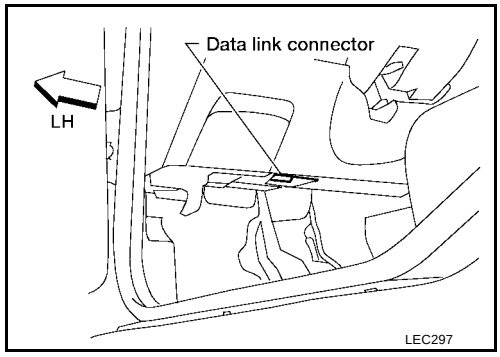
DIAGNOSTIC PROCEDURE 5

Inspecting SRS intermittent malfunction by using CONSULT-II — Diagnosis mode

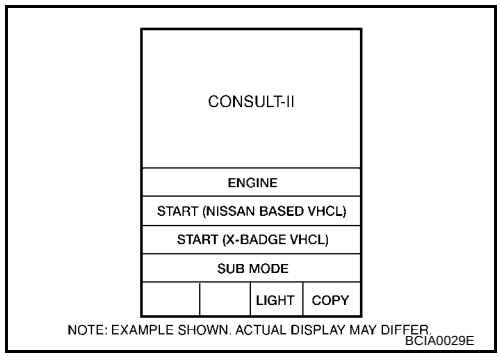
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunction might be detected in self-diagnosis depending on control unit which carry out CAN communication.

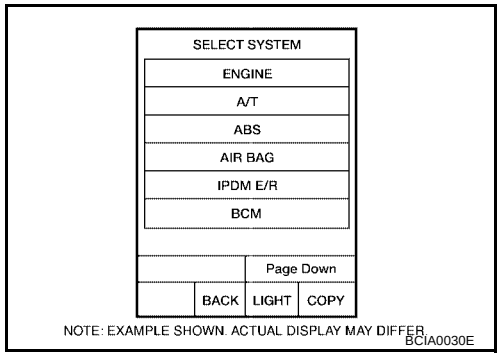
1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector.



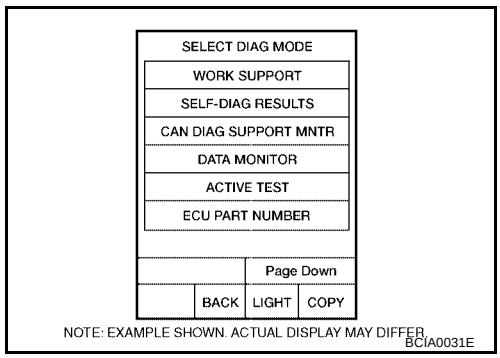
3. Turn ignition switch ON.
4. Touch “START (NISSAN BASED VHCL)”.



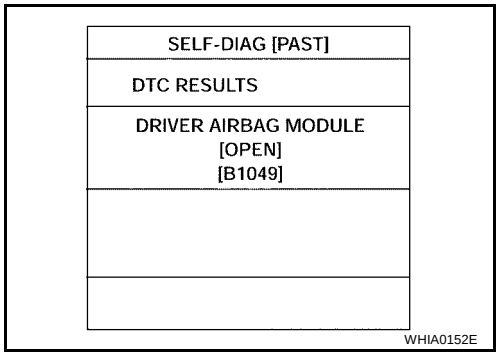
5. Touch “AIR BAG”.
   If "AIR BAG" is not indicated, refer to GI-38, "CONSULT-II Data Link Connector (DLC) Circuit" .



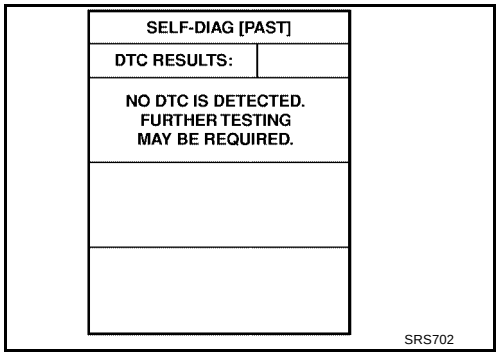
6. Touch “SELF-DIAG [PAST]”.



7. If diagnostic codes are displayed on “SELF-DIAG [PAST]”, go to step 10.

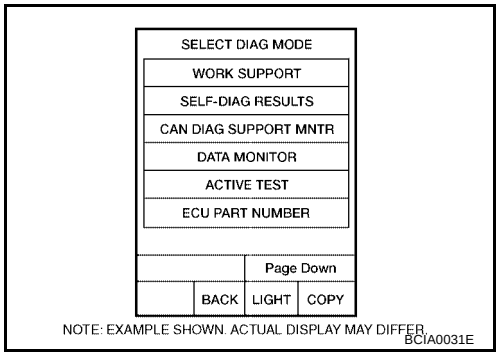


If no malfunction is detected on “SELF-DIAG [PAST]”, touch “BACK” and go back to “SELECT DIAG MODE”.

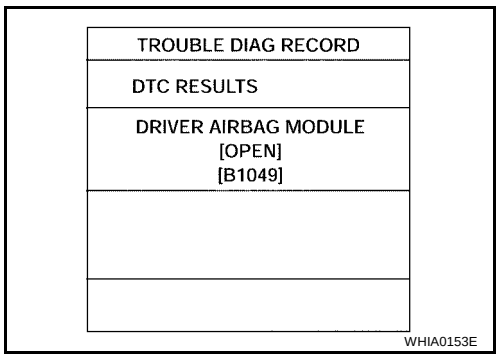


8. Touch “TROUBLE DIAG RECORD”.

NOTE:
With “TROUBLE DIAG RECORD”, diagnosis results previously erased by a reset operation can be displayed.



9. Diagnostic code is displayed on “TROUBLE DIAG RECORD”.
10. Touch “PRINT”.
11. Compare diagnostic codes to SRS-27, "Intermittent Malfunction Diagnostic Code Chart (“SELF-DIAG [PAST]” or “TROUBLE DIAG RECORD”)" .
12. Touch “BACK” key of CONSULT-II until “SELECT SYSTEM” appears.
13. Turn ignition switch OFF, then turn off and disconnect CONSULT-II, and both battery cables.
14. Repair the system as outlined by the “Repair order” in “Intermittent Malfunction Diagnostic Code Chart”, that corresponds to the self-diagnostic result. For replacement procedure of component parts, refer to the Removal and Installation procedure for the appropriate component.
15. Go to SRS-22, "DIAGNOSTIC PROCEDURE 3" , for final checking.



Intermittent Malfunction Diagnostic Code Chart ("SELF-DIAG [PAST]" or "TROUBLE DIAG RECORD")

Diagnostic item	Explanation	Repair order
NO DTC IS DETECTED.	● No malfunction is detected.	● Go to SRS-22, "DIAGNOSTIC PROCEDURE 3" .
DRIVER AIR BAG MODULE [OPEN] [B1049]	● Driver air bag module circuit is open. (including the spiral cable)	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the spiral cable, diagnosis sensor unit and driver air bag module. (Before disposal, it must be deployed.)
DRIVER AIR BAG MODULE [VB-SHORT] [B1050]	● Driver air bag module circuit is shorted to some power supply circuit. (including the spiral cable)	
DRIVER AIR BAG MODULE [GND-SHORT] [B1051]	● Driver air bag module circuit is shorted to ground. (including the spiral cable)	
DRIVER AIR BAG MODULE [SHORT] [B1052]	● Driver air bag module circuits are shorted to each other.	
ASSIST A/B MODULE [OPEN] [B1065]	● Front passenger air bag module circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and front passenger air bag module. (Before disposal, it must be deployed.)
ASSIST A/B MODULE [VB-SHORT] [B1066]	● Front passenger air bag module circuit is shorted to some power supply circuit.	
ASSIST A/B MODULE [GND-SHORT] [B1067]	● Front passenger air bag module circuit is shorted to ground.	
ASSIST A/B MODULE [SHORT] [B1068]	● Front passenger air bag module circuits are shorted to each other.	
SIDE MODULE LH [OPEN] [B1134]	● Front LH side air bag module circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and front LH seatback assembly. (Before disposal, it must be deployed.)
SIDE MODULE LH [VB-SHORT] [B1135]	● Front LH side air bag module circuit is shorted to some power supply circuits.	
SIDE MODULE LH [GND-SHORT] [B1136]	● Front LH side air bag module circuit is shorted to ground.	
SIDE MODULE LH [SHORT] [B1137]	● Front LH side air bag module circuits are shorted to each other.	
SIDE MODULE RH [OPEN] [B1129]	● Front RH side air bag module circuit is open.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and front RH seatback assembly. (Before disposal, it must be deployed.)
SIDE MODULE RH [VB-SHORT] [B1130]	● Front RH side air bag module circuit is shorted to some power supply circuits.	
SIDE MODULE RH [GND-SHORT] [B1131]	● Front RH side air bag module circuit is shorted to ground.	
SIDE MODULE RH [SHORT] [B1132]	● Front RH side air bag module circuits are shorted to each other.	

Diagnostic item	Explanation	Repair order
SATELLITE SENS LH [UNIT FAIL] [B1118] or [B1119] SATELLITE SENS LH [COMM FAIL] [B1120]	● LH side air bag (satellite) sensor	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and LH side air bag (satellite) sensor.
SATELLITE SENS RH [UNIT FAIL] [B1113] or [B1114] SATELLITE SENS RH [COMM FAIL] [B1115]	● RH side air bag (satellite) sensor	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and RH side air bag (satellite) sensor.
PRE-TEN FRONT LH [OPEN] [B1086]	● The circuit for front LH pre-tensioner is open to some power supply circuit.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and front LH seat belt. (Before disposal, it must be deployed.)
PRE-TEN FRONT LH [VB-SHORT] [B1087]	● The circuit for front LH pre-tensioner is shorted to some power supply circuit.	
PRE-TEN FRONT LH [GND-SHORT] [B1088]	● The circuit for front LH pre-tensioner is shorted to ground.	
PRE-TEN FRONT LH [SHORT] [B1089]	● The circuits for the front LH pre-tensioner are shorted to each other.	
PRE-TEN FRONT RH [OPEN] [B1081]	● The circuit for front RH pre-tensioner is open to some power supply circuit.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit and front RH seat belt. (Before disposal, it must be deployed.)
PRE-TEN FRONT RH [VB-SHORT] [B1082]	● The circuit for front RH pre-tensioner is shorted to some power supply circuit.	
PRE-TEN FRONT RH [GND-SHORT] [B1083]	● The circuit for front RH pre-tensioner is shorted to ground.	
PRE-TEN FRONT RH [SHORT] [B1084]	● The circuits for the front RH pre-tensioner are shorted to each other.	
CONTROL UNIT [B1XXX]	● Diagnosis sensor unit is malfunctioning.	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. If the harness check is OK, replace the diagnosis sensor unit.

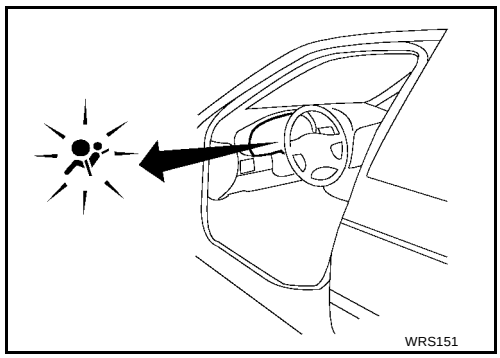
Follow the procedures in numerical order when repairing malfunctioning parts, then make the final system check.

Trouble Diagnoses without CONSULT-II

EHS000JS

DIAGNOSTIC PROCEDURE 6

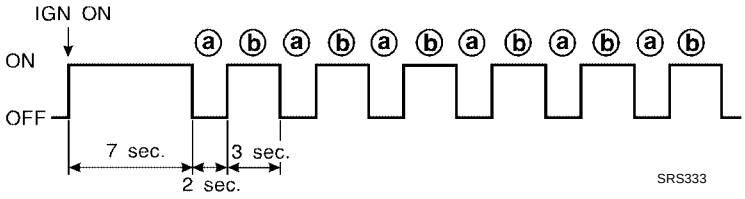
Inspecting SRS malfunctioning parts by using “AIR BAG” warning lamp — Diagnosis mode

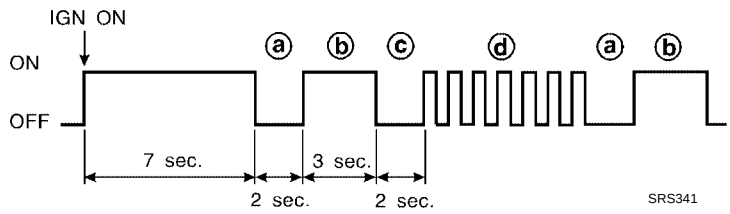
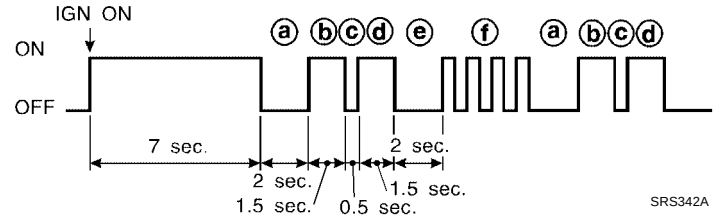


NOTE:
SRS will not enter Diagnosis mode if no malfunction is detected in User mode.

1. Turn ignition switch “ON”.
2. After “AIR BAG” warning lamp lights for 7 seconds, turn ignition switch “OFF” within 1 second.
3. Wait more than 3 seconds.
4. Repeat steps 1 to 3 three times.
5. Turn ignition switch “ON”.
   SRS is now in Diagnosis mode.
6. “AIR BAG” warning lamp operates in Diagnosis mode as follows:

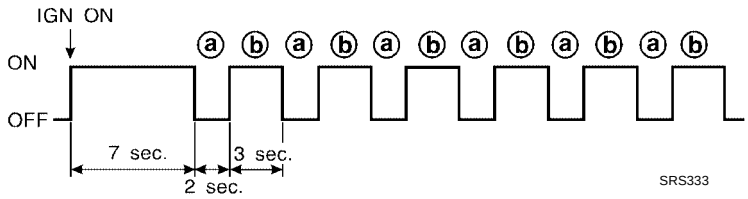
NOTE:
If SRS does not enter Diagnosis mode even though malfunction is detected in User mode, check the battery voltage.
If the battery voltage is less than 9V, charge the battery. Then go to SRS-34, "DIAGNOSTIC PROCEDURE 7".
If the battery voltage is OK, replace the diagnosis sensor unit.

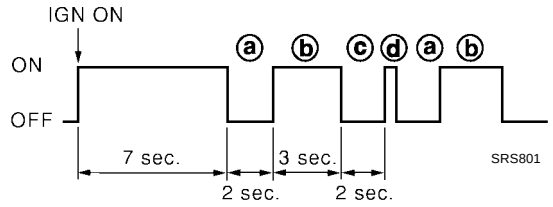
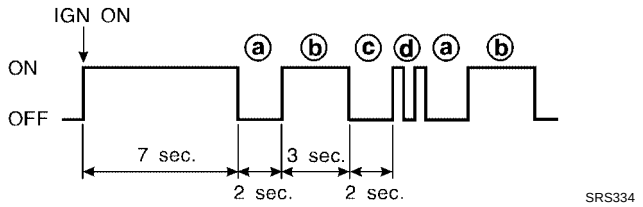
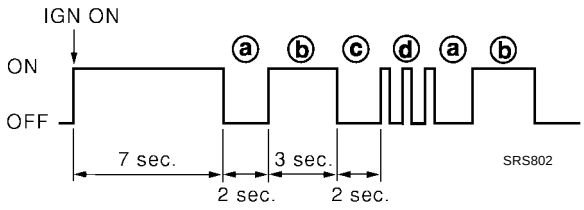
No.	“AIR BAG” warning lamp flash pattern — Diagnosis mode —		SRS condition
1		**a** through **b** are repeated.	● Diagnosis results (previously stored in the memory) might not be erased after repair. ● Intermittent malfunction has been detected in the past. Go to SRS-35, "DIAGNOSTIC PROCEDURE 8 (CONTINUED FROM DIAGNOSTIC PROCEDURE 6)".

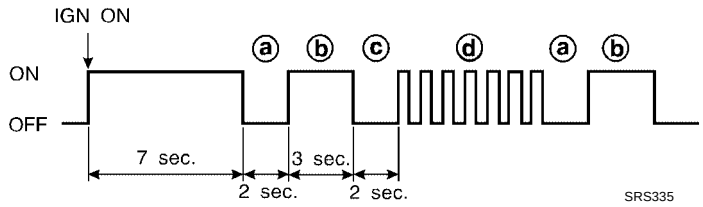
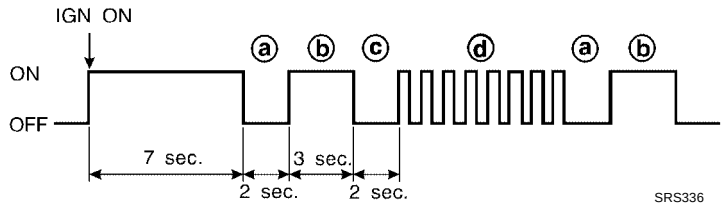
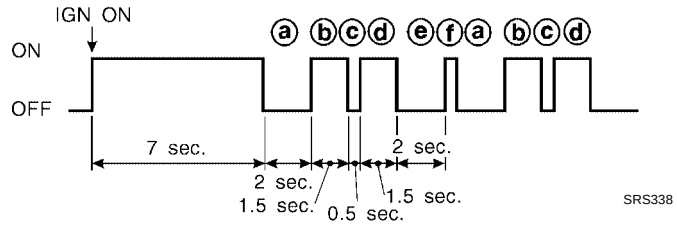
No.	“AIR BAG” warning lamp flash pattern — Diagnosis mode —		SRS condition
2		**a** through **d** are repeated. **b** — Driver and front passenger air bag marker (For identifying driver air bag, front passenger air bag and/or seat belt pre-tensioner malfunctioning) **d** — Indicates malfunctioning part. The number of flash varies with malfunctioning part (0.5 sec. ON and 0.5 sec. OFF is counted as one flash.)	The system is malfunctioning and needs to be repaired.
3		**a** through **f** are repeated. **b**, **c** , **d** — Front side air bag marker (For identifying front side air bag malfunctioning) **f** — Indicates malfunctioning part. The number of flash varies with malfunctioning part (0.5 sec. ON and 0.5 sec. OFF is counted as one flash.)	

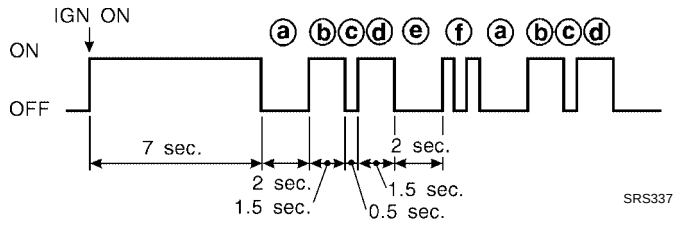
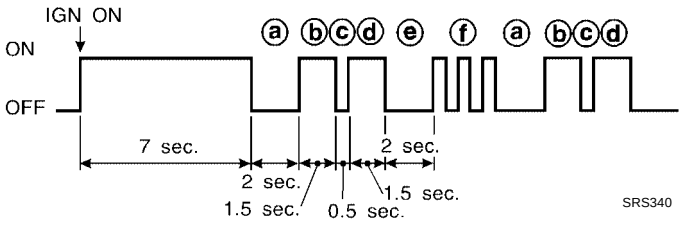
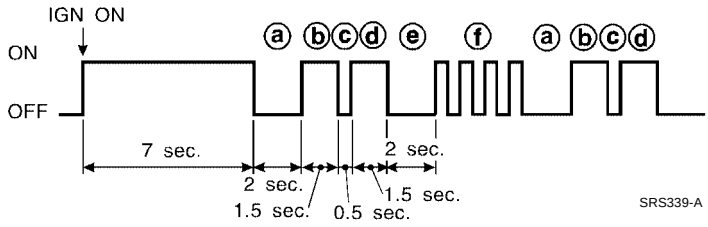
7. Malfunctioning part is indicated by the number of flashes (part **d** or **f**). Compare the number of flashes to SRS-30, "Air Bag Warning Lamp Flash Code Chart (Diagnosis mode)" , and locate malfunctioning part.
8. Turn ignition switch “OFF”, and disconnect both battery cables.
9. Repair the system as outlined by the “Repair order” in “Warning Lamp Flash Code Chart” that corresponds to the flash code. For replacement procedure of component parts, refer to the Removal and Installation procedure for the appropriate component.
10. After repairing the system, refer to SRS-34, "DIAGNOSTIC PROCEDURE 7" .

Air Bag Warning Lamp Flash Code Chart (Diagnosis mode)

	Flash pattern	
● Diagnosis results (previously stored in the memory) might not be erased after repair. ● Intermittent malfunction has been detected in the past.		**a** through **b** are repeated.
	Repair order	
	● Go to SRS-35, "DIAGNOSTIC PROCEDURE 8 (CONTINUED FROM DIAGNOSTIC PROCEDURE 6)" .	

The front RH seat belt pre-tensioner circuit is malfunctioning. (**d** : 1 flash)	Flash pattern	
		**a** through **d** are repeated. **d** — One flash indicates malfunctioning front RH pre-tensioner circuit.
	Repair order (“Recheck SRS at each replacement”).	
	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace front RH seat belt pre-tensioner. (Before disposing, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	
The driver air bag module circuit is malfunctioning. (**d** : 2 flashes)	Flash pattern	
		**a** through **d** are repeated. **d** — Two flashes indicate malfunctioning driver air bag module circuit.
	Repair order (“Recheck SRS at each replacement.”)	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the spiral cable. 4. Replace driver air bag module. (Before disposal, it must be deployed.) 5. Replace the diagnosis sensor unit. 6. Replace the related harness.	
The front LH seat belt pre-tensioner circuit is malfunctioning. (**d** : 3 flashes)	Flash pattern	
		**a** through **d** are repeated. **d** — Three flashes indicate malfunctioning front LH pre-tensioner circuit.
	Repair order (“Recheck SRS at each replacement”).	
	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace front LH seat belt pre-tensioner. (Before disposing, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	

The diagnosis sensor unit is malfunctioning. (**d** : 7 flashes)	Flash pattern	
		**a** through d are repeated. **d** — Seven flashes indicate malfunctioning diagnosis sensor unit.
	Repair order (“Recheck SRS at each replacement.”)	
	1. Visually check the wiring harness connections. 2. Replace the harness if it has visible damage. 3. Replace the diagnosis sensor unit. 4. Replace the related harness.	
The front passenger air bag module circuit is malfunctioning. (**d** : 8 flashes)	Flash pattern	
		**a** through **d** are repeated. **d** — Eight flashes indicate malfunctioning front passenger air bag module circuit.
	Repair order (“Recheck SRS at each replacement.”)	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace front passenger air bag module. (Before disposal, it must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	
The front RH side air bag module circuit is malfunctioning. (**f** : 1 flash)	Flash pattern	
		**a** through **f** are repeated. **f** — One flash indicates malfunctioning front RH side air bag module circuit.
	Repair order (“Recheck SRS at each replacement.”)	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace front RH seatback assembly. (Before disposal, the front RH side air bag module must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	

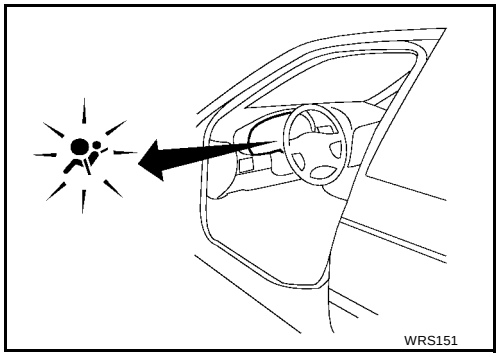
The front LH side air bag module circuit is malfunctioning. (**f** : 2 flashes)	Flash pattern	
		**a** through **f** are repeated. **f** — Two flashes indicate malfunctioning front LH side air bag module circuit.
	Repair order (“Recheck SRS at each replacement.”)	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace front LH seatback assembly. (Before disposal, the front LH side air bag module must be deployed.) 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	
The RH side air bag (satellite) sensor is malfunctioning. (**f** : 3 flashes)	Flash pattern	
		**a** through **f** are repeated. **f** — Three flashes indicate malfunctioning RH side air bag (satellite) sensor circuit.
	Repair order (“Recheck SRS at each replacement.”)	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the RH side air bag (satellite) sensor. 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	
The LH side air bag (satellite) sensor is malfunctioning. (**f** : 4 flashes)	Flash pattern	
		**a** through **f** are repeated. **f** — Four flashes indicate malfunctioning LH side air bag (satellite) sensor circuit.
	Repair order (“Recheck SRS at each replacement.”)	
	1. Visually check the wiring harness connection. 2. Replace the harness if it has visible damage. 3. Replace the LH side air bag (satellite) sensor. 4. Replace the diagnosis sensor unit. 5. Replace the related harness.	

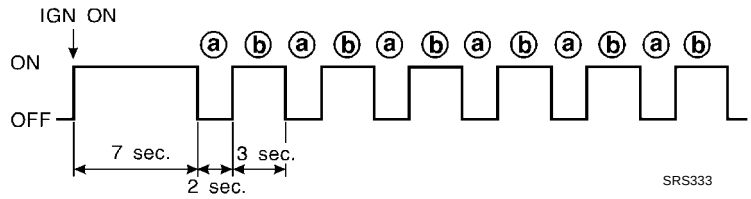
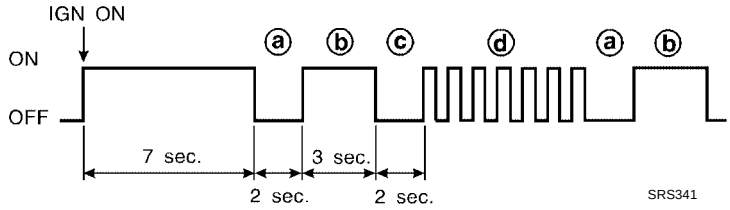
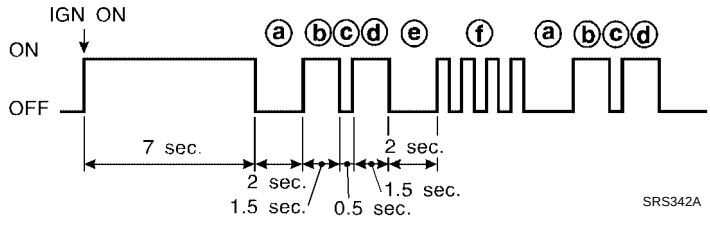
Follow the procedures in numerical order when repairing malfunctioning parts. Confirm whether malfunction is eliminated using the air bag warning lamp or CONSULT-II each time repair is finished. If malfunction is still observed, proceed to the next step. When malfunction is eliminated, further repair work is not required.

DIAGNOSTIC PROCEDURE 7

Final checking after repairing SRS by using “AIR BAG” warning lamp — Diagnosis mode and User mode

1. After repairing SRS, connect both battery cables.
2. Open driver's door.
3. Turn ignition switch “ON”.
4. “AIR BAG” warning lamp operates in Diagnosis mode as follows:



No.	“AIR BAG” warning lamp flash pattern — Diagnosis mode —		SRS condition
1		**a** through **b** are repeated.	No malfunction is detected or repair is completed. No further action is necessary.
2		**a** through **d** are repeated. **b** — Driver and front passenger air bag marker (For identifying driver air bag, front passenger air bag and/or seat belt pre-tensioner malfunctioning) **d** — Indicates malfunctioning part. The number of flashes varies with malfunctioning part (0.5 sec. ON and 0.5 sec. OFF is counted as one flash.)	The system is malfunctioning and needs to be repaired.
3		**a** through **f** are repeated. **b**, **c** , **d** — Front side air bag marker (For identifying front side air bag malfunctioning) **f** — Indicates malfunctioning part. The number of flashes varies with malfunctioning part (0.5 sec. ON and 0.5 sec. OFF is counted as one flash.)	

NOTE:
When diagnosis sensor unit is replaced with new one, “AIR BAG” warning lamp will operate in User mode. Checking “AIR BAG” warning lamp operation in Diagnosis mode is not required. Go to step 6.

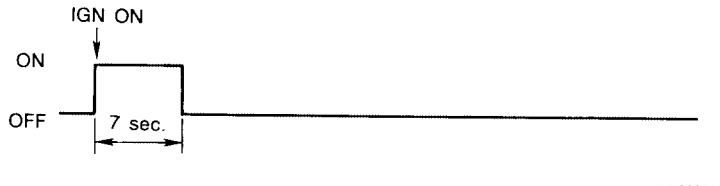
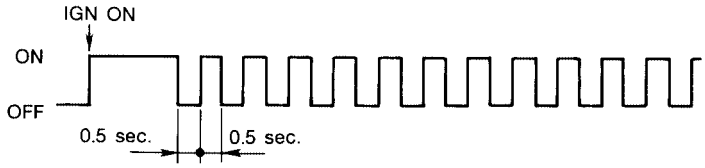
5. If “AIR BAG” warning lamp operates as shown in No. 1 in chart above, turn ignition switch “OFF” to reset from Diagnosis mode to User mode and to erase the memory of the malfunction. Then go to step 6.
   If “AIR BAG” warning lamp operates as shown in No. 2 or No. 3 in chart above, the malfunctioning part is not repaired completely, or another malfunctioning part is detected. Go to SRS-29, "DIAGNOSTIC PROCEDURE 6" , and repair malfunctioning part completely.
6. Turn ignition switch “ON”. “AIR BAG” warning lamp operates in User mode. Compare “AIR BAG” warning lamp operation to the chart below.

NOTE:
If switching Diagnosis mode to User mode is required while malfunction is being detected, turn ignition switch as follows:

7. Turn ignition switch “ON”.
8. After “AIR BAG” warning lamp lights for 7 seconds, turn ignition switch “OFF”.

9. Wait more than 3 seconds.
10. Repeat steps 1 to 3 three times.
11. Turn ignition switch “ON”.

SRS is now in User mode.

“AIR BAG” warning lamp operation — User mode —	SRS condition	Reference item
 MRS095A	No malfunction is detected. No further action is necessary.	—
 MRS096A	The system is malfunctioning and needs to be repaired as indicated.	Go to SRS-29, "DIAGNOSTIC PROCEDURE 6" .
MRS097A	Air bag is deployed.	Go to SRS-54, "COLLISION DIAGNOSIS" .
	Air bag fuse, diagnosis sensor unit or harness is malfunctioning and needs to be repaired.	Go to SRS-36, "DIAGNOSTIC PROCEDURE 9" .
MRS098A	One of the following has occurred and needs to be repaired. ● Meter fuse is blown. ● “AIR BAG” warning lamp circuit has open or short. ● Diagnosis sensor unit is malfunctioning.	Go to SRS-37, "DIAGNOSTIC PROCEDURE 10" .

DIAGNOSTIC PROCEDURE 8 (CONTINUED FROM DIAGNOSTIC PROCEDURE 6)

Inspecting SRS malfunctioning record

1. CONSIDER POSSIBILITY OF NOT ERASING SELF-DIAGNOSTIC RESULT AFTER REPAIRING

Is it the first time for maintenance of SRS?

Yes or No

Yes >> Go to SRS-25, "DIAGNOSTIC PROCEDURE 5" . (Further inspection cannot be performed without CONSULT-II.)

No >> Diagnosis results (previously stored in the memory) might not be erased after repair. Go to SRS-34, "DIAGNOSTIC PROCEDURE 7" .

Trouble Diagnoses: “AIR BAG” Warning Lamp Does Not Turn Off

EHS000JT

DIAGNOSTIC PROCEDURE 9

1. SEE THE DEPLOYMENT OF AIR BAG MODULE

Is air bag module deployed?

Yes or No

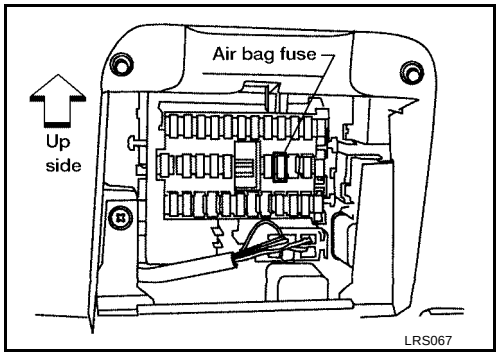
Yes >> Refer to SRS-54, "COLLISION DIAGNOSIS" .
No >> GO TO 2.

2. CHECK AIR BAG FUSE

Check 10A fuse 18 [located in the fuse block (J/B)].

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. CHECK AIR BAG FUSE AGAIN

Replace “AIR BAG” fuse and turn ignition switch ON.

Is “AIR BAG” fuse blown again?

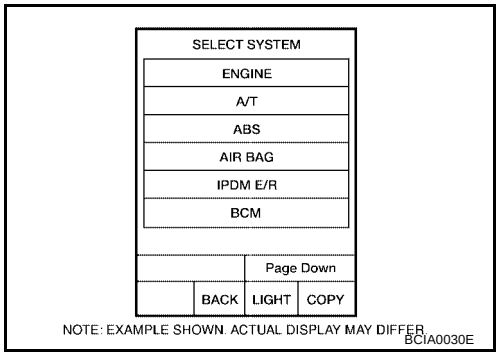
Yes >> Repair main harness and/or replace related harness.
No >> Inspection End.

4. CHECK DIAGNOSIS SENSOR UNIT

Connect CONSULT-II and touch “START”.
Is “AIR BAG” displayed on CONSULT-II?

Yes or No

Yes >> GO TO 5.
No >> Visually check the wiring harness connection of diagnosis sensor unit. If the harness connection check result is OK, replace diagnosis sensor unit. Refer to SRS-38, "Removal and Installation" .



5. CHECK HARNESS CONNECTION

Is harness connection between warning lamp and diagnosis sensor unit OK?

OK or NG

OK >> Replace diagnosis sensor unit. Refer to SRS-38, "Removal and Installation" .
NG >> Connect “AIR BAG” warning lamp and diagnosis sensor unit connector properly. If “AIR BAG” warning lamp still does not go off, replace harness.

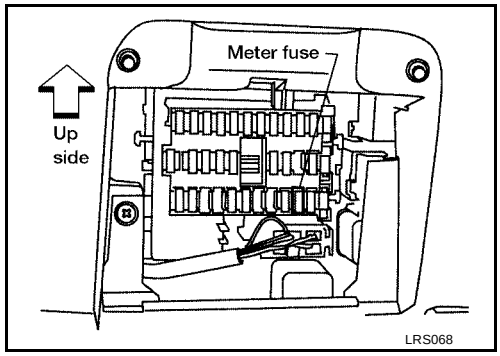
Trouble Diagnoses: “AIR BAG” Warning Lamp Does Not Turn On

EHS000JU

DIAGNOSTIC PROCEDURE 10

1. CHECK “METER” FUSE

Check 10A fuse 30 [located in the fuse block (J/B)].



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. CHECK “METER” FUSE AGAIN

Replace “METER” fuse and turn ignition switch ON.

Is “METER” fuse blown again?

Yes >> Repair main harness.
No >> Inspection End.

3. CHECK HARNESS CONNECTION BETWEEN DIAGNOSIS SENSOR UNIT AND “AIR BAG” WARNING LAMP

Disconnect diagnosis sensor unit connector and turn ignition switch “ON”.
Does “AIR BAG” warning lamp turn on?

Yes or No

Yes >> Replace diagnosis sensor unit. Refer to SRS-38, "Removal and Installation" .
No >> Check the ground circuit of “AIR BAG” warning lamp.

DIAGNOSIS SENSOR UNIT

PFP:28556

Removal and Installation

EHS000JV

REMOVAL

CAUTION:

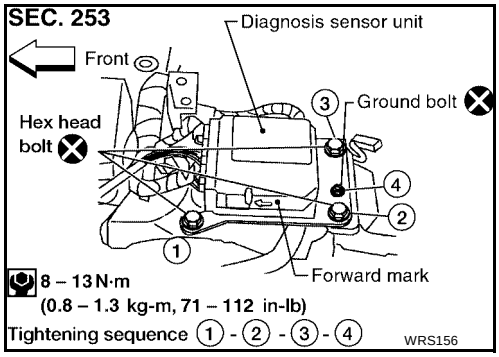
- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait for at least 3 minutes.**
- **Do not use old bolts after removal; replace with new ones.**
- **Check diagnosis sensor unit for proper installation.**
- **Check diagnosis sensor unit to ensure it is free of deformities, dents, cracks or rust. If they show any visible signs of damage, replace them with new ones.**
- **Check diagnosis sensor unit brackets to ensure they are free of deformities or rust.**
- **Replace diagnosis sensor unit if it has been dropped or sustained an impact.**
- **After replacement of diagnosis sensor unit, perform self-diagnosis for SRS. Refer to SRS-18, "SRS Operation Check" for details.**

1. Disconnect driver, front passenger and front side air bag module connectors. Also, disconnect front seat belt pre-tensioner connectors.
2. Remove console box. Refer to IP-10, "INSTRUMENT PANEL ASSEMBLY" .
3. Disconnect diagnosis sensor unit connector.
4. Remove bolts from diagnosis sensor unit.
   Then remove the diagnosis sensor unit.

INSTALLATION

NOTE:

- To install, reverse the removal procedure sequence.



FRONT SEAT BELT PRE-TENSIONER

PFP:86884

Removal and Installation

EHS000JW

For removal and installation of front seat belt pre-tensioners, refer to SB-3, "Removal and Installation" .

SIDE AIR BAG (SATELLITE) SENSOR

PFP:K8EH0

Removal and Installation

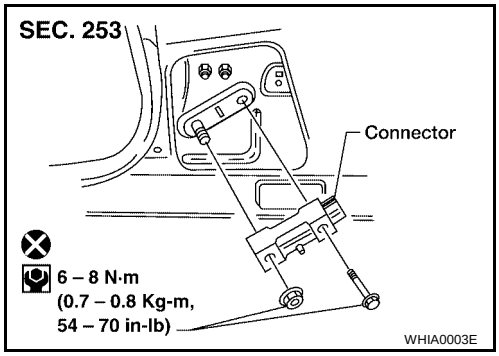
EHS000JX

REMOVAL

CAUTION:

- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait at least 3 minutes.**
- **Do not use old nut or bolt coated with bonding agent after removal; replace with new ones.**
- **Check side air bag (satellite) sensor to ensure they are free of deformities, dents, cracks or rust. If it shows any visible signs of damage, replace it with new one.**
- **Do not attempt to disassemble side air bag (satellite) sensor.**
- **Replace side air bag (satellite) sensor if it has been dropped or sustained an impact.**

1. Remove front seat belt pre-tensioner. Refer to SB-3, "Removal and Installation" .
2. Disconnect side air bag (satellite) sensor connector.
3. Remove bolt and nut from side air bag (satellite) sensor unit. Then remove the side air bag (satellite) sensor.



INSTALLATION

CAUTION:

- **Check side air bag (satellite) sensor for proper installation.**
- **After replacement of side air bag (satellite) sensor, check SRS function and perform self-diagnosis. Refer to SRS-18, "SRS Operation Check" for details.**

To install, reverse the removal procedure sequence.

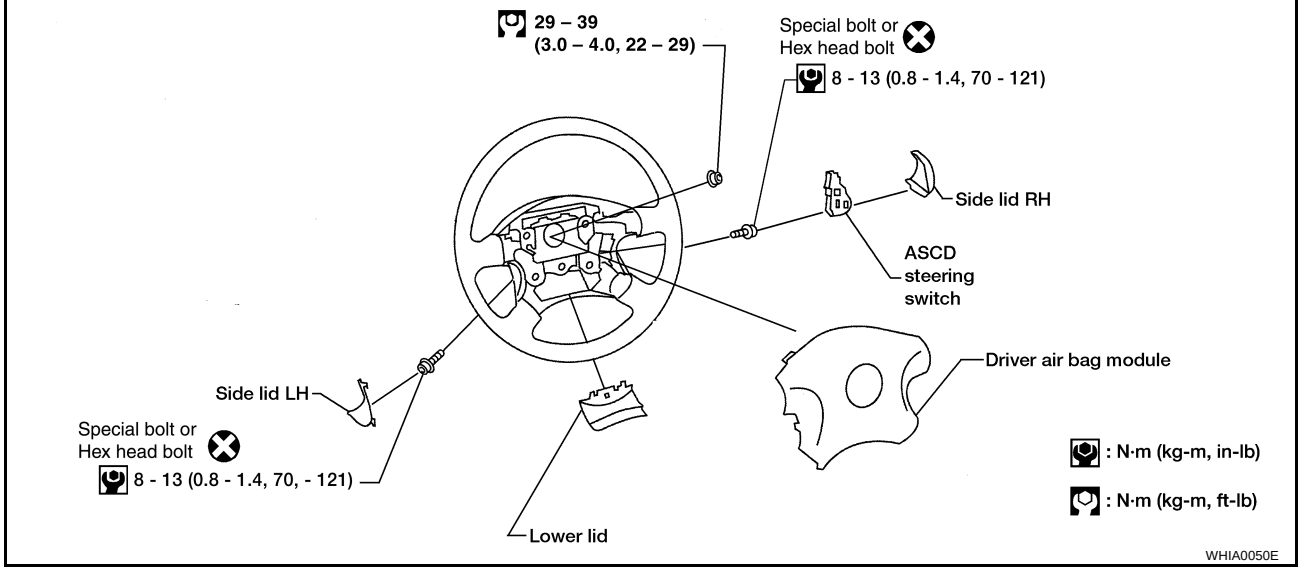
DRIVER AIR BAG MODULE

PFP:K8510

Removal and Installation

EHS000JY

SEC. 253•484



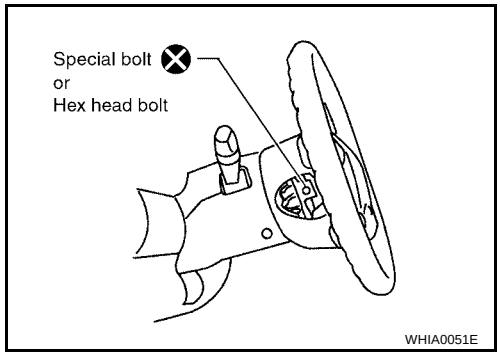
Removal

EHS000JZ

CAUTION:

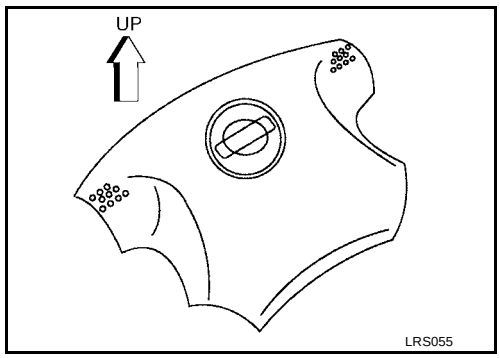
- **Do not attempt to repair or replace damaged direct-connect driver air bag module connectors. If a direct-connect harness connector is damaged, the harness must be replaced.**
- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait at least 3 minutes.**
- **Always work from the side of driver air bag module.**

1. Remove side lids and ASCD steering switch (if equipped). Using the TAMPER RESISTANT TORX (Size T30) (if equipped), remove left and right special bolts or hex head bolts. Driver air bag module can then be removed.
2. Disconnect the air bag harness connector and remove the air bag module.
   - For removal/installation of the direct-connect SRS connectors, refer to SRS-6, "Direct-connect SRS Component Connectors" .

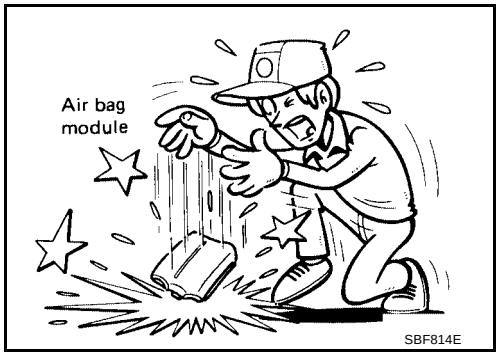


CAUTION:

- **Always place driver air bag module with pad side facing upward.**
- **Do not attempt to disassemble air bag module.**
- **The bolts are coated with bonding agent. Do not use old bolts after removal; replace with new ones.**
- **Do not insert any foreign objects (screwdriver, etc.) into air bag module connector.**



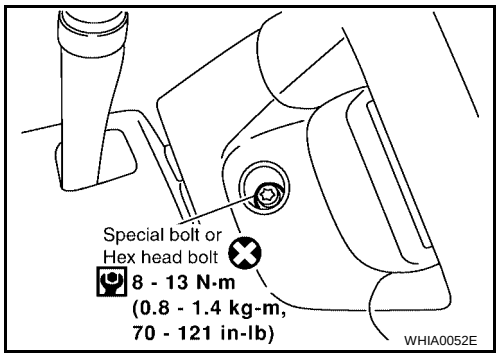
- **Replace driver air bag module if it has been dropped or sustained an impact.**
- **Do not expose the driver air bag module to temperatures exceeding 90°C (194°F).**
- **Do not allow oil, grease or water to come in contact with the driver air bag module.**



Installation

EHS000K0

1. Connect driver air bag harness connector.
   - For removal/installation of the direct-connect SRS connectors, refer to SRS-6, "Direct-connect SRS Component Connectors" .
2. Position driver air bag module, press firmly and tighten with new special bolts.
3. Install ASCD steering switch (if equipped) and all lids.
4. Connect both battery cables, then conduct self-diagnosis to ensure entire SRS operates properly. (Use CONSULT-II or warning lamp check.)
5. Turn steering wheel to the left end and then to the right end fully to make sure that spiral cable is set in the neutral position.
   If air bag warning lamp blinks or stays ON (at the user mode), it shows the spiral cable may be snapped due to its improper position. Perform self-diagnosis again (use CONSULT-II or warning lamp). Refer to SRS-18, "SRS Operation Check" . If a malfunction is detected, replace the spiral cable with a new one.
6. Perform self-diagnosis again to check that no malfunction is detected. Go to SRS-18, "SRS Operation Check" and perform self-diagnosis to ensure entire SRS operates properly. (Use CONSULT-II or warning lamp check.)

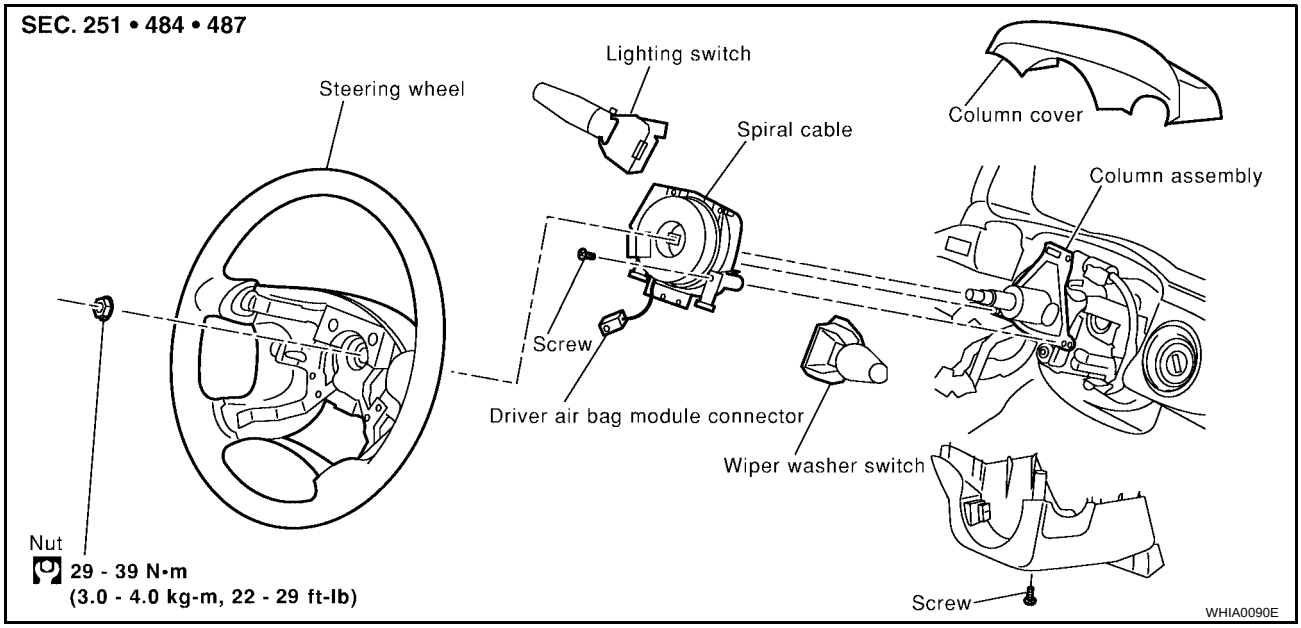


SPIRAL CABLE

PFP:25554

Removal and Installation

EHS000K1



Removal

EHS000K2

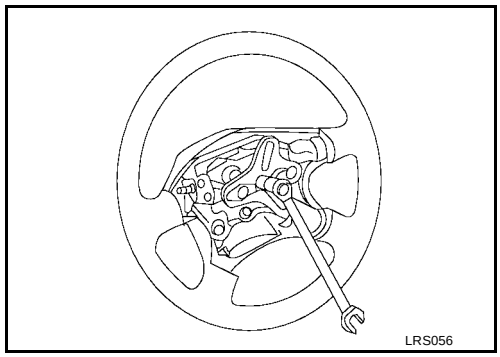
CAUTION:

- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait at least 3 minutes.**

1. Remove driver air bag module. Refer to SRS-41, "Removal" .
2. Set steering wheel in the neutral position.
3. Remove lower lid and disconnect horn connector. Remove steering wheel nut.
4. Using steering wheel puller, remove steering wheel. Be careful not to over-tighten puller bolt on steering wheel.

   CAUTION:

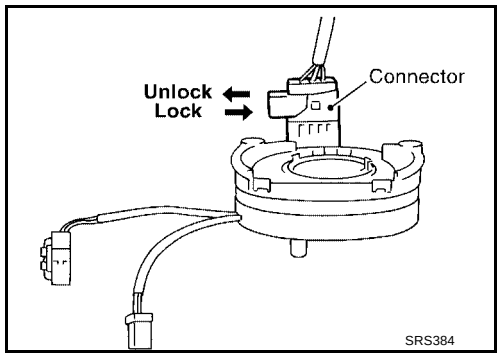
   - **Do not tap or bump the steering wheel.**
5. Remove steering column cover.



6. Unlock the spiral cable connector. Then disconnect connectors and remove the four screws. The spiral cable can then be removed.

   CAUTION:

   - **Do not attempt to disassemble spiral cable.**
   - **Do not apply lubricant to the spiral cable.**

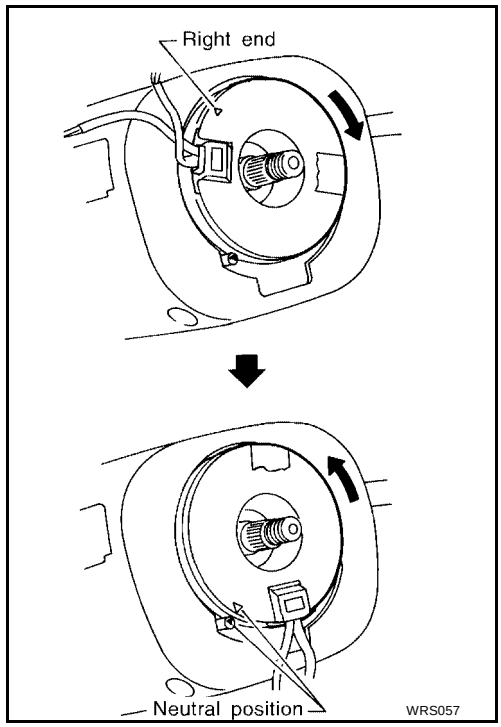


Installation

EHS000K3

1. Set the front wheels in the straight-ahead position.
2. Make sure that the spiral cable is in the neutral position.
   The neutral position is detected by turning left about 3.5 revolutions from the right end position. Align the two marks (⧗).
   CAUTION:
   - **The spiral cable may snap due to steering operation if the cable is installed in an improper position.**
   - **Also, with the steering linkage disconnected, the cable may snap by turning the steering wheel beyond the limited number of turns. To set spiral cable to neutral position turn to the left approximately 3.5 turns from the right end position.**
3. Connect spiral cable connector and tighten with screws. Install steering column cover.
4. Install steering wheel, aligning with spiral cable pin guides, and pull spiral cable through.
5. Connect horn connector and engage spiral cable with pawls in steering wheel. Move driver air bag module connector away from steering wheel lower lid opening.
6. Tighten nut.

   : 29 - 39 N-m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)



7. Install driver air bag module. Refer to SRS-42, "Installation" .
8. Connect both battery cables, then conduct self-diagnosis to ensure entire SRS operates properly. Refer to SRS-18, "SRS Operation Check" .

FRONT PASSENGER AIR BAG MODULE

PFP:K8515

Removal and Installation

EHS000K4

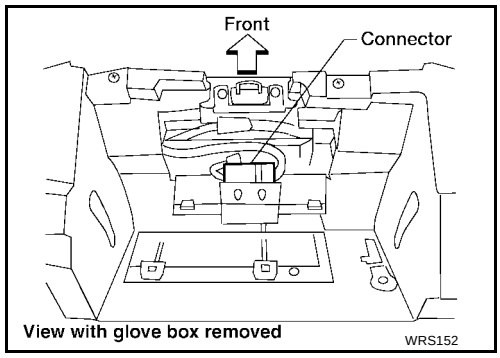
REMOVAL

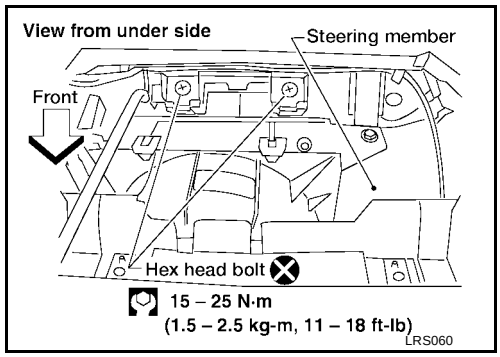
CAUTION:

- **Do not attempt to repair or replace damaged direct-connect front passenger air bag module connectors. If a direct-connect harness connector is damaged, the harness must be replaced.**
- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait for at least 3 minutes.**
- **Always work from the side of or under air bag module.**

1. Remove glove box assembly. Refer to IP-10, "INSTRUMENT PANEL ASSEMBLY" for details.
2. Disconnect front passenger air bag module connector from air bag harness connector.
3. Remove the nuts and hex bolts from front passenger air bag module.
4. Remove the front passenger air bag module from the instrument panel.

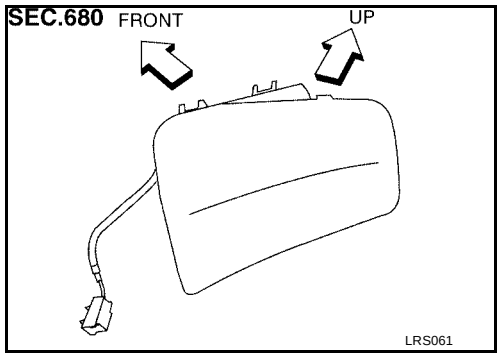
- The front passenger air bag module is heavy and should be supported using both hands during removal.



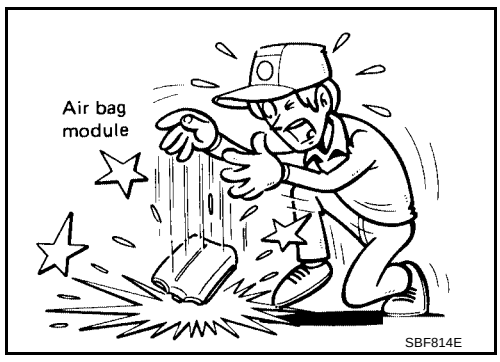


CAUTION:

- **Always place front passenger air bag module with pad side facing upward.**
- **Do not attempt to disassemble air bag module.**
- **The special bolts are coated with bonding agent. Do not use old bolts after removal; replace with new coated bolts.**
- **Do not insert any foreign objects (screwdriver, etc.) into air bag module connector.**



- **Replace air bag module if it has been dropped or sustained an impact.**
- **Do not expose the air bag module to temperatures exceeding 90°C (194°F).**
- **Do not allow oil, grease or water to come in contact with the front passenger air bag module.**
- **After air bag inflates, the front instrument panel assembly should be replaced if damaged.**

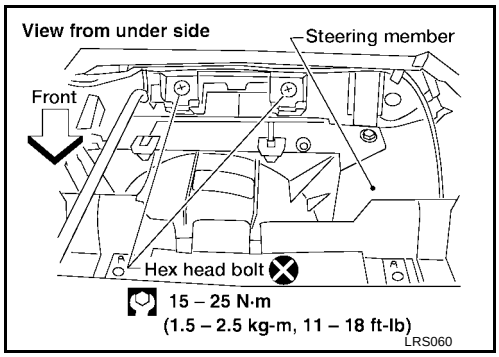


INSTALLATION

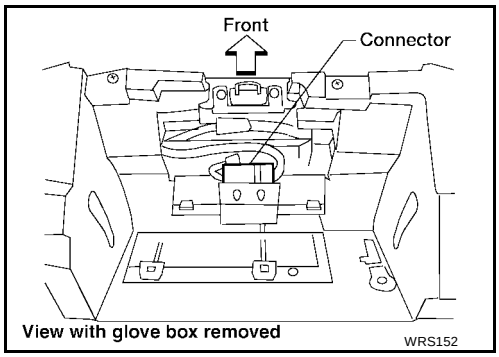
CAUTION:

- **Always work from the side of or under air bag module.**

1. Install front passenger air bag module on steering member.
   - Ensure harness is not caught between rear of air bag module and steering member.
2. Install glove box assembly. (Glove box lid is open.)



3. Connect front passenger air bag module connector to air bag harness connector.
4. Close the glove box lid.
5. Connect both battery cables.
6. Go to SRS-18, "SRS Operation Check" and perform self-diagnosis to ensure entire SRS operates properly. (Use CONSULT-II or warning lamp check.)



FRONT SIDE AIR BAG MODULE

PFP:K8EH0

Removal

EHS000K5

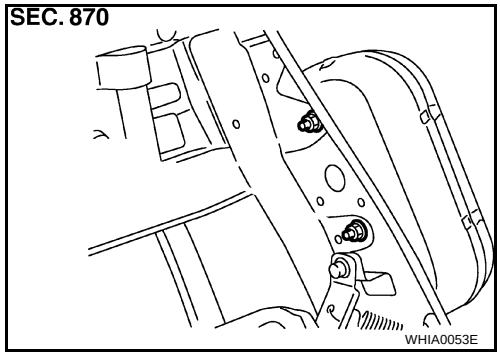
WARNING:

Removal of front side air bag module should only be done to allow deployment of front side air bag module prior to disposal of seatback assembly.
Only complete seatback assemblies can be replaced. Refer to SE-5, "Removal and Installation" .

CAUTION:

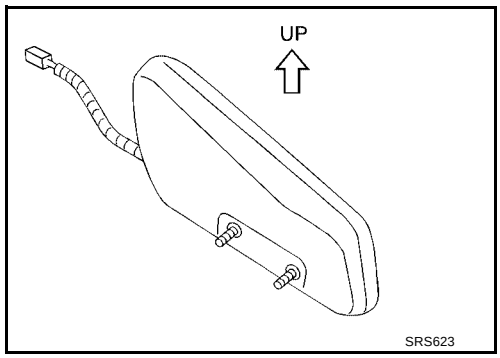
- **Before servicing SRS, turn the ignition switch off, disconnect both battery cables and wait at least 3 minutes.**
- **Always work from the rear of air bag module.**

1. Open seat back zipper to access module.
2. Pull up the seat back trim.
3. Remove the Torx nuts coated with bonding agent from front side air bag module.
4. Remove harness clips. Front side air bag module can then be removed.

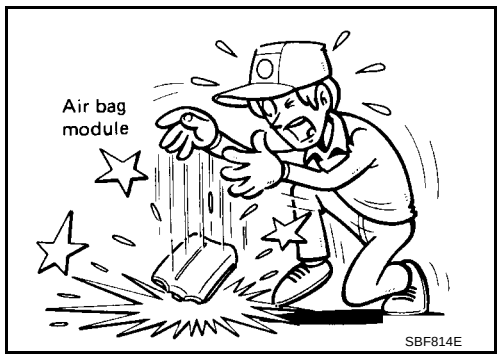


CAUTION:

- **Always place front side air bag module with the stud bolt side facing down.**
- **Do not attempt to disassemble air bag module.**
- **Do not insert any foreign objects (screwdriver, etc.) into air bag module connector.**



- **Replace front seatback assembly if it has been dropped or sustained an impact.**
- **Do not expose front seatback assembly to temperatures exceeding 90°C (194°F).**
- **Do not allow oil, grease or water to come in contact with the air bag module.**
- **After air bag inflates, the front seatback assembly must be replaced.**



DISPOSAL OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER

PFP:00014

Disposal of Air Bag Module and Seat Belt Pre-tensioner

EHS000K6

- Before disposing of air bag module or seat belt pre-tensioner, on vehicles equipped with such systems, deploy the systems. If such systems have already been deployed due to an accident, dispose of them as indicated in SRS-53, "DISPOSING OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER" .
- When deploying the air bag module and seat belt pre-tensioner, always use the Special Service Tool; Deployment tool KV99106400 (Kent-Moore No. J38381).
- When deploying the air bag module or seat belt pre-tensioner, stand at least 5 m (16 ft) away from the deployment component.
- When deploying air bag module or seat belt pre-tensioner, a fairly loud noise is made, followed by smoke being released. The smoke is not poisonous, however, be careful not to inhale smoke since it irritates the throat and can cause choking.
- Only deploy one air bag module at a time.
- Due to heat, leave air bag module unattended for more than 30 minutes after deployment. Leave seat belt pre-tensioner unattended for more than 10 minutes after deployment.
- Be sure to wear gloves when handling a deployed air bag module or seat belt pre-tensioner.
- Never apply water to the deployed air bag module or seat belt pre-tensioner.
- Wash your hands clean after finishing work.
- Place the vehicle outdoors with an open space of at least 6 m (20 ft) on all sides when deploying air bag module or seat belt pre-tensioner while mounted in vehicle.
- Use a voltmeter to make sure the vehicle battery is fully charged.
- Do not dispose of air bag modules or seat belt pre-tensioners un-deployed.

CHECKING DEPLOYMENT TOOL

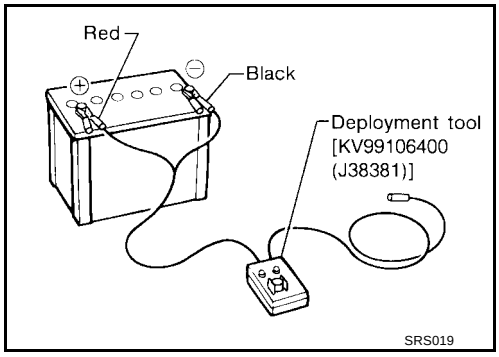
Connecting to Battery

CAUTION:

The battery must show voltage of 9.6V or more.

Remove the battery from the vehicle and place it on dry wood blocks approximately 5 m (16 ft) away from the vehicle.

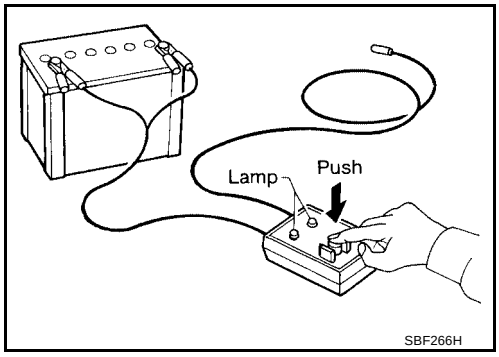
- Wait 3 minutes after the vehicle battery is disconnected before proceeding.
- Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.



Make sure the polarity is correct. The right side lamp in the tool, marked “deployment tool power”, should glow with a green light. If the right side lamp glows red, reverse the connections to the battery.

Deployment Tool Check

Press the deployment tool switch to the “ON” position. The left side lamp in the tool, marked “air bag connector voltage” should illuminate. If it does not illuminate, replace the tool.



Air Bag Deployment Tool Lamp Illumination Chart (Battery connected)

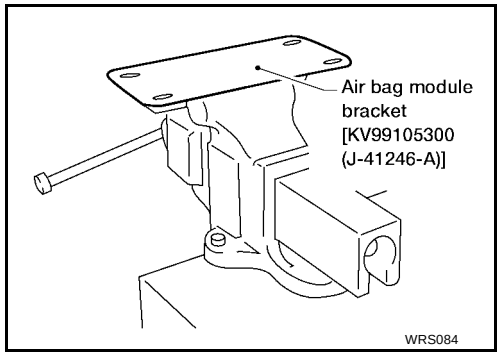
Switch operation	Left side lamp, green* "AIR BAG CONNECTOR VOLTAGE"	Right side lamp, green* "DEPLOYMENT TOOL POWER"
OFF	OFF	ON
ON	ON	ON

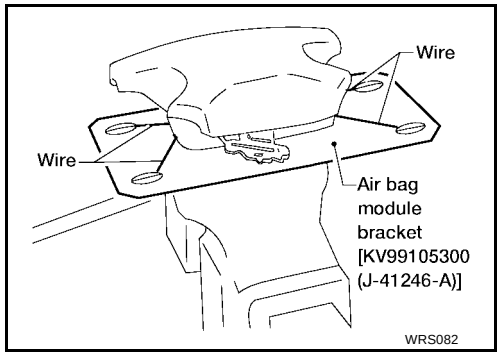
*: If this lamp glows red, the tool is connected to the battery incorrectly. Reverse the connections and make sure the lamp glows green.

DEPLOYMENT PROCEDURES FOR AIR BAG MODULE (OUTSIDE OF VEHICLE)

Unless the vehicle is being scrapped, deploying the air bag in the vehicle is not recommended. This may cause damage to the vehicle interior.

Anchor air bag module bracket [KV99105300 (J-41246-A)] in a vise secured to a firm foundation during deployment.



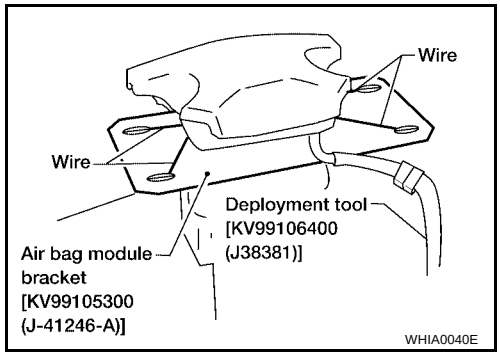


Deployment of Driver Air Bag Module (Outside of vehicle)

1. Using wire, secure driver air bag module to air bag module bracket [SST: KV99105300 (J-41246-A)] at two places.

   CAUTION:
   Use wire of at least 1 mm (0.04 in) diameter.

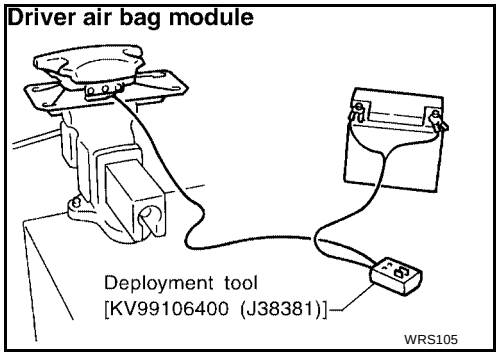
2. Firmly secure air bag module bracket [SST: KV99105300 (J-41246-A)] with air bag module attached, in a vise.
3. Connect deployment tool [SST: KV99106400 (J38381)] to driver air bag module connector. If adapter is required, use SST: KV99109000 (J44230).



4. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
5. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red.
6. Press the button on the deployment tool. The left side lamp on the tool, marked “air bag connector voltage”, will illuminate and the driver air bag module will deploy.

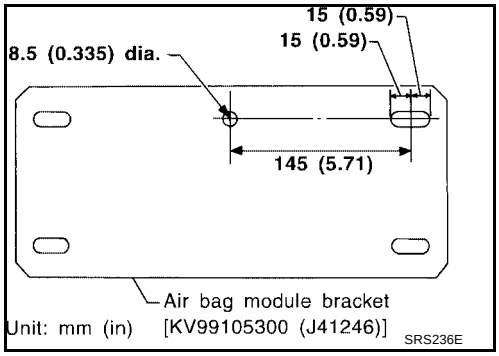
CAUTION:

When deploying the driver air bag module, stand at least 5 m (16 ft) away from the driver air bag module.

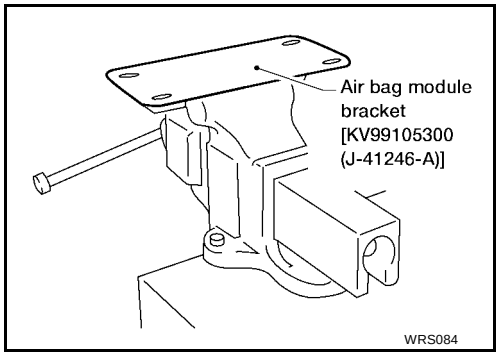


Deployment of Front Passenger Air Bag Module (Outside of vehicle)

1. Make an 8.5 mm (0.335 in) diameter hole in air bag module bracket [SST: KV99105300 (J-41246-A)] at the position shown in figure.



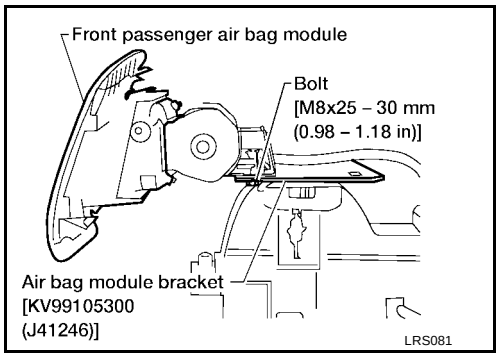
2. Firmly secure air bag module bracket [SST: KV99105300 (J-41246-A)] in a vise.



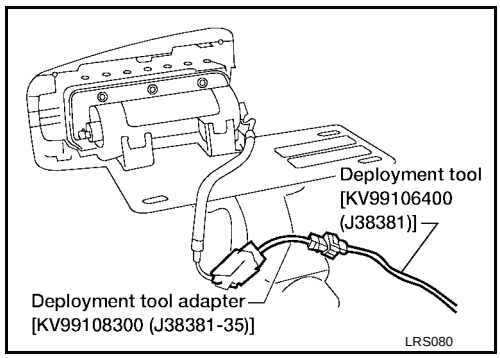
3. Match the two holes in air bag module bracket (held in vise) and front passenger air bag module and fix them with two bolts [M8 × 25 - 30 mm (0.98 - 1.18 in)].

CAUTION:

If a gap exists between front passenger air bag module and air bag module bracket, use a piece of wood inserted in the gap to stabilize the front passenger air bag module.



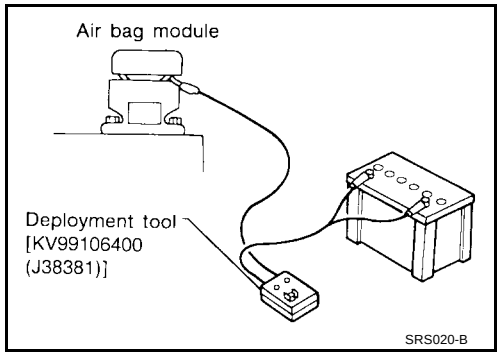
4. Connect deployment tool adapter [SST: KV99108300 (J38381-35)] to deployment tool [SST: KV99106400 (J38381)] connector and front passenger air bag module connector.
5. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
6. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red.



7. Press the button on the deployment tool. The left side lamp on the tool, marked “air bag connector voltage”, will illuminate and the front passenger air bag module will deploy.

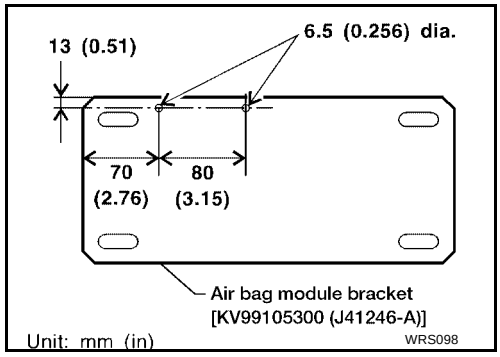
CAUTION:

- **When deploying the front passenger air bag module, do not stand on the deploying side.**
- **Stand at least 5 m (16 ft) away from the front passenger air bag module.**



Deployment of Front Side Air Bag Module (Outside of vehicle)

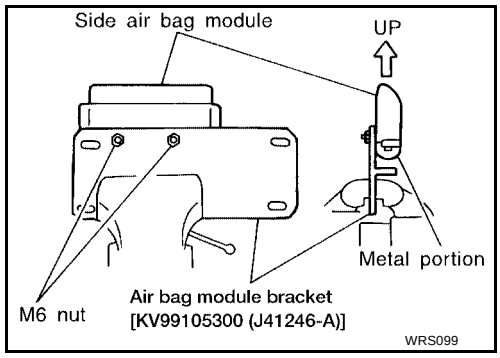
1. Make 6.5 mm (0.256 in) diameter holes in air bag module bracket [SST: KV99105300 (J-41246-A)] at the position shown in figure.



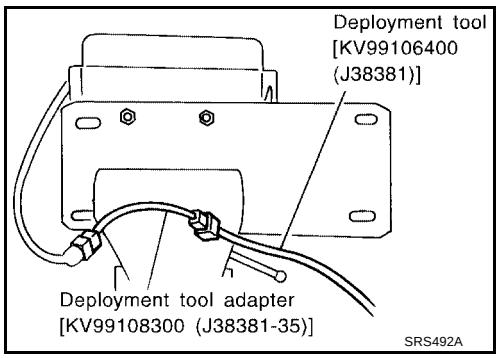
2. Firmly secure air bag module bracket [SST: KV99105300 (J-41246-A)] in a vise.
3. Insert the stud bolts of front side air bag module (built-in type) into the two holes in air bag module bracket (held in vise) and fix them with two M6 nuts.

CAUTION:

Front side air bag module should be secured to air bag module bracket [SST: KV99105300 (J-41246-A)] in a vise with metal portion facing down.

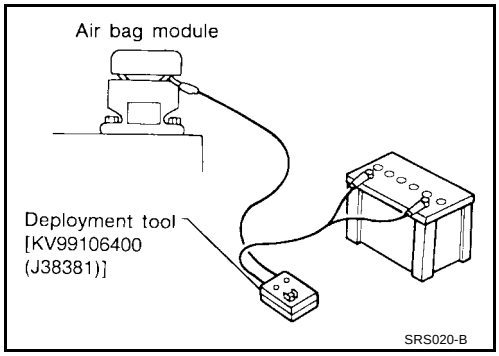


4. Connect deployment tool adapter [SST: KV99108300 (J38381-35)] to deployment tool [SST: KV99106400 (J38381)] connector and connector on air bag module.



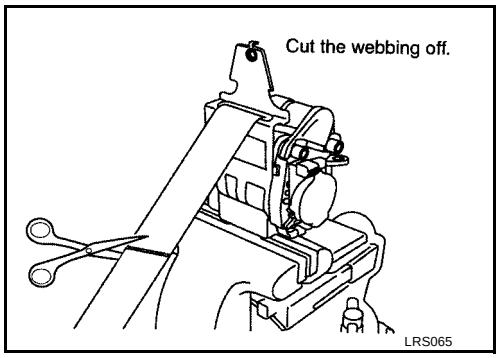
5. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
6. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red.
7. Press the button on the deployment tool. The left side lamp on the tool, marked “air bag connector voltage”, will illuminate and the front side air bag module will deploy.

CAUTION:
When deploying the front side air bag module, stand at least 5 m (16 ft) away from the front side air bag module.

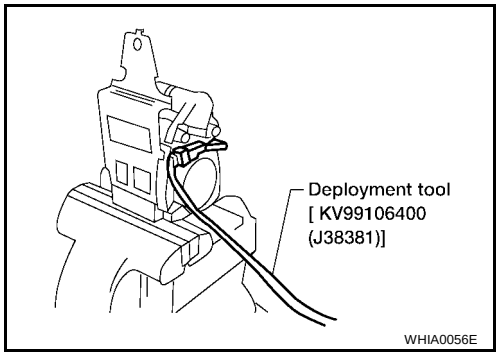


DEPLOYMENT PROCEDURES FOR SEAT BELT PRE-TENSIONER (OUTSIDE OF VEHICLE)

1. Firmly grip front seat belt pre-tensioner in a vise and cut the webbing off.
2. Connect deployment tool adapter to seat belt pre-tensioner.

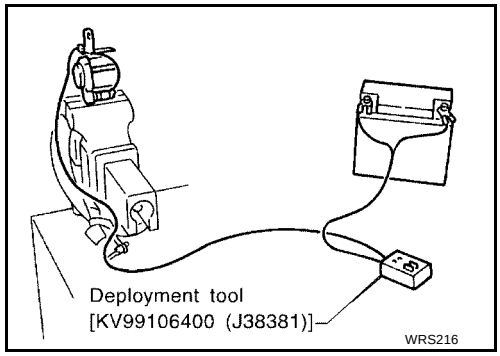


3. Connect deployment tool [SST: KV99106400 (J38381)] connector to front seat belt pre-tensioner connector.



4. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
5. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red.
6. Press the button on the deployment tool. The left side lamp on the tool, marked “seat belt pre-tensioner connector voltage”, will illuminate and the front seat belt pre-tensioner will deploy.

CAUTION:
When deploying the front seat belt pre-tensioner, stand at least 5 m (16 ft) away from the front seat belt pre-tensioner.



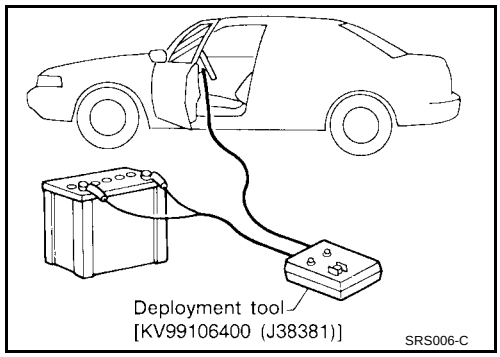
DEPLOYMENT OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER WHILE MOUNTED IN VEHICLE

When disposing of a vehicle, deploy air bag modules and seat belt pre-tensioners while they are mounted in vehicle.

CAUTION:
When deploying air bag module or seat belt pre-tensioner, ensure vehicle is empty.

1. Disconnect both the vehicle battery cables and wait 3 minutes.
2. Disconnect air bag module and seat belt pre-tensioner connectors.
3. Connect deployment tool [SST: KV99106400 (J38381)] to air bag module or seat belt pre-tensioner.
   For driver air bag module, attach deployment tool adapter [SST: KV99109000 (J44230)] to the tool connector.
   For front passenger air bag module, attach deployment tool adapter [SST: KV99108300 (J38381-35)] to the tool connector. For front side air bag module, attach deployment tool adapter [SST: KV99108300 (J38381-35)]. For front seat belt pre-tensioner, attach deployment tool adapter to the tool connector.
4. Connect red clip of deployment tool to battery positive terminal and black clip to negative terminal.
5. The lamp on the right side of the tool, marked “deployment tool power”, should glow green, not red.
6. Press the button on the deployment tool. The left side lamp on the tool, marked “air bag connector voltage”, will illuminate and the air bag module or seat belt pre-tensioner will deploy.

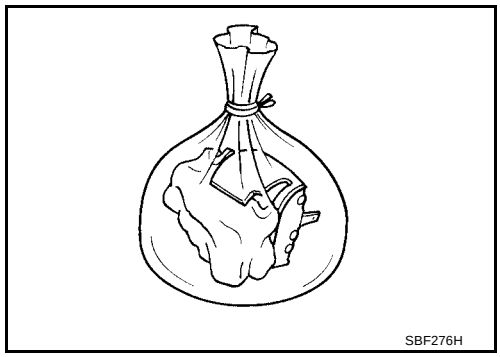
CAUTION:
Activate only one air bag module or seat belt pre-tensioner at a time.



DISPOSING OF AIR BAG MODULE AND SEAT BELT PRE-TENSIONER

Deployed air bag modules and seat belt pre-tensioners are very hot. Before disposing of air bag modules or seat belt pre-tensioners, wait at least 30 minutes or 10 minutes, respectively. Seal them in a plastic bag before disposal.

CAUTION:
- **Never apply water to a deployed air bag module or seat belt pre-tensioner.**
- **Be sure to wear gloves when handling a deployed air bag module or seat belt pre-tensioner.**
- **No poisonous smoke is produced upon air bag module deployment. However, be careful not to inhale smoke since it irritates throat and can cause choking.**
- **Do not attempt to disassemble air bag module or seat belt pre-tensioner.**
- **Air bag modules and seat belt pre-tensioners cannot be reused.**
- **Wash your hands clean after finishing work.**



COLLISION DIAGNOSIS

PFP:00015

FOR FRONTAL COLLISION

EHS000K7

To repair the SRS, perform the following steps.

When SRS (except the side air bag) is activated in a collision:

1. Replace the diagnosis sensor unit and (LH and RH) side airbag sensors.
2. Remove the air bag modules (except the side air bag modules) and front seat belt pre-tensioner assemblies.
3. Check the SRS components using the table shown below:

– Replace any SRS components showing visible signs of damage (dents, cracks and deformation).

4. Install new air bag modules (except the side air bag modules), spiral cable and front seat belt pre-tensioner assemblies.
5. Conduct self-diagnosis using CONSULT-II or “AIR BAG” warning lamp. Refer to SRS-18, "SRS Operation Check" for details. Ensure entire SRS operates properly.

When SRS is not activated in a collision:

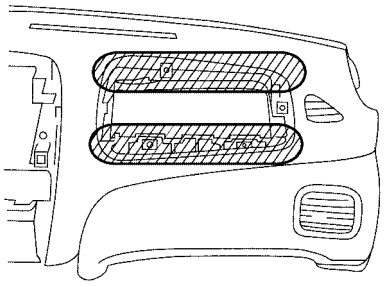
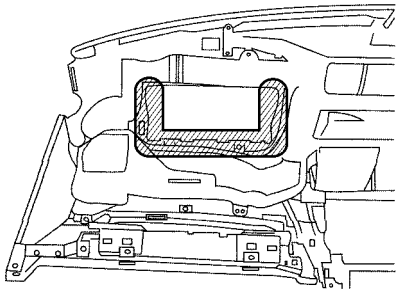
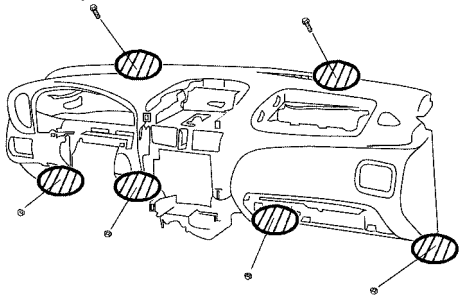
1. Check the SRS components using the table shown below:

– Replace any SRS components showing visible signs of damage (dents, cracks and deformation).

2. Conduct self-diagnosis using CONSULT-II or “AIR BAG” warning lamp. Refer to SRS-18, "SRS Operation Check" for details. Ensure entire SRS operates properly.

SRS INSPECTION (FOR FRONTAL COLLISION)

Part	SRS is activated	SRS is NOT activated
Air bag module (driver and front passenger side)	REPLACE Install with new bolts.	1. Remove air bag module. Check terminals for deformities, and harness for binding. 2. Install air bag modules. – Install driver air bag module into the steering wheel to check fit and alignment with the wheel. – Install front passenger air bag module into the instrument panel to check fit with the instrument panel. 3. If no damage is found, reinstall with new bolts. 4. If damaged—REPLACE. Install air bag modules with new bolts. Air bag must be deployed before discarding.
Front seat belt pre-tensioner assembly	REPLACE Install front seat belt pre-tensioner with new bolts.	1. Remove front seat belt pre-tensioners. Check terminals for deformities, and harness for binding. 2. Check belts for damage and anchors for loose mounting. 3. Check retractor for smooth operation. 4. If no damage is found, reinstall the front seat belt pre-tensioner assembly. 5. If damaged—REPLACE. Install the front seat belt pre-tensioners with new bolts coated with bonding agent. Front seat belt pre-tensioners must be deployed before discarding.
Diagnosis sensor unit	REPLACE (LH and RH) side air bag (satellite) sensor Diagnosis sensor unit	1. Check case and bracket for dents, cracks or deformities. 2. Check connectors for damage, and terminals for deformities. 3. If no damage is found, reinstall with new bolts and ground bolt coated with bonding agent. 4. If damaged—REPLACE. Install with new bolts and ground bolt.
Steering wheel	1. Visually check steering wheel for deformities. 2. Check harness (built into steering wheel) and connectors for damage, and terminals for deformities. 3. Install driver air bag module to check fit or alignment with steering wheel. 4. Check steering wheel for excessive free play. 5. If no damage is found, reinstall with new bolts. 6. If damaged—REPLACE.	

Part	SRS is activated	SRS is NOT activated
Spiral cable	1. Visually check spiral cable and combination switch for damage. 2. Check connectors and protective tape for damage. 3. Check steering wheel for noise, binding or heavy operation. 4. If no damage is found, reinstall with new bolts. 5. If damaged—REPLACE.	
Harness and connectors	1. Check connectors for poor connection, damage, and terminals for deformities. 2. Check harness for binding, chafing, cuts, or deformities. 3. If no damage is found, reinstall the harness and connectors. 4. If damaged—REPLACE damaged harness. Do not attempt to repair, splice or modify any SRS harness.	
Instrument panel	1. When front passenger air bag inflates, check the following points for bending, deformities or cracks. – Opening portion for front passenger air bag  : Check points LRS069 – Front passenger air bag module brackets  : Check points LRS070 – The portions securing the instrument panel  : Check points LRS071 2. If no damage is found, reinstall the instrument panel. 3. If damaged—REPLACE the instrument panel with new bolts and nuts.	

FOR SIDE COLLISION

EHS000K8

To repair the SRS for a side collision, perform the following steps.
When the side air bag is activated in the side collision:

1. Replace the following components:
– Front seatback assembly (on the side on which side air bag is activated)

- Diagnosis sensor unit
- (LH and RH) side air bag (satellite) sensors

2. Check the SRS components and the related parts using the table shown below.

- Replace any SRS components and the related parts showing visible signs of damage (dents, cracks, deformation).

3. Conduct self-diagnosis using CONSULT-II and “AIR BAG” warning lamp. Refer to SRS-18, "SRS Operation Check" for details. Ensure entire SRS operates properly.

When SRS is not activated in the side collision:

1. Check the SRS components and the related parts using the table shown below.

- If the front seatback assembly is damaged, the front seatback assembly must be replaced.

2. Conduct self-diagnosis using CONSULT-II and “AIR BAG” warning lamp. Refer to SRS-18, "SRS Operation Check" for details. Ensure entire SRS operates properly.

SRS INSPECTION (FOR SIDE COLLISION)

Part	Side air bag is activated	SRS is NOT activated
Front (LH or RH) side air bag module	REPLACE front seatback assembly.	1. Check for visible signs of damage (dents, tears, deformation) of the seat back on the collision side. 2. Check harness and connectors for damage, and terminals for deformities. 3. If damaged—REPLACE the front seatback assembly. Air bag must be deployed before disposing of it.
(LH or RH) side air bag (satellite) sensor	REPLACE (LH and RH) side air bag (satellite sensor and diagnosis sensor unit. (Repair the center pillar inner, etc. before installing new one if damaged.)	1. Remove the side air bag (satellite) sensor on the collision side. Check harness connectors for damage, terminals for deformities, and harness for binding. 2. Check for visible signs of damage (dents, cracks, deformation) of the satellite sensor. 3. Install the side air bag (satellite) sensor to check fit. 4. If no damage is found, reinstall the side air bag (satellite) sensor with new nut and bolt coated with bonding agent. 5. If damaged—REPLACE the (LH and RH) side air bag (satellite sensor and diagnosis sensor unit with new nut and bolt coated with bonding agent.
Diagnosis sensor unit	REPLACE (LH and RH) side air bag (satellite sensor and diagnosis sensor unit with new bolts.	1. Check case and bracket for dents, cracks or deformities. 2. Check connectors for damage, and terminals for deformities. 3. If no damage is found, reinstall with new bolts and ground bolt coated with bonding agent. 4. If damaged—REPLACE. Install (LH and RH) side air bag (satellite sensor and diagnosis sensor unit with new bolts and ground bolt coated with bonding agent.
Front seat belt pre-tensioner assembly	1. Check if the seat belt can be extended smoothly. If the seat belt cannot be extended smoothly. – Check for deformities of the center pillar inner. – If the center pillar inner has no damage, REPLACE the front seat belt pre-tensioner assembly. 2. Remove the front seat belt pre-tensioner assembly on the collision side. Check harness cover and connectors for damage, terminals for deformities, and harness for binding. 3. Check for visible signs of damage (dents, cracks, deformation) of the front seat belt pre-tensioner assembly. 4. If no damage is found, reinstall the front seat belt pre-tensioner assembly. 5. If damaged—REPLACE the front seat belt pre-tensioner assembly with new bolts coated with bonding agent. The front seat belt pre-tensioner assembly must be deployed before disposing of it.	
Seat (with side air bag)	REPLACE front seatback assembly.	1. Visually check the seat on the collision side. 2. Remove the seat on the collision side and check the following for damage and deformities. – Harness, connectors and terminals – Frame and recliner (for front and rear seat), and also adjuster and slides (for front seat) 3. If no damage is found, reinstall the seat. 4. If damaged—REPLACE the damaged seat parts with new bolts. If the front seatback assembly is damaged, the front seatback assembly must be replaced.

Part	Side air bag is activated	SRS is NOT activated
Center pillar inner	1. Check the center pillar inner on the collision side for damage (dents, cracks, deformation). 2. If damaged—REPAIR the center pillar inner.	
Trim	1. Check for visible signs of damage (dents, cracks, deformation) of the interior trim on the collision side. 2. If damaged—REPLACE the damaged trim parts.	

SECTION RF
ROOF

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EIS0016F

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**

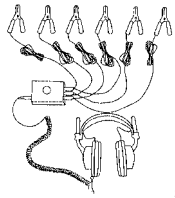
PREPARATION

PFP:00002

Special service tool

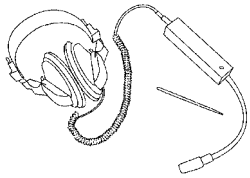
EIS0016G

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
— (J-39570) Chassis ear  SIIA0993E	Locating noise
— (J-43980) NISSAN Squeak and Rattle Kit SIIA0994E	Repairing the cause of noise

Commercial Service Tool

EIS0016H

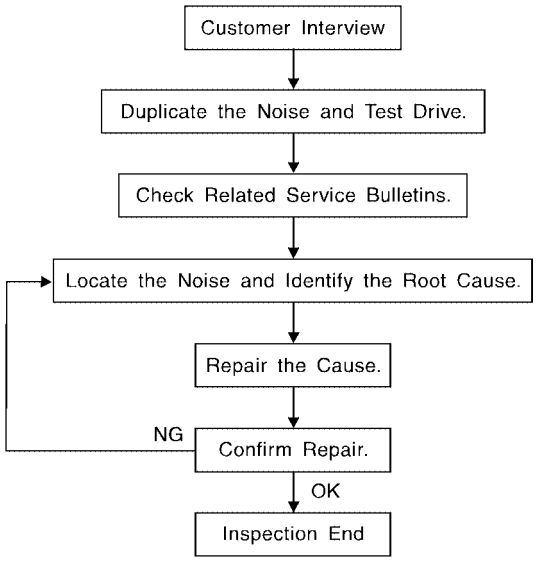
Tool name (Kent-Moore No.)	Description
Engine ear (J-39565)  SIIA0995E	Locating noise

SQUEAK AND RATTLE TROUBLE DIAGNOSES

PFP:00000

Work Flow

EIS0047U



SBT842

CUSTOMER INTERVIEW

Interview the customer if possible, to determine the conditions that exist when the noise occurs. Use the Diagnostic Worksheet during the interview to document the facts and conditions when the noise occurs and any customer's comments; refer to RF-8, "Diagnostic Worksheet" . This information is necessary to duplicate the conditions that exist when the noise occurs.

- The customer may not be able to provide a detailed description or the location of the noise. Attempt to obtain all the facts and conditions that exist when the noise occurs (or does not occur).
- If there is more than one noise in the vehicle, be sure to diagnose and repair the noise that the customer is concerned about. This can be accomplished by test driving the vehicle with the customer.
- After identifying the type of noise, isolate the noise in terms of its characteristics. The noise characteristics are provided so the customer, service adviser and technician are all speaking the same language when defining the noise.
- Squeak —(Like tennis shoes on a clean floor)
  Squeak characteristics include the light contact/fast movement/brought on by road conditions/hard surfaces = higher pitch noise/softer surfaces = lower pitch noises/edge to surface = chirping.
- Creak—(Like walking on an old wooden floor)
  Creak characteristics include firm contact/slow movement/twisting with a rotational movement/pitch dependent on materials/often brought on by activity.
- Rattle—(Like shaking a baby rattle)
  Rattle characteristics include the fast repeated contact/vibration or similar movement/loose parts/missing clip or fastener/incorrect clearance.
- Knock —(Like a knock on a door)
  Knock characteristics include hollow sounding/sometimes repeating/often brought on by driver action.
- Tick—(Like a clock second hand)
  Tick characteristics include gentle contacting of light materials/loose components/can be caused by driver action or road conditions.
- Thump—(Heavy, muffled knock noise)
  Thump characteristics include softer knock/dead sound often brought on by activity.
- Buzz—(Like a bumble bee)
  Buzz characteristics include high frequency rattle/firm contact.
- Often the degree of acceptable noise level will vary depending upon the person. A noise that you may judge as acceptable may be very irritating to the customer.
- Weather conditions, especially humidity and temperature, may have a great effect on noise level.

DUPLICATE THE NOISE AND TEST DRIVE

If possible, drive the vehicle with the customer until the noise is duplicated. Note any additional information on the Diagnostic Worksheet regarding the conditions or location of the noise. This information can be used to duplicate the same conditions when you confirm the repair.
If the noise can be duplicated easily during the test drive, to help identify the source of the noise, try to duplicate the noise with the vehicle stopped by doing one or all of the following:

1) Close a door.
2) Tap or push/pull around the area where the noise appears to be coming from.
3) Rev the engine.
4) Use a floor jack to recreate vehicle “twist”.
5) At idle, apply engine load (electrical load, half-clutch on M/T model, drive position on A/T model).
6) Raise the vehicle on a hoist and hit a tire with a rubber hammer.

- Drive the vehicle and attempt to duplicate the conditions the customer states exist when the noise occurs.
- If it is difficult to duplicate the noise, drive the vehicle slowly on an undulating or rough road to stress the vehicle body.

CHECK RELATED SERVICE BULLETINS

After verifying the customer concern or symptom, check ASIST for Technical Service Bulletins (TSBs) related to that concern or symptom.
If a TSB relates to the symptom, follow the procedure to repair the noise.

LOCATE THE NOISE AND IDENTIFY THE ROOT CAUSE

1. Narrow down the noise to a general area.To help pinpoint the source of the noise, use a listening tool (Chassis Ear: J-39570, Engine Ear: J-39565 and mechanic's stethoscope).
2. Narrow down the noise to a more specific area and identify the cause of the noise by:

- removing the components in the area that you suspect the noise is coming from.
  Do not use too much force when removing clips and fasteners, otherwise clips and fasteners can be broken or lost during the repair, resulting in the creation of new noise.
- tapping or pushing/pulling the component that you suspect is causing the noise.
  Do not tap or push/pull the component with excessive force, otherwise the noise will be eliminated only temporarily.
- feeling for a vibration with your hand by touching the component(s) that you suspect is (are) causing the noise.
- placing a piece of paper between components that you suspect are causing the noise.
- looking for loose components and contact marks.
  Refer to RF-6, "Generic Squeak and Rattle Troubleshooting" .

REPAIR THE CAUSE

- If the cause is a loose component, tighten the component securely.
- If the cause is insufficient clearance between components:
  - separate components by repositioning or loosening and retightening the component, if possible.
  - insulate components with a suitable insulator such as urethane pads, foam blocks, felt cloth tape or urethane tape. A NISSAN Squeak and Rattle Kit (J-43980) is available through your authorized NISSAN Parts Department.

CAUTION:
Do not use excessive force as many components are constructed of plastic and may be damaged.
Always check with the Parts Department for the latest parts information.
The following materials are contained in the NISSAN Squeak and Rattle Kit (J-43980). Each item can be ordered separately as needed.
URETHANE PADS [1.5 mm (0.059 in) thick]
Insulates connectors, harness, etc.
76268-9E005: 100×135 mm (3.94×5.31 in)/76884-71L01: 60×85 mm (2.36×3.35 in)/76884-71L02: 15×25 mm (0.59×0.98 in)
INSULATOR (Foam blocks)
Insulates components from contact. Can be used to fill space behind a panel.
73982-9E000: 45 mm (1.77 in) thick, 50×50 mm (1.97×1.97 in)/73982-50Y00: 10 mm (0.39 in) thick, 50×50 mm (1.97×1.97 in)
INSULATOR (Light foam block)

80845-71L00: 30 mm (1.18 in) thick, 30×50 mm (1.18×1.97 in)
FELT CLOTH TAPE
Used to insulate where movement does not occur. Ideal for instrument panel applications.
68370-4B000: 15×25 mm (0.59×0.98 in) pad/68239-13E00: 5 mm (0.20 in) wide tape roll. The following materials not found in the kit can also be used to repair squeaks and rattles.
UHMW (TEFLON) TAPE
Insulates where slight movement is present. Ideal for instrument panel applications.
SILICONE GREASE
Used instead of UHMW tape that will be visible or not fit.
Note: Will only last a few months.
SILICONE SPRAY
Use when grease cannot be applied.
DUCT TAPE
Use to eliminate movement.

CONFIRM THE REPAIR

Confirm that the cause of a noise is repaired by test driving the vehicle. Operate the vehicle under the same conditions as when the noise originally occurred. Refer to the notes on the Diagnostic Worksheet.

Generic Squeak and Rattle Troubleshooting

EIS0047V

Refer to Table of Contents for specific component removal and installation information.

INSTRUMENT PANEL

Most incidents are caused by contact and movement between:

1. The cluster lid A and instrument panel
2. Acrylic lens and combination meter housing
3. Instrument panel to front pillar garnish
4. Instrument panel to windshield
5. Instrument panel mounting pins
6. Wiring harnesses behind the combination meter
7. A/C defroster duct and duct joint

These incidents can usually be located by tapping or moving the components to duplicate the noise or by pressing on the components while driving to stop the noise. Most of these incidents can be repaired by applying felt cloth tape or silicone spray (in hard to reach areas). Urethane pads can be used to insulate wiring harness.

CAUTION:
Do not use silicone spray to isolate a squeak or rattle. If you saturate the area with silicone, you will not be able to recheck the repair.

CENTER CONSOLE

Components to pay attention to include:

1. Shifter assembly cover to finisher
2. A/C control unit and cluster lid C
3. Wiring harnesses behind audio and A/C control unit

The instrument panel repair and isolation procedures also apply to the center console.

DOORS

Pay attention to the:

1. Finisher and inner panel making a slapping noise
2. Inside handle escutcheon to door finisher
3. Wiring harnesses tapping
4. Door striker out of alignment causing a popping noise on starts and stops

Tapping or moving the components or pressing on them while driving to duplicate the conditions can isolate many of these incidents. You can usually insulate the areas with felt cloth tape or insulator foam blocks from the NISSAN Squeak and Rattle Kit (J-43980) to repair the noise.

TRUNK

Trunk noises are often caused by a loose jack or loose items put into the trunk by the owner.
In addition look for:

1. Trunk lid bumpers out of adjustment
2. Trunk lid striker out of adjustment
3. The trunk lid torsion bars knocking together
4. A loose license plate or bracket

Most of these incidents can be repaired by adjusting, securing or insulating the item(s) or component(s) causing the noise.

SUNROOF/HEADLINING

Noises in the sunroof/headlining area can often be traced to one of the following:

1. Sunroof lid, rail, linkage or seals making a rattle or light knocking noise
2. Sun visor shaft shaking in the holder
3. Front or rear windshield touching headliner and squeaking

Again, pressing on the components to stop the noise while duplicating the conditions can isolate most of these incidents. Repairs usually consist of insulating with felt cloth tape.

OVERHEAD CONSOLE (FRONT AND REAR)

Overhead console noises are often caused by the console panel clips not being engaged correctly. Most of these incidents are repaired by pushing up on the console at the clip locations until the clips engage.
In addition look for :

1. Loose harness or harness connectors.
2. Front console map/reading lamp lense loose.
3. Loose screws at console attachment points.

SEATS

When isolating seat noise it's important to note the position the seat is in and the load placed on the seat when the noise is present. These conditions should be duplicated when verifying and isolating the cause of the noise.
Cause of seat noise include:

1. Headrest rods and holder
2. A squeak between the seat pad cushion and frame
3. The rear seat back lock and bracket

These noises can be isolated by moving or pressing on the suspected components while duplicating the conditions under which the noise occurs. Most of these incidents can be repaired by repositioning the component or applying urethane tape to the contact area.

UNDERHOOD

Some interior noise may be caused by components under the hood or on the engine wall. The noise is then transmitted into the passenger compartment.
Causes of transmitted underhood noise include:

1. Any component mounted to the engine wall
2. Components that pass through the engine wall
3. Engine wall mounts and connectors
4. Loose radiator mounting pins
5. Hood bumpers out of adjustment
6. Hood striker out of adjustment

These noises can be difficult to isolate since they cannot be reached from the interior of the vehicle. The best method is to secure, move or insulate one component at a time and test drive the vehicle. Also, engine RPM or load can be changed to isolate the noise. Repairs can usually be made by moving, adjusting, securing, or insulating the component causing the noise.

Diagnostic Worksheet

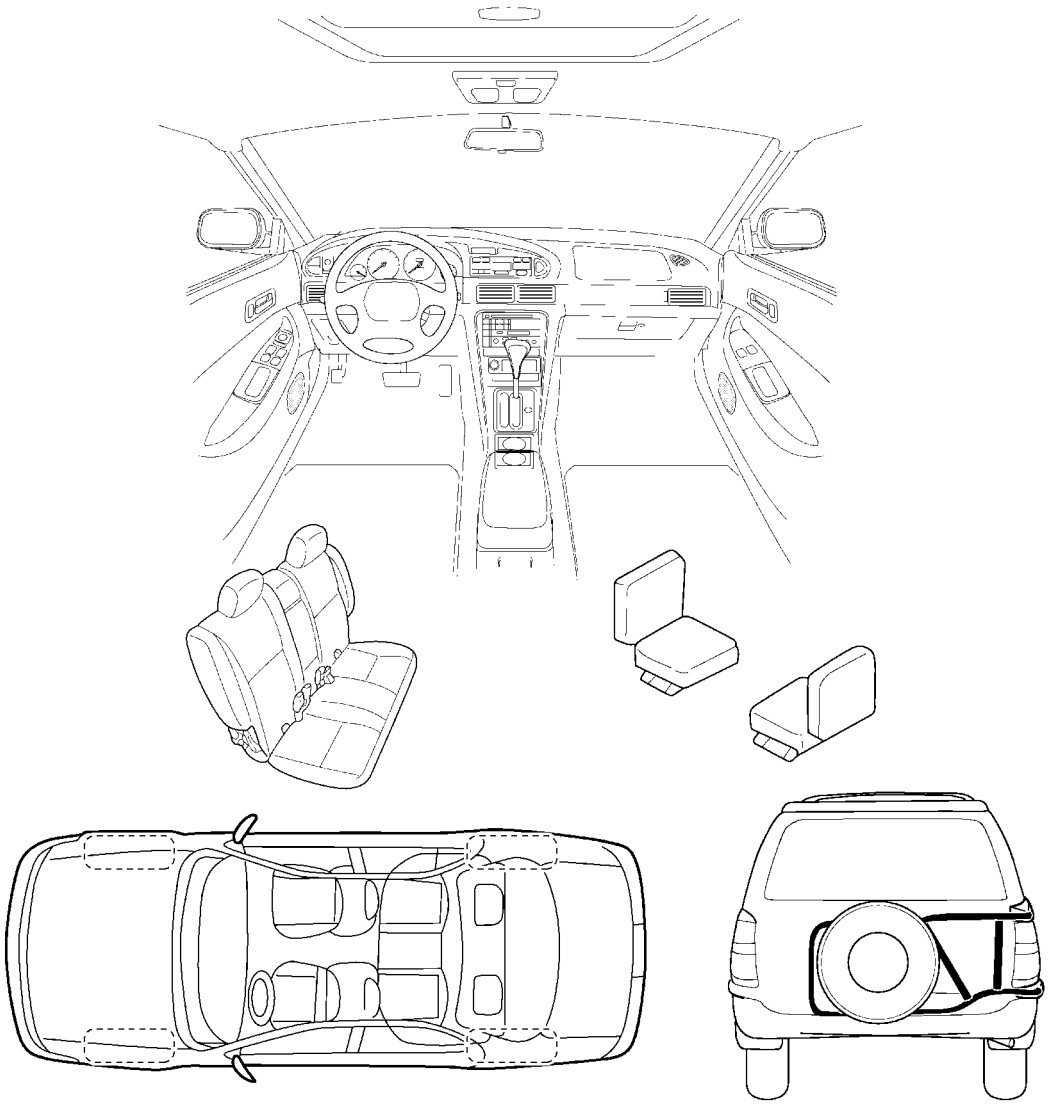
EIS0047W

SQUEAK & RATTLE DIAGNOSTIC WORKSHEET

Dear Nissan Customer:
We are concerned about your satisfaction with your Nissan vehicle. Repairing a squeak or rattle sometimes can be very difficult. To help us fix your Nissan right the first time, please take a moment to note the area of the vehicle where the squeak or rattle occurs and under what conditions. You may be asked to take a test drive with a service advisor or technician to ensure we confirm the noise you are hearing.

I. WHERE DOESTHE NOISE COME FROM? (circle the area of the vehicle)

The illustrations are for reference only, and may not reflect the actual configuration of your vehicle.



Continue to the back of the worksheet and briefly describe the location of the noise or rattle. In addition, please indicate the conditions which are present when the noise occurs.

LIWA0276E

SQUEAK & RATTLE DIAGNOSTIC WORKSHEET- page 2

Briefly describe the location where the noise occurs:

_____

_____

II. WHEN DOES IT OCCUR? (check the boxes that apply)

❑ anytime
❑ 1st time in the morning
❑ only when it is cold outside
❑ only when it is hot outside
❑ after sitting out in the sun
❑ when it is raining or wet
❑ dry or dusty conditions
❑ other: _____

III. WHEN DRIVING:

❑ through driveways
❑ over rough roads
❑ over speed bumps
❑ only at about _____ mph
❑ on acceleration
❑ coming to a stop
❑ on turns : left, right or either (circle)
❑ with passengers or cargo
❑ other: _____
❑ after driving _____ miles or _____ minutes

IV. WHAT TYPE OF NOISE?

❑ squeak (like tennis shoes on a clean floor)
❑ creak (like walking on an old wooden floor)
❑ rattle (like shaking a baby rattle)
❑ knock (like a knock on a door)
❑ tick (like a clock second hand)
❑ thump (heavy, muffled knock noise)
❑ buzz (like a bumble bee)

TO BE COMPLETED BY DEALERSHIP PERSONNEL
Test Drive Notes:

_____

_____

	YES	NO	Initials of person performing
Vehicle test driven with customer	❑	❑	_____
- Noise verified on test drive	❑	❑	
- Noise source located and repaired	❑	❑	_____
- Follow up test drive performed to confirm repair	❑	❑	_____

VIN: _____ Customer Name: _____

W.O. #: _____ Date: _____

SBT844

This form must be attached to Work Order

SUNROOF

PFP:91210

System Description

EIS0016L

POWER

Power is supplied at all times:

- through 30A fusible link (letter **d** , located in the fuse and fusible link box)
- to sunroof motor assembly terminal 5.

The power circuit is protected by the circuit breaker. The sunroof motor assembly is grounded through body ground R5.

NOTE:
When the battery or sunroof motor harness connector is disconnected during service, the sunroof will not operate properly.
Procedure for resetting motor memory:
From any sunroof position (full open, partially open, closed, partially vented, and vented), push and hold the button in the forward position until the sunroof vent is in the full up position. This resets the sunroof motor memory and the sunroof will operate correctly.

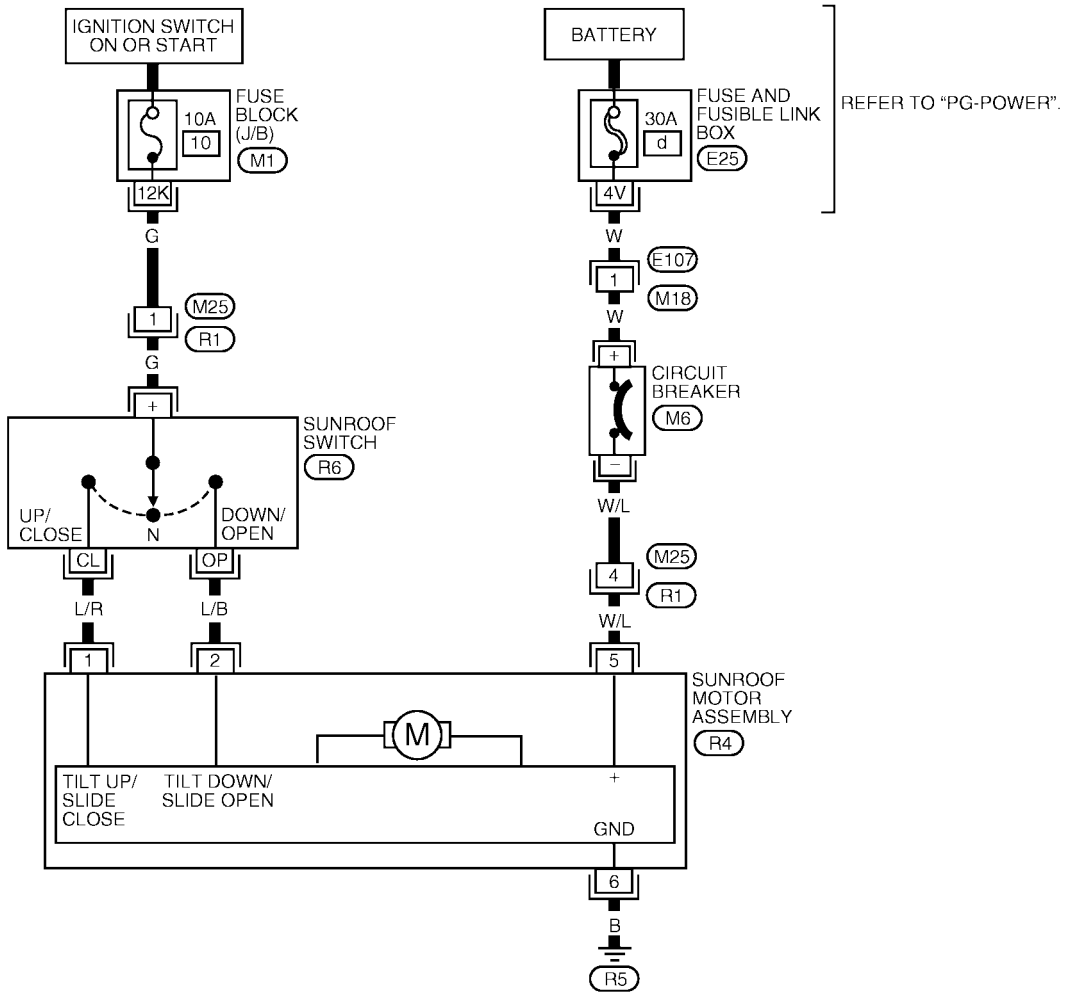
TILT AND SLIDE OPERATION

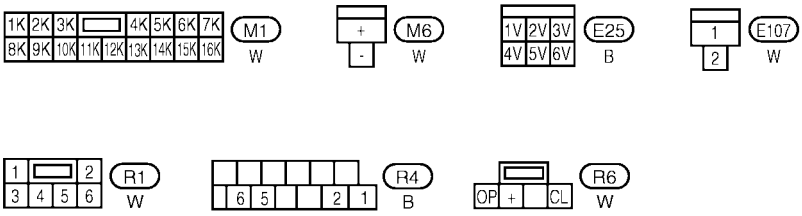
The sunroof is controlled by the sunroof switch. With the sunroof in the closed position, depressing the UP/CLOSE switch will tilt the rear of the sunroof up. The sunroof will stop when the switch is released, or when the sunroof reaches its maximum tilt position.
The sunroof will tilt down when in the tilt up position and the DOWN/OPEN switch is depressed. The sunroof will stop when the switch is released, or when the sunroof is fully closed.
With the sunroof in the closed position, pressing the DOWN/OPEN switch will cause the sunroof to slide open. The sunroof will slide open until the switch is released or until it is all the way open. The sunroof will close when in the open position, and the UP/CLOSE switch is depressed. The sunroof will slide until the switch is released, or when the sunroof is fully closed.
All automatic operations in sunroof are controlled by internal limit switches located in the sunroof motor assembly.

Wiring Diagram — SROOF —

EIS0016M

RF-SROOF-01





WIWA0001E

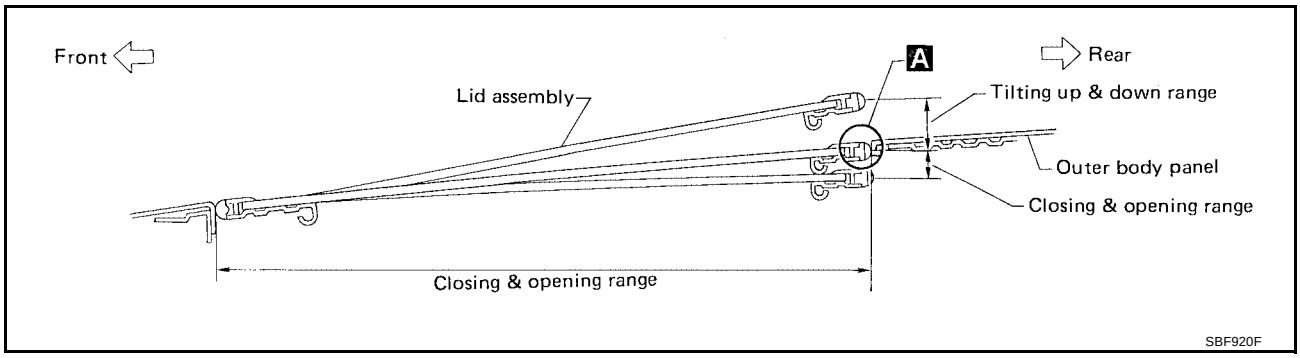
Memory Reset Adjustment

EIS0016N

If the battery is disconnected or the sunroof motor harness connector is disconnected, the sunroof motor memory must be reset. To reset the sunroof motor memory from any sunroof position (full open, partially open, closed, partially vented, and vented), push and hold the sunroof button in the forward position until the sunroof vents in the full up position. This resets the sunroof motor memory and now the sunroof will operate correctly.

Install motor and limit SW assembly and sunroof rail assembly in the following sequence:

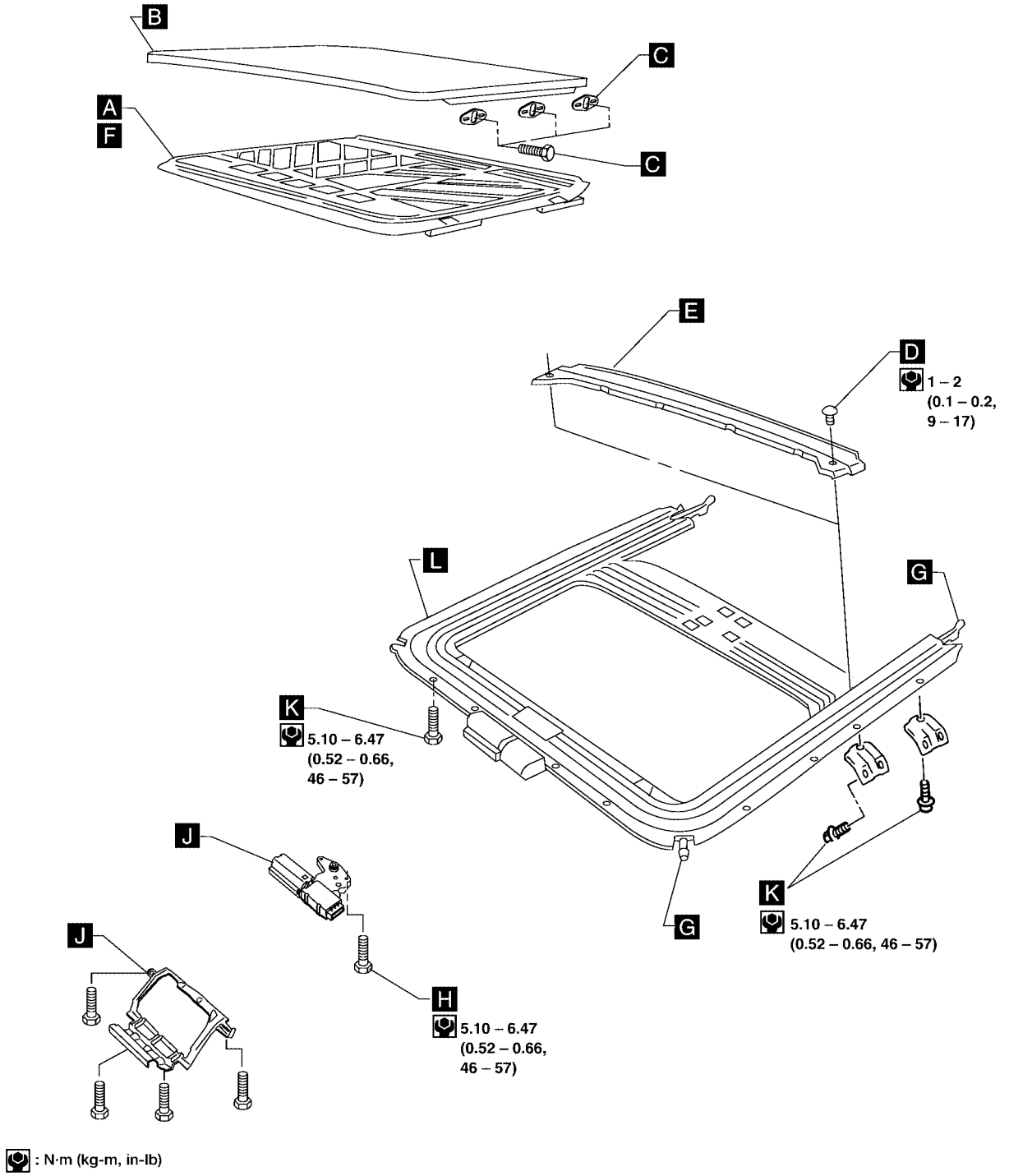
1. Arrange equal lengths of link and wire assemblies on both sides of the sunroof opening.
2. Connect the sunroof connector to the sunroof switch and positive (+) power supply.
3. Set the lid assembly to the fully closed position **A** by operating the sunroof switch.
4. Fit the outer side of the lid assembly to the surface of the roof outer body panel.
5. Remove the motor and keep the DOWN/OPEN switch depressed until the motor pinion gear reaches the end of its rotating range.
6. Install the motor.
7. Check that the motor drive gear fits properly in wires.
8. Press the UP/CLOSE switch to check the lid assembly for normal tilting.
9. Check the sunroof lid assembly for normal operations (tilt up, tilt down, open and close).



Removal

EIS0016O

SEC. 736



WIIA0001E

- After any repair, check sunroof operation and glass lid alignment.
- Handle the finisher plate and glass lid with care so as not to cause damage.
- To ease installation, mark each point before removal.

CAUTION:

- **Always work with a helper.**

- **Before removal, fully close the glass lid assembly, then after removal, do not move the motor assembly.**

SUNROOF LID ASSEMBLY

1. Open the sunroof shade. A
2. Close the glass lid. B
3. Remove the six bolts securing the glass lid assembly to the sunroof assembly. C

SHADE ASSEMBLY

1. After removing the glass lid assembly, remove the two screws securing the drain channel. D
2. Remove the drain channel. E
3. Remove the shade assembly. F

SUNROOF ASSEMBLY

1. Remove the headlining. Refer to EI-32, "Removal and Installation" .
2. Disconnect the front and rear drain hoses. G
3. Remove the two screws securing the sunroof motor to the sunroof assembly. H
4. Remove the sunroof motor and bracket. J
5. Remove bolts securing the sunroof assembly to the roof. K
6. Remove the sunroof assembly. L

Trouble Diagnoses

EIS0016P

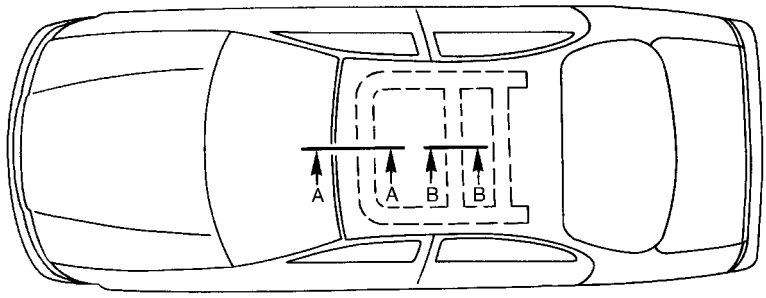
DIAGNOSTIC TABLE

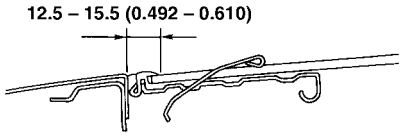
		Check items (Components)			
		Adjustment	Drain hoses	Weatherstrip	Link and wire assembly
	Reference page	RF-15, "ADJUSTMENT"	RF-16, "DRAIN HOSES"	RF-16, "WEATHER-STRIP"	RF-16, "LINK AND WIRE ASSEMBLY"
Symptom	Excessive wind noise	1		2	
	Water leaks	1	2	3	
	Sunroof rattles	1	4	2	3
	Excessive operation noise	1		2	3

The numbers in this table mean checking order.

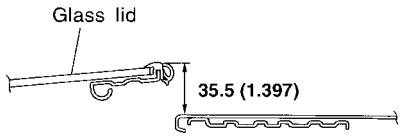
ADJUSTMENT

SEC. 736





A – A



B – B (When sunroof is tilted up)

Unit: mm (in)

WBT061

If any gap or height difference between glass lid and roof is found, check glass lid fit and adjust as follows:

Gap Adjustment

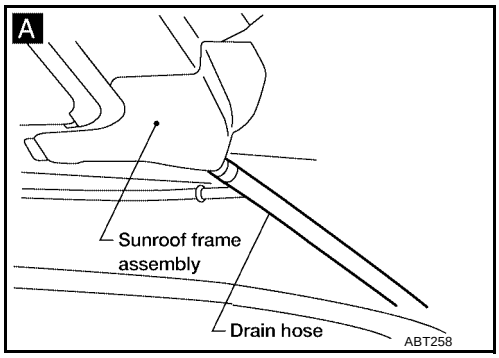
1. Open the shade assembly.
2. Tilt the glass lid up then remove the side trim.
3. Loosen the glass lid securing bolts (3 each on left and right sides), then tilt the glass lid down.
4. Adjust the glass lid from outside of vehicle so it resembles “A-A” as shown in the figure above.
5. Tilt the glass lid up and down until it is adjusted to “B-B” as shown in the figure above.
6. After adjusting the glass lid, tilt the glass lid up and tighten the bolts.
7. Tilt the glass lid up and down several times to check that it moves smoothly.

Height Difference Adjustment

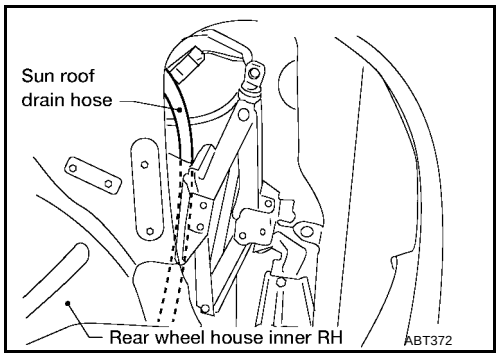
1. Tilt the glass lid up and down.
2. Check the height difference between the roof panel and the glass lid to see if it is as “A-A” as shown in the figure above.
3. If necessary, adjust it by using one of following procedures.
   - Adjust by adding or removing adjustment shim(s) between the glass lid and link assembly.
   - If the glass lid protrudes above the roof panel, add shim(s) or plain washer(s) at the sunroof mounting bracket or stud bolt locations to adjust sunroof installation as required.

DRAIN HOSES

1. Remove the headlining to access the drain hose connections. (Refer to EI-32, "Removal and Installation" .)



2. Check visually for proper connections, damage or deterioration. A (The figure shows only the front side.)
3. If leakage occurs around the trunk room, remove the trunk room side trim and check connecting area. Check for proper connection or damage.
4. Remove the drain hoses and check visually for any damage, cracks or deterioration.
5. Pour water into the drain hoses to find the damaged portion.
   - If any damaged portion is found at each step, replace the damaged hose.



WEATHERSTRIP

- In case of leakage around the roof lid, close it and pour water over the roof lid to find the damaged or gap portion.
- If gap is between the weatherstrip and the roof panel, perform gap adjustment. Refer to RF-15, "Gap Adjustment" .
- If gap is between the weatherstrip and the roof lid, or if weatherstrip is flattened, damaged or deteriorated, replace the roof lid assembly. (Weatherstrip is not serviceable.)

LINK AND WIRE ASSEMBLY

NOTE:
Before replacing a suspect part, carefully ensure it is the source of noise being experienced.

1. Check link to determine if coating film has peeled off to such an extent that substrate is visible. Check also to determine if link is the source of noise. If it is, replace it.
2. Visually check to determine if a sufficient amount of petroleum jelly has been applied to wire or rail groove. If not, add petroleum jelly as required.
3. Check wire for any damage or deterioration. If damaged, replace wire.

SECTION EI
EXTERIOR & INTERIOR

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EIS001EH

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**

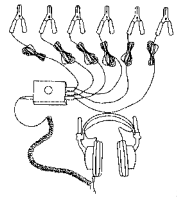
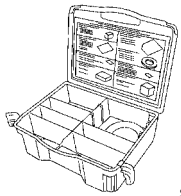
PREPARATION

PFP:00002

Special Service Tools

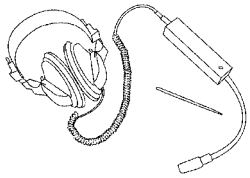
EIS0016R

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
— (J-39570) Chassis ear  SIIA0993E	Locating the noise
— (J-43980) NISSAN Squeak and Rattle kit  SIIA0994E	Repairing the cause of noise

Commercial Service Tools

EIS0016S

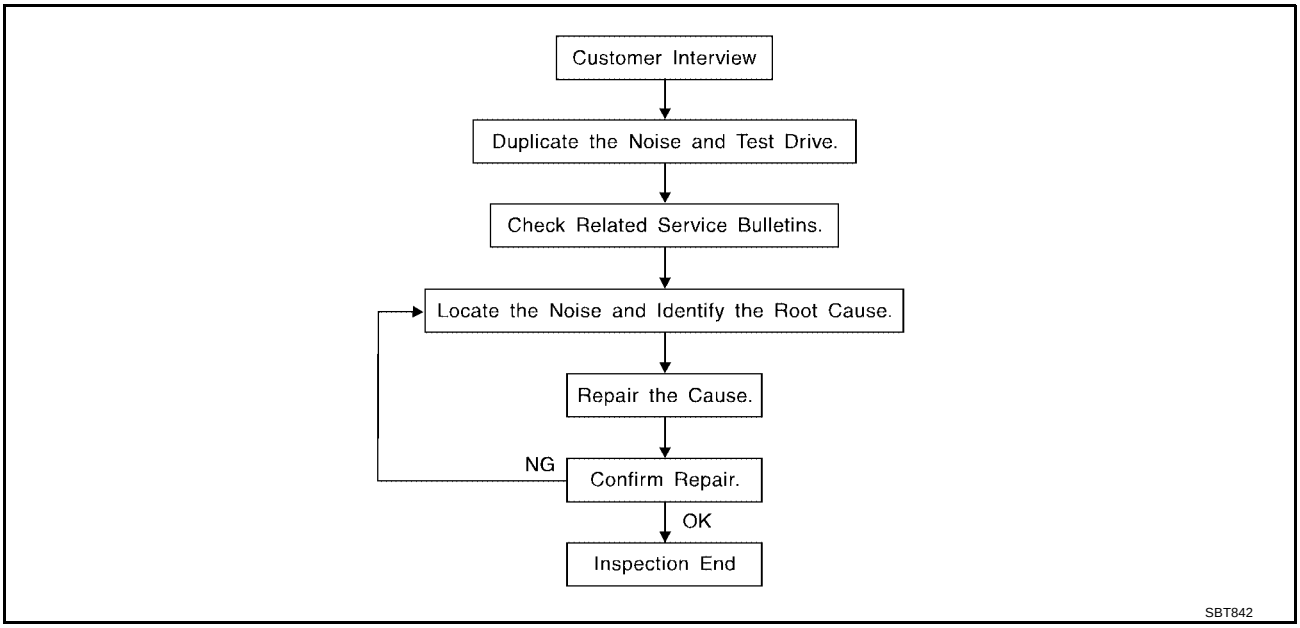
Tool name (Kent-Moore No.)	Description
Engine ear (J-39565)  SIIA0995E	Locating the noise

SQUEAK AND RATTLE TROUBLE DIAGNOSES

PFP:00003

Work Flow

EIS0016T



CUSTOMER INTERVIEW

Interview the customer, if possible, to determine the conditions that exist when the noise occurs. Use the Diagnostic Worksheet during the interview to document the facts and conditions when the noise occurs and any customer's comments; refer to EI-8, "Diagnostic Worksheet" . This information is necessary to duplicate the conditions that exist when the noise occurs.

- The customer may not be able to provide a detailed description or the location of the noise. Attempt to obtain all the facts and conditions that exist when the noise occurs (or does not occur).
- If there is more than one noise in the vehicle, be sure to diagnose and repair the noise that the customer is concerned about. This can be accomplished by test driving the vehicle with the customer.
- After identifying the type of noise, isolate the noise in terms of its characteristics. The noise characteristics are provided so the customer, service adviser and technician are all speaking the same language when defining the noise.

– Squeak — (Like tennis shoes on a clean floor)
Squeak characteristics include the light contact/fast movement/brought on by road conditions/hard surfaces = higher pitch noise/softer surfaces = lower pitch noises/edge to surface = chirping

– Creak — (Like walking on an old wooden floor)
Creak characteristics include firm contact/slow movement/twisting with a rotational movement/pitch dependent on materials/often brought on by activity.

– Rattle — (Like shaking a baby rattle)
Rattle characteristics include the fast repeated contact/vibration or similar movement/loose parts/missing clip or fastener/incorrect clearance.

– Knock — (Like a knock on a door)
Knock characteristics include hollow sounding/sometimes repeating/often brought on by driver action.

– Tick — (Like a clock second hand)
Tick characteristics include gentle contacting of light materials/loose components/can be caused by driver action or road conditions.

– Thump — (Heavy, muffled knock noise)
Thump characteristics include softer knock/dead sound often brought on by activity.

– Buzz — (Like a bumblebee)
Buzz characteristics include high frequency rattle/firm contact.

- Often the degree of acceptable noise level will vary depending upon the person. A noise that you may judge as acceptable may be very irritating to the customer.
- Weather conditions, especially humidity and temperature, may have a great effect on noise level.

DUPLICATE THE NOISE AND TEST DRIVE

If possible, drive the vehicle with the customer until the noise is duplicated. Note any additional information on the Diagnostic Worksheet regarding the conditions or location of the noise. This information can be used to duplicate the same conditions when you confirm the repair.
If the noise can be duplicated easily during the test drive, to help identify the source of the noise, try to duplicate the noise with the vehicle stopped by doing one or all of the following:

- Close a door.
- Tap or push/pull around the area where the noise appears to be coming from.
- Rev the engine.
- Use a floor jack to recreate vehicle “twist”.
- At idle, apply engine load (electrical load, half-clutch on M/T model, drive position on A/T model).
- Raise the vehicle on a hoist and hit a tire with a rubber hammer.
- Drive the vehicle and attempt to duplicate the conditions the customer states exist when the noise occurs.
- If it is difficult to duplicate the noise, drive the vehicle slowly on an undulating or rough road to stress the vehicle body.

CHECK RELATED SERVICE BULLETINS

After verifying the customer concern or symptom, check ASIST for Technical Service Bulletins (TSBs) related to that concern or symptom.
If a TSB relates to the symptom, follow the procedure to repair the noise.

LOCATE THE NOISE AND IDENTIFY THE ROOT CAUSE

1. Narrow down the noise to a general area. To help pinpoint the source of the noise, use a listening tool (Chassis Ear: J-39570, Engine Ear: J-39565 and mechanics stethoscope).
2. Narrow down the noise to a more specific area and identify the cause of the noise by:
   - Removing the components in the area that you suspect the noise is coming from.
     Do not use too much force when removing clips and fasteners, otherwise clips and fasteners can be broken or lost during the repair, resulting in the creation of new noise.
   - Tapping or pushing/pulling the component that you suspect is causing the noise.
     Do not tap or push/pull the component with excessive force, otherwise the noise will be eliminated only temporarily.
   - Feeling for a vibration with your hand by touching the component(s) that you suspect is (are) causing the noise.
   - Placing a piece of paper between components that you suspect are causing the noise.
   - Looking for loose components and contact marks.

   Refer to EI-6, "Generic Squeak and Rattle Troubleshooting" .

REPAIR THE CAUSE

- If the cause is a loose component, tighten the component securely.
- If the cause is insufficient clearance between components:

– Separate components by repositioning or loosening and retightening the component, if possible.
– Insulate components with a suitable insulator such as urethane pads, foam blocks, felt cloth tape or urethane tape. A NISSAN Squeak and Rattle Kit (J-43980) is available through your authorized NISSAN Parts Department.

CAUTION:
Do not use excessive force as many components are constructed of plastic and may be damaged. Always check with the Parts Department for the latest parts information.

The following materials are contained in the NISSAN Squeak and Rattle Kit (J-43980). Each item can be ordered separately as needed.
URETHANE PADS [1.5 mm (0.059 in) thick]
Insulates connectors, harness, etc.
76268-9E005: 100 x 135 mm (3.94 x 5.31 in)/76884-71L01: 60 x 85 mm (2.36 x 3.35 in)/76884-71L02: 15 x 25 mm (0.59 x 0.98 in)
INSULATOR (Foam blocks)
Insulates components from contact. Can be used to fill space behind a panel.

73982-9E000: 45 mm (1.77 in) thick, 50 x 50 mm (1.97 x 1.97 in)/73982-50Y00: 10 mm (0.39 in) thick, 50 x 50 mm (1.97 x 1.97 in)
INSULATOR (Light foam block)
80845-71L00: 30 mm (1.18 in) thick, 30 x 50 mm (1.18 x 1.97 in)
FELT CLOTH TAPE
Used to insulate where movement does not occur. Ideal for instrument panel applications.
68370-4B000: 15 x 25 mm (0.59 x 0.98 in) pad/68239-13E00: 5 mm (0.20 in) wide tape roll
The following materials, not found in the kit, can also be used to repair squeaks and rattles.
UHMW (TEFLON) TAPE
Insulates where slight movement is present. Ideal for instrument panel applications.
SILICONE GREASE
Used in place of UHMW tape that will be visible or not fit.
Note: Will only last a few months.
SILICONE SPRAY
Use when grease cannot be applied.
DUCT TAPE
Use to eliminate movement.

CONFIRM THE REPAIR

Confirm that the cause of a noise is repaired by test driving the vehicle. Operate the vehicle under the same conditions as when the noise originally occurred. Refer to the notes on the Diagnostic Worksheet.

Generic Squeak and Rattle Troubleshooting

EIS0016U

Refer to Table of Contents for specific component removal and installation information.

INSTRUMENT PANEL

Most incidents are caused by contact and movement between:

1. The cluster lid A and instrument panel
2. Acrylic lens and combination meter housing
3. Instrument panel to front pillar garnish
4. Instrument panel to windshield
5. Instrument panel mounting pins
6. Wiring harnesses behind the combination meter
7. A/C defroster duct and duct joint

These incidents can usually be located by tapping or moving the components to duplicate the noise or by pressing on the components while driving to stop the noise. Most of these incidents can be repaired by applying felt cloth tape or silicone spray (in hard to reach areas). Urethane pads can be used to insulate wiring harness.

CAUTION:
Do not use silicone spray to isolate a squeak or rattle. If you saturate the area with silicone, you will not be able to recheck the repair.

CENTER CONSOLE

Components to pay attention to include:

1. Shifter assembly cover to finisher
2. A/C control unit and upper/lower cluster lid C
3. Wiring harnesses behind audio and A/C control unit

The instrument panel repair and isolation procedures also apply to the center console.

DOORS

Pay attention to the:

1. Finisher and inner panel making a slapping noise
2. Inside handle escutcheon to door finisher
3. Wiring harnesses tapping
4. Door striker out of alignment causing a popping noise on starts and stops

Tapping or moving the components or pressing on them while driving to duplicate the conditions can isolate many of these incidents. You can usually insulate the areas with felt cloth tape or insulator foam blocks from the NISSAN Squeak and Rattle Kit (J-43980) to repair the noise.

TRUNK

Trunk noises are often caused by a loose jack or loose items put into the trunk by the owner.
In addition look for:

1. Trunk lid bumpers out of adjustment
2. Trunk lid striker out of adjustment
3. The trunk lid torsion bars knocking together
4. A loose license plate or bracket

Most of these incidents can be repaired by adjusting, securing or insulating the item(s) or component(s) causing the noise.

SUNROOF/HEADLINER

Noises in the sunroof/headliner area can often be traced to one of the following:

1. Sunroof lid, rail, linkage or seals making a rattle or light knocking noise
2. Sunvisor shaft shaking in the holder
3. Front or rear windshield touching headliner and squeaking

Again, pressing on the components to stop the noise while duplicating the conditions can isolate most of these incidents. Repairs usually consist of insulating with felt cloth tape.

OVERHEAD CONSOLE (FRONT AND REAR)

Overhead console noises are often caused by the console panel clips not being engaged correctly. Most of these incidents are repaired by pushing up on the console at the clip locations until the clips engage.
In addition look for:

1. Loose harness or harness connectors.
2. Front console map/reading lamp lens loose.
3. Loose screws at console attachment points.

SEATS

When isolating seat noises it is important to note the position the seat is in and the load placed on the seat when the noise is present. These conditions should be duplicated when verifying and isolating the cause of the noise.
Cause of seat noise include:

1. Headrest rods and holders
2. A squeak between the seat pad cushion and frame
3. The rear seat back lock and bracket

These noises can be isolated by moving or pressing on the suspected components while duplicating the conditions under which the noise occurs. Most of these incidents can be repaired by repositioning the component or applying urethane tape to the contact area.

UNDERHOOD

Some interior noises may be caused by components under the hood or on the engine wall. The noise is then transmitted into the passenger compartment.
Causes of transmitted underhood noises include:

1. Any component mounted to the engine wall
2. Components that pass through the engine wall
3. Engine wall mounts and connectors
4. Loose radiator mounting pins
5. Hood bumpers out of adjustment
6. Hood striker out of adjustment

These noises can be difficult to isolate since they cannot be reached from the interior of the vehicle. The best method is to secure, move or insulate one component at a time and test drive the vehicle. Also, engine RPM or load can be changed to isolate the noise. Repairs can usually be made by moving, adjusting, securing, or insulating the component causing the noise.

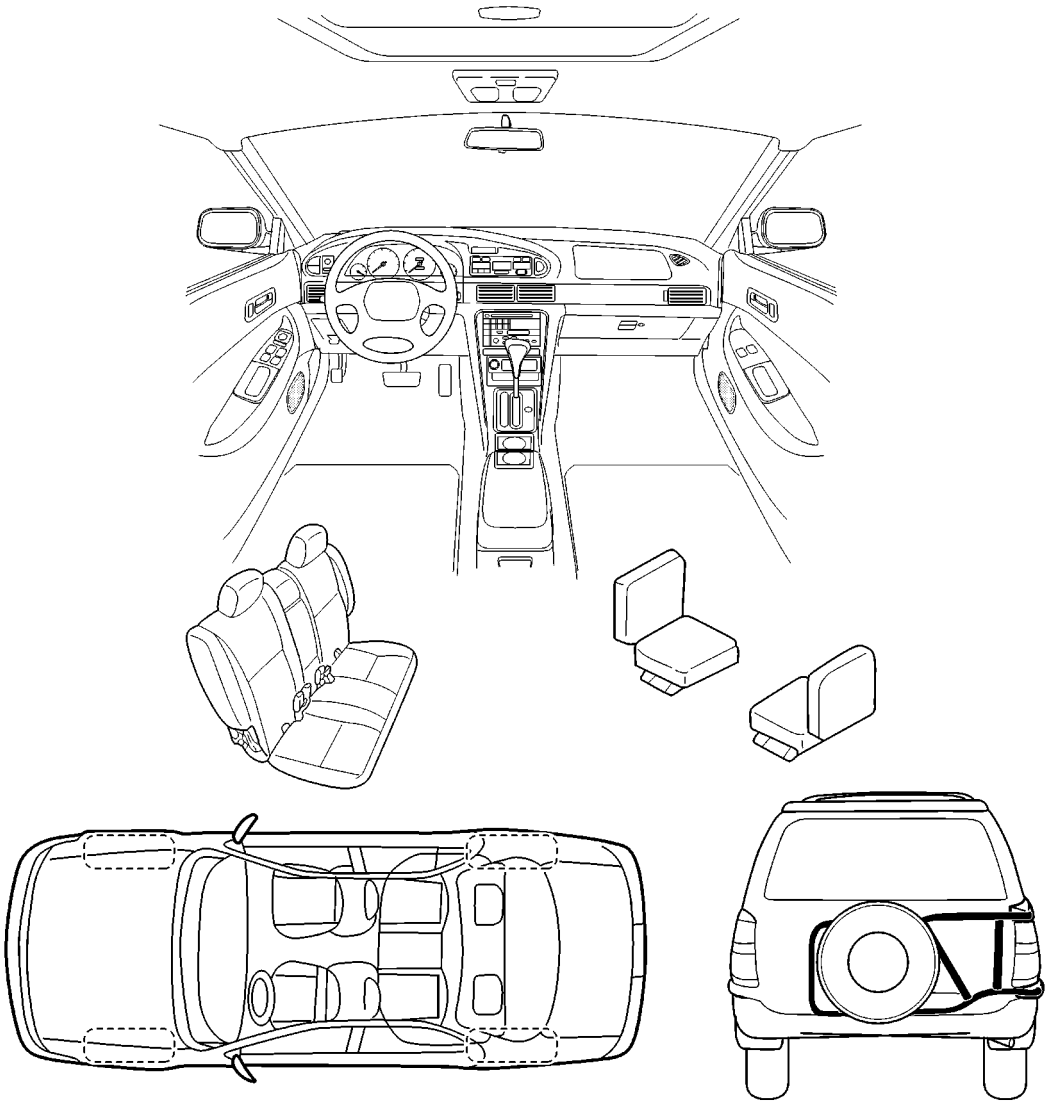
Diagnostic Worksheet

EIS0016V

SQUEAK & RATTLE DIAGNOSTIC WORKSHEET

Dear Nissan Customer:
We are concerned about your satisfaction with your Nissan vehicle. Repairing a squeak or rattle sometimes can be very difficult. To help us fix your Nissan right the first time, please take a moment to note the area of the vehicle where the squeak or rattle occurs and under what conditions. You may be asked to take a test drive with a service advisor or technician to ensure we confirm the noise you are hearing.

I. WHERE DOESTHE NOISE COME FROM? (circle the area of the vehicle)
The illustrations are for reference only, and may not reflect the actual configuration of your vehicle.



Continue to the back of the worksheet and briefly describe the location of the noise or rattle. In addition, please indicate the conditions which are present when the noise occurs.

LIWA0276E

SQUEAK & RATTLE DIAGNOSTIC WORKSHEET- page 2

Briefly describe the location where the noise occurs:

_____

_____

II. WHEN DOES IT OCCUR? (check the boxes that apply)

❑ anytime
❑ 1st time in the morning
❑ only when it is cold outside
❑ only when it is hot outside
❑ after sitting out in the sun
❑ when it is raining or wet
❑ dry or dusty conditions
❑ other: _____

III. WHEN DRIVING:

❑ through driveways
❑ over rough roads
❑ over speed bumps
❑ only at about _____ mph
❑ on acceleration
❑ coming to a stop
❑ on turns : left, right or either (circle)
❑ with passengers or cargo
❑ other: _____
❑ after driving _____ miles or _____ minutes

IV. WHAT TYPE OF NOISE?

❑ squeak (like tennis shoes on a clean floor)
❑ creak (like walking on an old wooden floor)
❑ rattle (like shaking a baby rattle)
❑ knock (like a knock on a door)
❑ tick (like a clock second hand)
❑ thump (heavy, muffled knock noise)
❑ buzz (like a bumble bee)

TO BE COMPLETED BY DEALERSHIP PERSONNEL
Test Drive Notes:

_____

_____

	YES	NO	Initials of person performing
Vehicle test driven with customer	❑	❑	_____
- Noise verified on test drive	❑	❑	
- Noise source located and repaired	❑	❑	_____
- Follow up test drive performed to confirm repair	❑	❑	_____

VIN: _____ Customer Name: _____

W.O. #: _____ Date: _____

This form must be attached to Work Order

SBT844

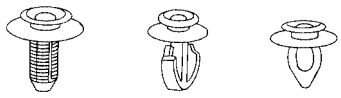
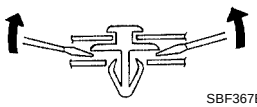
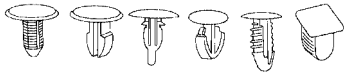
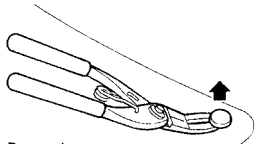
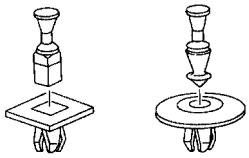
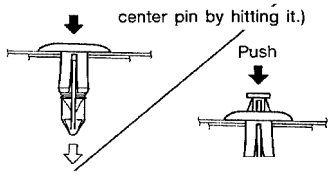
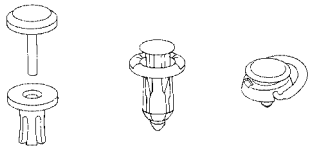
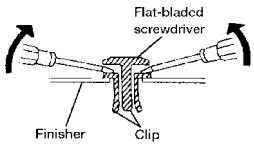
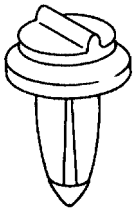
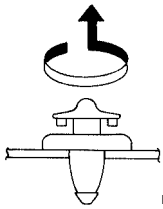
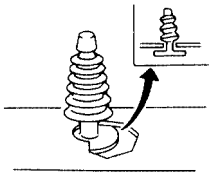
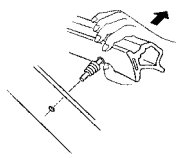
CLIP AND FASTENER

PFP:76906

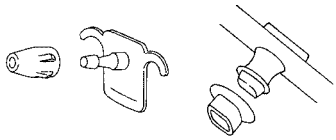
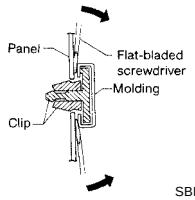
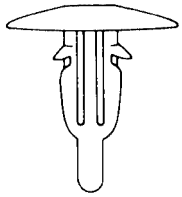
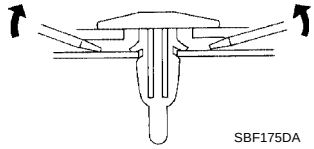
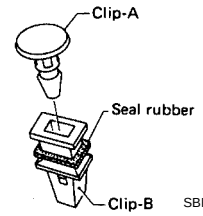
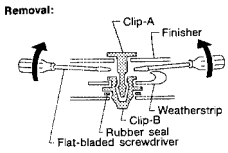
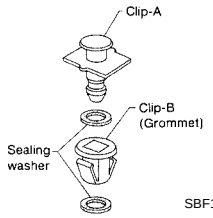
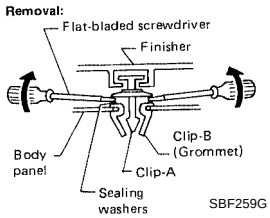
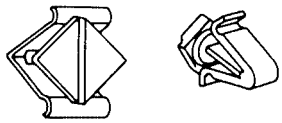
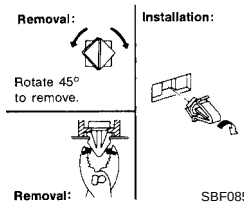
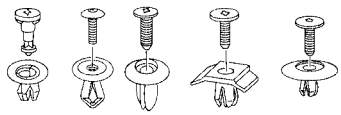
Description

EIS0016W

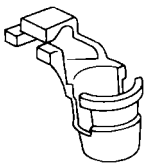
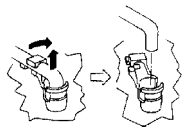
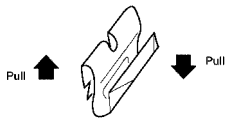
- Clips and fasteners in EI section correspond to the following numbers and symbols.
- Replace any clips and/or fasteners which are damaged during removal or installation.

Symbol No.	Shapes	Removal & Installation
C101	 SBF302H	**Removal:** Remove by bending up with flat-bladed screwdrivers or clip remover.  SBF367BA
C103	 SBT095	 **Removal:** Remove with a clip remover. SBF423H
C203	 SBF258G	center pin by hitting it.) Push  SBF708E
C205	 MBT080A	**Removal:** Flat-bladed screwdriver Finisher Clip  SBF638CA
C206	 MBF519B	 MBF520B
CE103	 SBF104B	**Removal:**  SBF147B

CLIP AND FASTENER

Symbol No.	Shapes	Removal & Installation
CE107	 SBF411H	 SBF767B
CE117	 SBF174D	**Removal:** Remove by bending up with a flat-bladed screwdriver or pliers.  SBF175DA
CF110	 SBF648B	 SBF649B
CF118	 SBF151D	 SBF259G
CG101	 SBF145B	 SBF085B
CS101	 SBF078B	**Removal:** 1. Screw out with a Phillips screwdriver. 2. Remove female portion with flat-bladed screwdriver. SBF992G

CLIP AND FASTENER

Symbol No.	Shapes	Removal & Installation
CR103	 SBF768B	**Removal:** Holder portion of clip must be spread out to remove rod.  SBF770B
Metal Clip	WBT072	**Removal:**  WBT073

BODY FRONT END

PFP:H5022

Removal and Installation

EIS0016X

- When removing or installing hood, place a cloth or other padding on front fender panels and cowl top. This prevents vehicle body from being scratched.
- Bumper fascia is made of plastic. Do not use excessive force and be sure to keep oil away from it.
- Hood adjustment: Adjust at hinge portion. B
- Hood lock adjustment: After adjusting, check hood lock control operation. Apply a coat of grease to hood lock engaging mechanism.
- Hood opener: Do not attempt to bend cable forcibly. Doing so increases effort required to unlock hood.

FRONT BUMPER ASSEMBLY

1. Remove screws securing left and right front fog lamps, and remove the lamps (if equipped); or remove filler trim panel.
2. Remove four clips C205 from the top of the front grille, pull up to unclip bottom and remove. A
3. Remove clips C205 and screws located on front side of fender protector at wheel opening.
4. Remove three bolts from the air deflector.
5. Remove two bolts securing lower side of front bumper fascia.
6. Pull off front bumper fascia and energy absorber.
7. Remove four nuts securing bumper reinforcement, then remove bumper reinforcement.
8. Remove four bolts securing front bumper side stays.
9. Remove front bumper side stays.
10. Remove the air dam if necessary.

QG18DE

SEC. 620 • 623 • 630

Hood lock adjustment

Adjust hood so that hood primary lock meshes at a position 1 to 1.5mm (0.039 to 0.059 in) lower than fender.
After hood lock adjustment, adjust bumper rubber.
When securing hood lock, ensure that it does not tilt. Striker must be positioned at the center of hood primary lock.
After adjustment, ensure that hood primary and secondary lock operate properly.

Hood lock secondary latch hooking length.

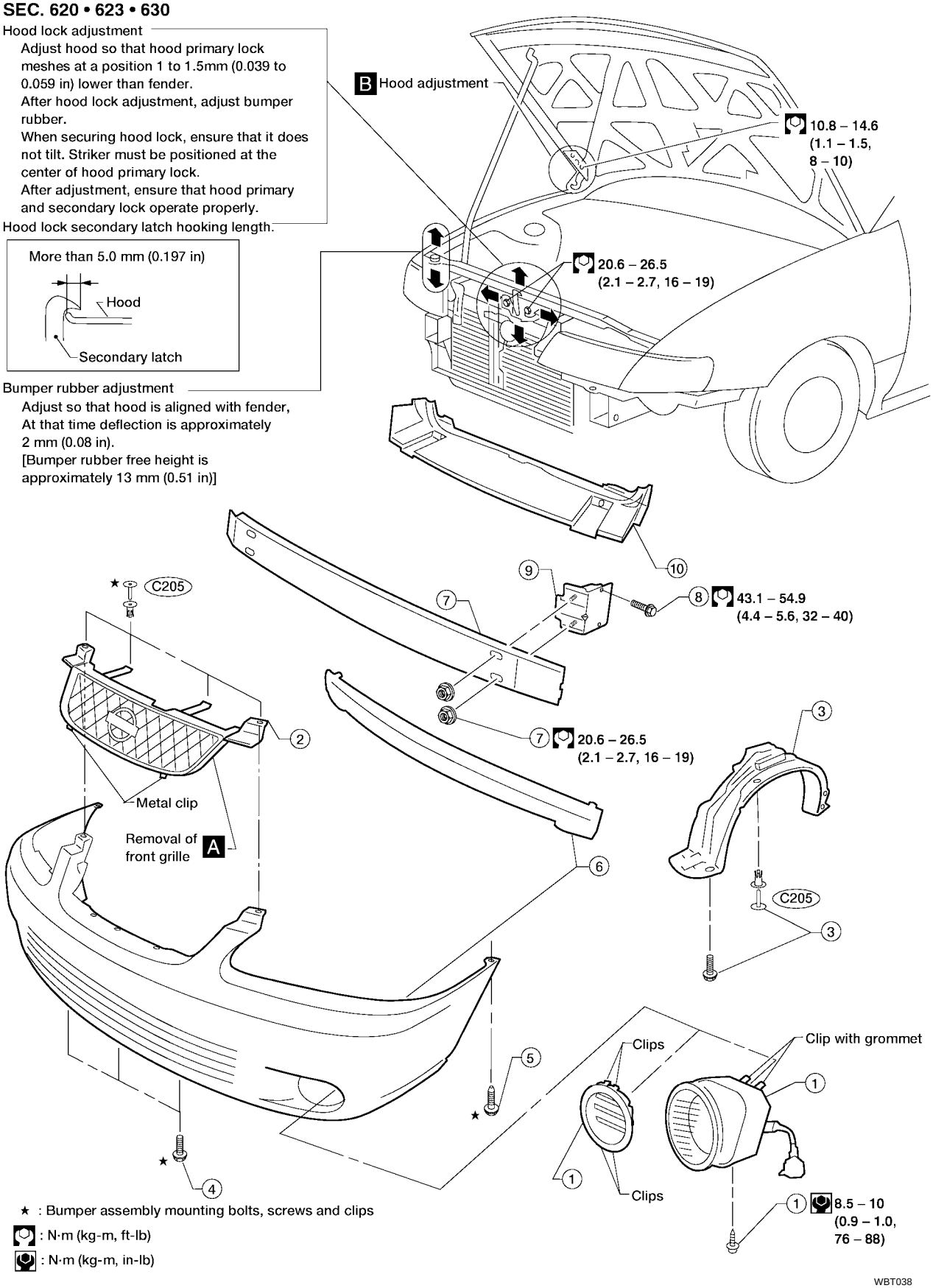
More than 5.0 mm (0.197 in)

Hood

Secondary latch

Bumper rubber adjustment

Adjust so that hood is aligned with fender, At that time deflection is approximately 2 mm (0.08 in).
[Bumper rubber free height is approximately 13 mm (0.51 in)]

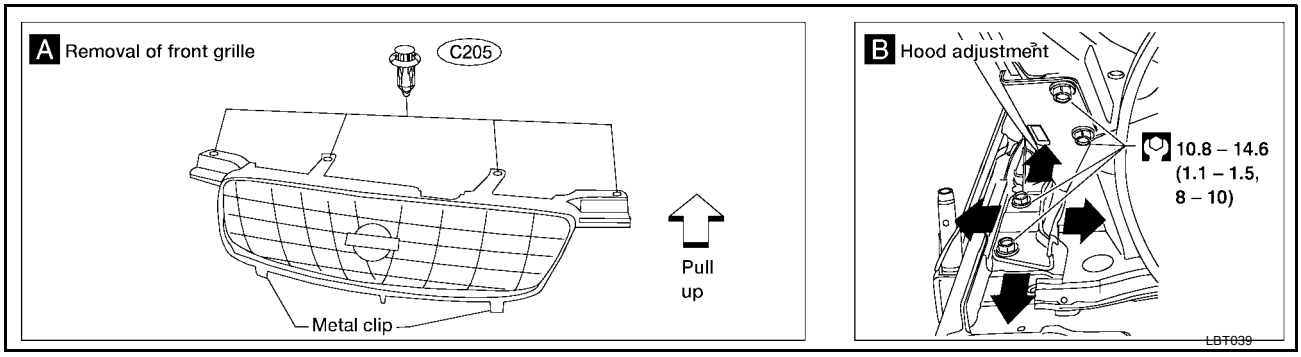


★ : Bumper assembly mounting bolts, screws and clips

: N·m (kg-m, ft-lb)

: N·m (kg-m, in-lb)

WBT038


A Removal of front grille
C205
Pull up
Metal clip
B Hood adjustment
10.8 – 14.6 (1.1 – 1.5, 8 – 10)
LBT039

QR25DE

SEC. 620 • 623 • 630

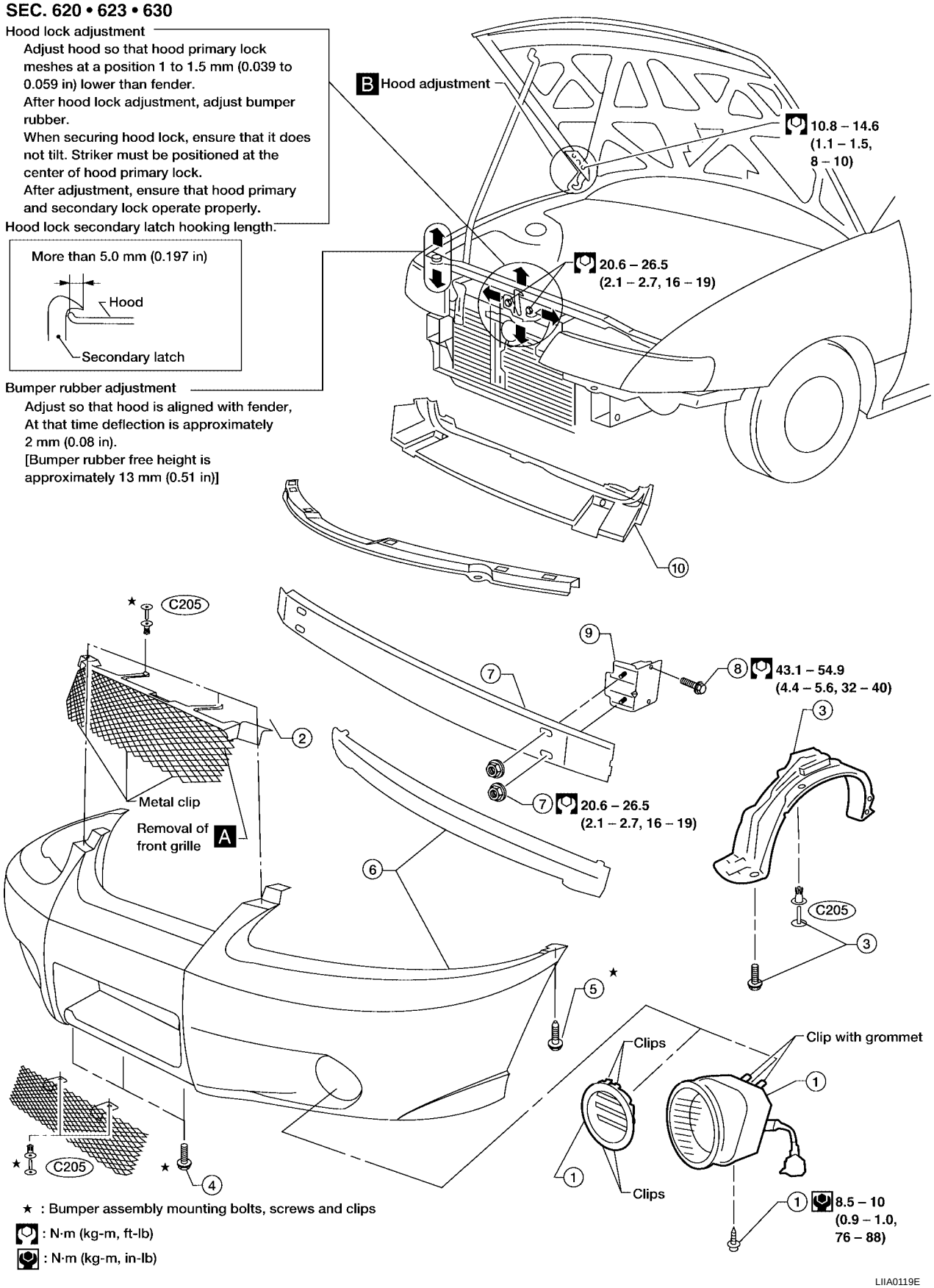
Hood lock adjustment

Adjust hood so that hood primary lock meshes at a position 1 to 1.5 mm (0.039 to 0.059 in) lower than fender.
After hood lock adjustment, adjust bumper rubber.
When securing hood lock, ensure that it does not tilt. Striker must be positioned at the center of hood primary lock.
After adjustment, ensure that hood primary and secondary lock operate properly.

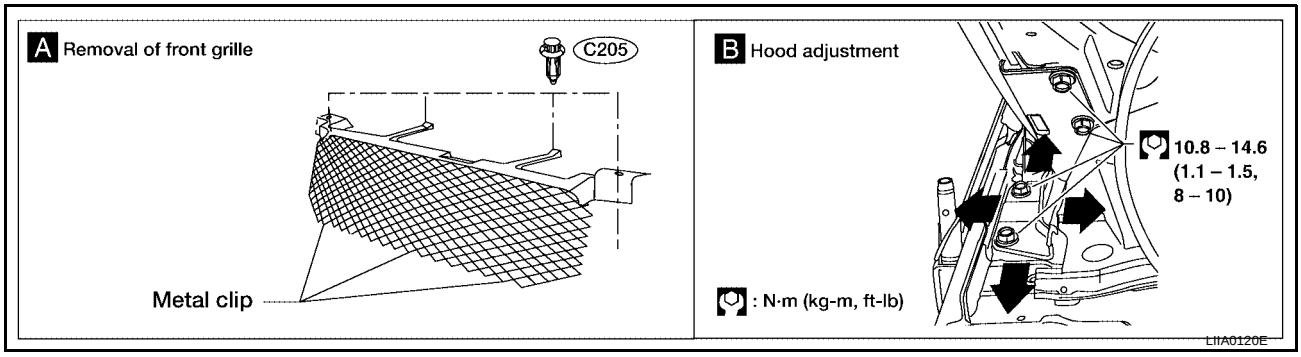
Hood lock secondary latch hooking length.

Bumper rubber adjustment

Adjust so that hood is aligned with fender,
At that time deflection is approximately 2 mm (0.08 in).
[Bumper rubber free height is approximately 13 mm (0.51 in)]



LIIA0119E


A Removal of front grille
C205
Metal clip
B Hood adjustment
10.8 – 14.6
(1.1 – 1.5,
8 – 10)
: N·m (kg-m, ft-lb)
LIIA0120E

BODY REAR END AND OPENER

PFP:F2022

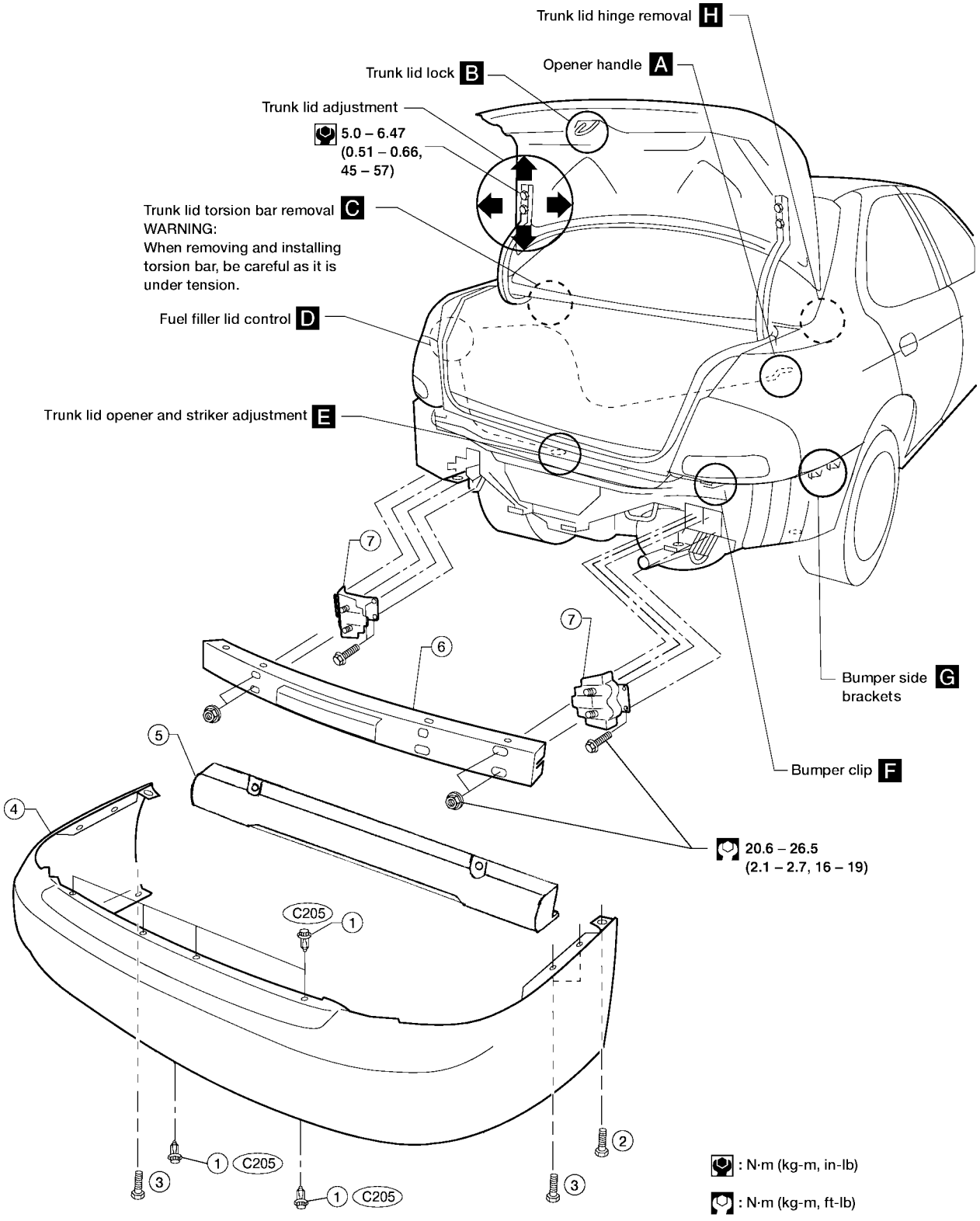
Removal and Installation

EIS0016Y

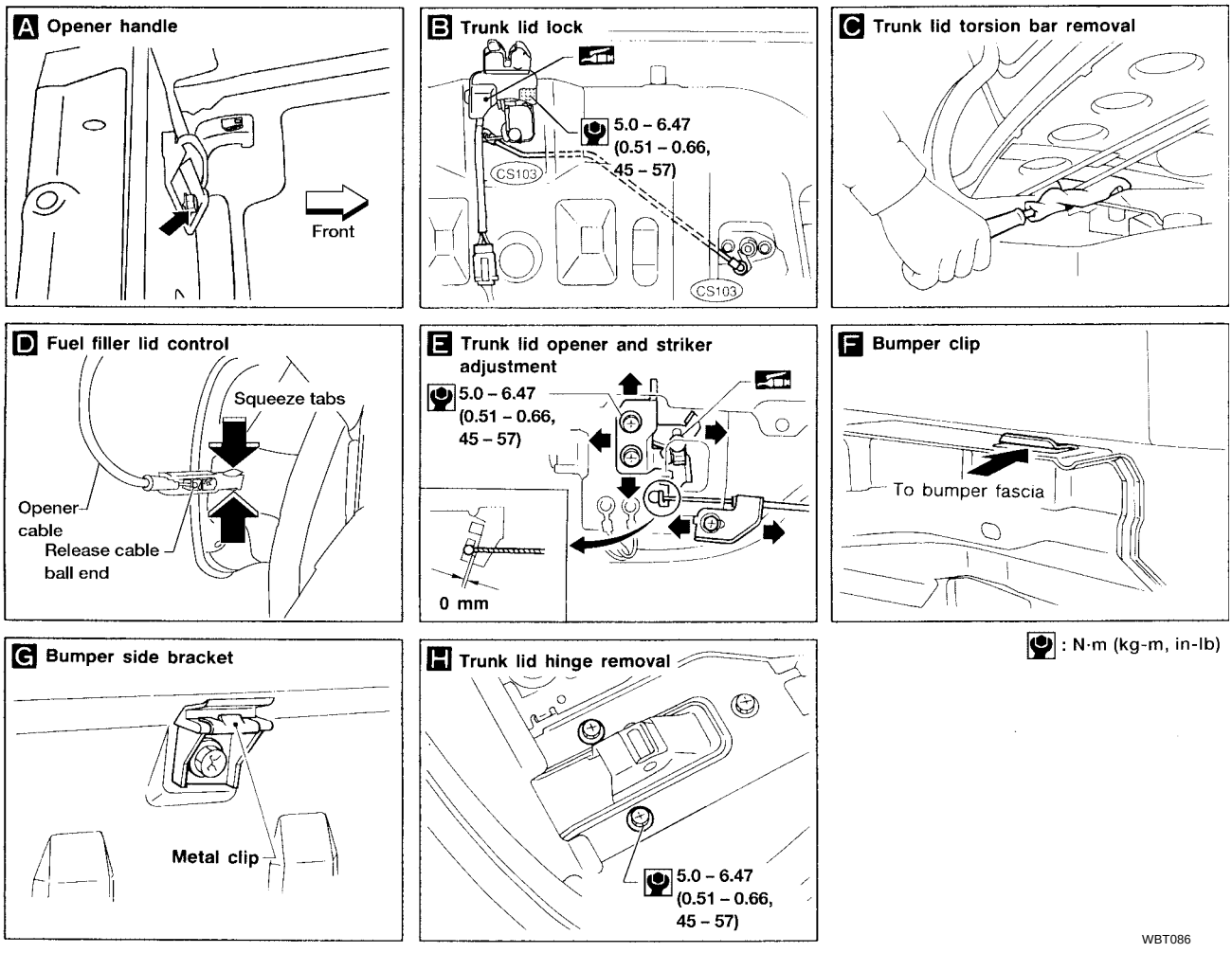
- When removing or installing trunk lid, place a cloth or other padding on rear fender panels. This prevents vehicle body from being scratched.
- Bumper fascia is made of plastic. Do not use excessive force and be sure to keep oil away from it.
- Trunk lid adjustment: Adjust at hinge-trunk lid portion for proper trunk lid fit.
- Trunk lid lock system adjustment: Adjust striker so that it is in the center of the lock. After adjustment, check trunk lid lock operation.
- Opener cable: Do not attempt to bend cable using excessive force.
- After installation, make sure that trunk lid and fuel filler lid open smoothly.

REAR BUMPER ASSEMBLY

1. Remove two clips C205 from lower side and four clips C205 from upper side of rear bumper fascia.
2. Remove two screws from each quarter panel side.
3. Remove two screws from each upper side of fascia into bumper side brackets.
4. Remove rear bumper fascia.
5. Remove energy absorber from rear bumper reinforcement.
6. Remove four nuts securing bumper reinforcement and remove bumper reinforcement.
7. Remove four bolts securing each bumper side stay, and remove bumper side stays.


Trunk lid hinge removal H
Opener handle A
Trunk lid lock B
Trunk lid adjustment
5.0 – 6.47
(0.51 – 0.66,
45 – 57)
Trunk lid torsion bar removal C
WARNING:
When removing and installing
torsion bar, be careful as it is
under tension.
Fuel filler lid control D
Trunk lid opener and striker adjustment E
Bumper side
brackets G
Bumper clip F
20.6 – 26.5
(2.1 – 2.7, 16 – 19)
C205
: N·m (kg-m, in-lb)
: N·m (kg-m, ft-lb)

WIIA0197E


A Opener handle
Front
B Trunk lid lock
5.0 – 6.47
(0.51 – 0.66,
45 – 57)
CS103
CS103
C Trunk lid torsion bar removal
D Fuel filler lid control
Squeeze tabs
Opener cable
Release cable ball end
E Trunk lid opener and striker adjustment
5.0 – 6.47
(0.51 – 0.66,
45 – 57)
0 mm
F Bumper clip
To bumper fascia
: N·m (kg-m, in-lb)
G Bumper side bracket
Metal clip
H Trunk lid hinge removal
5.0 – 6.47
(0.51 – 0.66,
45 – 57)
WBT086

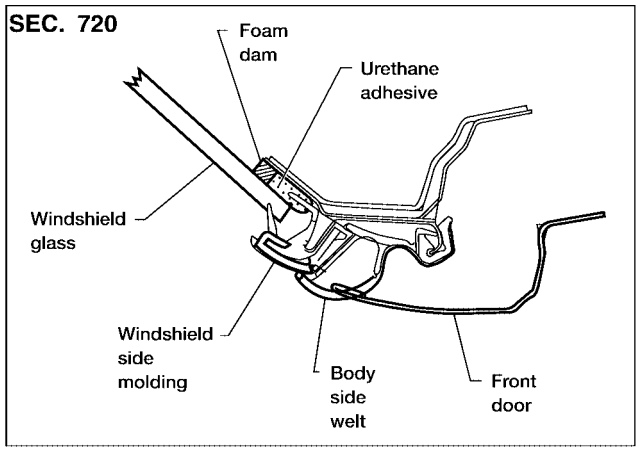
WINDSHIELD MOLDING

PFP:72700

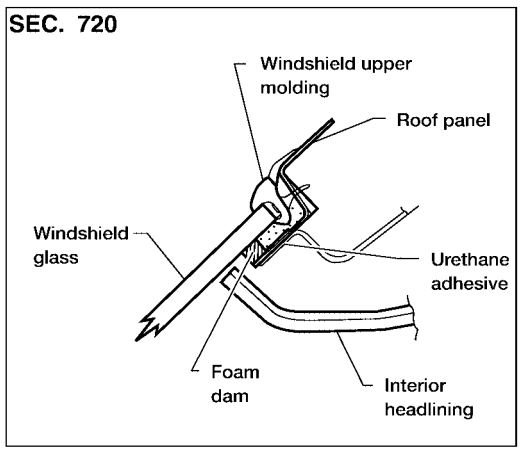
Windshield and Rear Window

EIS0016Z

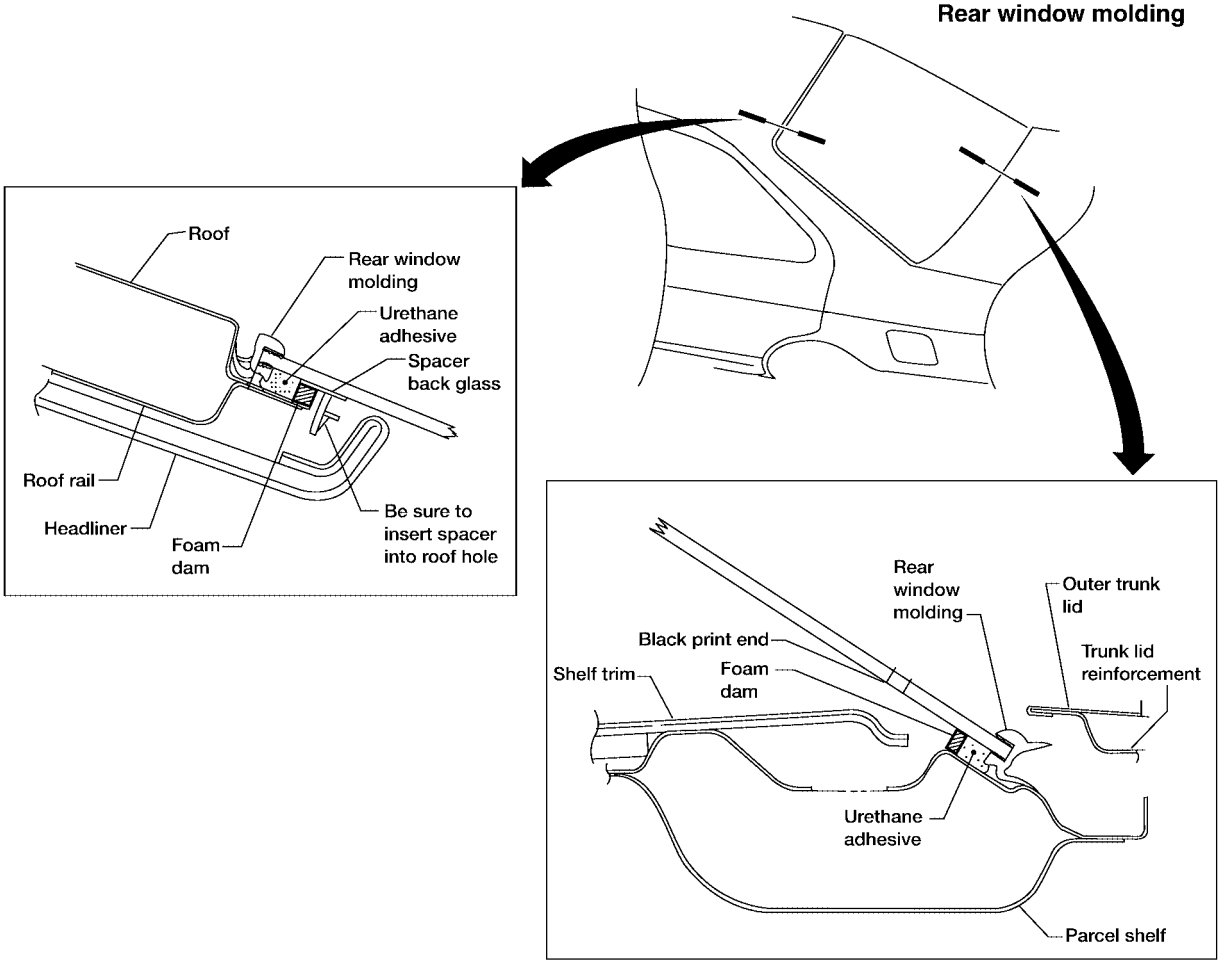
Windshield side molding



Windshield upper molding



Rear window molding



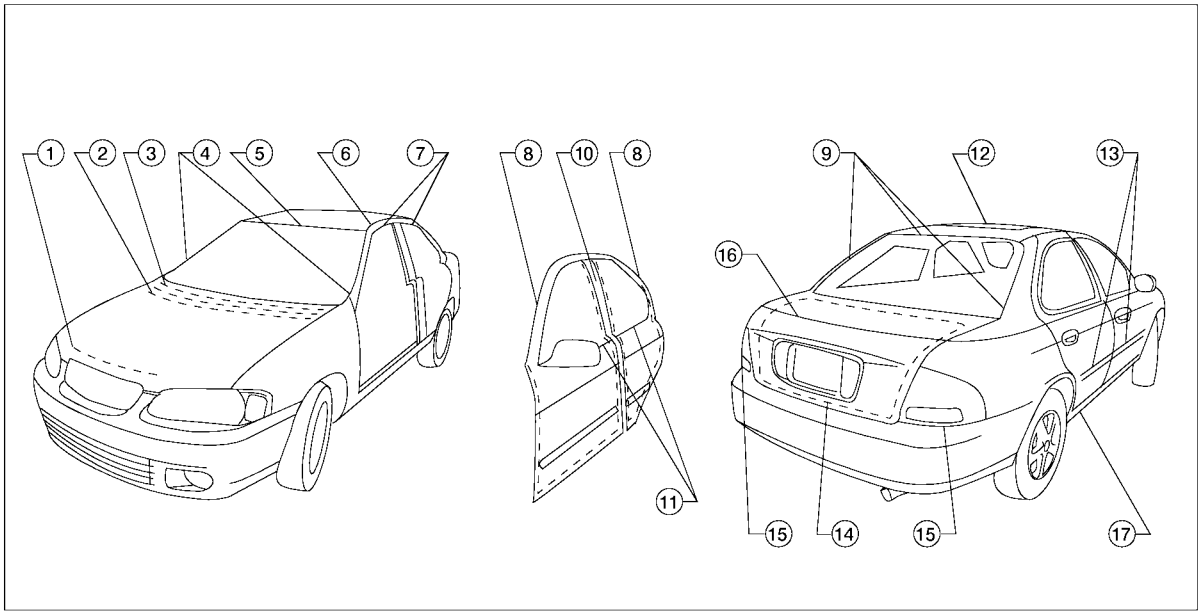
WBT114

EXTERIOR

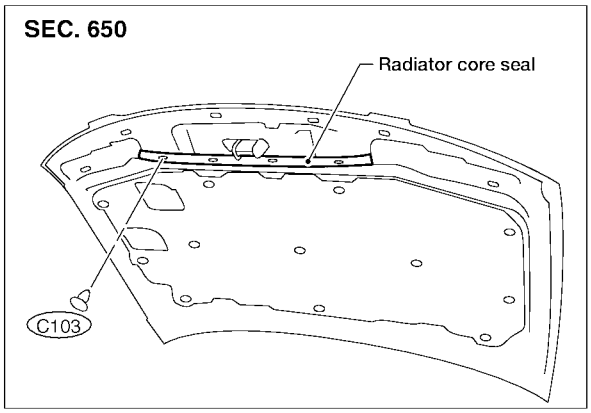
PFP:AAAAA

Removal and Installation

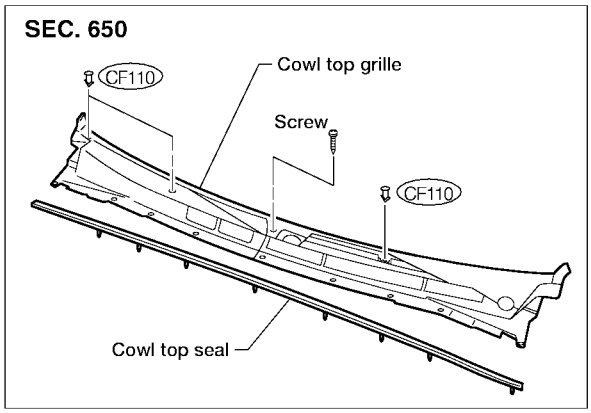
EIS00170



① **Hood front seal**

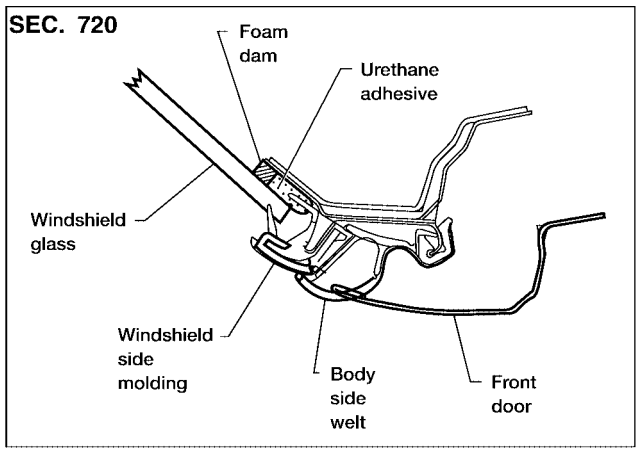


② ③ **Cowl top seal and cowl top grille**

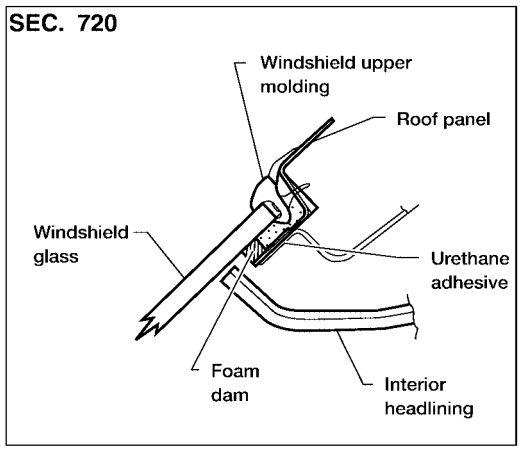


WBT054

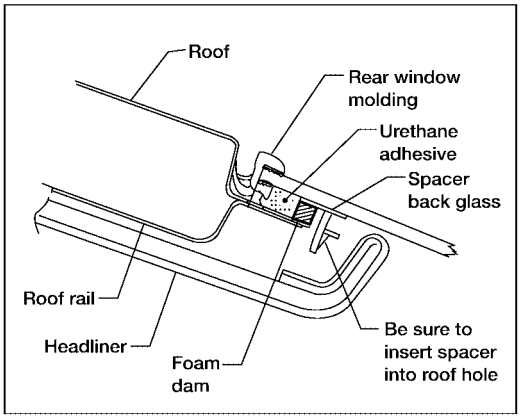
④ Windshield side molding

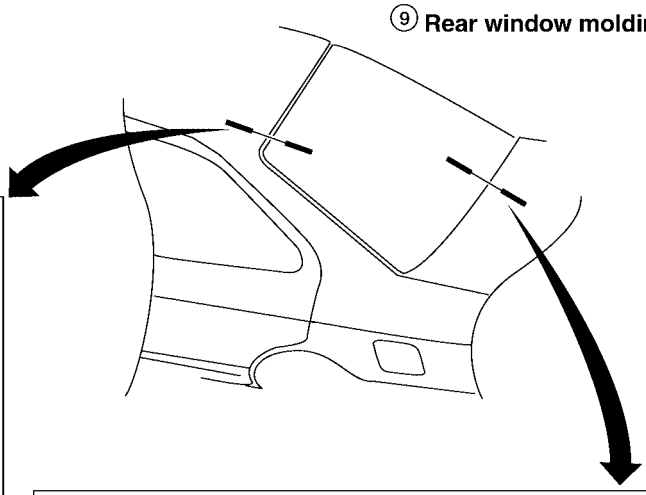


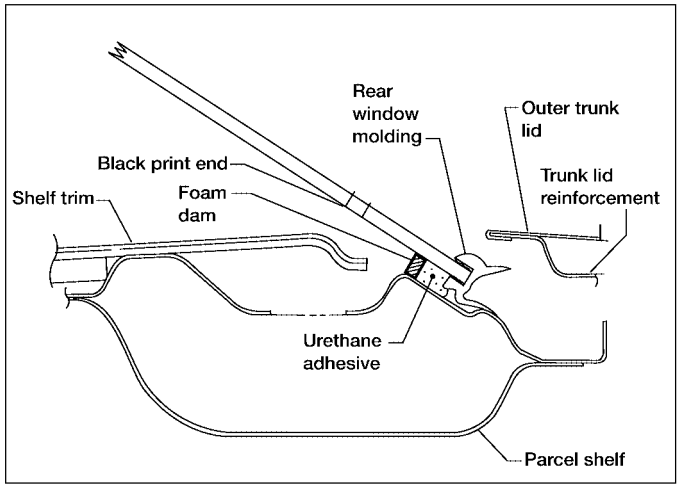
⑤ Windshield upper molding



⑨ Rear window molding



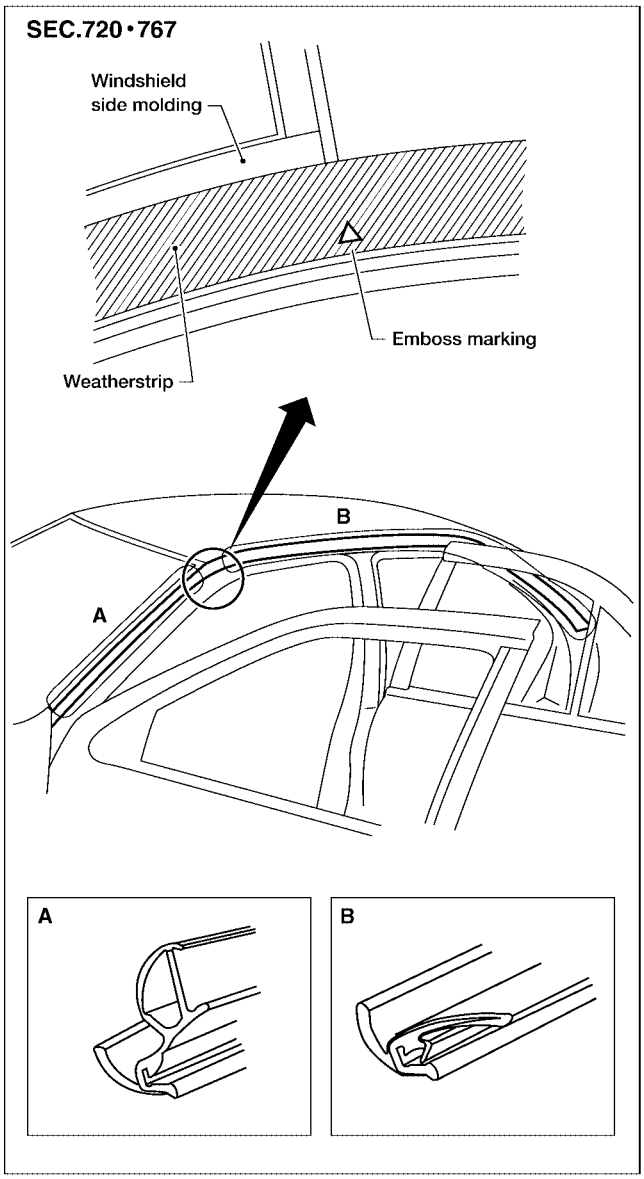




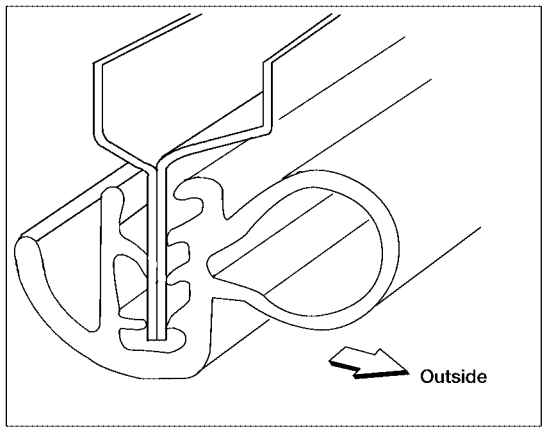
WBT113

A B C D E F G H EI J K L M

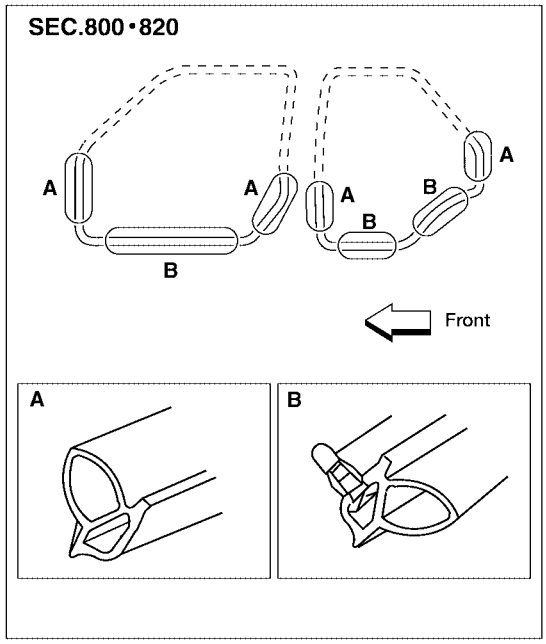
⑥ Drip weatherstrip



⑦ Body side welt

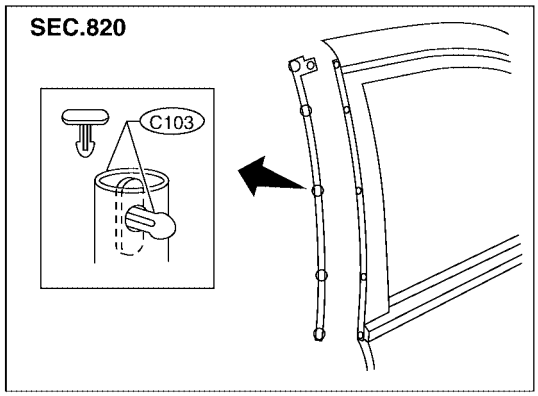


⑧ Door weatherstrip

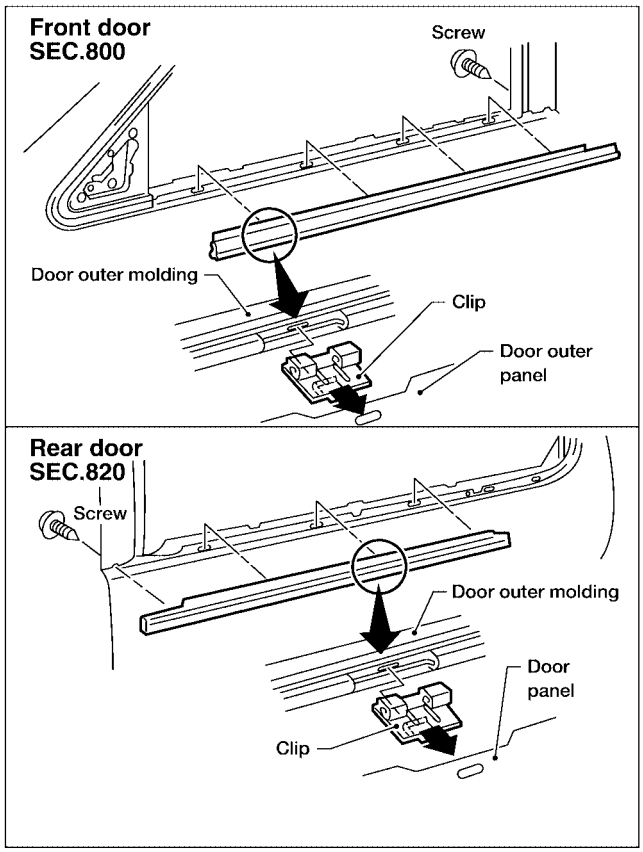


LIIA0009E

⑩ **Rear door parting seal**



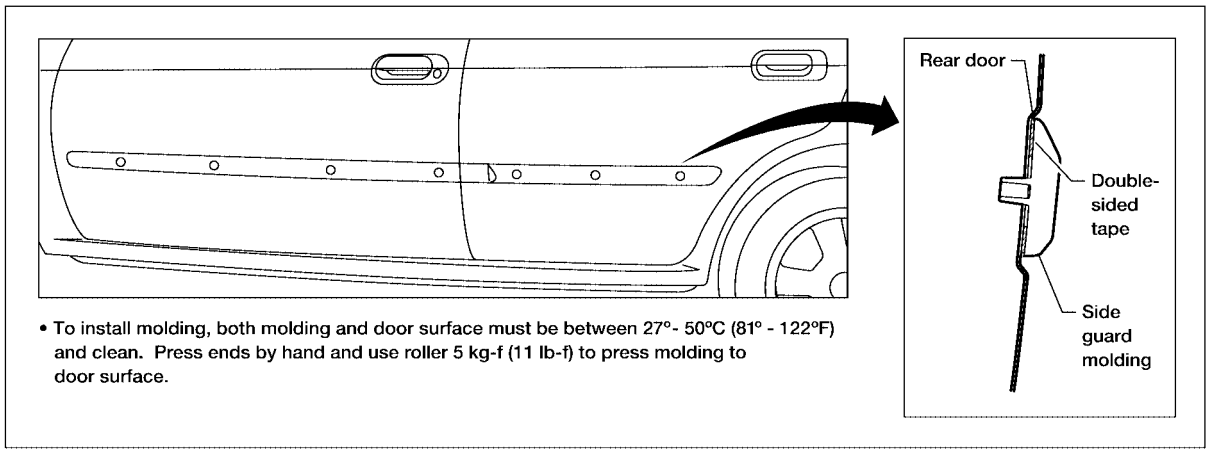
⑪ **Door outside molding**



⑫ **Sunroof lid weatherstrip**

Sunroof weatherstrip is part of the glass lid and must be replaced as an assembly.

⑬ **Side guard molding**

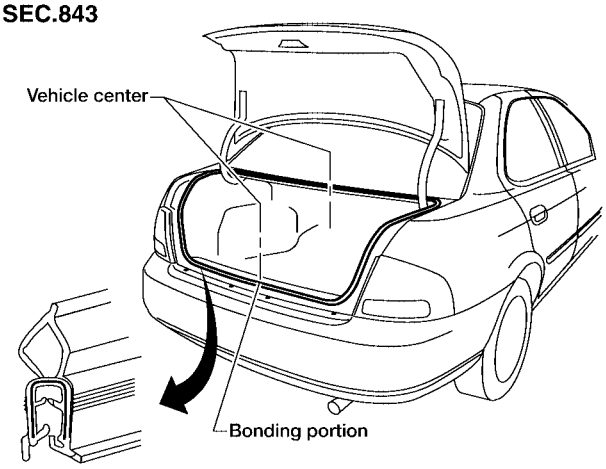


• To install molding, both molding and door surface must be between 27°- 50°C (81° - 122°F) and clean. Press ends by hand and use roller 5 kg-f (11 lb-f) to press molding to door surface.

LIIA0148E

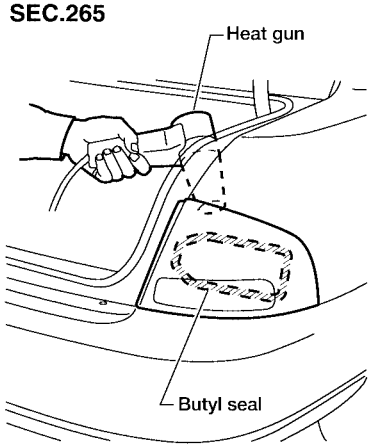
⑭ **Trunk lid weatherstrip**

SEC.843



⑮ **Rear combination lamp**

SEC.265



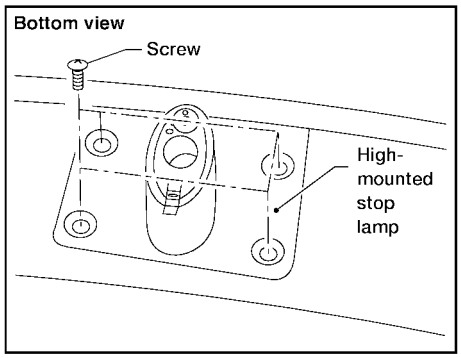
- Apply butyl seal evenly as it tends to become thin in the corners.
- Warm up lamp assembly area to a temperature of a little below 60°C (140°F).

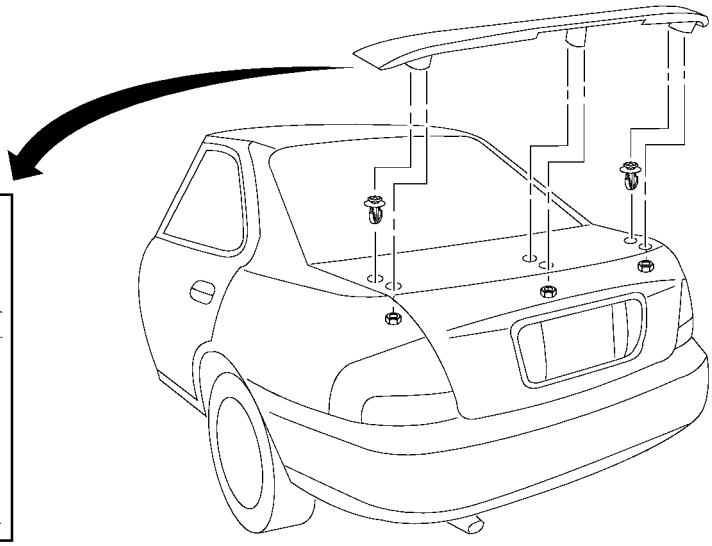
LIIA0010E

SEC. 960

⑯ **Rear air spoiler and high-mounted stop lamp**

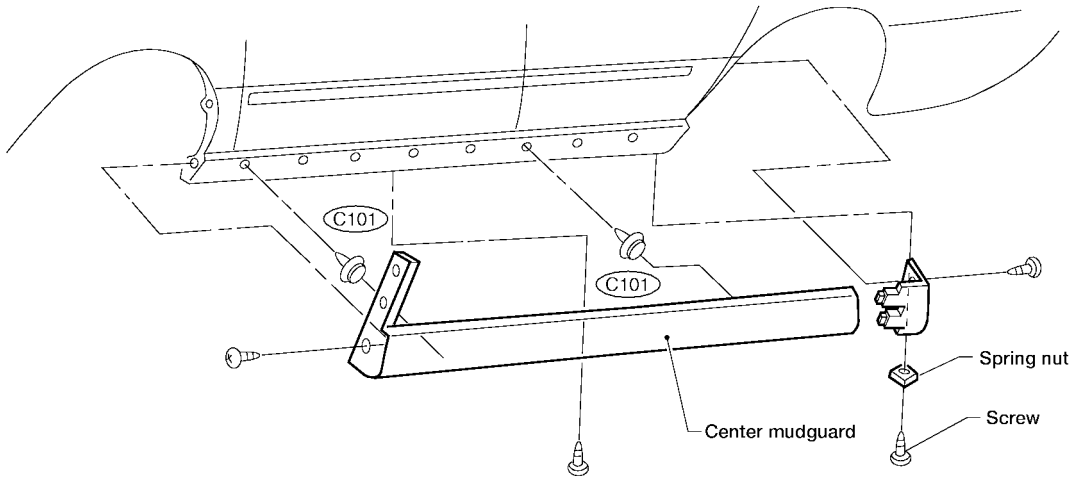
- **When installing, make sure that there are no gaps or waves at ends of air spoiler.**
- **Before installing spoiler, clean and remove oil from surface where spoiler will be mounted.**





LBT065

⑰ **Fender and center mudguard**



LBT059

SIDE AND FLOOR TRIM

PFP:76913

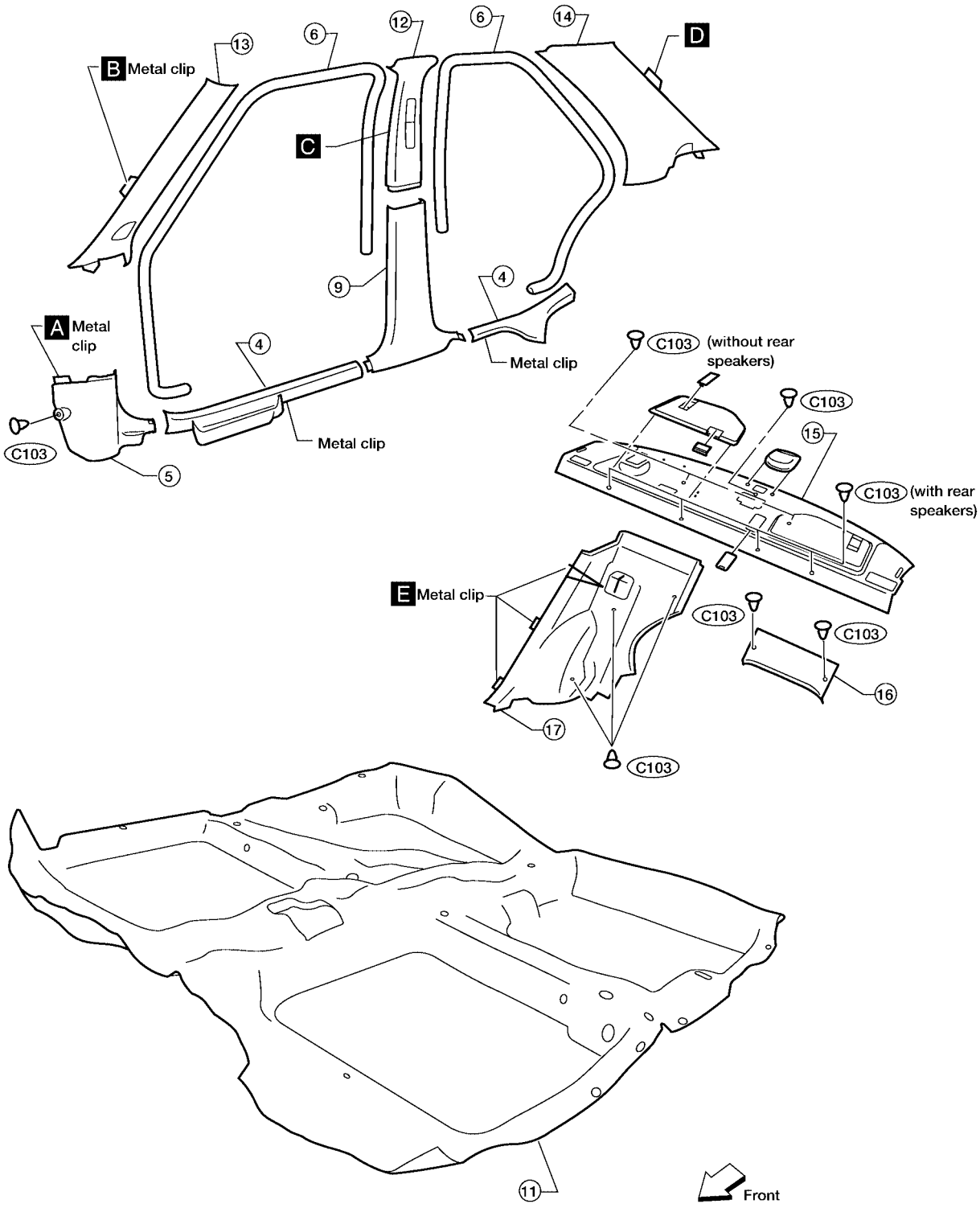
Removal and Installation

EIS00171

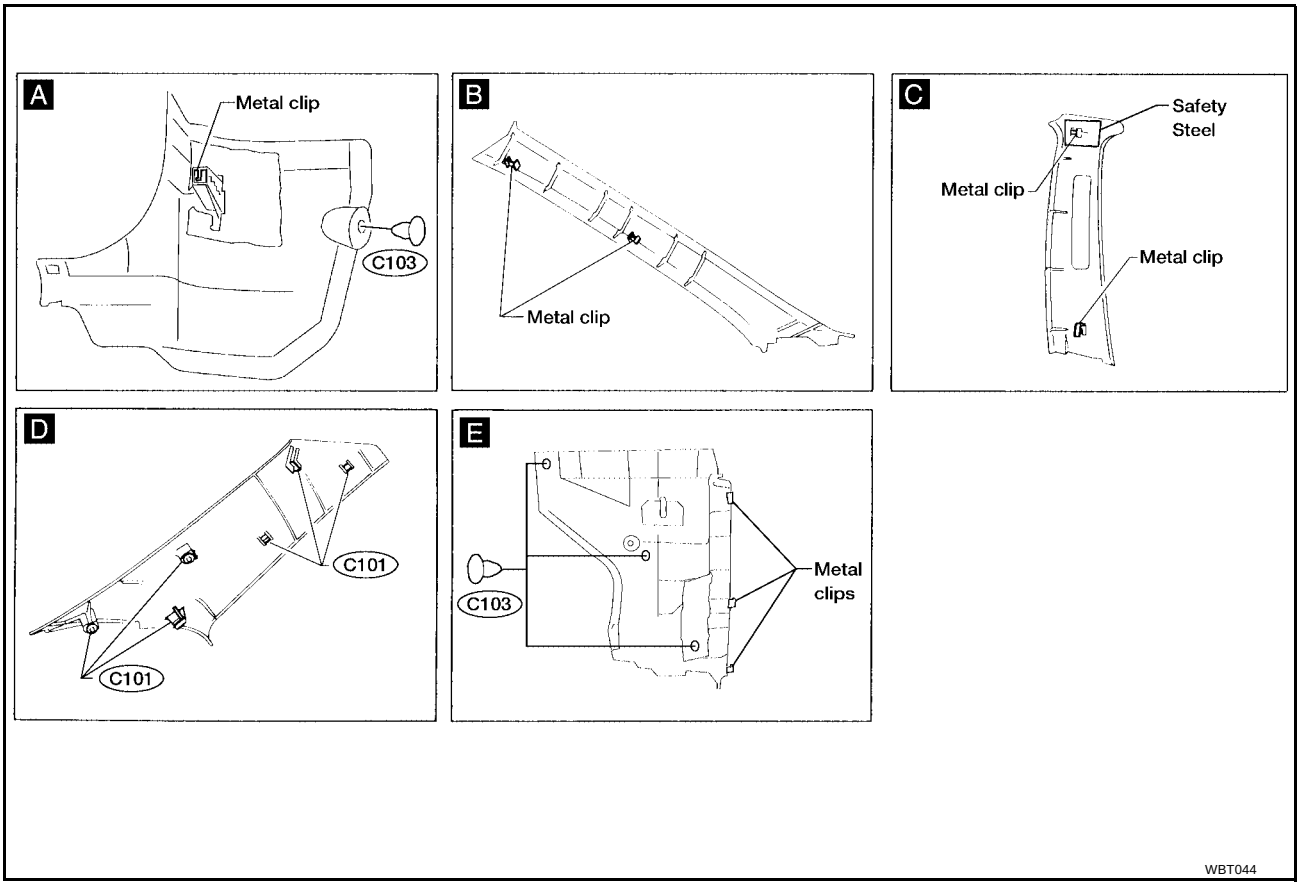
CAUTION:

- **Wrap the tip of flat-bladed screwdriver with a cloth when removing metal clips from garnishes.**

1. Remove A/T finisher or M/T shift lever boot. Refer to IP-10, "Removal and Installation" .
2. Remove the console. Refer to IP-10, "Removal and Installation" .
3. Remove front and rear seats. Refer to SE-3, "Removal and Installation" (front), or SE-5, "Removal and Installation" (rear).
4. Remove kick plates.
5. Remove dash side lower garnish. A
6. Remove body side welts.
7. Remove front seat belt floor anchor bolt. Refer to SB-3, "Removal and Installation" .
8. Remove rear seat belt floor anchor bolt. Refer to SB-5, "Removal and Installation" .
9. Remove center pillar lower garnish.
10. Remove adjuster cover and pillar shoulder bolt. Refer to SB-3, "Removal and Installation" .
11. Remove floor carpet.
12. Remove center pillar upper garnish. C
13. Remove front pillar garnish. B
14. Remove rear pillar garnish. D
15. Remove parcel shelf.
16. Remove center rear seat back finisher.
17. Remove side rear seat back finishers. E


B Metal clip
13
6
12
6
14
D
C
9
4
A Metal clip
4
Metal clip
C103
5
Metal clip
C103 (without rear speakers)
C103
15
C103 (with rear speakers)
E Metal clip
C103
C103
16
17
C103
11
Front

WBT128


A
Metal clip
C103
B
Metal clip
C
Safety Steel
Metal clip
Metal clip
D
C101
C101
E
C103
Metal clips
WBT044

DOOR FINISHER

PFP:80900

Removal and Installation

EIS00172

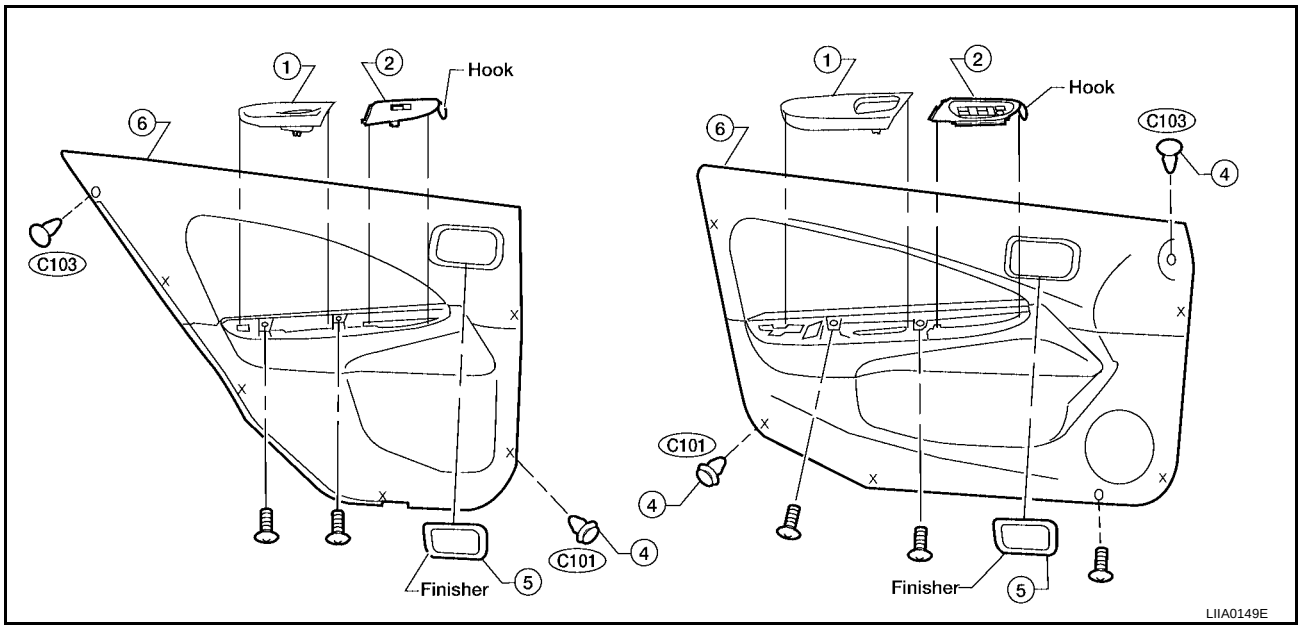
CAUTION:

Wrap the tip of a flat-bladed screwdriver with cloth when prying pawls from door trim.

1. Remove the door pull finisher(s).
2. Remove power window switch(es) finisher(s), then disconnect the connector(s) (models equipped with power windows).

- **Do not lift the front of the power window switch assembly.**

3. Remove window regulator handle (models without power windows).
4. Remove screws and disconnect clips C101 and clips C103 from door.
5. Reach behind and carefully pull door trim panel from inside handle until finisher pops off.
6. Lift out door trim.



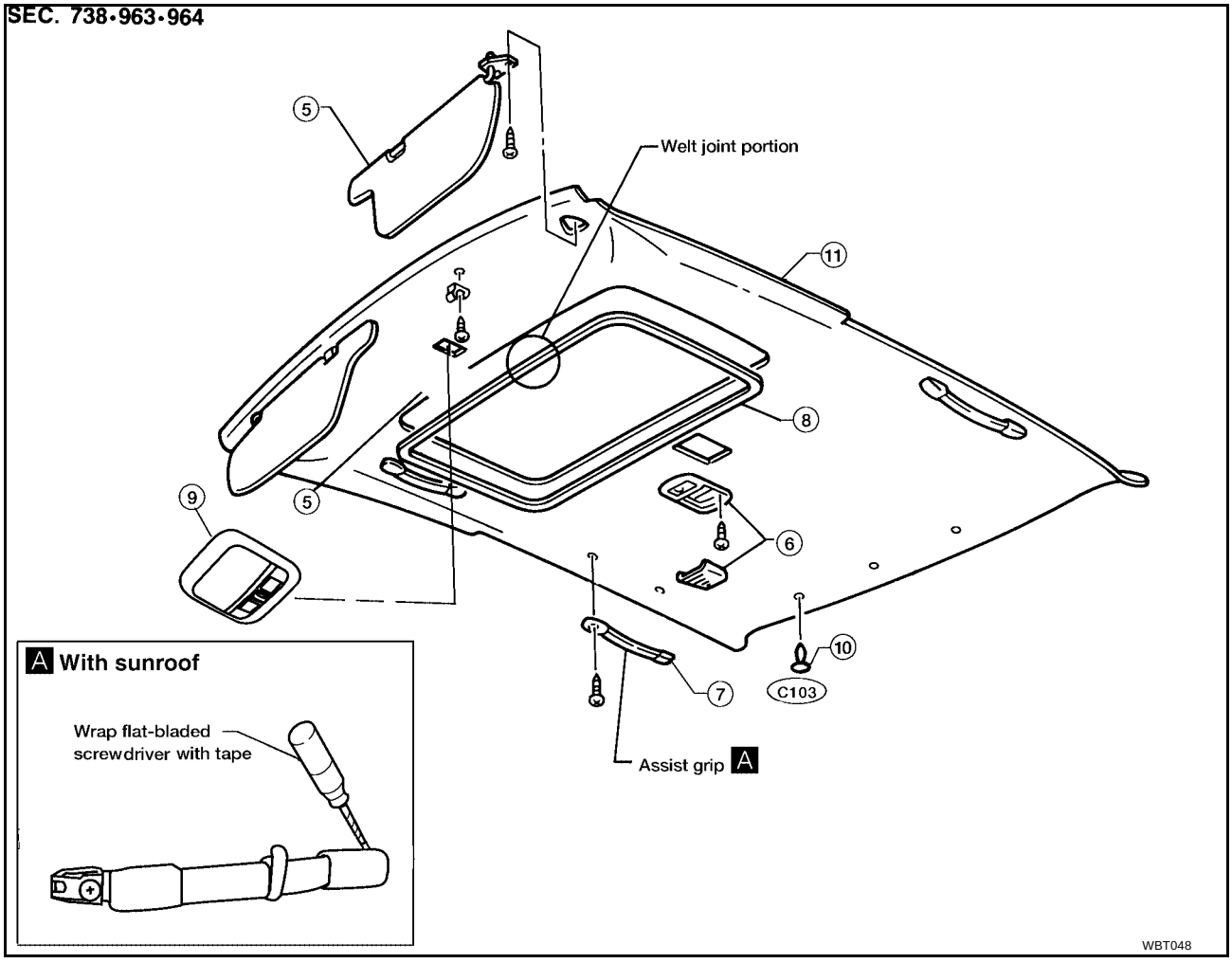
ROOF TRIM

PFP:73910

Removal and Installation

EIS00173

1. Fully tilt front right and left seat backs backward.
2. Remove front pillar garnish, front and rear kick plates. Refer to EI-28, "Removal and Installation" .
3. Remove center pillar lower and upper garnish, and rear pillar garnish. Refer to EI-28, "Removal and Installation" .
4. Remove sun visors.
5. Remove interior lamp.
6. Remove assist grips. A
7. Remove sunroof welt (if equipped) and door welts.
8. Remove sunroof switch (if equipped) and map lamp assembly.
9. Remove clips attached to roof.
10. Take out headlining from the front passenger door.

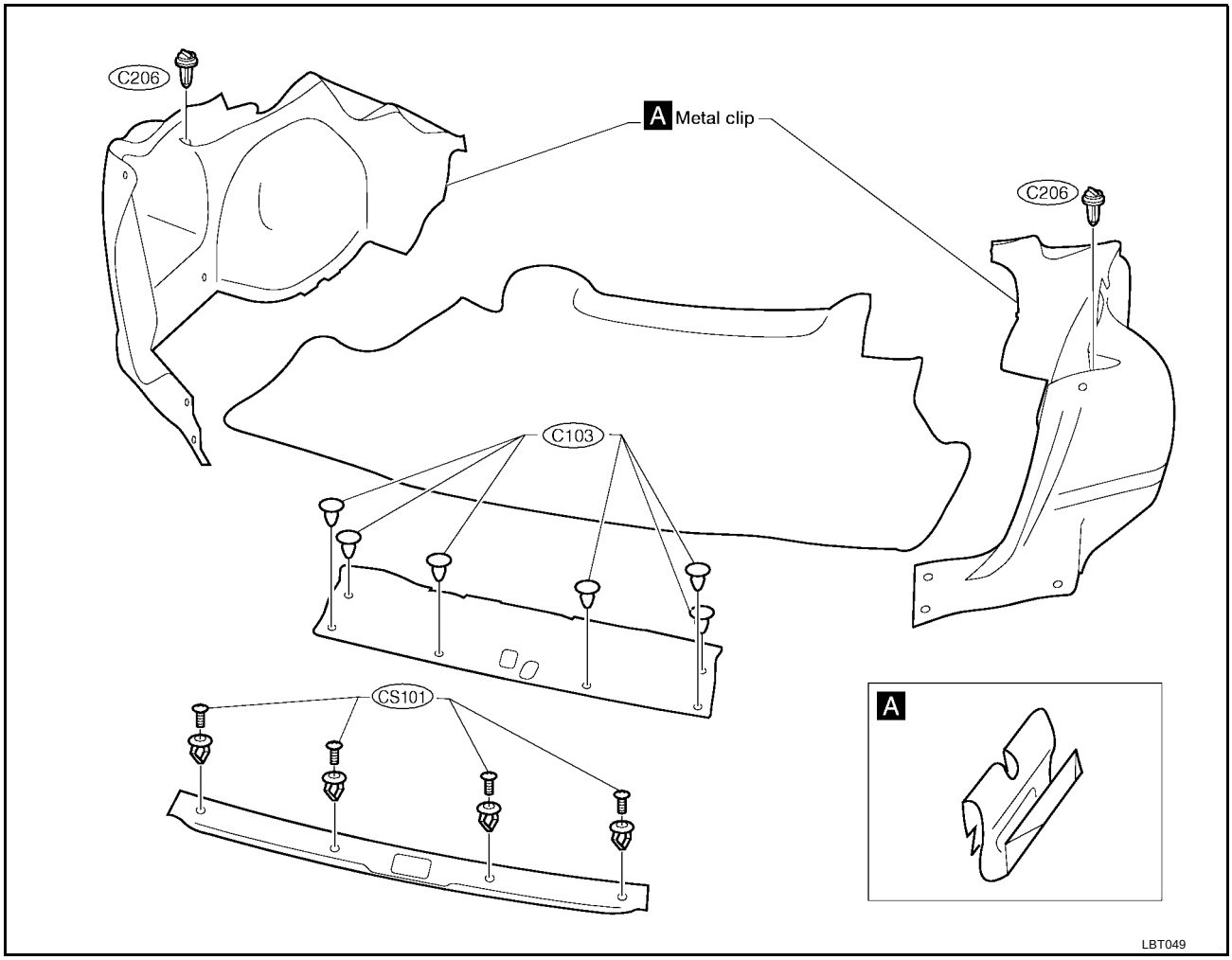


TRUNK ROOM TRIM

PFP:84920

Removal and Installation

EIS00174



SECTION IP
INSTRUMENT PANEL

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EIS001EI

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**

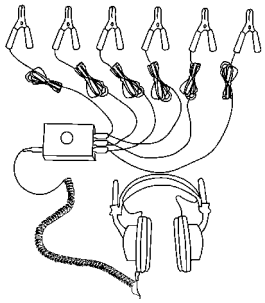
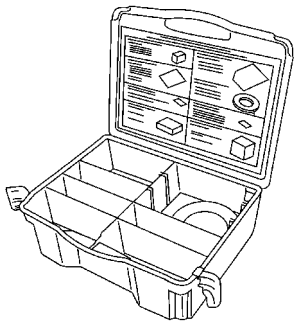
PREPARATION

PFP:00002

Special Service Tools

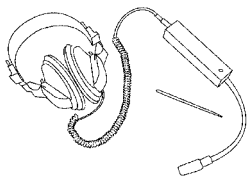
EIS00176

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description
— (J-39570) Chassis ear  SBT839	Locating the noise
— (J-43980) NISSAN Squeak and Rattle kit  SBT840	Repairing the cause of noise

Commercial Service Tools

EIS00177

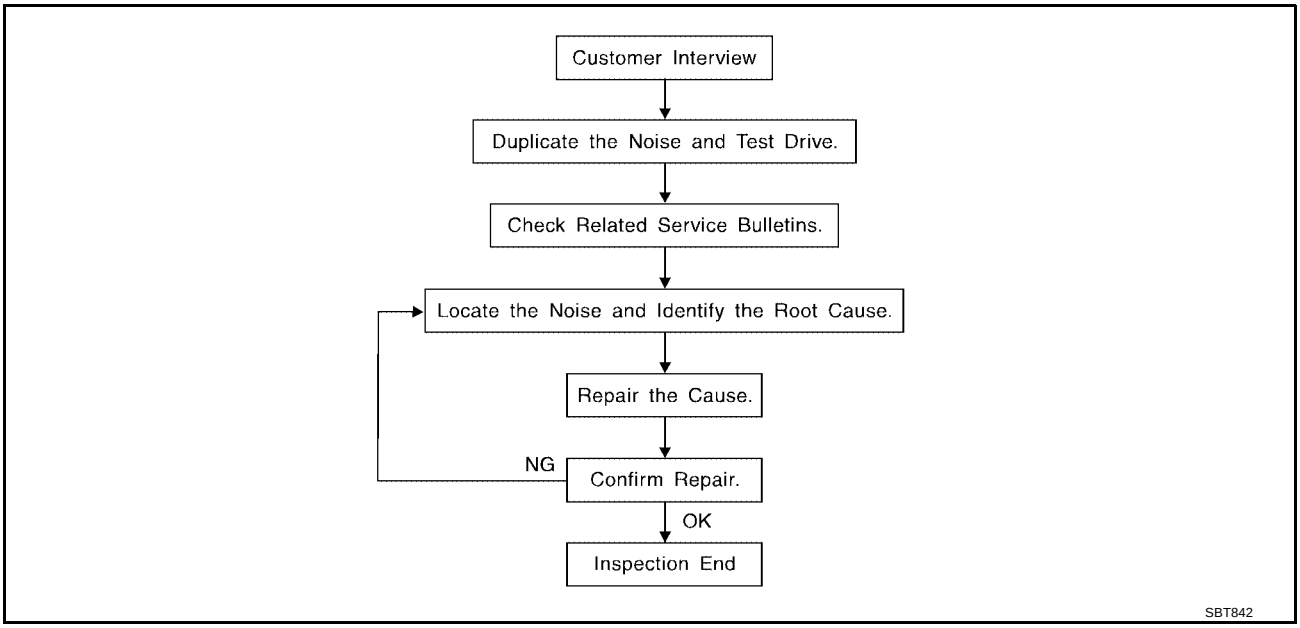
Tool name (Kent-Moore No.)	Description
Engine ear (J-39565)  SIIA0995E	Locating the noise

SQUEAK AND RATTLE TROUBLE DIAGNOSES

PFP:00003

Work Flow

EIS00178



CUSTOMER INTERVIEW

Interview the customer, if possible, to determine the conditions that exist when the noise occurs. Use the Diagnostic Worksheet during the interview to document the facts and conditions when the noise occurs and any customer's comments; refer to IP-8, "Diagnostic Worksheet" . This information is necessary to duplicate the conditions that exist when the noise occurs.

- The customer may not be able to provide a detailed description or the location of the noise. Attempt to obtain all the facts and conditions that exist when the noise occurs (or does not occur).
- If there is more than one noise in the vehicle, be sure to diagnose and repair the noise that the customer is concerned about. This can be accomplished by test driving the vehicle with the customer.
- After identifying the type of noise, isolate the noise in terms of its characteristics. The noise characteristics are provided so the customer, service adviser and technician are all speaking the same language when defining the noise.

– Squeak — (Like tennis shoes on a clean floor)
Squeak characteristics include the light contact/fast movement/brought on by road conditions/hard surfaces = higher pitch noise/softer surfaces = lower pitch noises/edge to surface = chirping

– Creak — (Like walking on an old wooden floor)
Creak characteristics include firm contact/slow movement/twisting with a rotational movement/pitch dependent on materials/often brought on by activity.

– Rattle — (Like shaking a baby rattle)
Rattle characteristics include the fast repeated contact/vibration or similar movement/loose parts/missing clip or fastener/incorrect clearance.

– Knock — (Like a knock on a door)
Knock characteristics include hollow sounding/sometimes repeating/often brought on by driver action.

– Tick — (Like a clock second hand)
Tick characteristics include gentle contacting of light materials/loose components/can be caused by driver action or road conditions.

– Thump — (Heavy, muffled knock noise)
Thump characteristics include softer knock/dead sound often brought on by activity.

– Buzz — (Like a bumblebee)
Buzz characteristics include high frequency rattle/firm contact.

- Often the degree of acceptable noise level will vary depending upon the person. A noise that you may judge as acceptable may be very irritating to the customer.
- Weather conditions, especially humidity and temperature, may have a great effect on noise level.

DUPLICATE THE NOISE AND TEST DRIVE

If possible, drive the vehicle with the customer until the noise is duplicated. Note any additional information on the Diagnostic Worksheet regarding the conditions or location of the noise. This information can be used to duplicate the same conditions when you confirm the repair.
If the noise can be duplicated easily during the test drive, to help identify the source of the noise, try to duplicate the noise with the vehicle stopped by doing one or all of the following:

1. Close a door.
2. Tap or push/pull around the area where the noise appears to be coming from.
3. Rev the engine.
4. Use a floor jack to recreate vehicle “twist”.
5. At idle, apply engine load (electrical load, half-clutch on M/T model, drive position on A/T model).
6. Raise the vehicle on a hoist and hit a tire with a rubber hammer.

- Drive the vehicle and attempt to duplicate the conditions the customer states exist when the noise occurs.
- If it is difficult to duplicate the noise, drive the vehicle slowly on an undulating or rough road to stress the vehicle body.

CHECK RELATED SERVICE BULLETINS

After verifying the customer concern or symptom, check ASIST for Technical Service Bulletins (TSBs) related to that concern or symptom.
If a TSB relates to the symptom, follow the procedure to repair the noise.

LOCATE THE NOISE AND IDENTIFY THE ROOT CAUSE

1. Narrow down the noise to a general area. To help pinpoint the source of the noise, use a listening tool (Chassis Ear: J-39570, Engine Ear: J-39565 and mechanics stethoscope).
2. Narrow down the noise to a more specific area and identify the cause of the noise by:
   - Removing the components in the area that you suspect the noise is coming from.
     Do not use too much force when removing clips and fasteners, otherwise clips and fasteners can be broken or lost during the repair, resulting in the creation of new noise.
   - Tapping or pushing/pulling the component that you suspect is causing the noise.
     Do not tap or push/pull the component with excessive force, otherwise the noise will be eliminated only temporarily.
   - Feeling for a vibration with your hand by touching the component(s) that you suspect is (are) causing the noise.
   - Placing a piece of paper between components that you suspect are causing the noise.
   - Looking for loose components and contact marks.

   Refer to IP-6, "Generic Squeak and Rattle Troubleshooting" .

REPAIR THE CAUSE

- If the cause is a loose component, tighten the component securely.
- If the cause is insufficient clearance between components:

– Separate components by repositioning or loosening and retightening the component, if possible.
– Insulate components with a suitable insulator such as urethane pads, foam blocks, felt cloth tape or urethane tape. A NISSAN Squeak and Rattle Kit (J-43980) is available through your authorized NISSAN Parts Department.

CAUTION:
Do not use excessive force as many components are constructed of plastic and may be damaged. Always check with the Parts Department for the latest parts information.

The following materials are contained in the NISSAN Squeak and Rattle Kit (J-43980). Each item can be ordered separately as needed.
URETHANE PADS [1.5 mm (0.059 in) thick]
Insulates connectors, harness, etc.
76268-9E005: 100 x 135 mm (3.94 x 5.31 in)/76884-71L01: 60 x 85 mm (2.36 x 3.35 in)/76884-71L02: 15 x 25 mm (0.59 x 0.98 in)
INSULATOR (Foam blocks)
Insulates components from contact. Can be used to fill space behind a panel.

73982-9E000: 45 mm (1.77 in) thick, 50 x 50 mm (1.97 x 1.97 in)/73982-50Y00: 10 mm (0.39 in) thick, 50 x 50 mm (1.97 x 1.97 in)
INSULATOR (Light foam block)
80845-71L00: 30 mm (1.18 in) thick, 30 x 50 mm (1.18 x 1.97 in)
FELT CLOTH TAPE
Used to insulate where movement does not occur. Ideal for instrument panel applications.
68370-4B000: 15 x 25 mm (0.59 x 0.98 in) pad/68239-13E00: 5 mm (0.20 in) wide tape roll
The following materials, not found in the kit, can also be used to repair squeaks and rattles.
UHMW (TEFLON) TAPE
Insulates where slight movement is present. Ideal for instrument panel applications.
SILICONE GREASE
Used in place of UHMW tape that will be visible or not fit.
Note: Will only last a few months.
SILICONE SPRAY
Use when grease cannot be applied.
DUCT TAPE
Use to eliminate movement.

CONFIRM THE REPAIR

Confirm that the cause of a noise is repaired by test driving the vehicle. Operate the vehicle under the same conditions as when the noise originally occurred. Refer to the notes on the Diagnostic Worksheet.

Generic Squeak and Rattle Troubleshooting

EIS00179

Refer to Table of Contents for specific component removal and installation information.

INSTRUMENT PANEL

Most incidents are caused by contact and movement between:

1. The cluster lid A and instrument panel
2. Acrylic lens and combination meter housing
3. Instrument panel to front pillar garnish
4. Instrument panel to windshield
5. Instrument panel mounting pins
6. Wiring harnesses behind the combination meter
7. A/C defroster duct and duct joint

These incidents can usually be located by tapping or moving the components to duplicate the noise or by pressing on the components while driving to stop the noise. Most of these incidents can be repaired by applying felt cloth tape or silicone spray (in hard to reach areas). Urethane pads can be used to insulate wiring harness.

CAUTION:
Do not use silicone spray to isolate a squeak or rattle. If you saturate the area with silicone, you will not be able to recheck the repair.

CENTER CONSOLE

Components to pay attention to include:

1. Shifter assembly cover to finisher
2. A/C control unit and upper/lower cluster lid C
3. Wiring harnesses behind audio and A/C control unit

The instrument panel repair and isolation procedures also apply to the center console.

DOORS

Pay attention to the:

1. Finisher and inner panel making a slapping noise
2. Inside handle escutcheon to door finisher
3. Wiring harnesses tapping
4. Door striker out of alignment causing a popping noise on starts and stops

Tapping or moving the components or pressing on them while driving to duplicate the conditions can isolate many of these incidents. You can usually insulate the areas with felt cloth tape or insulator foam blocks from the NISSAN Squeak and Rattle Kit (J-43980) to repair the noise.

TRUNK

Trunk noises are often caused by a loose jack or loose items put into the trunk by the owner.
In addition look for:

1. Trunk lid bumpers out of adjustment
2. Trunk lid striker out of adjustment
3. The trunk lid torsion bars knocking together
4. A loose license plate or bracket

Most of these incidents can be repaired by adjusting, securing or insulating the item(s) or component(s) causing the noise.

SUNROOF/HEADLINER

Noises in the sunroof/headliner area can often be traced to one of the following:

1. Sunroof lid, rail, linkage or seals making a rattle or light knocking noise
2. Sunvisor shaft shaking in the holder
3. Front or rear windshield touching headliner and squeaking

Again, pressing on the components to stop the noise while duplicating the conditions can isolate most of these incidents. Repairs usually consist of insulating with felt cloth tape.

OVERHEAD CONSOLE (FRONT AND REAR)

Overhead console noises are often caused by the console panel clips not being engaged correctly. Most of these incidents are repaired by pushing up on the console at the clip locations until the clips engage.
In addition look for:

1. Loose harness or harness connectors.
2. Front console map/reading lamp lens loose.
3. Loose screws at console attachment points.

SEATS

When isolating seat noises it is important to note the position the seat is in and the load placed on the seat when the noise is present. These conditions should be duplicated when verifying and isolating the cause of the noise.
Cause of seat noise include:

1. Headrest rods and holders
2. A squeak between the seat pad cushion and frame
3. The rear seat back lock and bracket

These noises can be isolated by moving or pressing on the suspected components while duplicating the conditions under which the noise occurs. Most of these incidents can be repaired by repositioning the component or applying urethane tape to the contact area.

UNDERHOOD

Some interior noises may be caused by components under the hood or on the engine wall. The noise is then transmitted into the passenger compartment.
Causes of transmitted underhood noises include:

1. Any component mounted to the engine wall
2. Components that pass through the engine wall
3. Engine wall mounts and connectors
4. Loose radiator mounting pins
5. Hood bumpers out of adjustment
6. Hood striker out of adjustment

These noises can be difficult to isolate since they cannot be reached from the interior of the vehicle. The best method is to secure, move or insulate one component at a time and test drive the vehicle. Also, engine RPM or load can be changed to isolate the noise. Repairs can usually be made by moving, adjusting, securing, or insulating the component causing the noise.

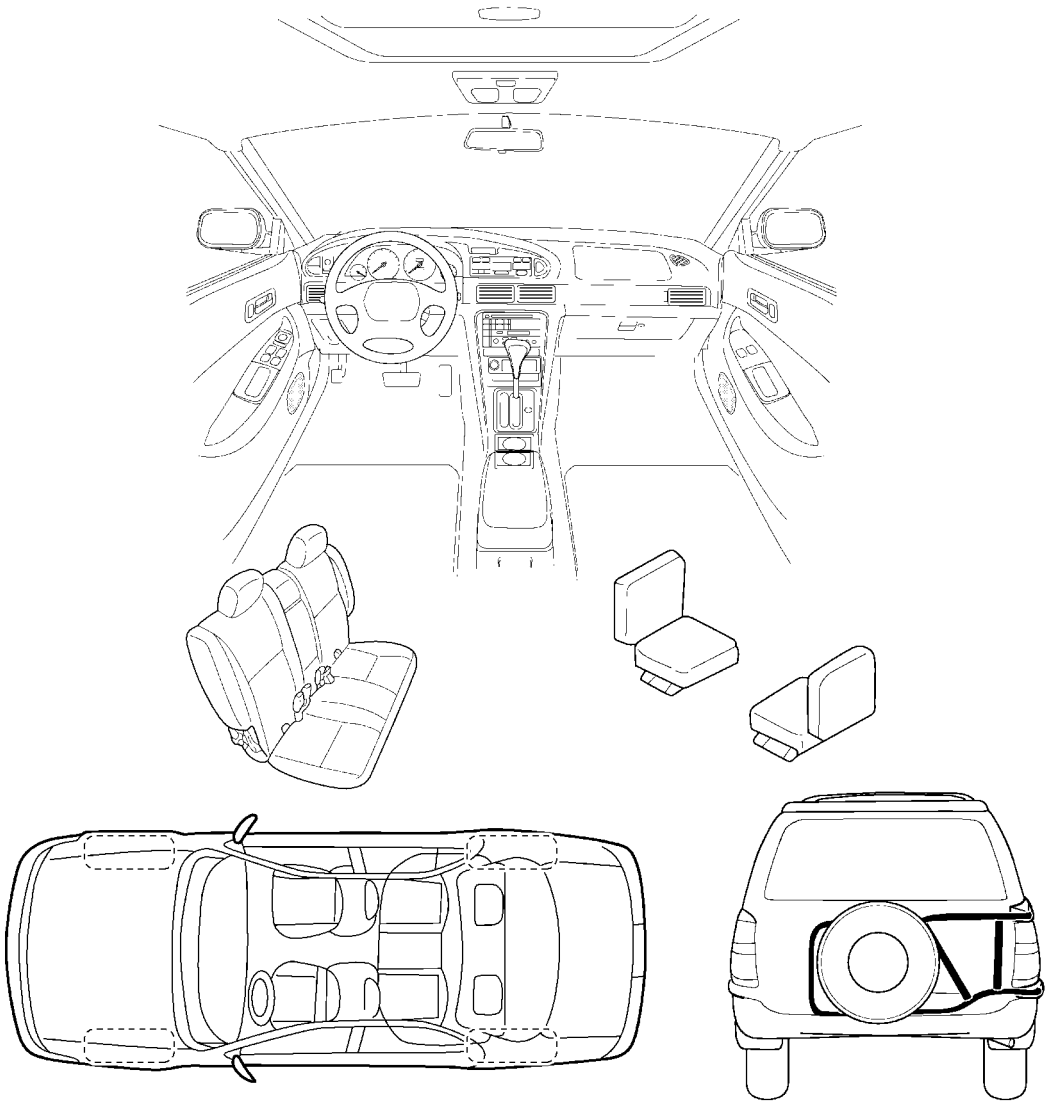
Diagnostic Worksheet

EIS0017A

SQUEAK & RATTLE DIAGNOSTIC WORKSHEET

Dear Nissan Customer:
We are concerned about your satisfaction with your Nissan vehicle. Repairing a squeak or rattle sometimes can be very difficult. To help us fix your Nissan right the first time, please take a moment to note the area of the vehicle where the squeak or rattle occurs and under what conditions. You may be asked to take a test drive with a service advisor or technician to ensure we confirm the noise you are hearing.

I. WHERE DOESTHE NOISE COME FROM? (circle the area of the vehicle)
The illustrations are for reference only, and may not reflect the actual configuration of your vehicle.



Continue to the back of the worksheet and briefly describe the location of the noise or rattle. In addition, please indicate the conditions which are present when the noise occurs.

LIWA0276E

SQUEAK & RATTLE DIAGNOSTIC WORKSHEET- page 2

Briefly describe the location where the noise occurs:

_____

_____

II. WHEN DOES IT OCCUR? (check the boxes that apply)

❑ anytime
❑ 1st time in the morning
❑ only when it is cold outside
❑ only when it is hot outside
❑ after sitting out in the sun
❑ when it is raining or wet
❑ dry or dusty conditions
❑ other: _____

III. WHEN DRIVING:

❑ through driveways
❑ over rough roads
❑ over speed bumps
❑ only at about _____ mph
❑ on acceleration
❑ coming to a stop
❑ on turns : left, right or either (circle)
❑ with passengers or cargo
❑ other: _____
❑ after driving _____ miles or _____ minutes

IV. WHAT TYPE OF NOISE?

❑ squeak (like tennis shoes on a clean floor)
❑ creak (like walking on an old wooden floor)
❑ rattle (like shaking a baby rattle)
❑ knock (like a knock on a door)
❑ tick (like a clock second hand)
❑ thump (heavy, muffled knock noise)
❑ buzz (like a bumble bee)

TO BE COMPLETED BY DEALERSHIP PERSONNEL
Test Drive Notes:

_____

_____

	YES	NO	Initials of person performing
Vehicle test driven with customer	❑	❑	_____
- Noise verified on test drive	❑	❑	
- Noise source located and repaired	❑	❑	_____
- Follow up test drive performed to confirm repair	❑	❑	_____

VIN: _____ Customer Name: _____

W.O. #: _____ Date: _____

This form must be attached to Work Order

SBT844

INSTRUMENT PANEL ASSEMBLY

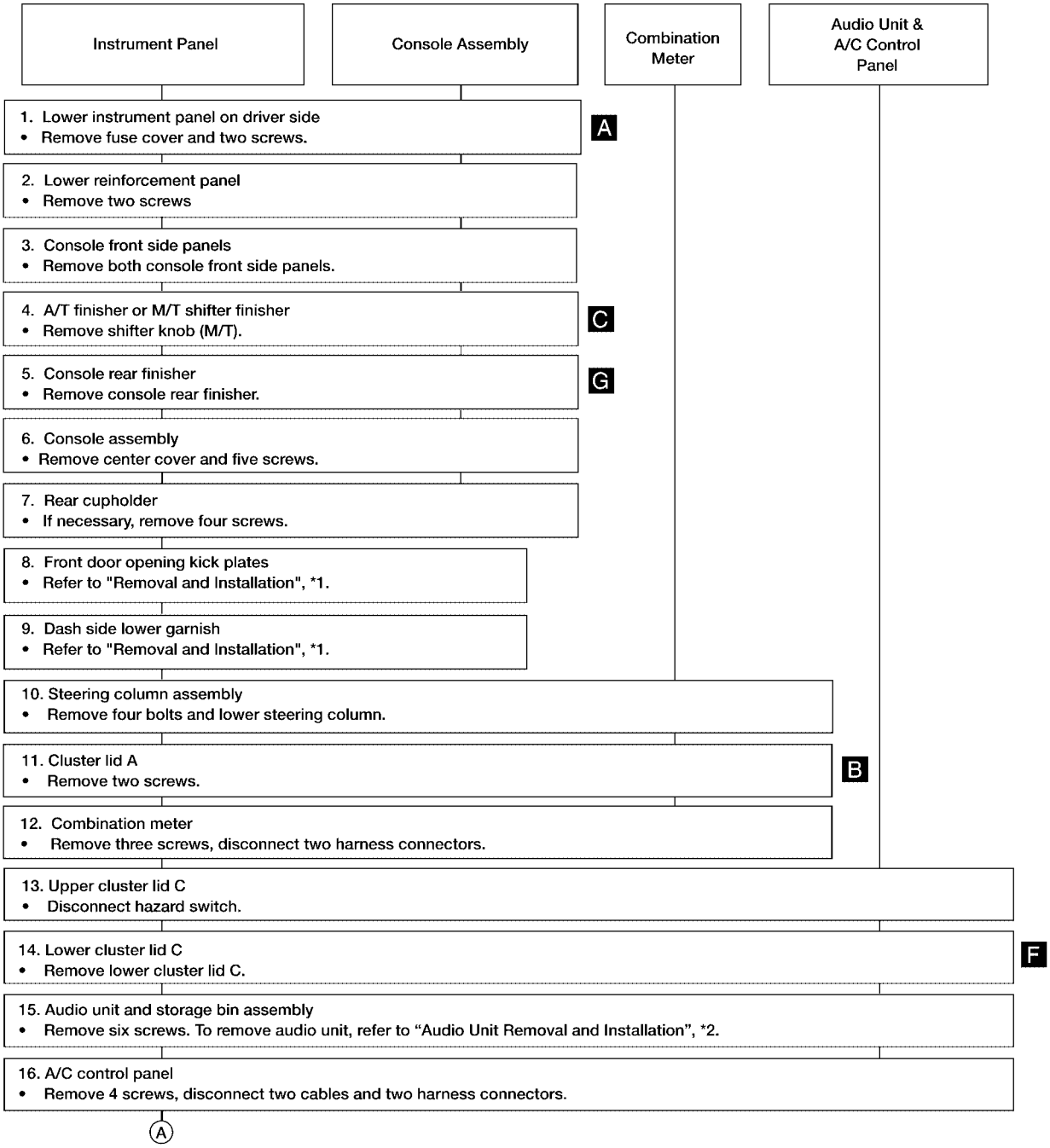
PFP:68200

Removal and Installation

EIS0017B

CAUTION:

- **Lock the CD changer unit mechanism (models with CD changer). Refer to AV-14, "LOCKING CD AUTOCHANGER MECHANISM" .**
- **Disconnect both terminals from battery and wait three minutes.**
- **Disconnect air bag module connectors in advance.**
- **Be careful not to scratch pad and other parts.**
- **Never tamper with or force air bag lid open, as this may adversely affect air bag performance.**



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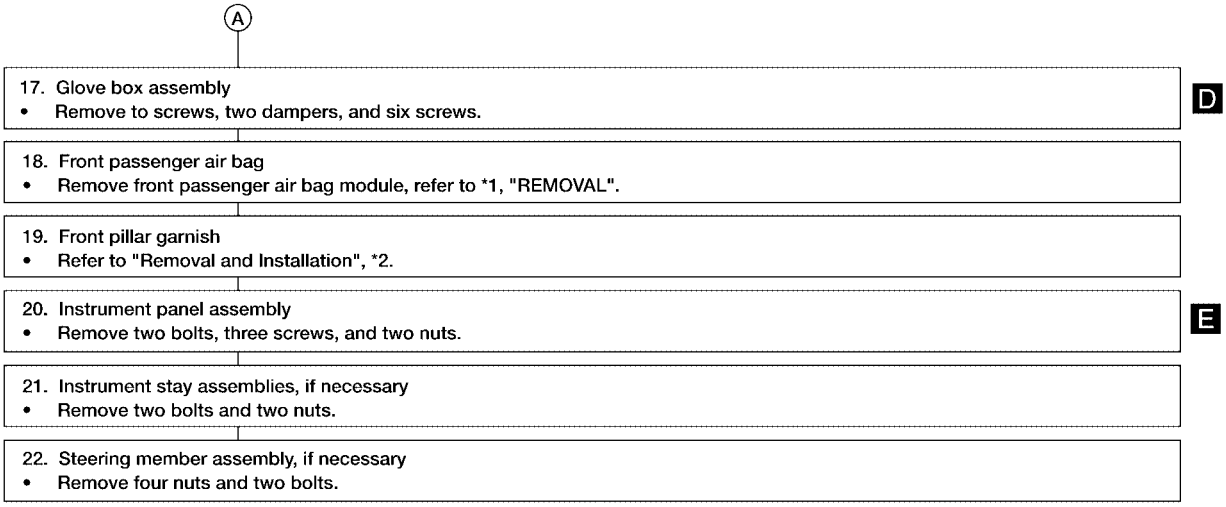
*1 EI-28 *2 AV-14



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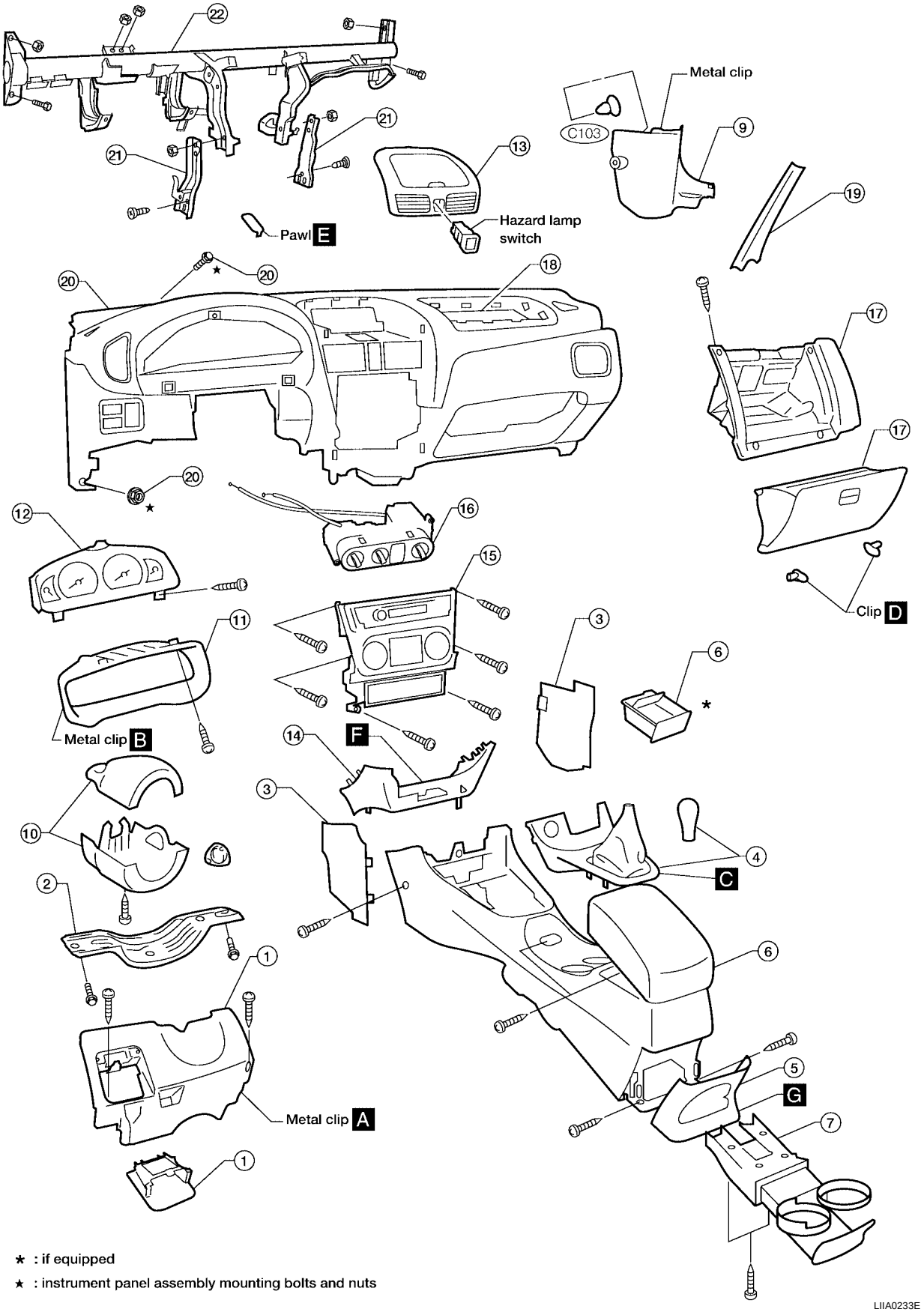
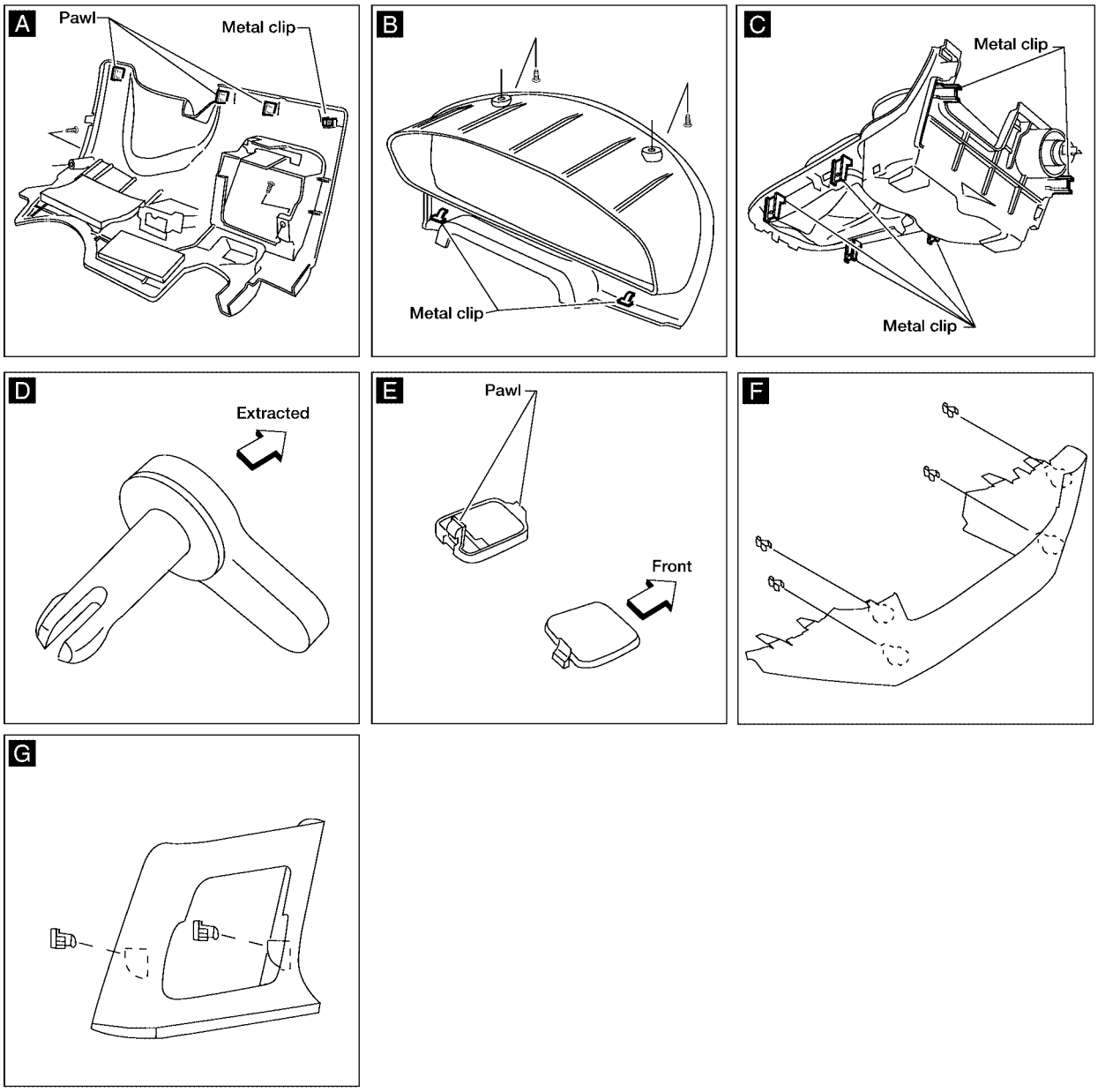
*1 SRS-45 *2 EI-28



★ : if equipped

★ : instrument panel assembly mounting bolts and nuts

LIIA0233E


A
Pawl
Metal clip
B
Metal clip
C
Metal clip
Metal clip
D
Extracted
E
Pawl
Front
F
G

LIIA0004E

SECTION SE
SEAT

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EIS0017C

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**

FRONT SEAT

PFP:87000

Removal and Installation

EIS0017D

WARNING:

Removal of front side air bag module should only be done to allow deployment of front side air bag module prior to disposal of seatback assembly.

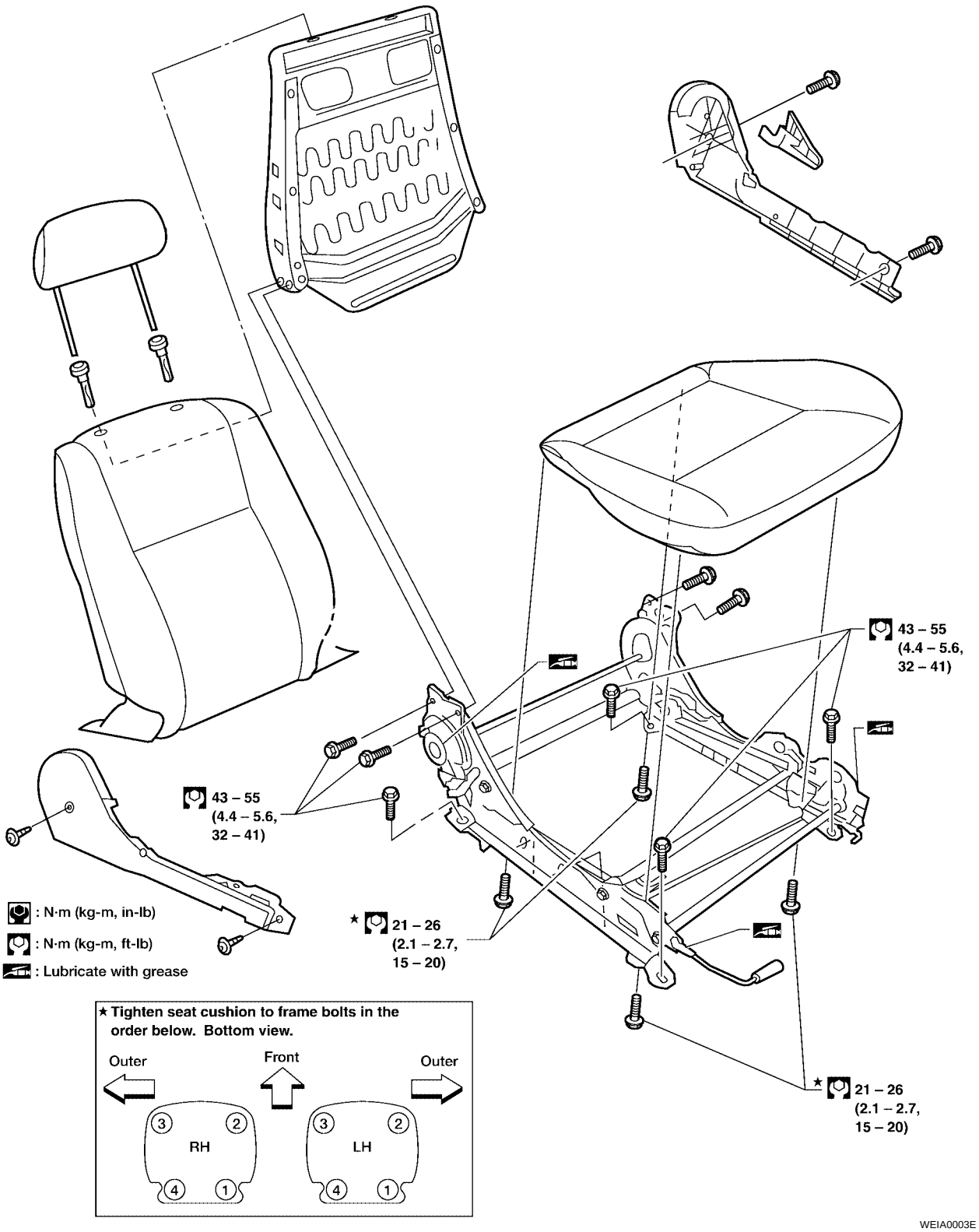
For Wiring Diagrams, refer to SRS-3, "Wiring Diagrams and Trouble Diagnosis" .

CAUTION:

- **On vehicles equipped with side air bags, before removing the front seat, turn the ignition switch off, disconnect the negative and positive battery cables and wait a minimum of 3 minutes.**
- **When checking the power seat circuitry for continuity using a circuit tester, do not confuse the seat connector with the side air bag connector. Doing so could cause the side air bag to deploy.**
- **Do not drop, tilt, or bump the side air bag module installed in the seat. Always handle it with care.**
- **Disconnect the side air bag harness connector, if equipped, and the power seat switch harness connector from under the seat before removing the seat. Refer to SRS-47, "Removal" .**
- **After front side air bag module inflates, front seatback assembly must be replaced.**

NOTE:

Only complete seatback assemblies can be replaced on vehicles equipped with side air bags.

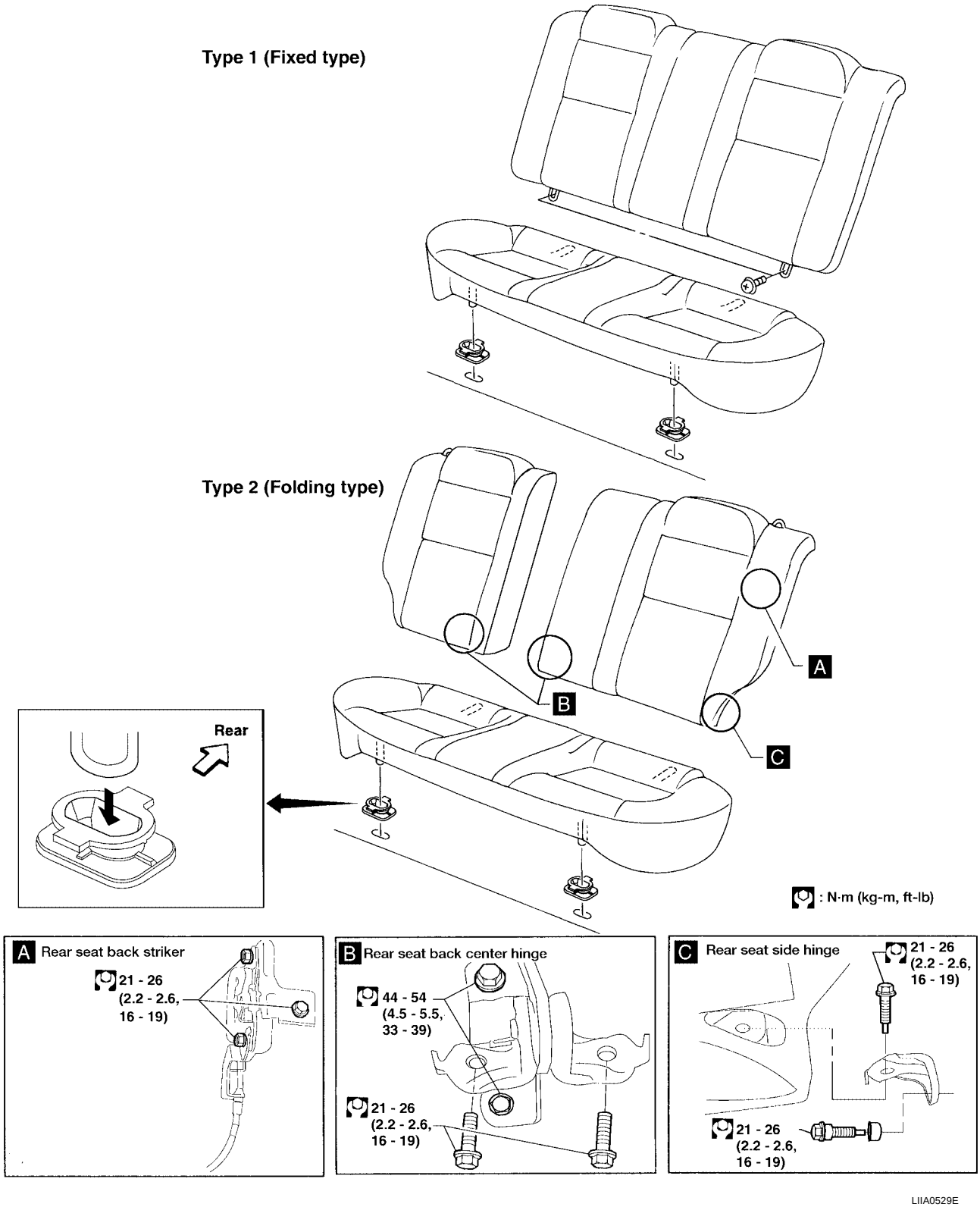

43 – 55
(4.4 – 5.6,
32 – 41)
43 – 55
(4.4 – 5.6,
32 – 41)
★ 21 – 26
(2.1 – 2.7,
15 – 20)
★ 21 – 26
(2.1 – 2.7,
15 – 20)
: N·m (kg-m, in-lb)
: N·m (kg-m, ft-lb)
: Lubricate with grease
★ Tighten seat cushion to frame bolts in the order below. Bottom view.
Outer
Front
Outer
RH
LH
3
2
4
1
WEIA0003E

REAR SEAT

PFP:88300

Removal and Installation

EIS0017E



LIIA0529E

SECTION MTC

MANUAL AIR CONDITIONER

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EJS001QX

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precautions for Working with HFC-134a (R-134a)

EJS001A7

WARNING:

- **CFC-12 (R-12) refrigerant and HFC-134a (R-134a) refrigerant are not compatible. If the refrigerants are mixed and compressor failure is likely to occur. Refer to MTC-3, "Contaminated Refrigerant" . To determine the purity of HFC-134a (R-134a) in the vehicle and recovery tank, use Refrigerant Recovery/Recycling Recharging equipment and Refrigerant Identifier.**
- **Use only specified lubricant for the HFC-134a (R-134a) A/C system and HFC-134a (R-134a) components. If lubricant other than that specified is used, compressor failure is likely to occur.**
- **The specified HFC-134a (R-134a) lubricant rapidly absorbs moisture from the atmosphere. The following handling precautions must be observed:**
  - **When removing refrigerant components from a vehicle, immediately cap (seal) the component to minimize the entry of moisture from the atmosphere.**
  - **When installing refrigerant components to a vehicle, do not remove the caps (unseal) until just before connecting the components. Connect all refrigerant loop components as quickly as possible to minimize the entry of moisture into system.**
  - **Only use the specified lubricant from a sealed container. Immediately reseal containers of lubricant. Without proper sealing, lubricant will become moisture saturated and should not be used.**
  - **Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Remove R-134a from the A/C system, using certified service equipment meeting requirements of SAE J2210 (R-134a recycling equipment), or J2209 (R-134a recovery equipment). If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.**
  - **Do not allow A/C lubricant to come in contact with styrofoam parts. Damage may result.**

Contaminated Refrigerant

EJS001A8

If a refrigerant other than pure R-134a is identified in a vehicle, your options are:

- Explain to the customer that environmental regulations prohibit the release of contaminated refrigerant into the atmosphere.
- Explain that recovery of the contaminated refrigerant could damage your service equipment and refrigerant supply.
- Suggest the customer return the vehicle to the location of previous service where the contamination may have occurred.
- If you choose to perform the repair, recover the refrigerant using only **dedicated equipment and containers. Do not recover contaminated refrigerant into your existing service equipment.** If your facility does not have dedicated recovery equipment, you may contact a local refrigerant product retailer for available service. This refrigerant must be disposed of in accordance with all federal and local regulations. In addition, replacement of all refrigerant system components on the vehicle is recommended.

- If the vehicle is within the warranty period, the air conditioner warranty is void. Please contact NISSAN Customer Affairs for further assistance.

General Refrigerant Precautions

EJS001A9

WARNING:

- **Do not release refrigerant into the air. Use approved recovery/recycling equipment to capture the refrigerant every time an air conditioning system is discharged.**
- **Always wear eye and hand protection (goggles and gloves) when working with any refrigerant or air conditioning system.**
- **Do not store or heat refrigerant containers above 52°C (125°F).**
- **Do not heat a refrigerant container with an open flame; if container warming is required, place the bottom of the container in a warm pail of water.**
- **Do not intentionally drop, puncture, or incinerate refrigerant containers.**
- **Keep refrigerant away from open flames: poisonous gas will be produced if refrigerant burns.**
- **Refrigerant will displace oxygen, therefore be certain to work in well ventilated areas to prevent suffocation.**
- **Do not pressure test or leak test HFC-134a (R-134a) service equipment and/or vehicle air conditioning systems with compressed air during repair. Some mixtures of air and R-134a have been shown to be combustible at elevated pressures. These mixtures, if ignited, may cause injury or property damage. Additional health and safety information may be obtained from refrigerant manufacturers.**

Precautions for Leak Detection Dye

EJS001AA

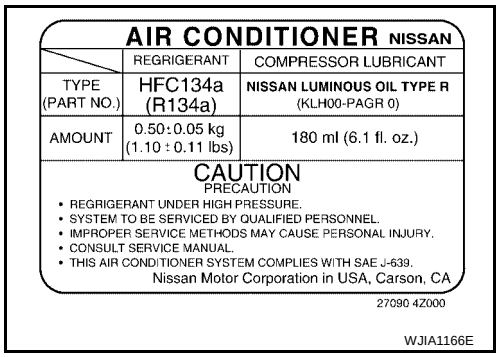
- The A/C system contains a fluorescent leak detection dye used for locating refrigerant leaks. An ultraviolet (UV) lamp is required to illuminate the dye when inspecting for leaks.
- Always wear fluorescence enhancing UV safety glasses to protect your eyes and enhance the visibility of the fluorescent dye.
- A compressor shaft seal should not be repaired because of dye seepage. The compressor shaft seal should only be repaired after confirming the leak with an electronic refrigerant leak detector (J-41995).
- Always remove any dye from the leak area after repairs are complete to avoid a misdiagnosis during a future service.
- Do not allow dye to come into contact with painted body panels or interior components. If dye is spilled, clean immediately with the approved dye cleaner. Fluorescent dye left on a surface for an extended period of time **cannot be removed** .
- Do not spray the fluorescent dye cleaning agent on hot surfaces (engine exhaust manifold, etc.).
- Do not use more than one refrigerant dye bottle (1/4 ounce / 7.4 cc) per A/C system.
- Leak detection dyes for R-134a and R-12 A/C systems are different. Do not use R-134a leak detection dye in R-12 A/C systems or R-12 leak detection dye in R-134a A/C systems or A/C system damage may result.
- The fluorescent properties of the dye will remain for over three (3) years unless a compressor failure occurs.

A/C Identification Label

EJS001AB

Vehicles are equipped factory installed fluorescent dye and have this identification label on the RH fender ledge.

NOTE:
Vehicles equipped with factory installed fluorescent dye have a green label.

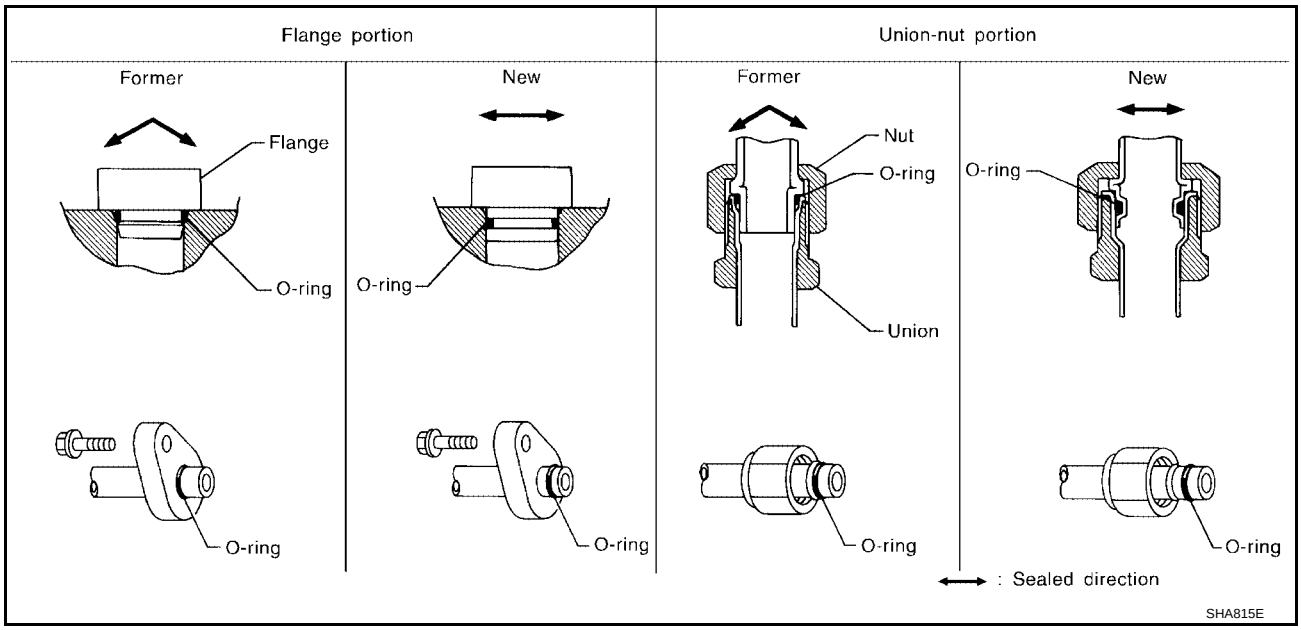


Precautions for Refrigerant Connection

EJS001AC

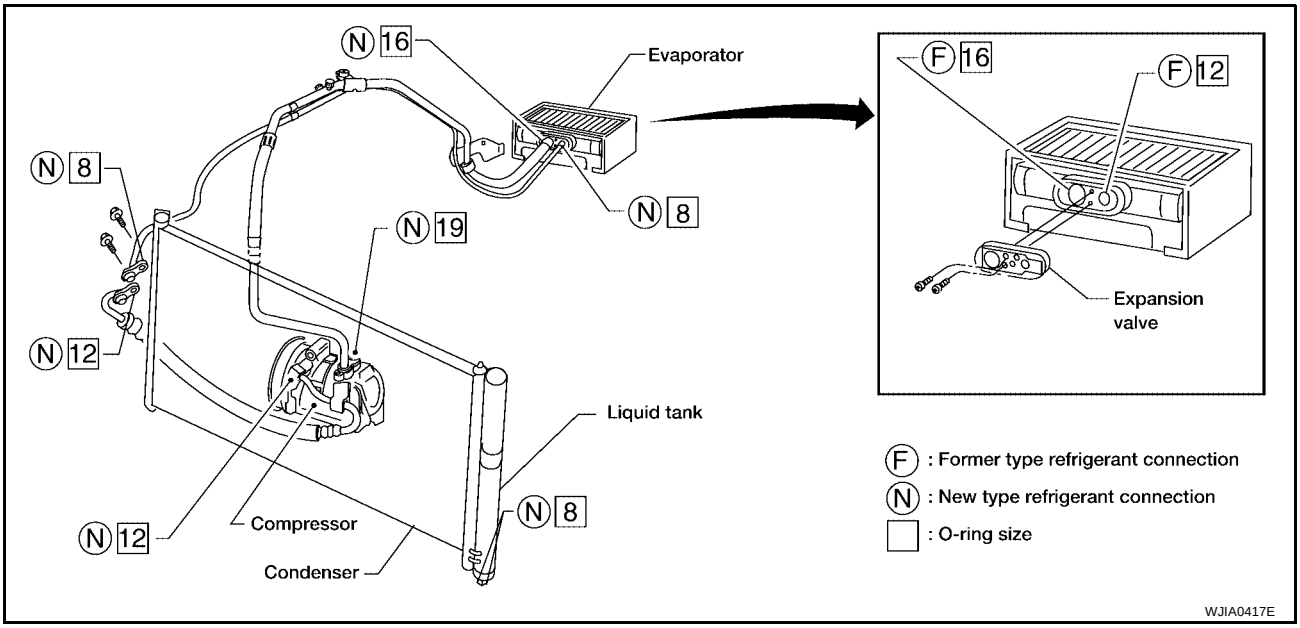
FEATURES OF NEW TYPE REFRIGERANT CONNECTION

- The O-ring has been relocated. It has also been provided with a groove for proper installation. This eliminates the chance of the O-ring being caught in, or damaged by, the mating part. The sealing direction of the O-ring is now set vertically in relation to the contacting surface of the mating part to improve sealing characteristics.
- The reaction force of the O-ring will not occur in the direction that causes the joint to pull out, thereby facilitating piping connections.

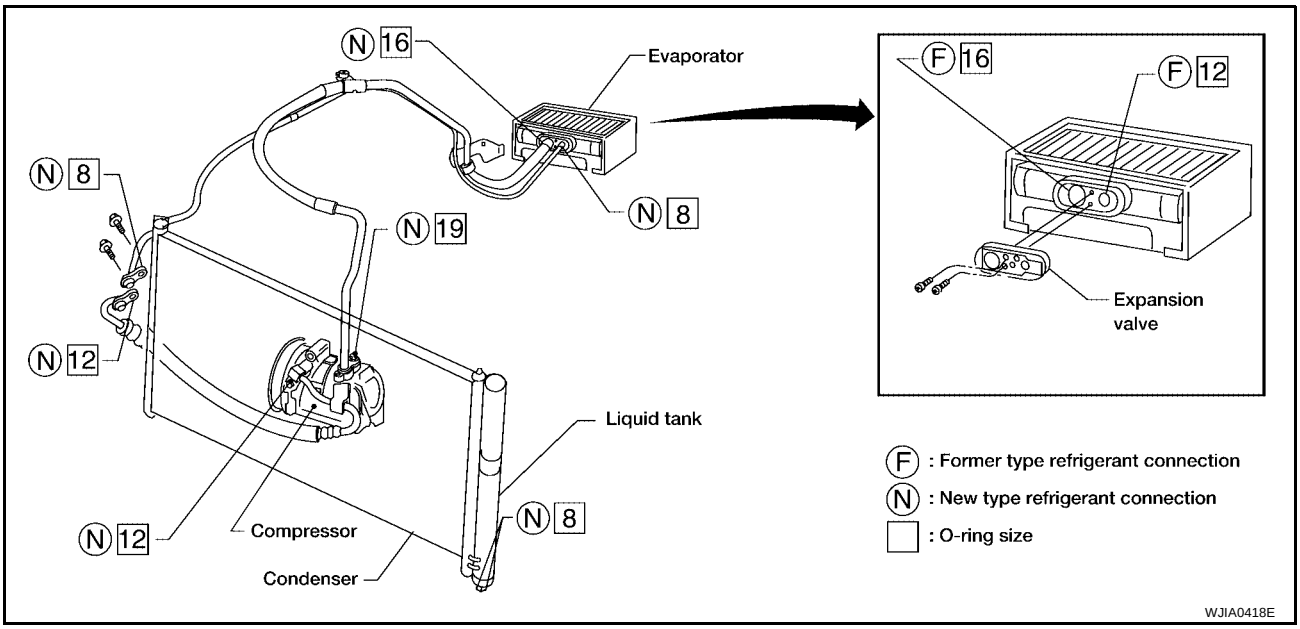


O-RING AND REFRIGERANT CONNECTION

QG18DE



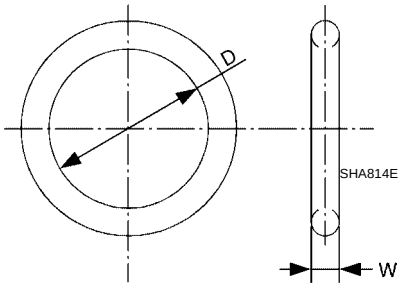
QR25DE



CAUTION:

The new and former refrigerant connections in some systems use different O-ring configurations. Do not confuse O-rings since they are not interchangeable. If a wrong O-ring is installed, refrigerant will leak at, or around, the connection.

O-Ring Part Numbers and Specifications



Connection type	O-ring size	Part number*	D mm (in)	W mm (in)
New	8	92471 N8210	6.8 (0.268)	1.85 (0.0728)
Former	12	92475 71L00	10.8 (0.425)	1.78 (0.0701)
New	12	92472 N8210	10.9 (0.429)	3.65 (0.1437)
Former	16	92475 72L00	13.9 (0.547)	1.78 (0.0701)
New	16	92473 N8210	13.6 (0.535)	2.43 (0.0957)
New	19	92474 N8210	16.5 (0.650)	2.43 (0.0957)

*: Always check with the Parts Department for the latest parts information.

WARNING:

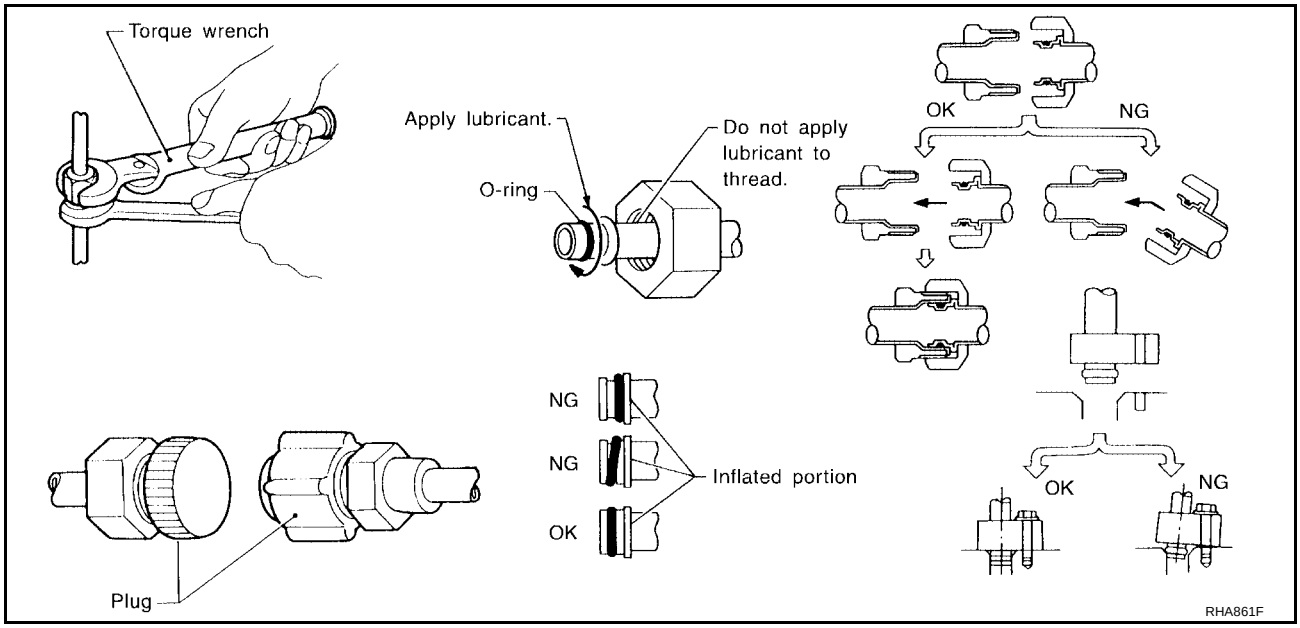
Make sure all refrigerant is discharged into the recycling equipment and the pressure in the system is less than atmospheric pressure. Then gradually loosen the discharge side hose fitting and remove it.

CAUTION:

When replacing or cleaning refrigerant cycle components, observe the following.

- **When the compressor is removed, store it in the same position as it is when mounted on the car. Failure to do so will cause lubricant to enter the low pressure chamber.**
- **When connecting tubes, always use a torque wrench and a back-up wrench.**
- **After disconnecting tubes, immediately plug all openings to prevent entry of dirt and moisture.**
- **When installing an air conditioner in the vehicle, connect the pipes as the final stage of the operation. Do not remove the seal caps of pipes and other components until just before required for connection.**
- **Allow components stored in cool areas to warm to working area temperature before removing seal caps. This prevents condensation from forming inside A/C components.**
- **Thoroughly remove moisture from the refrigeration system before charging the refrigerant.**
- **Always replace used O-rings.**
- **When connecting tube, apply lubricant to circle of the O-rings shown in illustration. Be careful not to apply lubricant to threaded portion.**
  Lubricant name: Genuine NISSAN A/C System Lubricant Type R or equivalent
  Part number: KLH00-PAGR0
- **O-ring must be closely attached to dented portion of tube.**
- **When replacing the O-ring, be careful not to damage O-ring and tube.**
- **Connect tube until you hear it click, then tighten the nut or bolt by hand until snug. Make sure that the O-ring is installed to tube correctly.**

- **After connecting line, conduct leak test and make sure that there is no leakage from connections. When the gas leaking point is found, disconnect that line and replace the O-ring. Then tighten connections of seal seat to the specified torque.**



Precautions for Servicing Compressor

EJS001AD

- **Plug all openings to prevent moisture and foreign matter from entering.**
- **When the compressor is removed, store it in the same position as it is when mounted on the car.**
- **When replacing or repairing compressor, follow “Maintenance of Lubricant Quantity in Compressor” exactly. Refer to MTC-16, "Maintenance of Lubricant Quantity in Compressor" .**
- **Keep friction surfaces between clutch and pulley clean. If the surface is contaminated, with lubricant, wipe it off by using a clean waste cloth moistened with thinner.**
- **After compressor service operation, turn the compressor shaft by hand more than five turns in both directions. This will equally distribute lubricant inside the compressor. After the compressor is installed, let the engine idle and operate the compressor for one hour.**
- **After replacing the compressor magnet clutch, apply voltage to the new one and check for normal operation. [Gap between clutch disc and pulley is 0.3 - 0.6 mm (0.012 - 0.024 in)]**

Precautions for Service Equipment

EJS001AE

RECOVERY/RECYCLING EQUIPMENT

Follow the manufacturer's instructions for machine operation and machine maintenance. Never introduce any refrigerant other than that specified into the machine.

ELECTRONIC LEAK DETECTOR

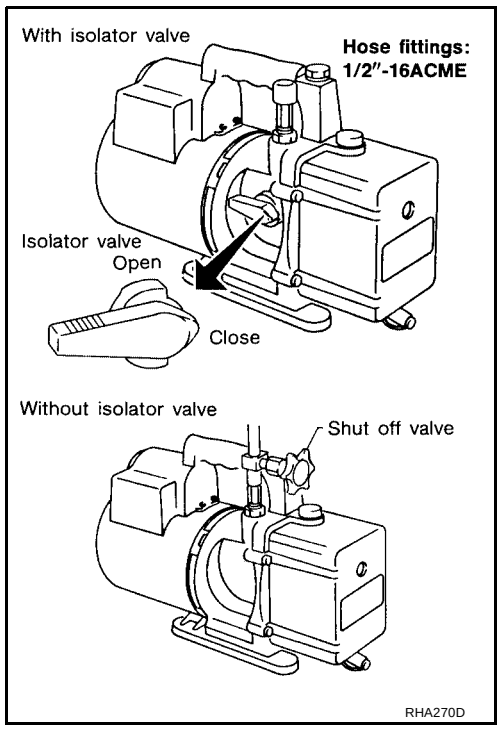
Follow the manufacturer's instructions for tester operation and tester maintenance.

VACUUM PUMP

The lubricant contained inside the vacuum pump is not compatible with the specified lubricant for HFC-134a (R-134a) A/C systems. The vent side of the vacuum pump is exposed to atmospheric pressure so the vacuum pump lubricant may migrate out of the pump into the service hose. This is possible when the pump is switched off after evacuation (vacuuming) and hose is connected to it.
To prevent this migration, use a manual valve situated near the hose-to-pump connection, as follows.

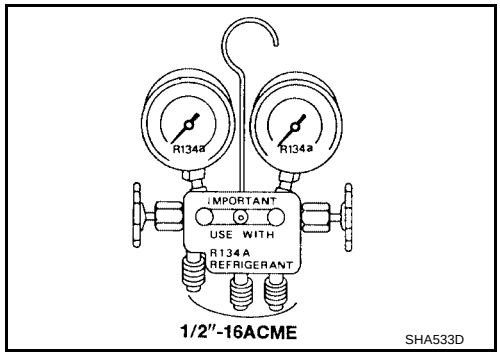
- Usually vacuum pumps have a manual isolator valve as part of the pump. Close this valve to isolate the service hose from the pump.
- For pumps without an isolator, use a hose equipped with a manual shut-off valve near the pump end. Close the valve to isolate the hose from the pump.
- If the hose has an automatic shut off valve, disconnect the hose from the pump: as long as the hose is connected, the valve is open and lubricating oil may migrate.

Some one-way valves open when vacuum is applied and close under a no vacuum condition. Such valves may restrict the pump's ability to pull a deep vacuum and are not recommended.



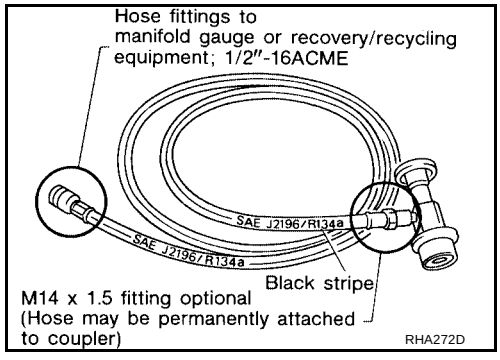
MANIFOLD GAUGE SET

Be certain that the gauge face indicates R-134a or 134a. Make sure the gauge set has 1/2″-16 ACME threaded connections for service hoses. Confirm the set has been used only with refrigerant HFC-134a (R-134a) along with specified lubricant.



SERVICE HOSES

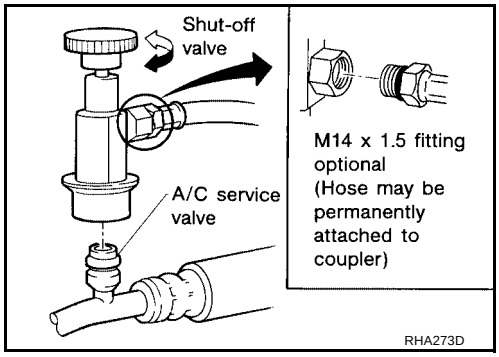
Be certain that the service hoses display the markings described (colored hose with black stripe). All hoses must include positive shut off devices (either manual or automatic) near the end of the hoses opposite the manifold gauge.



SERVICE COUPLERS

Never attempt to connect HFC-134a (R-134a) service couplers to an CFC-12 (R-12) A/C system. The HFC-134a (R-134a) couplers will not properly connect to the CFC-12 (R-12) system. However, if an improper connection is attempted, discharging and contamination may occur.

Shut-off valve rotation	A/C service valve
Clockwise	Open
Counterclockwise	Close



CHARGING CYLINDER

Using a charging cylinder is not recommended. Refrigerant may be vented into air from cylinder's top valve when filling the cylinder with refrigerant. Also, the accuracy of the cylinder is generally less than that of an electronic scale or of quality recycle/recharge equipment.

Wiring Diagrams and Trouble Diagnosis

EJS001AF

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams"
- PG-5, "Wiring Diagram — POWER —"

When you perform trouble diagnosis, refer to the following:

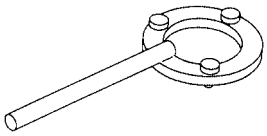
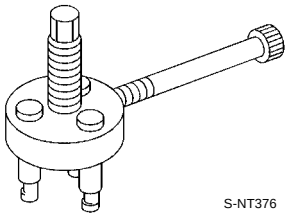
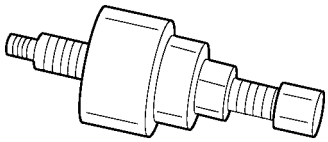
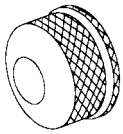
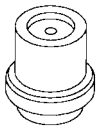
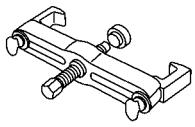
- GI-9, "How to Follow Trouble Diagnoses"
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident"

PREPARATION

PFP:00002

Special Service Tools

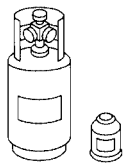
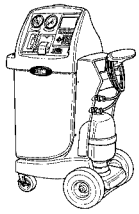
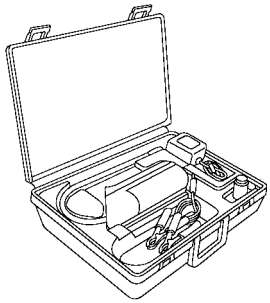
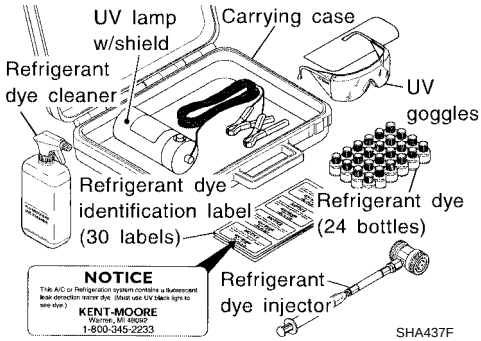
EJS001AG

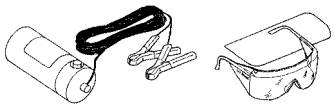
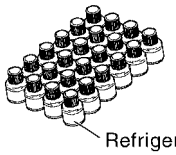
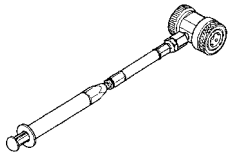
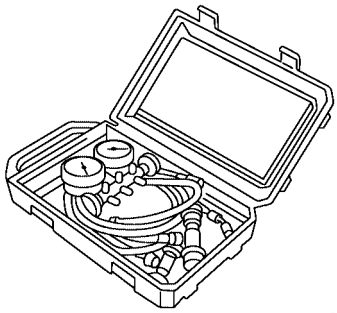
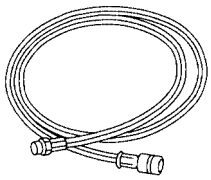
Tool number (Kent-Moore No.) Tool name		Description
KV99231260 (J-38874) Clutch disc wrench	 NT204	Removing shaft nut and clutch disc
KV99232340 (J-38874) Clutch disc puller	 S-NT376	Removing clutch disc
(J-38873-A) Drive plate installer	 WJIA0367E	Installing pulley and drive plate
KV99234330 (J-39024) Pulley installer	 NT207	Installing pulley
KV99233130 (J-39023) Pulley puller	 NT208	Removing pulley
KV99233130 (J-29884) (with small adaptor) Pulley puller	 LHA172	Removing pulley

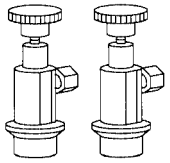
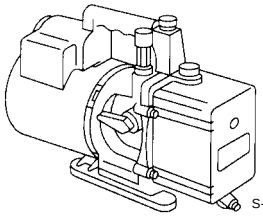
HFC-134a (R-134a) Service Tools and Equipment

EJS001AH

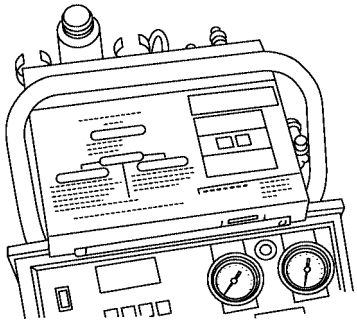
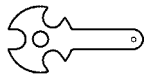
Never mix HFC-134a refrigerant and/or its specified lubricant with CFC-12 (R-12) refrigerant and/or its lubricant.
Separate and non-interchangeable service equipment must be used for handling each type of refrigerant/lubricant.
Refrigerant container fittings, service hose fittings and service equipment fittings (equipment which handles refrigerant and/or lubricant) are different between CFC-12 (R-12) and HFC-134a (R-134a). This is to avoid mixed use of the refrigerants/lubricant.
Adapters that convert one size fitting to another must never be used: refrigerant/lubricant contamination will occur and compressor failure will result.

Tool number (Kent-Moore No.) Tool name	Description
HFC-134a (R-134a) refrigerant  S-NT196	Container color: Light blue Container marking: HFC-134a (R-134a) Fitting size:Thread size ● large container 1/2^2 -16 ACME
KLH00-PAGR0 (–) Genuine Nissan A/C System Lubricant Type R S-NT197	Type: Poly alkylene glycol oil (PAG), type R Application: HFC-134a (R-134a) vane rotary compressors (Nissan only) Lubricity:40 ml [Litre] (1.4 US fl oz, 1.4 Imp fl oz)
(J-43600) Recovery/Recycling Recharging equipment (ACR2000)  WJIA0293E	Function: Refrigerant Recovery and Recycling and Recharging
(J-41995) Electrical leak detector  AHA281A	Power supply: ● DC 12V (Cigarette lighter)
(J-43926) Refrigerant dye leak detection kit Kit includes: (J-42220) UV lamp and UV safety glasses (J-41459) Refrigerant dye injector (J-41447) qty. 24 HFC-134a (R-134a) refrigerant dye (J-43872) Refrigerant dye cleaner  SHA437F	Power supply: DC 12V (Battery terminal)

Tool number (Kent-Moore No.) Tool name		Description
(J-42220) Fluorescent dye leak detector	 SHA438F	Power supply: DC 12V (Battery terminal) For checking refrigerant leak when fluorescent dye is installed in A/C system. Includes: UV lamp and UV safety glasses
(J-41447) HFC-134a (R-134a) Fluorescent leak detection dye (Box of 24, 1/4 ounce bottles)	 Refrigerant dye (24 bottles) SHA439F	Application: For HFC-134a (R-134a) PAG oil Container: 1/4 ounce (7.4cc) bottle (Includes self-adhesive dye identification labels for affixing to vehicle after charging system with dye.)
(J-41459) HFC-134a (R-134a) Dye injector Use with J-41447, 1/4 ounce bottle	 SHA440F	For injecting 1/4 ounce of fluorescent leak detection dye into A/C system.
(J-43872) Dye cleaner	 SHA441F	For cleaning dye spills.
(J-39183) Manifold gauge set (with hoses and couplers)	 RJIA0196E	Identification: ● The gauge face indicates R-134a. Fitting size:Thread size ● 1/2^2 -16 ACME
Service hoses ● High side hose (J-39501-72) ● Low side hose (J-39502-72) ● Utility hose (J-39476-72)	 S-NT201	Hose color: ● Low hose: Blue with black stripe ● High hose: Red with black stripe ● Utility hose: Yellow with black stripe or green with black stripe Hose fitting to gauge: ● 1/2^2 -16 ACME

Tool number (Kent-Moore No.) Tool name	Description
Service couplers ● High side coupler (J-39500-20) ● Low side coupler (J-39500-24)  S-NT202	Hose fitting to service hose: ● M14 x 1.5 fitting is optional or permanently attached.
(J-39649) Vacuum pump (Including the isolator valve)  S-NT203	Capacity: ● Air displacement: 4 CFM ● Micron rating: 20 microns ● Oil capacity: 482 g (17 oz) Fitting size: Thread size ● $1/2^2$ -16 ACME

COMMERCIAL SERVICE TOOL

Tool name	Description
(J-41810-NI) Refrigerant identifier equipment (R-134a)  RJIA0197E	For checking refrigerant purity and for system contamination
(J-44614) Clutch disc holding tool 	For holding clutch disc

REFRIGERATION SYSTEM

PFP:KA990

Refrigeration Cycle

EJS001AI

REFRIGERANT FLOW

The refrigerant flows in the standard pattern, that is, through the compressor, the condenser, the liquid tank, through the evaporator, and back to the compressor. The refrigerant evaporation through the evaporator coil is controlled by an externally equalized expansion valve, located inside the evaporator case.

FREEZE PROTECTION

The compressor cycles go on and off to maintain the evaporator temperature within a specified range. When the evaporator coil temperature falls below a specified point, the intake sensor interrupts the compressor operation. When the evaporator coil temperature rises above the specification, the thermo control amplifier allows compressor operation.

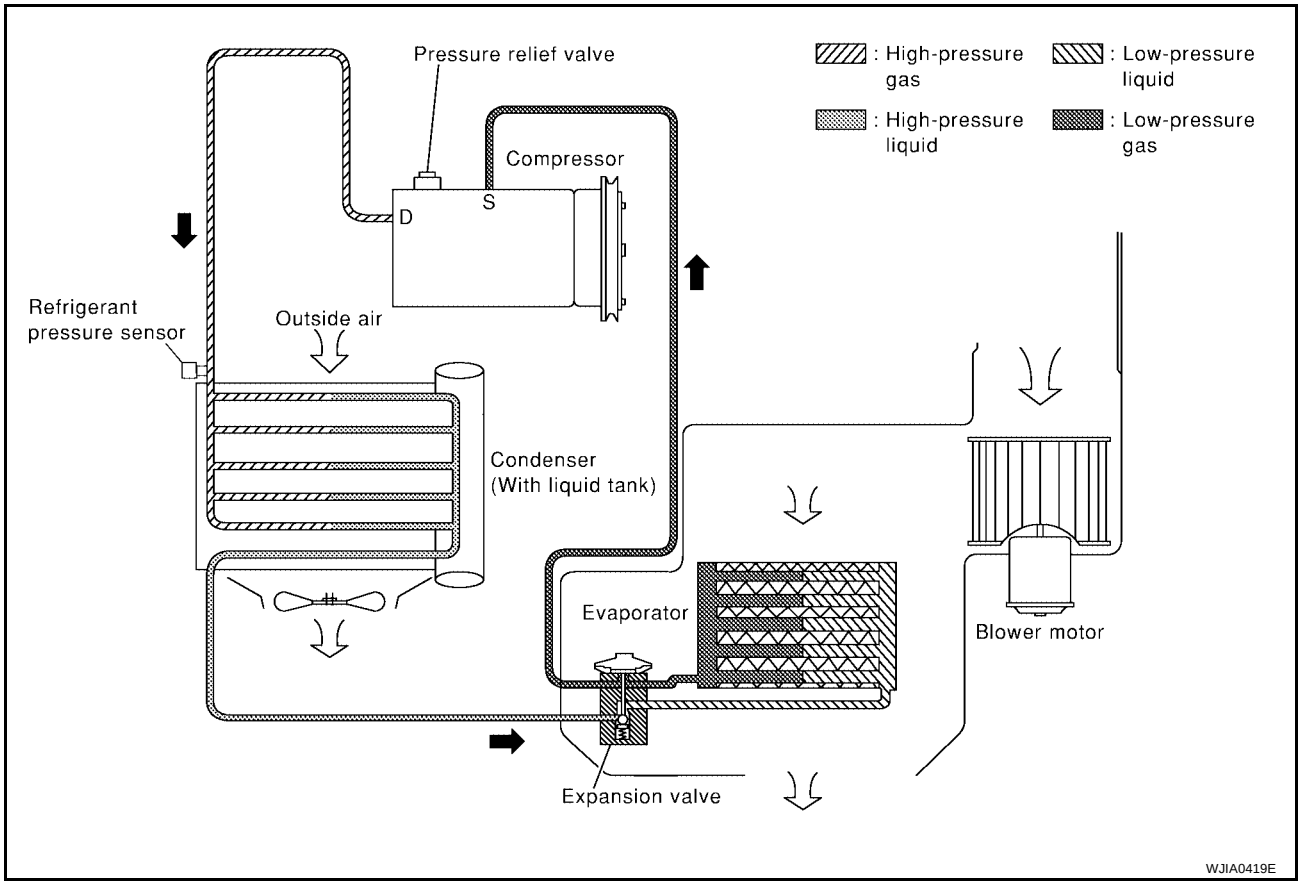
REFRIGERANT SYSTEM PROTECTION

Refrigerant Pressure Sensor

The refrigerant system is protected against excessively high or low pressures by the refrigerant pressure sensor, located on the refrigerant lines where they attach to the condenser. If the system pressure rises above or falls below the specifications, the refrigerant pressure sensor detects the pressure inside the refrigerant line and sends the voltage signal to the ECM. The ECM turns the A/C relay OFF and stops the compressor when pressure on the high pressure side detected by refrigerant pressure sensor is over about 2,746 kPa (28 kg/cm^2 , 398 psi) or below about 177 kPa (1.8 kg/cm^2 , 26 psi).

Pressure Relief Valve

The refrigerant system is also protected by a pressure relief valve, located in the rear head of the compressor. When the pressure of refrigerant in the system increases to an abnormal level [more than 3,727 kPa (38 kg/cm^2 , 540 psi)], the release port on the pressure relief valve automatically opens and releases refrigerant into the atmosphere.



LUBRICANT

PFP:KLG00

Maintenance of Lubricant Quantity in Compressor

EJS001AJ

The lubricant in the compressor circulates through the system with the refrigerant. Add lubricant to compressor when replacing any component or after a large refrigerant leakage has occurred. It is important to maintain the specified amount.
If lubricant quantity is not maintained properly, the following malfunctions may result:

- Lack of lubricant: May lead to a seized compressor
- Excessive lubricant: Inadequate cooling (thermal exchange interference)

LUBRICANT

Name: Genuine Nissan A/C System Lubricant Type R or equivalent
Part number: KLH00-PAGR0

CHECKING AND ADJUSTING

Adjust the lubricant quantity according to the test group shown below.

1. LUBRICANT RETURN OPERATION

Can lubricant return operation be performed?

- A/C system works properly.
- There is no evidence of a large amount of lubricant leakage.

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. PERFORM LUBRICANT RETURN OPERATION

1. Start engine, and set the following conditions:

- **Test condition**
  Engine speed: Idling to 1,200 rpm
  A/C switch: ON
  Blower speed: Max. position

2. Perform lubricant return operation for about 10 minutes.
3. Stop engine.

CAUTION:
If excessive lubricant leakage is noted, do not perform the lubricant return operation.

>> GO TO 3.

3. CHECK COMPRESSOR

Should the compressor be replaced?

Yes or No

Yes >> GO TO MTC-64, "Removal and Installation" .
No >> GO TO 4.

4. CHECK ANY PART

Is there any part to be replaced? (Evaporator, condenser, liquid tank or in case there is evidence of a large amount of lubricant leakage.)

Yes or No

Yes >> GO TO MTC-17, "Lubricant Adjusting Procedure for Components Replacement Except Compressor" .
No >> Carry out the A/C performance test.

Lubricant Adjusting Procedure for Components Replacement Except Compressor

After replacing any of the following major components, add the correct amount of lubricant to the system.

Amount of lubricant to be added

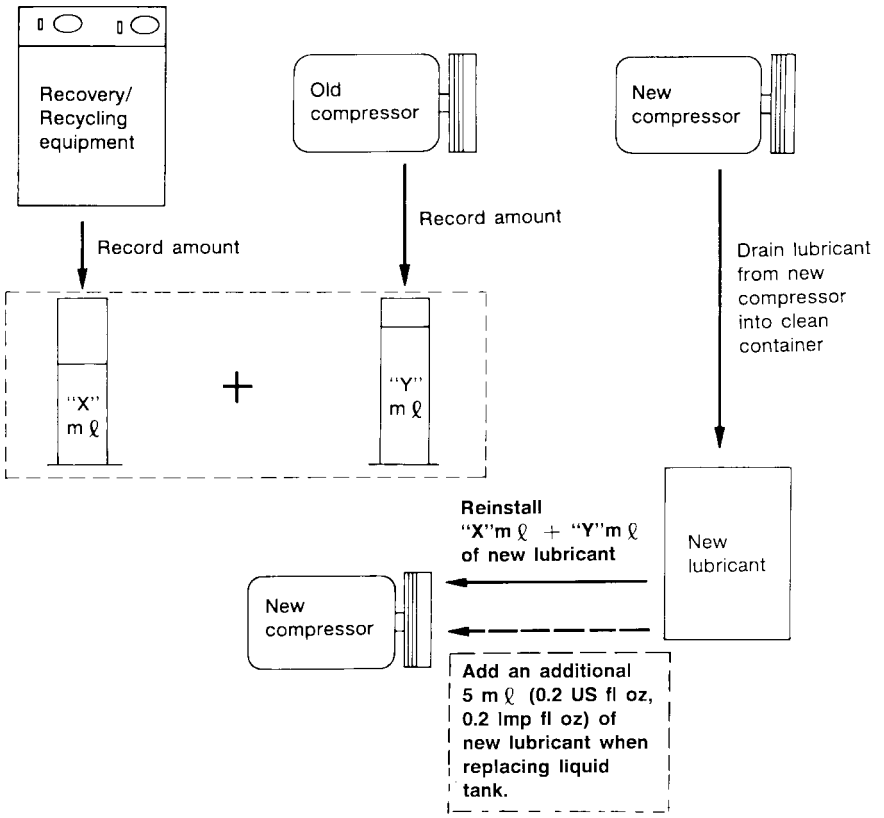
Part replaced	Lubricant to be added to system	Remarks
	Amount of lubricant ml (US fl oz, Imp fl oz)	
Evaporator	75 (2.5, 2.6)	—
Condenser	75 (2.5, 2.6)	—
Liquid tank	5 (0.2, 0.2)	Add if compressor is not replaced.
In case of refrigerant leak	30 (1.0, 1.1)	Large leak
	—	Small leak *1

- *1: If refrigerant leak is small, no addition of lubricant is needed.

Lubricant Adjustment Procedure for Compressor Replacement

1. Before connecting the recovery/recycling recharging equipment to the vehicle, check the recovery/recycling recharging equipment gauges. No refrigerant pressure should be displayed. If OK, recover refrigerant from equipment lines.
2. Confirm refrigerant purity in supply tank using recovery/recycling recharging equipment and refrigerant identifier. If NG, refer to MTC-3, "Contaminated Refrigerant" .
3. Connect recovery/recycling recharging equipment to the vehicle. Confirm refrigerant purity in vehicle A/C system using recovery/recycling recharging equipment and refrigerant identifier. If NG, refer to MTC-3, "Contaminated Refrigerant" .
4. Discharge refrigerant into the refrigerant recovery/recycling recharging equipment. Measure lubricant discharged into the recovery/recycling recharging equipment.
5. Drain the lubricant from the “old” (removed) compressor into a graduated container and recover the amount of lubricant drained.
6. Drain the lubricant from the “new” compressor into a separate, clean container.
7. Measure an amount of new lubricant installed equal to amount drained from “old” compressor. Add this lubricant to “new” compressor through the suction port opening.
8. Measure an amount of new lubricant equal to the amount recovered during discharging. Add this lubricant to “new” compressor through the suction port opening.
9. If the liquid tank also needs to be replaced, add an additional 5 ml (0.2 US fl oz, 0.2 Imp fl oz) of lubricant at this time.
   Do not add this 5 ml (0.2 US fl oz, 0.2 Imp fl oz) of lubricant if only replacing the compressor.

Lubricant adjusting procedure for compressor replacement



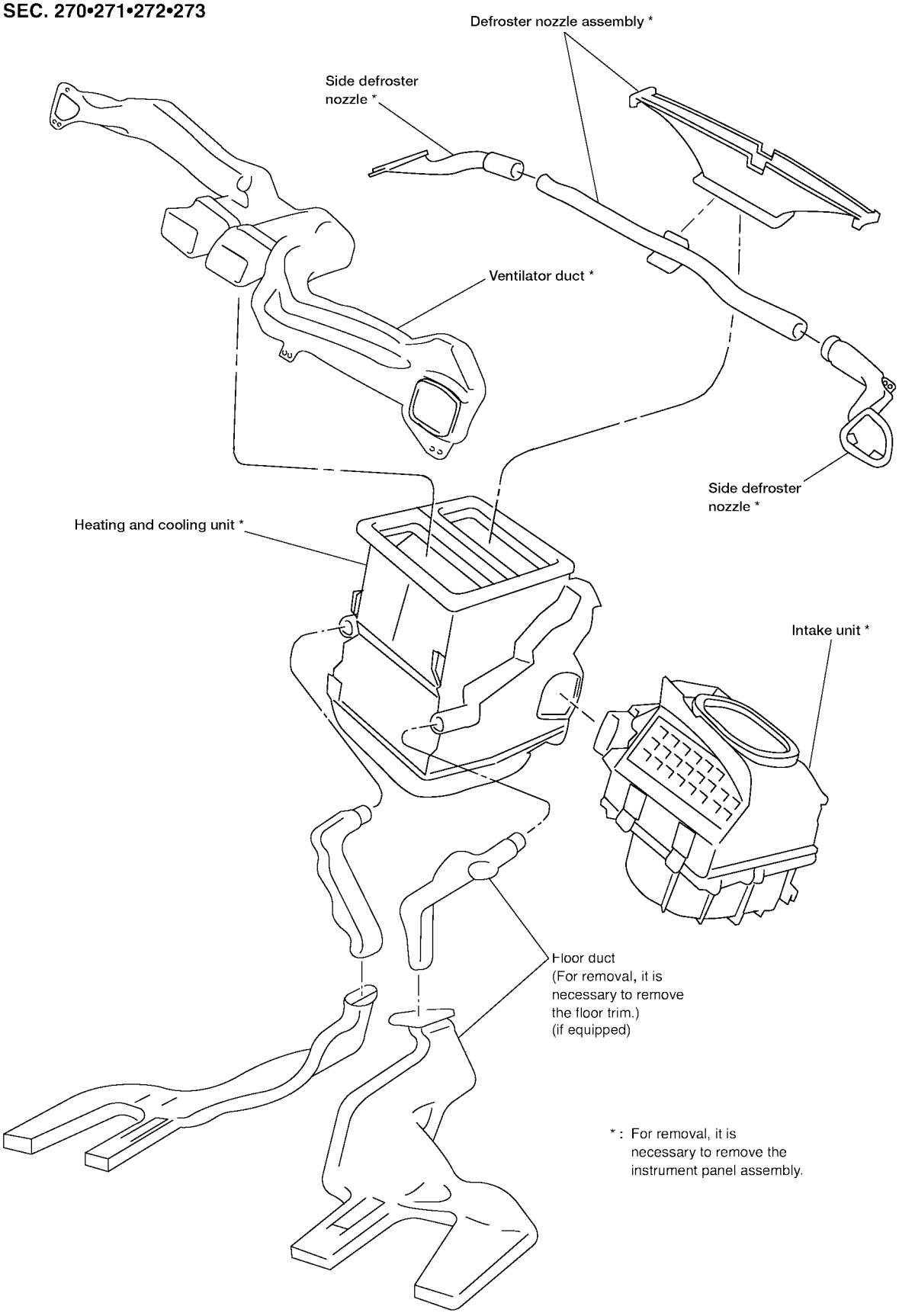
TROUBLE DIAGNOSIS

PFP:00004

Component Layout

EJS001AK

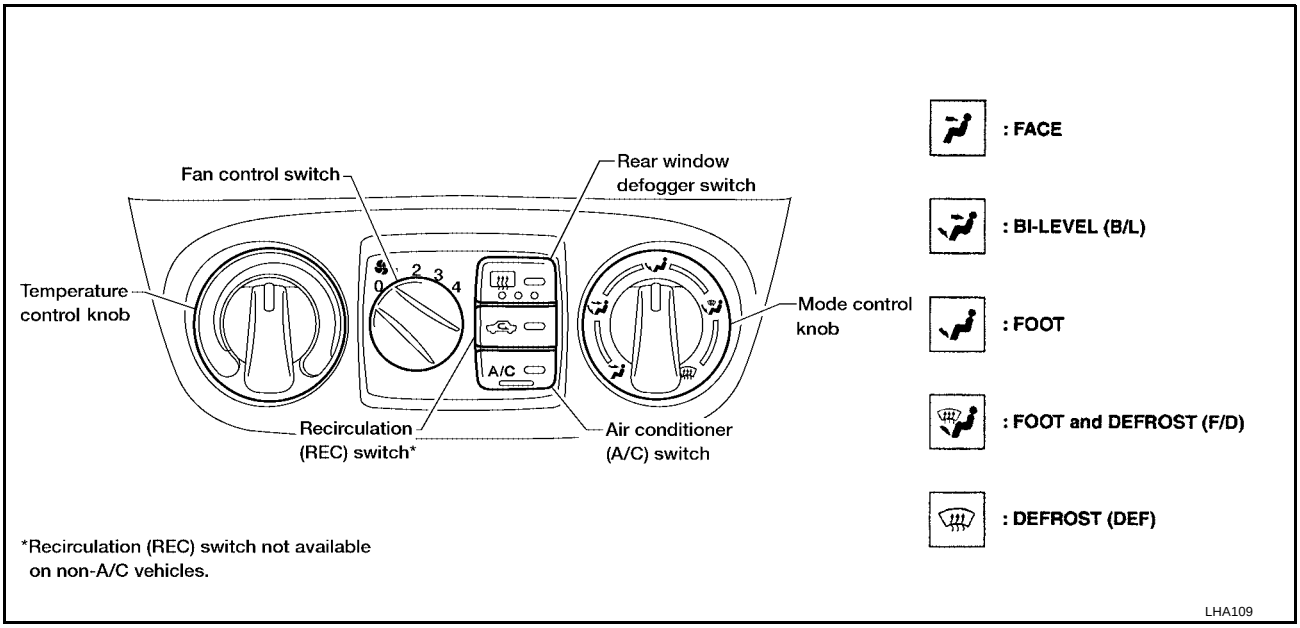
SEC. 270•271•272•273



WJIA0257E

Control Operation

EJS001AL



FAN CONTROL SWITCH

This switch turns the fan ON and OFF, and controls fan speed.

REAR WINDOW DEFOGGER SWITCH

This switch turns the rear window defogger ON and OFF.

MODE CONTROL KNOB

This control knob controls the outlet air flow.

When DEF or F/D mode is selected, the push control unit sets the intake door to FRESH.

The compressor turns on when DEF mode is selected and remains on until the key is turned off.

TEMPERATURE CONTROL KNOB

This knob adjusts the temperature of the discharge air.

RECIRCULATION (REC) SWITCH

OFF position: Outside air is drawn into the passenger compartment.
ON position: Interior air is recirculated inside the vehicle.
The indicator lamp will also light.

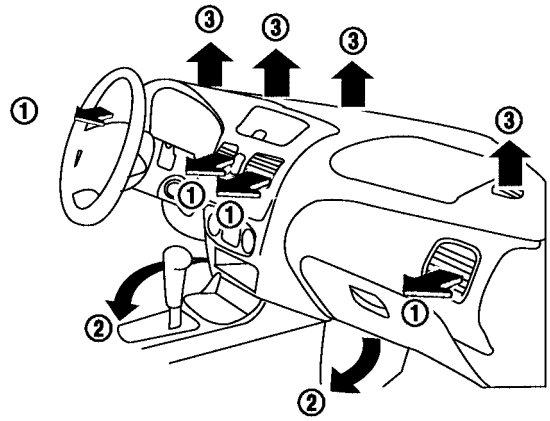
Recirculation is canceled when DEF or F/D mode is selected, and resumes when another mode is chosen.

AIR CONDITIONER (A/C) SWITCH

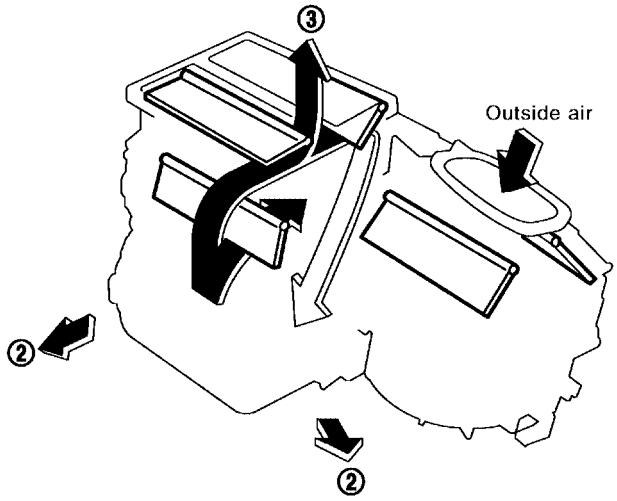
The air conditioner switch controls the A/C system. When the switch is depressed with the fan ON, the compressor will turn ON. The indicator lamp will also light.
The air conditioner cooling function operates only when the engine is running.

Discharge Air Flow

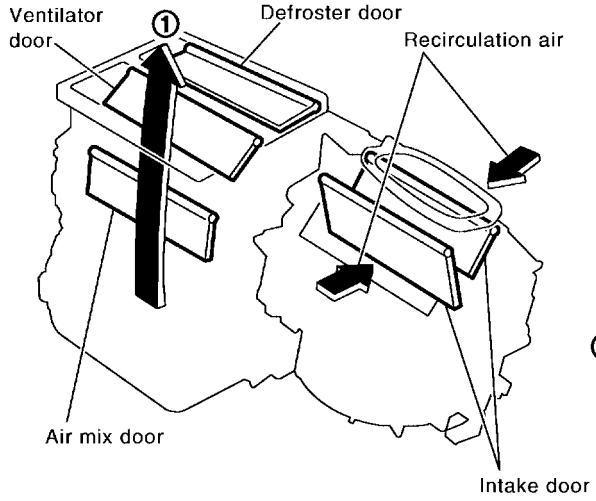
EJS001AM



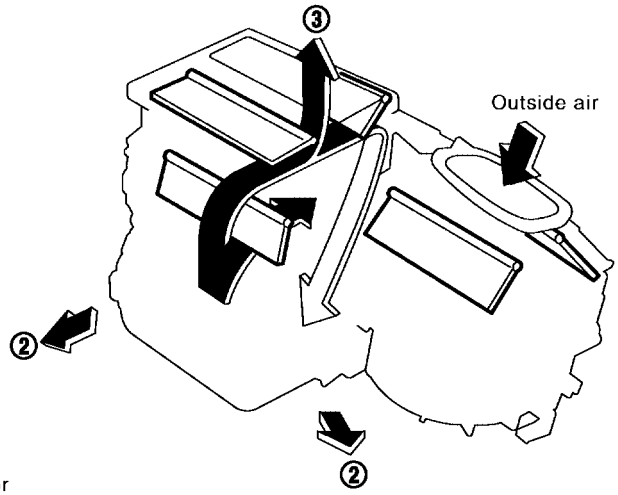
Foot



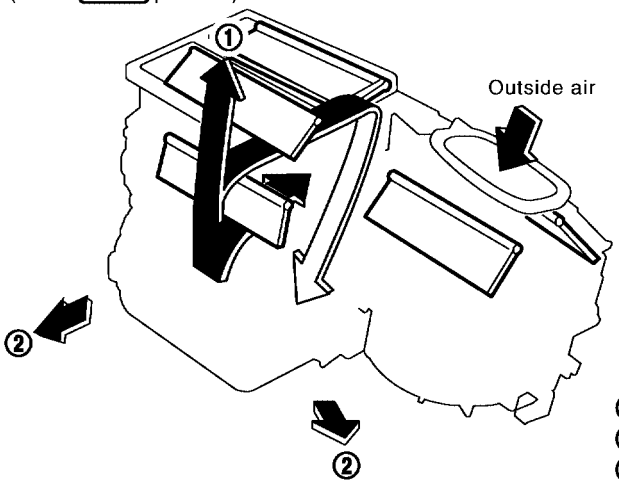
Ventilation
(Recirculation position)



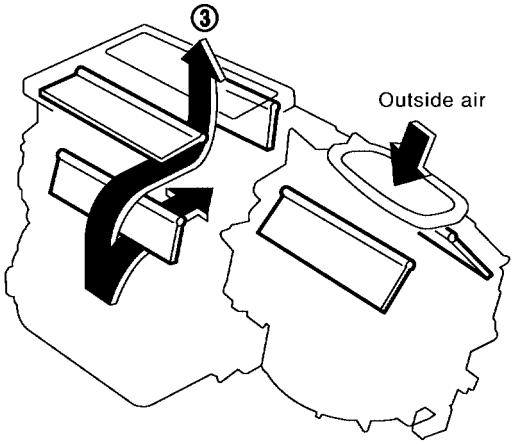
F/D



Bi-level
(Fresh position)



Defroster



①: To face
②: To foot
③: To defroster

For air flow %, refer to "Operational Check", "TROUBLE DIAGNOSES".

LHA127

System Description

EJS001AN

SWITCHES AND THEIR CONTROL FUNCTIONS

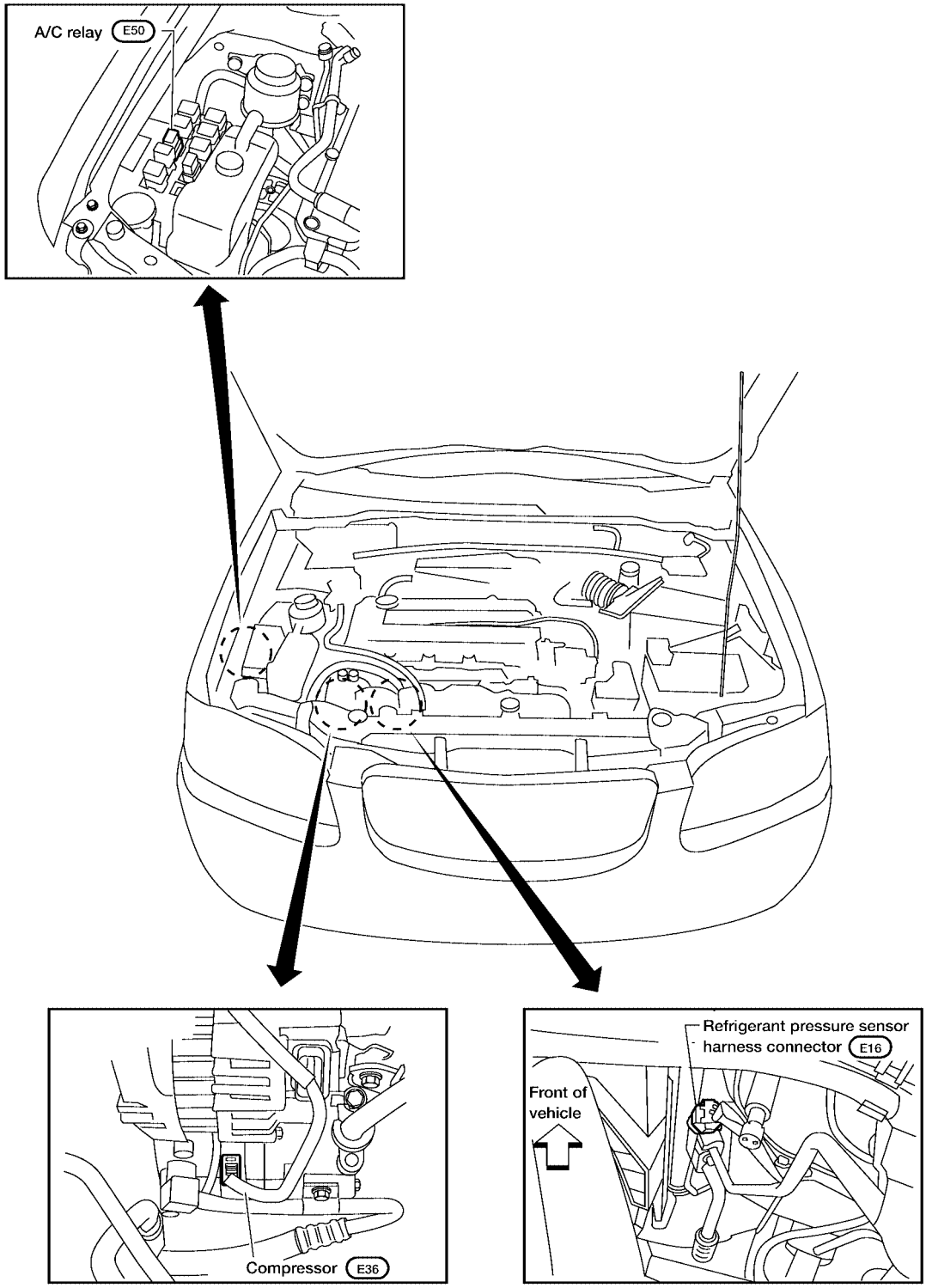
Knob/Switch		Knob/Switch position							Air outlet	Intake air	Compressor
		A/C									
A/C		○							—	—	ON*1
Mode			○						FACE	—	—
				○					B/L	—	—
					○				FOOT	—	—
						○			F/D	FRE	—
							○		DEF	FRE	ON*1
								○	—	REC*2	—

*1: Compressor operation is controlled by the ECM (when the compressor is activated in DEF mode, it remains on until the key is turned off).
*2: In DEF and F/D modes, REC switch is canceled.

Component Location

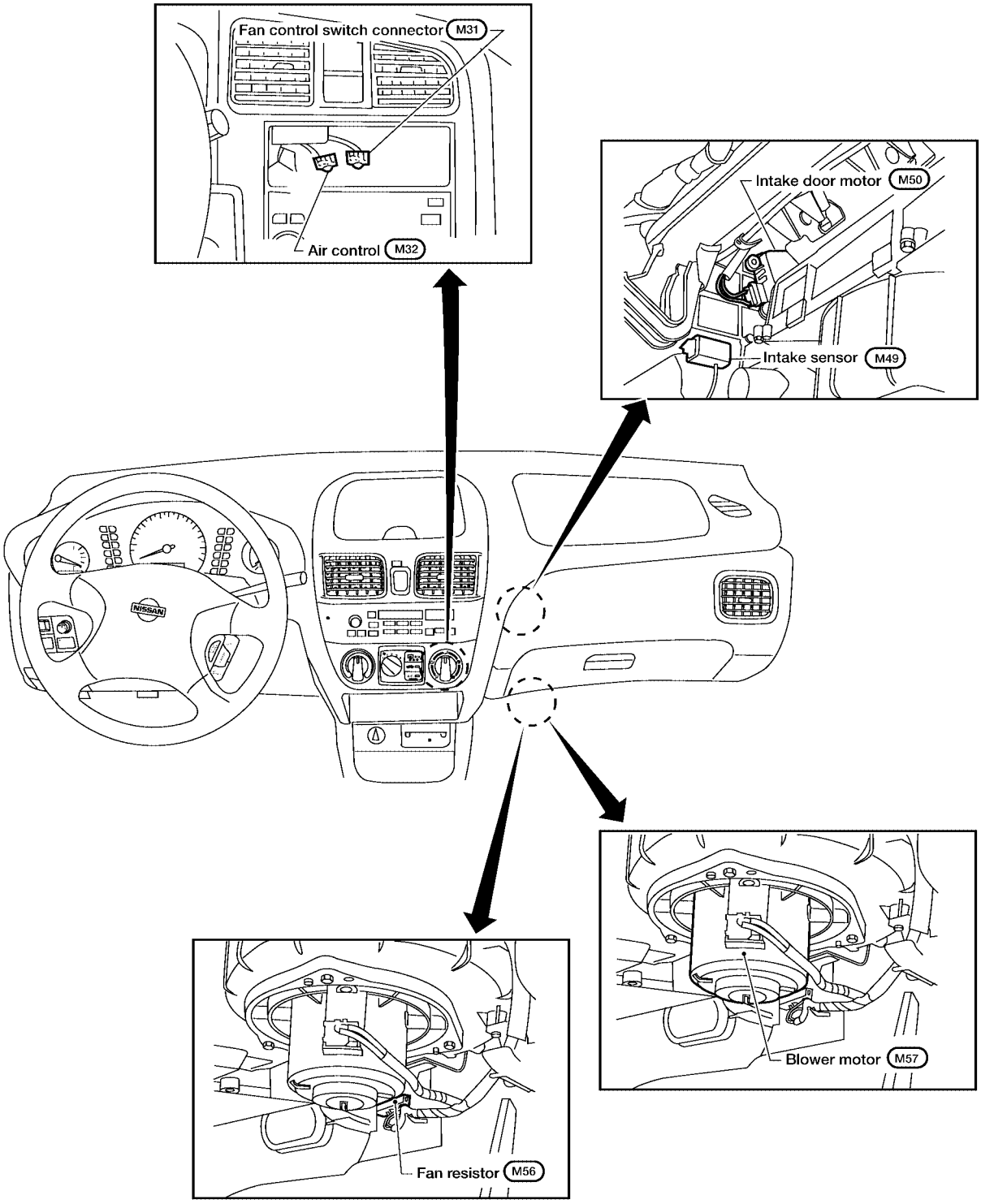
EJS001AO

ENGINE COMPARTMENT



WJIA0248E

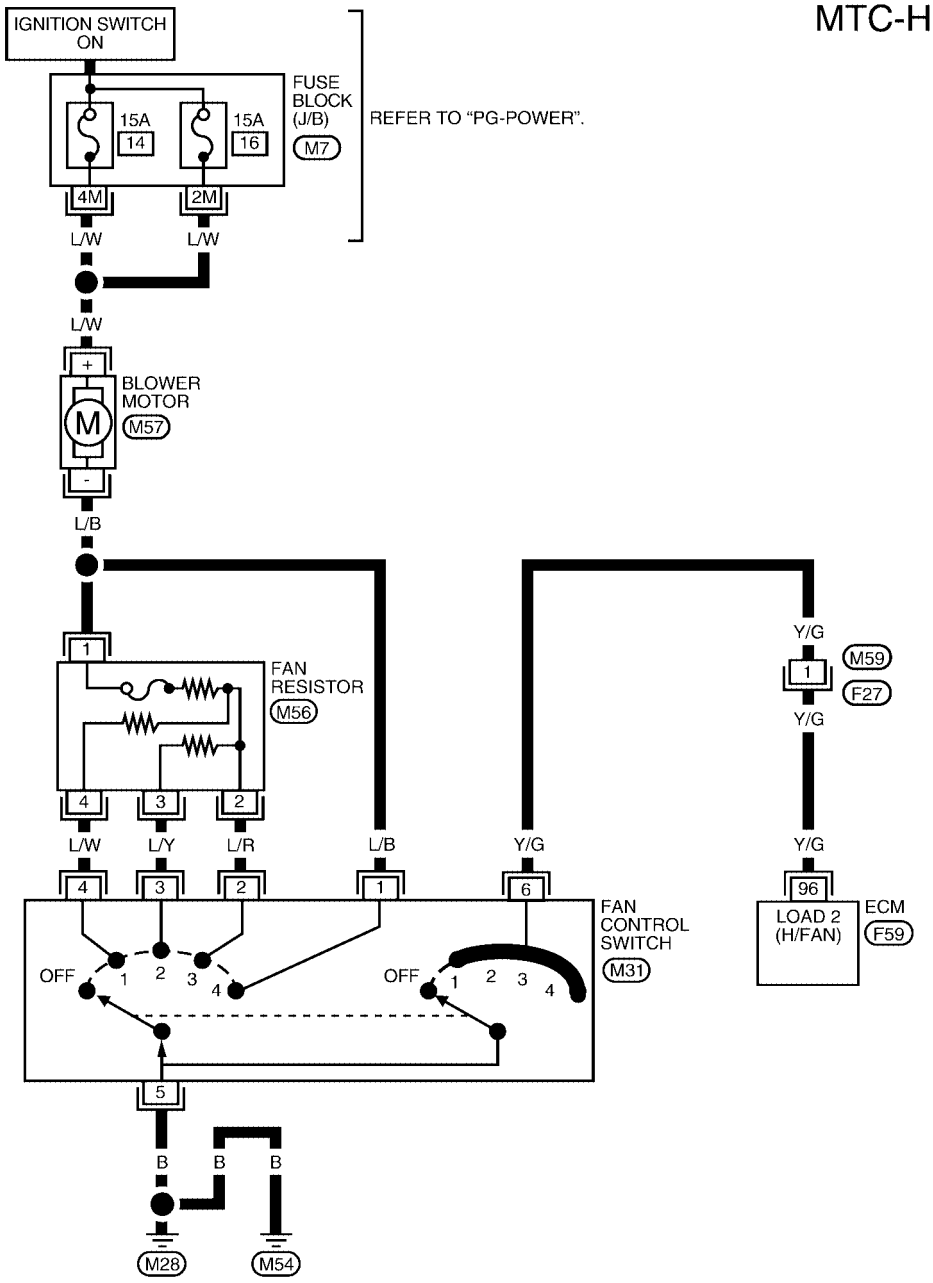
PASSENGER COMPARTMENT

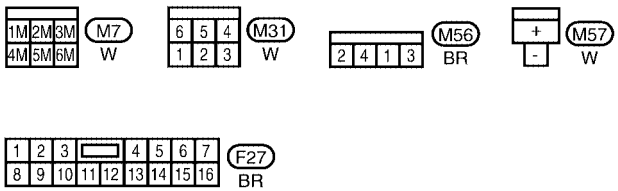


Wiring Diagram — Heater —

EJS001AP

WITHOUT A/C





REFER TO THE FOLLOWING.
F59 - ELECTRICAL UNITS

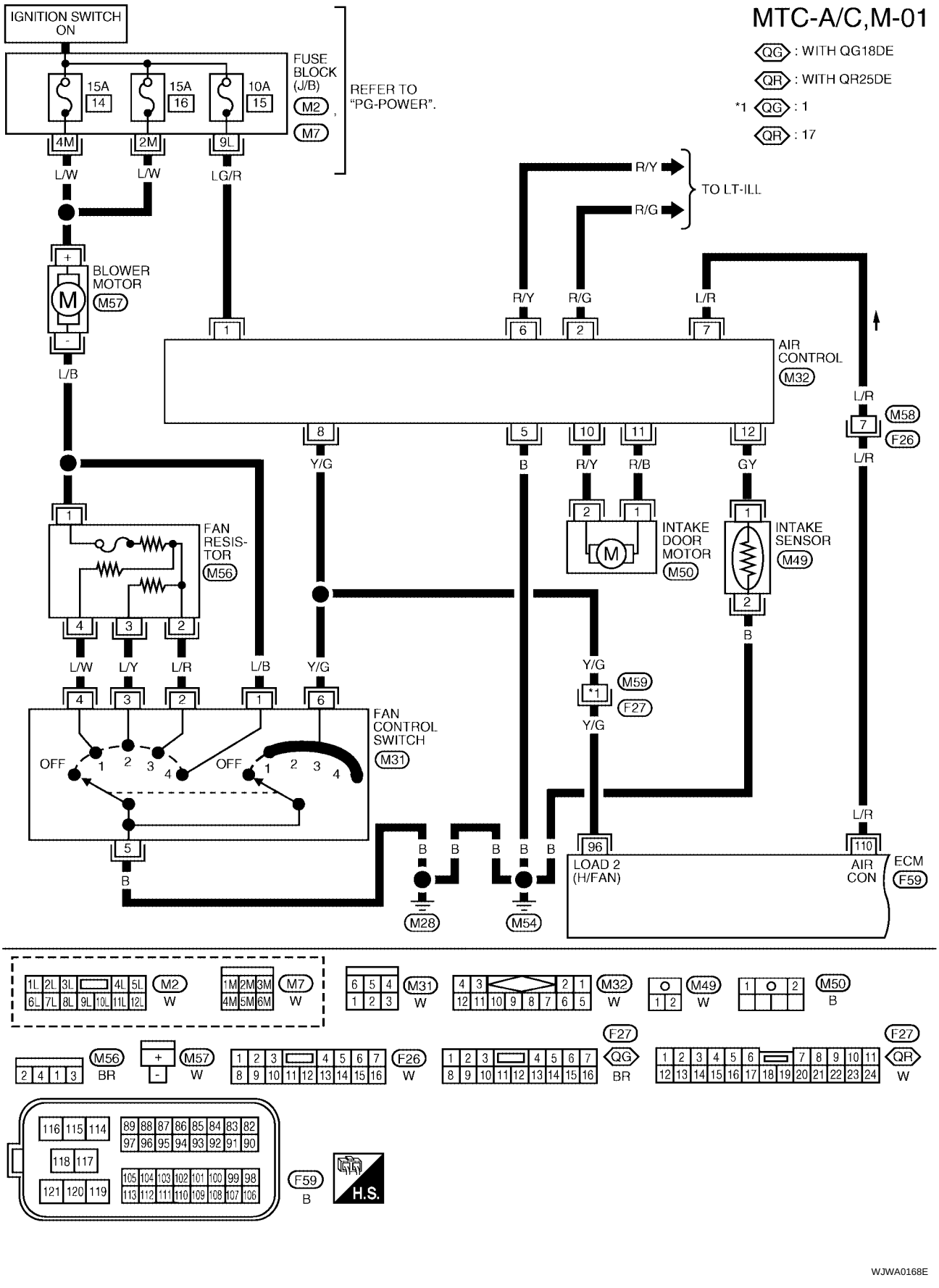
WJWA0052E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
96	Y/G	FAN CONTROL SWITCH	FAN CONTROL SWITCH "ON" (ENGINE RUNNING)	APPROX. 0V
			FAN CONTROL SWITCH "OFF" (ENGINE RUNNING)	APPROX. 5V

Wiring Diagram — A/C, M —

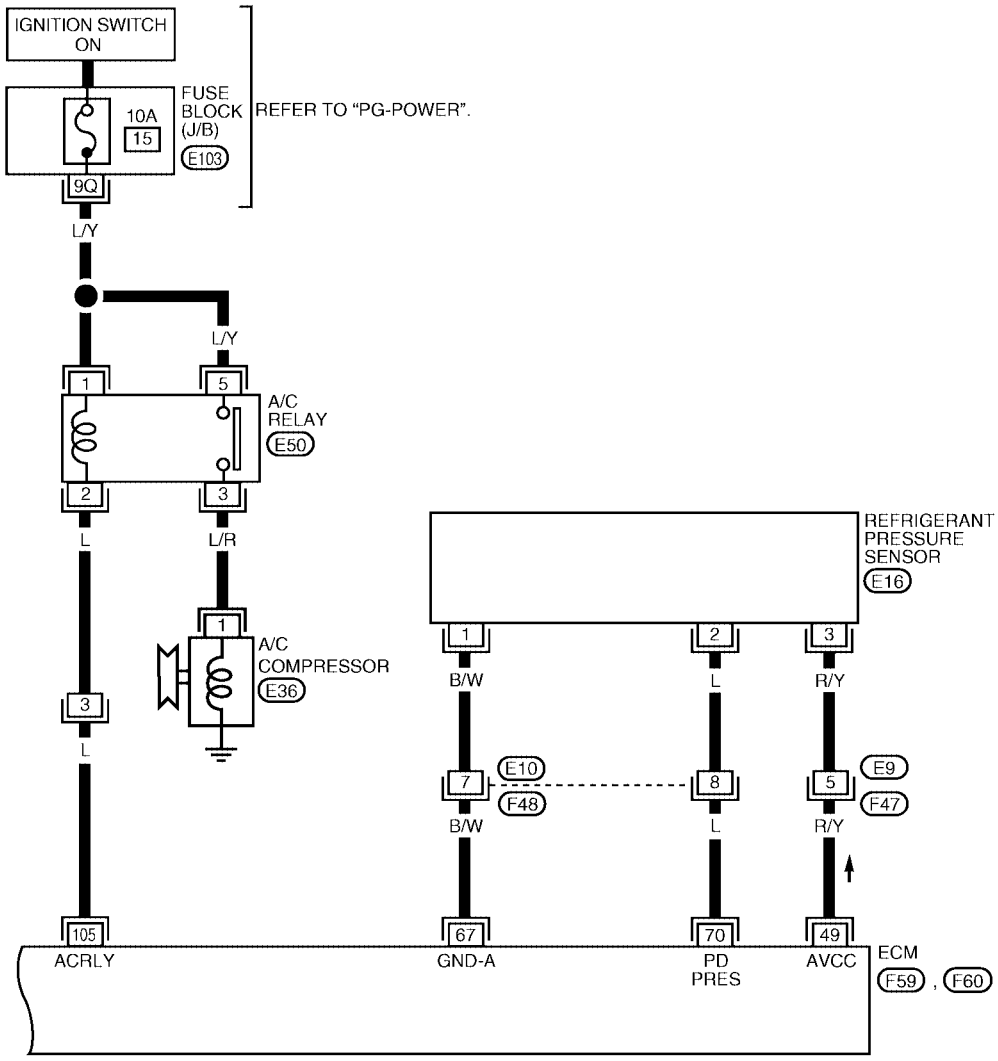
EJS001AQ

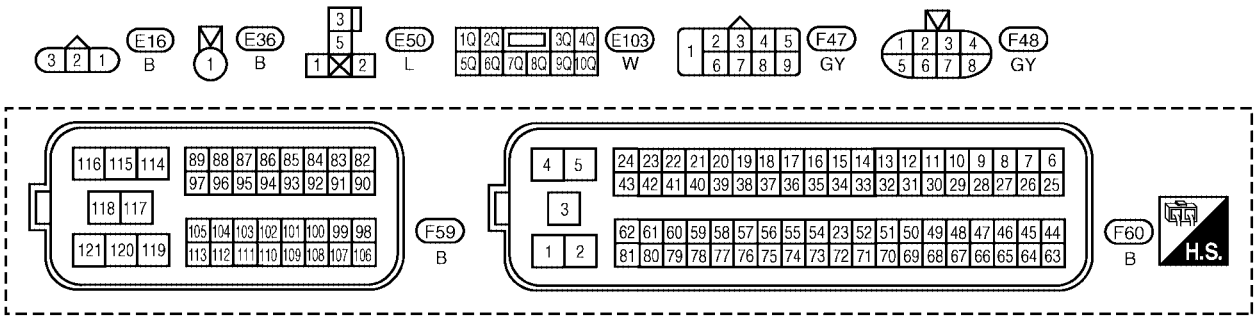
WITH A/C



WJWA0168E

ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND				
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
96	Y/G	FAN CONTROL SWITCH	FAN CONTROL SWITCH "ON" (ENGINE RUNNING)	APPROX. 0V
			FAN CONTROL SWITCH "OFF" (ENGINE RUNNING)	APPROX. 5V
110	L/R	AIR CONDITIONER SWITCH SIGNAL	BOTH A/C SWITCH AND BLOWER SWITCH "ON" (ENGINE RUNNING)	APPROX. 0V
			A/C SWITCH "OFF" (ENGINE RUNNING)	BATTERY VOLTAGE


IGNITION SWITCH ON
FUSE BLOCK (J/B)
E103
10A
15
REFER TO "PG-POWER".
9Q
L/Y
A/C RELAY
E50
A/C COMPRESSOR
E36
REFRIGERANT PRESSURE SENSOR
E16
B/W
L
R/Y
E10
F48
E9
F47
105
ACRLY
67
GND-A
70
PD PRES
49
AVCC
ECM
F59 , F60


E16 B
E36 B
E50 L
E103 W
F47 GY
F48 GY
F59 B
F60 B
H.S.

WJWA0169E

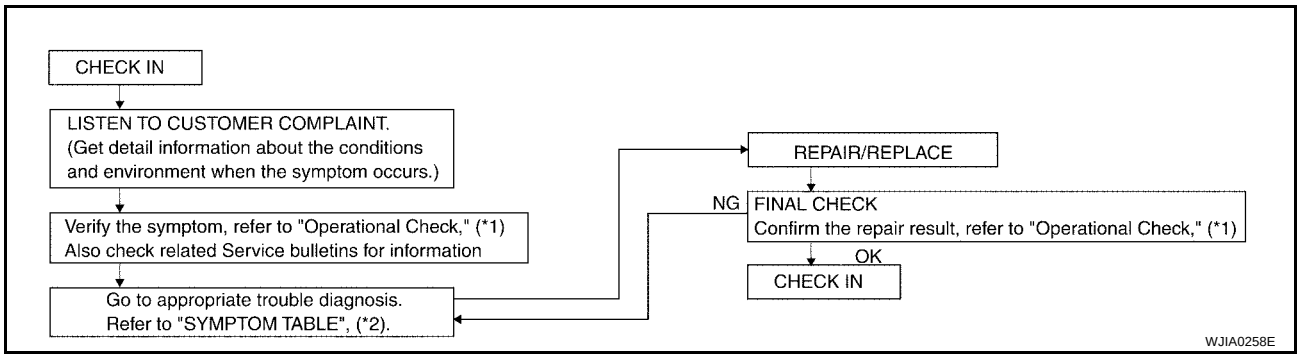
ECM TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
49	R/Y	SENSOR POWER SUPPLY	IGNITION SWITCH "ON"	APPROX. 5.0V
67	B/W	ECM GROUND	IDLE SPEED (ENGINE RUNNING)	1V OR LESS
70	L	REFRIGERANT PRESSURE SENSOR	BOTH A/C SWITCH AND BLOWER SWITCH "ON" (ENGINE RUNNING, WARM-UP CONDITION, COMPRESSOR OPERATING)	0.36 - 3.88V
105	L	AIR CONDITIONER RELAY	BOTH A/C SWITCH AND BLOWER SWITCH "ON" (ENGINE RUNNING) (COMPRESSOR OPERATING)	0 - 1.0V
			A/C SWITCH "OFF" (ENGINE RUNNING)	BATTERY VOLTAGE

How to Perform Trouble Diagnoses for Quick and Accurate Repair

EJS001AR

WORK FLOW



*1: MTC-31 *2 MTC-30

SYMPTOM TABLE

Symptom	Reference page	
● Intake door does not change in VENT, B/L or FOOT mode.	● Go to “TROUBLE DIAGNOSIS PROCEDURE FOR INTAKE DOOR”.	MTC-34
● Air outlet does not change.	● Go to “TROUBLE DIAGNOSIS PROCEDURE FOR MODE DOOR”.	MTC-38
● Air mix door does not change.	● Go to “TROUBLE DIAGNOSIS PROCEDURE FOR AIR MIX DOOR”.	MTC-40
● Blower motor does not rotate at all.	● Go to “TROUBLE DIAGNOSIS PROCEDURE FOR BLOWER MOTOR”.	MTC-42
● Magnet clutch does not engage when A/C switch and fan switch are ON.	● Go to “TROUBLE DIAGNOSIS PROCEDURE FOR MAGNET CLUTCH”.	MTC-47
● Insufficient cooling.	● Go to “TROUBLE DIAGNOSIS PROCEDURE FOR INSUFFICIENT COOLING”.	MTC-53
● Insufficient heating.	● Go to “TROUBLE DIAGNOSIS PROCEDURE FOR INSUFFICIENT HEATING”.	MTC-60
● Noise	● Go to “TROUBLE DIAGNOSIS PROCEDURE FOR NOISE”.	MTC-61

Operational Check

EJS001AS

The purpose of the operational check is to confirm that the system operates properly.

CONDITIONS:

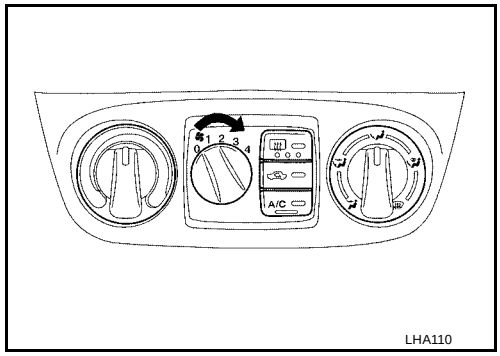
- **Engine running and at normal operating temperature.**

PROCEDURE:

1. Check Blower

1. Turn fan control switch to 1-speed.
   Blower should operate on 1-speed.
2. Then turn fan control switch to 2-speed, and continue checking blower speed until all speeds are checked.
3. Leave fan control switch on 4-speed.

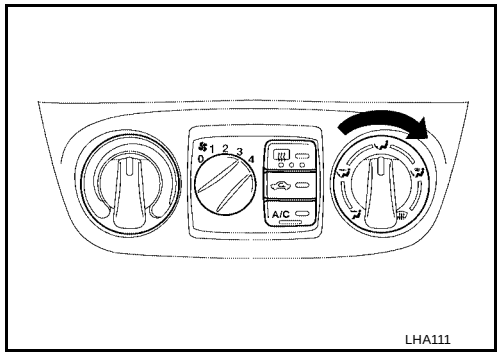
If NG, go to MTC-42, "Trouble Diagnosis Procedure for Blower Motor" .
If OK, continue with next check.



LHA110

2. Check Discharge Air

1. Turn knob to each mode.



LHA111

2. Confirm that discharge air comes out according to the air distribution table.

Refer to MTC-21, "Discharge Air Flow" .
If NG, go to MTC-38, "TROUBLE DIAGNOSIS PROCEDURE FOR MODE DOOR" .
If OK, continue with next check.

NOTE:
Confirm that the compressor clutch is engaged (visual inspection) and intake door position is at FRESH when the DEF mode is selected.
Confirm that the intake door position is at FRESH when the F/D mode is selected.
Intake door position is checked in the next step.

Discharge air flow

Mode control knob	Air outlet/distribution		
	Face	Foot	Defroster
	100%	–	–
	60%	40%	–
	–	80%	20%
	–	60%	40%
	–	–	100%

RHA654F

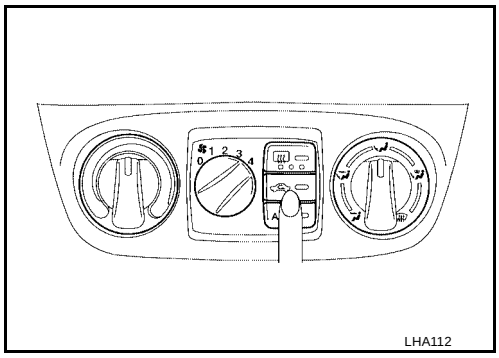
3. Check Recirculation

1. Press REC switch.
   Recirculation indicator should illuminate.
2. Listen for intake door position change (you should hear blower sound change slightly).

If NG, go to MTC-34, "Trouble Diagnosis Procedure for Intake Door" .
If OK, continue with next check.

NOTE:

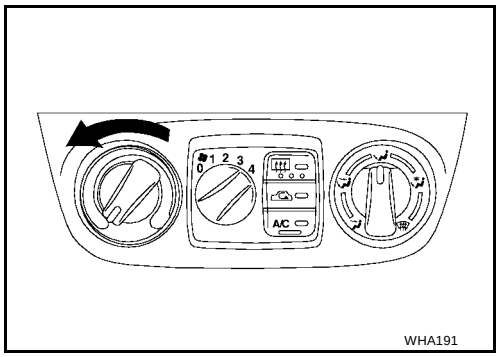
- **Recirculation does not operate in DEF and F/D modes.**



4. Check Temperature Decrease

1. Turn temperature control knob to full cold.
2. Check for cold air at discharge air outlets.

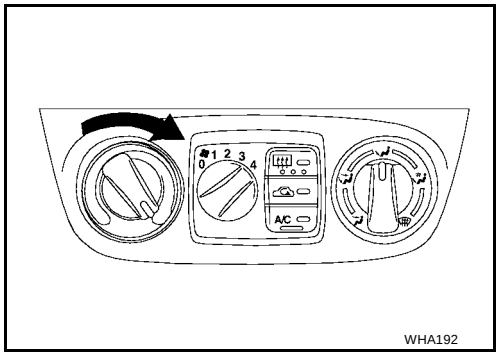
If NG, go to MTC-53, "Trouble Diagnosis Procedure for Insufficient Cooling" .
If OK, continue with next check.



5. Check Temperature Increase

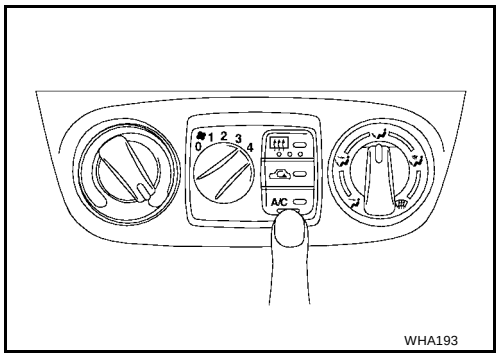
1. Turn temperature control knob to full hot.
2. Check for hot air at discharge air outlets.

If NG, go to MTC-60, "Trouble Diagnosis Procedure for Insufficient Heating" .



6. Check Air Conditioner Switch

Turn the fan control switch to the desired (1- to 4-speed) position and push the A/C switch to turn ON the air conditioner.
The indicator lamp should come on when air conditioner is ON.
If NG, go to MTC-47, "Trouble Diagnosis Procedure for Magnet Clutch" .



Main Power Supply and Ground Circuit Check

EJS001AT

POWER SUPPLY CIRCUIT CHECK

Check power supply circuit for air conditioner system.
Refer to PG-5, "Wiring Diagram — POWER —" .

INTAKE DOOR

PFP:27245

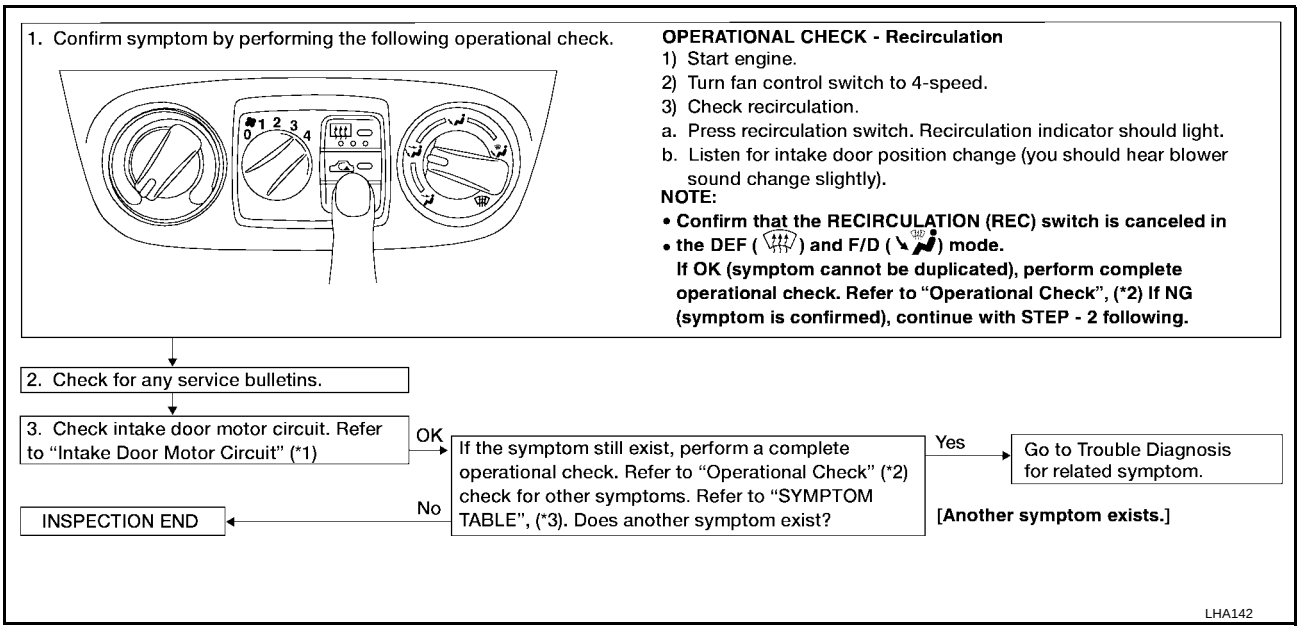
Trouble Diagnosis Procedure for Intake Door

EJS001AU

SYMPTOM:

- **Intake door does not change.**

INSPECTION FLOW



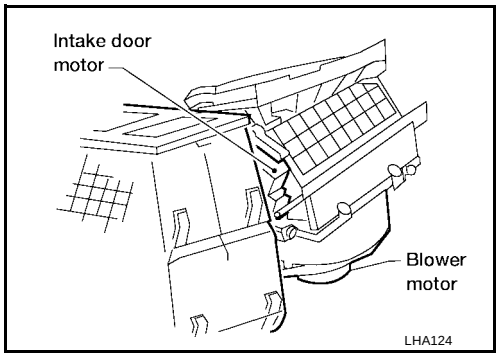
*1 MTC-35 *2 MTC-31 *3 MTC-30

Component Description

EJS001AV

INTAKE DOOR MOTOR

The intake door motor is installed on the intake unit. Using a link, it opens and closes the intake door.
When REC switch is ON, the ground line of the motor is switched from terminal 2 to 1. This starts the motor because the position switch contacts built into it make current flow. When REC switch is OFF, the ground line is switched from terminal 1 to 2. The contacts turn along with the motor. When they reach the non-current flow position, the motor will stop.



Intake Door Motor Circuit

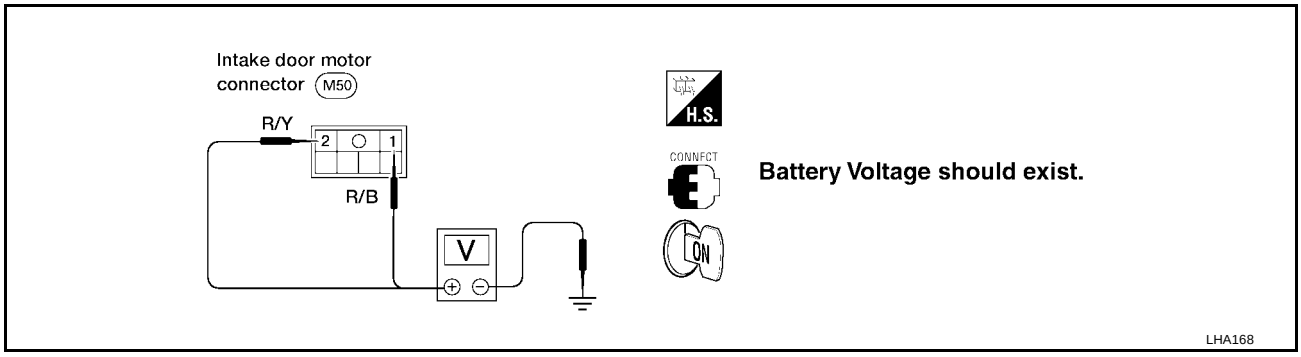
EJS001AW

SYMPTOM:

- **Intake door does not change.**

1. CHECK POWER SUPPLY FOR INTAKE DOOR MOTOR

Disconnect intake door motor harness connector.
Do approx. 12 volts exist between intake door motor harness terminal Nos. 1, 2 and body ground?

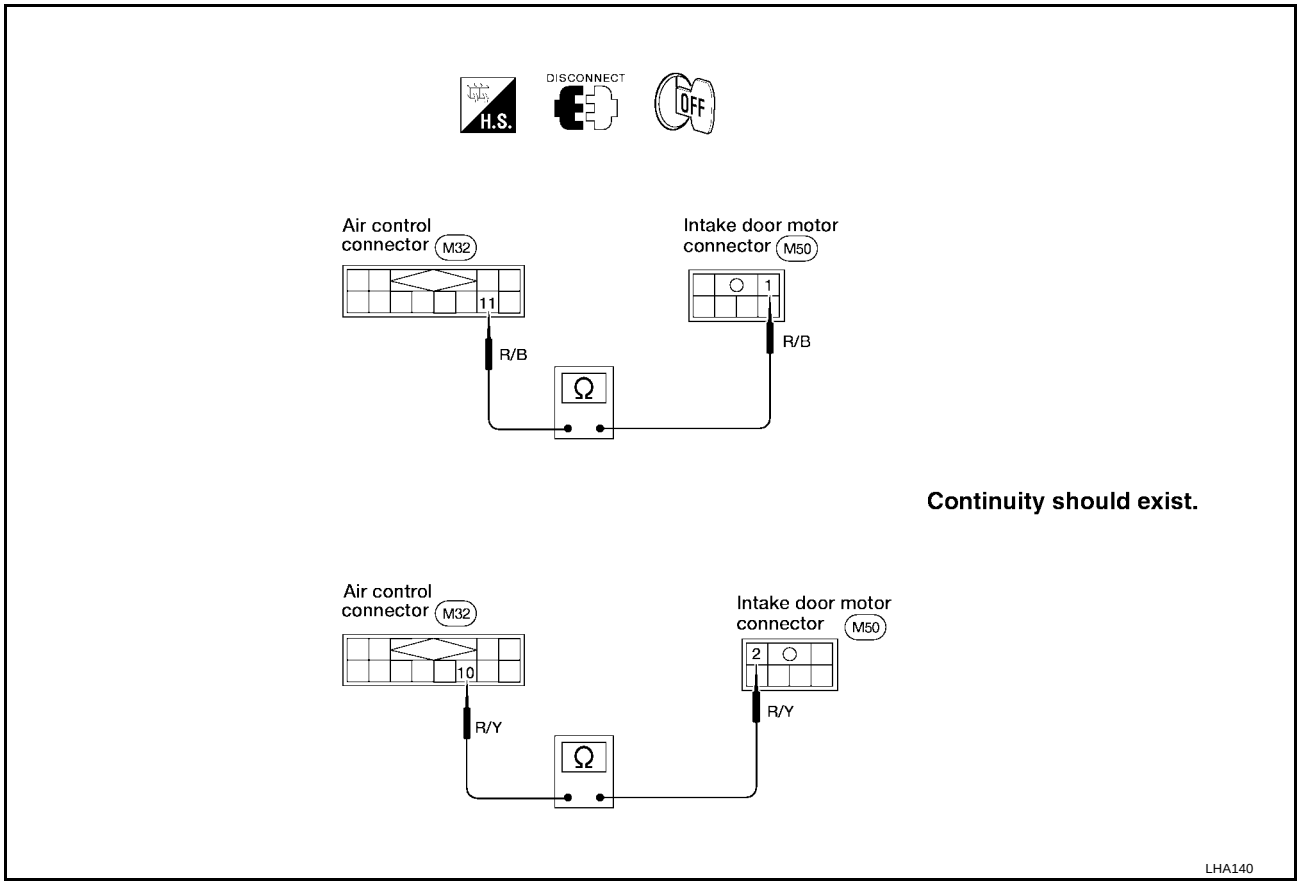


Yes or No

Yes >> GO TO 3.
No >> GO TO 2.

2. CHECK CIRCUIT CONTINUITY BETWEEN INTAKE DOOR MOTOR AND AIR CONTROL UNIT

Check circuit continuity between air control harness terminal Nos. 10 (11) and intake door motor harness terminal Nos. 2 (1).



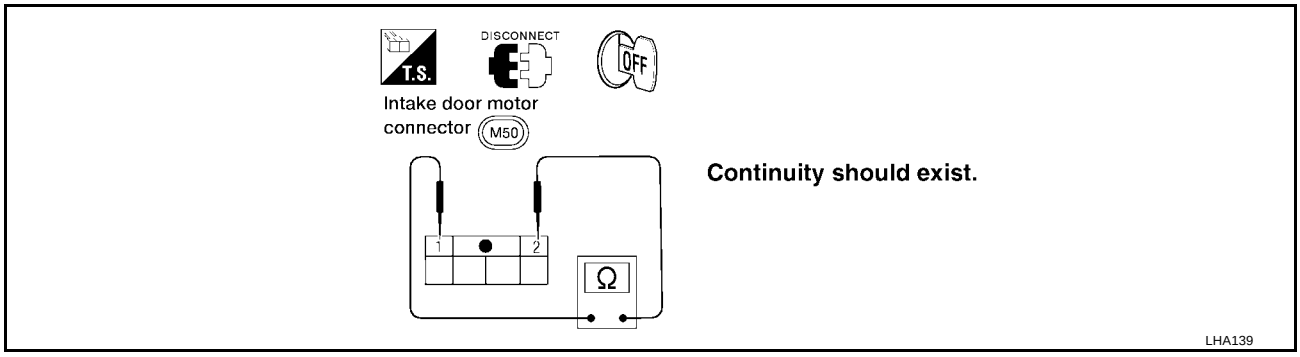
If OK, check harness for short.

Yes or No

Yes >> Replace air control.
No >> Repair harness or connector.

3. CHECK CIRCUIT CONTINUITY OF INTAKE DOOR MOTOR

Check circuit continuity between intake door motor harness terminal No. 1 and No. 2.



OK or NG

OK >> GO TO 4.
NG >> Replace intake door motor.

4. CHECK INTAKE DOOR LINKAGE

Refer to MTC-39, "CONTROL LINKAGE ADJUSTMENT" .

OK or NG

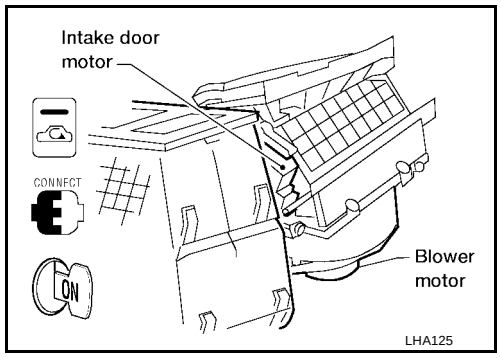
OK >> **INSPECTION END**.
NG >> Repair or adjust.

Control Linkage Adjustment

EJS001AX

INTAKE DOOR MOTOR

1. Install intake door motor on intake unit.
   Ensure that the intake door motor lever is fitted into the slit portion of intake door link.
2. Connect the intake door motor harness connector.
3. Turn ignition switch to “ON” position.
4. Check that intake door operates properly when REC switch is turned ON and OFF.



Mode Door

EJS001AY

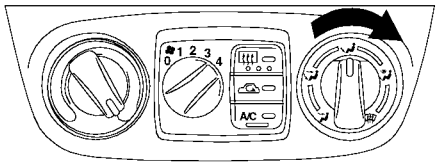
TROUBLE DIAGNOSIS PROCEDURE FOR MODE DOOR

SYMPTOM:

- **Mode door does not change.**

INSPECTION FLOW

1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK - Discharge air.

1) Turn mode control knob.

2) Confirm that discharge air comes out according to the air distribution table at left.
Refer to "Discharge Air Flow" in "DESCRIPTION" (*1).

Discharge air flow

Mode control knob	Air outlet/distribution		
	Face	Foot	Defroster
	100%	–	–
	60%	40%	–
	–	80%	20%
	–	60%	40%
	–	–	100%

NOTE:
Confirm that the compressor clutch is engaged (visual inspection) and intake door position is at FRESH when the DEF ( ) or D/F ( ) button is pressed.
If OK (symptom cannot be duplicated), perform complete operational check (*3).
If NG (symptom is confirmed), continue with STEP-2 following.

2. Check for any service bulletins.

3. Check mode door control linkage adjustment, refer to “CONTROL LINKAGE ADJUSTMENT” (*2)

OK

If the symptom still exists, perform a complete operational check, refer to “Operational Check”, (*3) and check for other symptoms.
Refer to “SYMPTOM TABLE”, (*4)
Does another symptom exist?

No → INSPECTION END

Yes → Go to Trouble Diagnosis for related symptom

[Another symptom exists.]

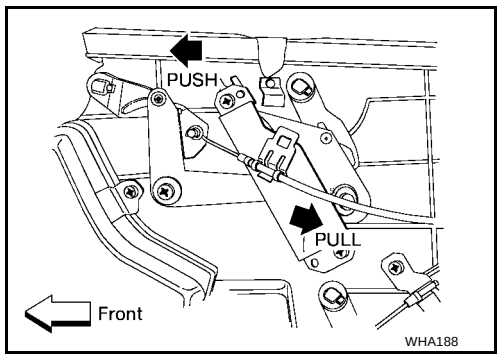
LHA146

*1 MTC-21 *2 MTC-37 *3 MTC-31
*4 MTC-30

CONTROL LINKAGE ADJUSTMENT

Mode Door Control Linkage

- Turn mode door control knob to position.
- Set side link in DEF mode.
- Pull on outer cable in direction of arrow and then clamp it.
- **After positioning mode door control cable, check that it operates properly.**



Air Mix Door

EJS001AZ

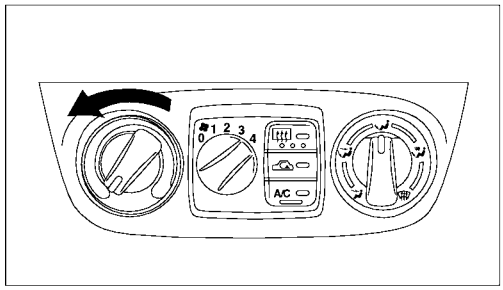
TROUBLE DIAGNOSIS PROCEDURE FOR AIR MIX DOOR

SYMPTOM:

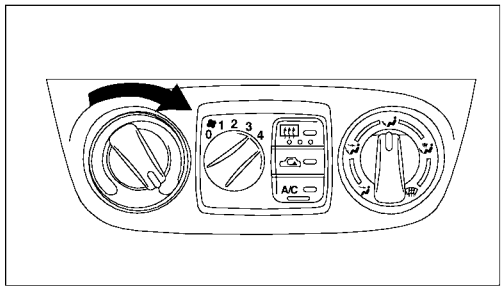
- **Air mix door does not change.**

INSPECTION FLOW

1. Confirm symptom by performing the following operational check.



OPERATIONAL CHECK - Recirculation
1. Check Temperature Decrease
1) Turn temperature control knob to full cold.
2) Check for cold air at discharge air outlets.



2. Check Temperature Increase
1) Turn temperature control knob to full hot.
2) Check for hot air at discharge air outlets.

If OK (symptom cannot be duplicated). Perform complete operational check. (*1)
If NG (symptom is confirmed), continue with STEP-2 following.

2. Check for any service bulletins.

3. Visually check air mix door linkage operation.

4. Visually check air mix door.

OK

If the symptom still exist, perform a complete operational check and check for other symptoms. Refer to "SYMPTOM TABLE", (*2). Does another symptom exist?

Yes → Go to Trouble Diagnosis for related symptom.

[Another symptom exists.]

No → INSPECTION END

WHA190

*1 MTC-31 *2 MTC-30

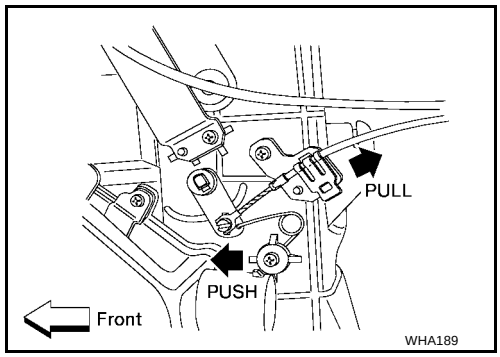
Temperature Control Linkage Adjustment

EJS001B0

Temperature Control Cable

- Turn temperature control knob to the full cold position.
- Set the air mix door lever in the full cold position by hand.
- Pull on cable cover in the direction of the arrow and then clamp cable cover.

After positioning air mix door control cable, check for proper operation.



BLOWER MOTOR

PFP:27226

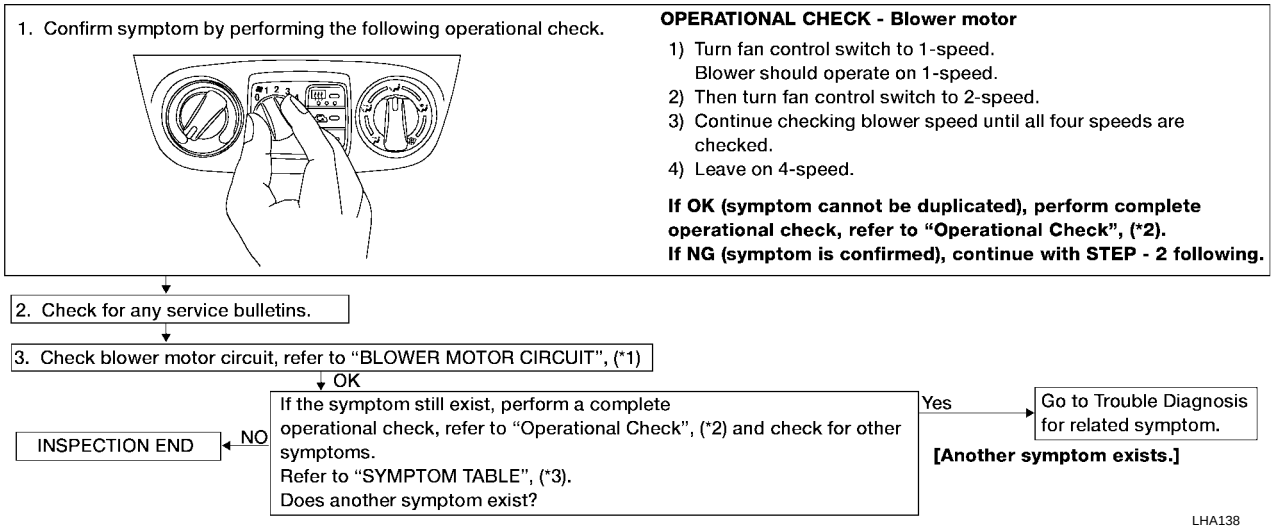
Trouble Diagnosis Procedure for Blower Motor

EJS001B1

SYMPTOM:

- **Blower motor does not rotate at all.**

INSPECTION FLOW



*1 MTC-42 *2 MTC-31 *3 MTC-30

Blower Motor Circuit

EJS001B2

SYMPTOM:

- **Blower motor does not rotate.**

Symp-tom table No.	INCIDENT
1	Fan fails to rotate.
2	Fan does not rotate at 1-speed.
3	Fan does not rotate at 2-speed.
4	Fan does not rotate at 3-speed.
5	Fan does not rotate at 4-speed.

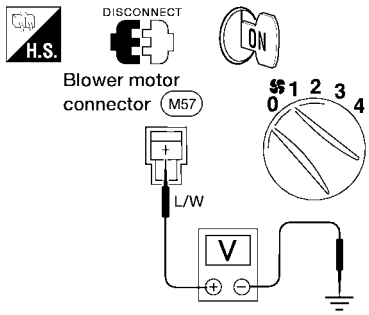
1. DIAGNOSTIC PROCEDURE

Check if blower motor rotates properly at each fan speed.
Conduct checks as per symptom table above.

1 >> GO TO 2.
2, 3, 4 >> GO TO 8.
5 >> GO TO 10.

2. CHECK POWER SUPPLY FOR BLOWER MOTOR

1. Disconnect blower motor harness connector.
2. Do approx. 12 volts exist between blower motor harness terminal + and body ground?



Battery Voltage should exist.

LHA137

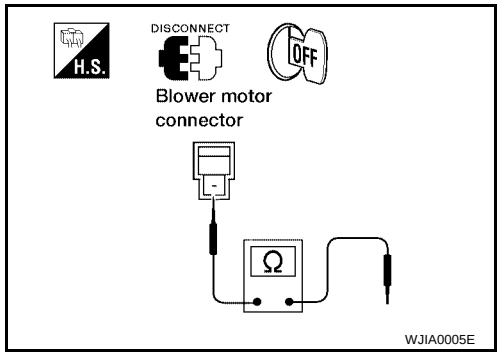
Yes or No

Yes >> GO TO 3.
No >> Check 15A (Nos. 14 and 16) fuses at fuse block. Refer to PG-9, "IGNITION POWER SUPPLY — IGNITION SW. IN "ON"" .

3. CHECK CIRCUIT CONTINUITY FOR BLOWER MOTOR

1. Turn fan control switch to any position except OFF.
2. Check circuit continuity between blower motor connector M57 terminal – (L/B) and body ground.

Continuity should exist.



WJIA0005E

OK or NG

OK >> GO TO 4.
NG >> Reconnect blower motor harness connector. GO TO 5.

4. CHECK BLOWER MOTOR

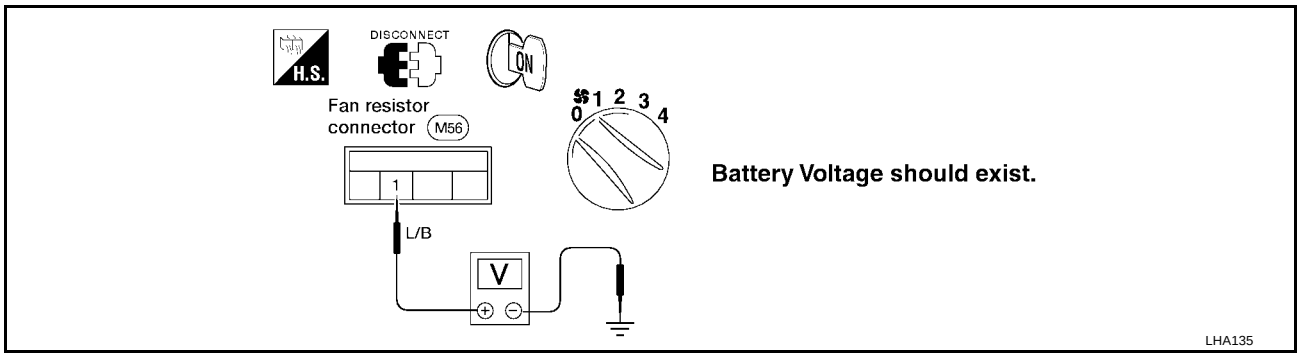
Refer to MTC-46, "BLOWER MOTOR" .

OK or NG

OK >> **INSPECTION END**.
NG >> Replace blower motor.

5. CHECK BLOWER MOTOR CIRCUIT BETWEEN BLOWER MOTOR AND FAN RESISTOR

Do approx. 12 volts exist between fan resistor harness terminal No. 1 and body ground?

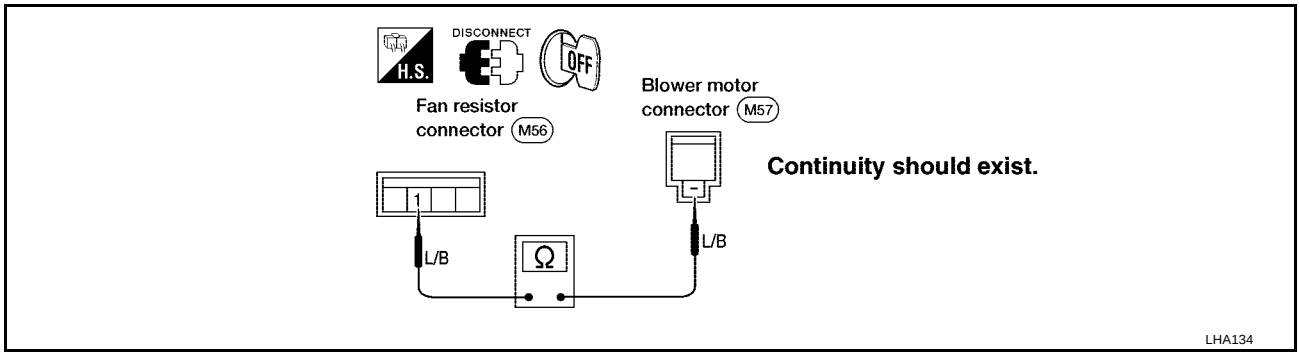


Yes or No

Yes >> Disconnect fan control switch harness connector. GO TO 7.
No >> Disconnect blower motor and fan resistor harness connectors. GO TO 6.

6. CHECK CIRCUIT CONTINUITY BETWEEN BLOWER MOTOR AND FAN RESISTOR

Check circuit continuity between blower motor harness terminal – and fan resistor harness terminal No. 1.

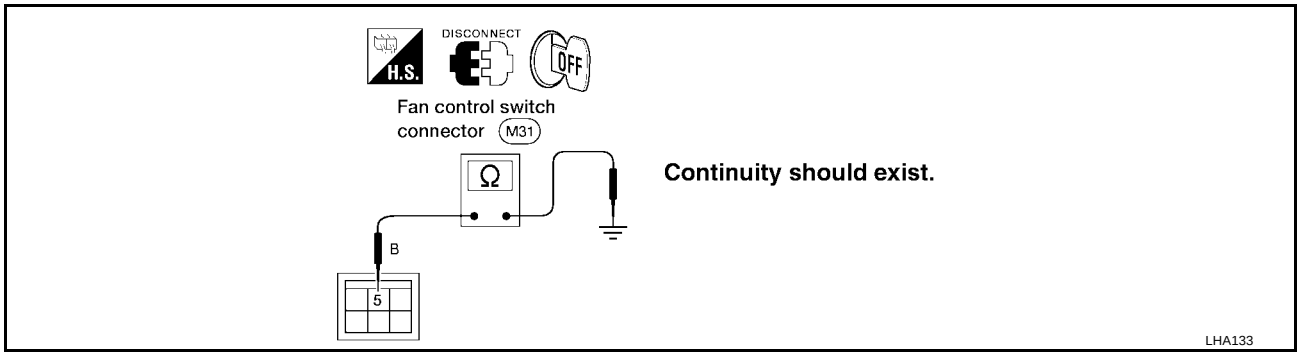


OK or NG

OK >> Check harness for short and repair as necessary.
NG >> Check harness for open and check connectors. Repair as necessary.

7. CHECK GROUND CIRCUIT FOR FAN CONTROL SWITCH

Check circuit continuity between fan control switch harness terminal No. 5 and body ground.



OK or NG

OK >> GO TO 8.
NG >> Repair harness or connector.

8. CHECK RESISTOR AFTER DISCONNECTING IT

Refer to MTC-46, "FAN RESISTOR" .

OK or NG

OK >> GO TO 9.
NG >> Replace fan resistor.

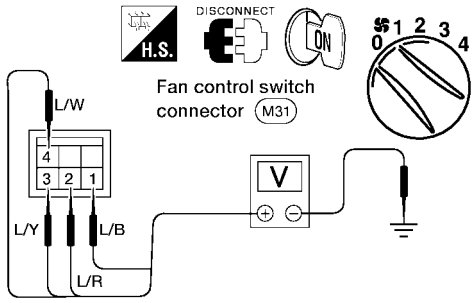
9. CHECK FAN RESISTOR HARNESS CONNECTOR

Reconnect fan resistor harness connector.

1 >> GO TO 12.
2, 3, 4 >> GO TO 10.

10. CHECK FAN CONTROL SWITCH CIRCUIT

Do approx. 12 volts exist between each fan control switch harness terminal and body ground?



Symptom table No.	Terminal No. (+)	Terminal No. (−)	Voltage
2	4	Body ground	Approx. 12V
3	3		
4	2		
5	1		

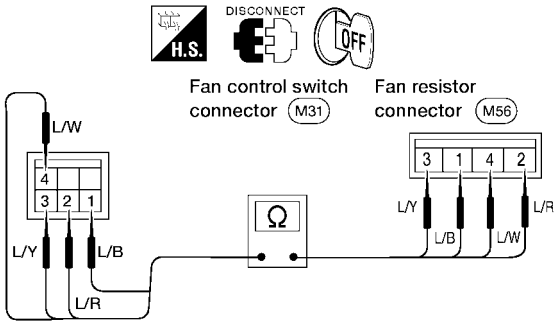
LHA131

Yes or No

Yes >> GO TO 12.
No >> GO TO 11.

11. CHECK CIRCUIT CONTINUITY BETWEEN FAN CONTROL SWITCH AND FAN RESISTOR

Check circuit continuity between fan control switch harness terminal and fan resistor harness terminal.



Terminal No. Fan control switch	Terminal No. Fan resistor	Continuity
1	1	Yes
2	2	
3	3	
4	4	

LHA132

OK or NG

OK >> Check harness for short and repair as necessary.
NG >> Check harness for open and check connectors. Repair as necessary.

12. CHECK FAN CONTROL SWITCH AFTER DISCONNECTING IT

Refer to MTC-46, "FAN CONTROL SWITCH" .

OK or NG

OK >> **INSPECTION END**.
NG >> Replace fan control switch.

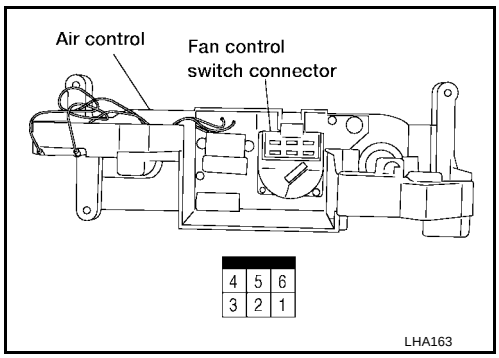
Electrical Components Inspection

EJS001B3

FAN CONTROL SWITCH

Check continuity between terminals at each switch position.

Fan control switch position	Continuity between terminals
OFF	
1	4 — 5 — 6
2	3 — 5 — 6
3	2 — 5 — 6
4	1 — 5 — 6



BLOWER MOTOR

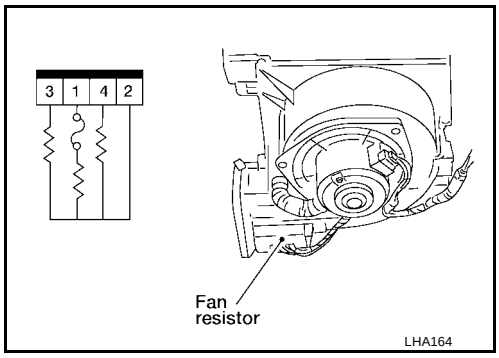
Confirm smooth rotation of the blower motor.

- Ensure that there are no foreign particles inside the intake unit.

FAN RESISTOR

Check resistance between terminals.

Terminal No.		Resistance (Approx.)
(+)	(–)	
3	1	1.305 - 1.595Ω
4		2.457 - 3.003Ω
2		0.225 - 0.275Ω



MAGNET CLUTCH

PFP:92660

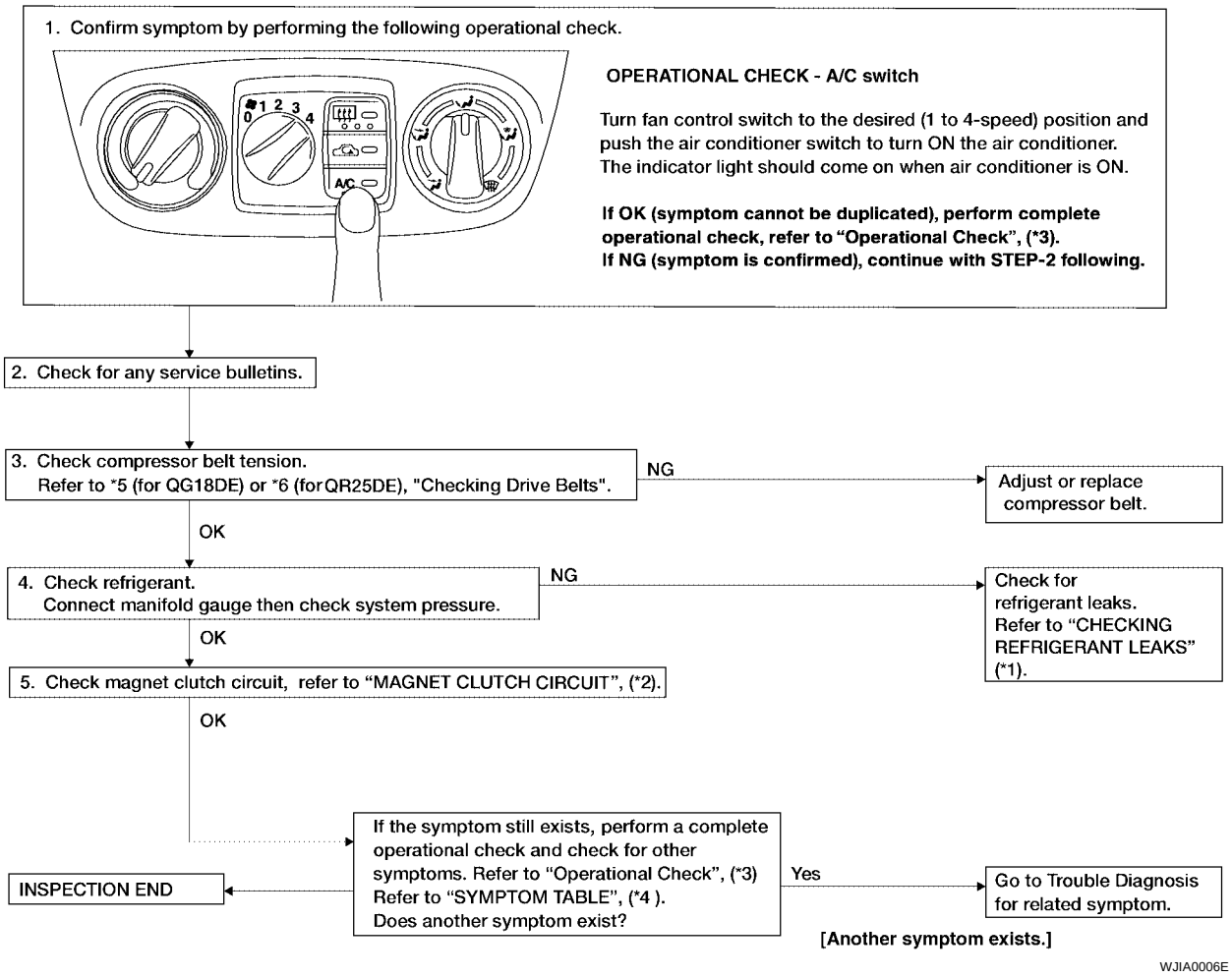
Trouble Diagnosis Procedure for Magnet Clutch

EJS001B4

SYMPTOM:

- **Magnet clutch does not operate when A/C switch and fan control switch are ON.**

INSPECTION FLOW



*1 MTC-82 *2 MTC-48 *3 MTC-31

*4 MTC-30 *5 MA-16 *6 MA-23

Magnet Clutch Circuit

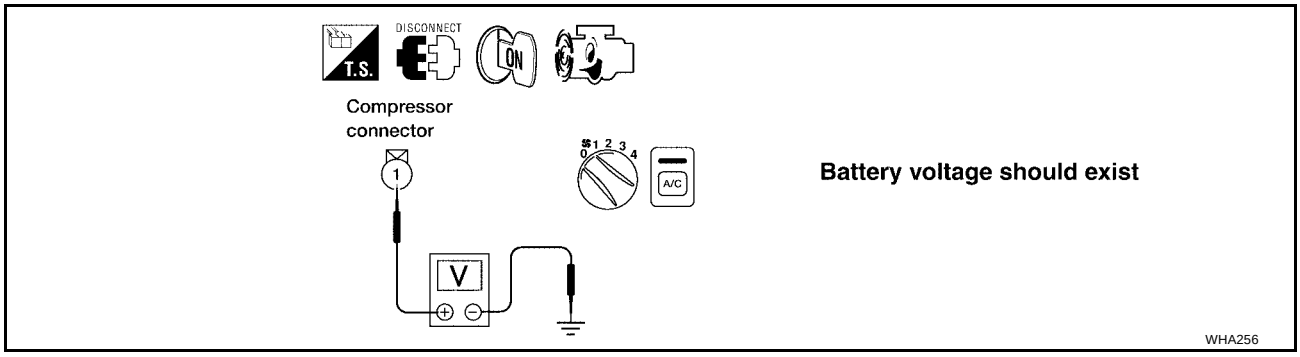
EJS001B5

SYMPTOM:

- **Magnet clutch does not engage when A/C switch and fan control switch are ON.**

1. CHECK POWER SUPPLY FOR COMPRESSOR

Disconnect A/C compressor harness connector.
Do approx. 12 volts exist between A/C compressor harness connector E36 terminal 1, (L/R) and body ground?

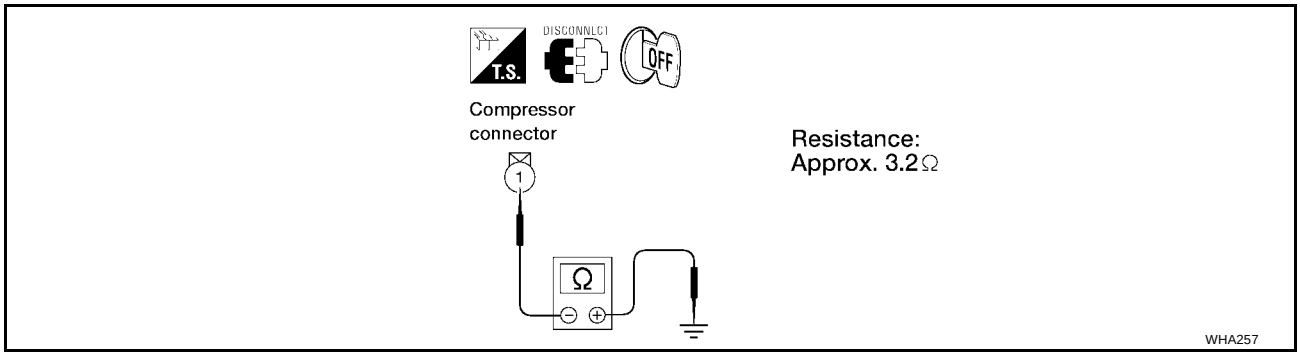


Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK MAGNET CLUTCH COIL

Disconnect magnet clutch connector.
Do approx. 3.2Ω exist between A/C compressor harness connector E36 terminal 1, (L/R) and body ground?

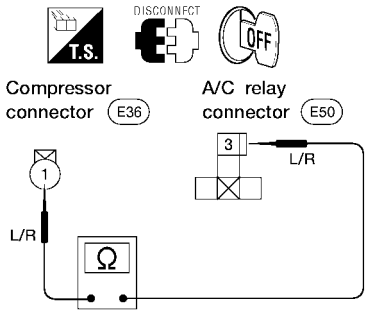


Yes or No

Yes >> **INSPECTION END**.
No >> Replace magnet clutch. Refer to MTC-65, "COMPRESSOR CLUTCH" .

3. CHECK CIRCUIT CONTINUITY BETWEEN A/C RELAY AND COMPRESSOR HARNESS

Disconnect A/C relay.
Check circuit continuity between A/C relay harness terminal 3 and compressor harness terminal 1.



Continuity should exist.

LHA149

If OK, check harness for short.

OK or NG

OK >> GO TO 4.
NG >> Repair harness or connector.

4. CHECK INTAKE SENSOR CIRCUIT

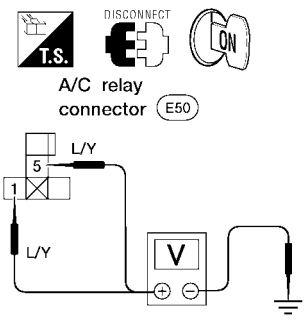
Refer to MTC-62, "Intake Sensor Circuit" .

OK or NG

OK >> GO TO 5.
NG >> Repair as necessary.

5. CHECK POWER SUPPLY FOR A/C RELAY

Disconnect A/C relay.
Do approx. 12 volts exist between A/C relay harness terminal 1, 5 and body ground?



Battery voltage should exist

LHA150

Yes or No

Yes >> GO TO 6.
No >> Check power supply circuit and 10A (No. 15) fuse at fuse block. Refer to PG-9, "IGNITION POWER SUPPLY — IGNITION SW. IN “ON”" .

6. CHECK A/C RELAY AFTER DISCONNECTING IT

Refer to MTC-51, "A/C RELAY" .

OK or NG

OK >> Reconnect A/C relay. GO TO 7.
NG >> Replace A/C relay.

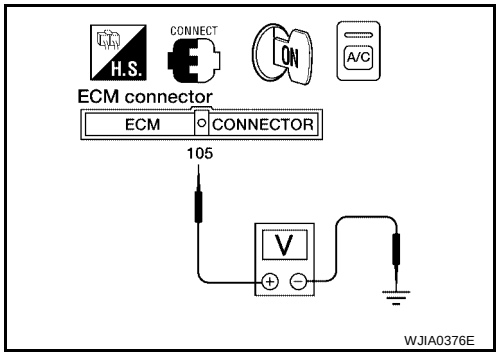
7. CHECK COIL SIDE CIRCUIT OF A/C RELAY

Reconnect A/C relay.
Do approx. 12 volts exist between ECM harness connector F59 terminal 105 (L) and body ground?

Battery voltage should exist.

Yes or No

Yes >> GO TO 9.
No >> Disconnect A/C relay. Disconnect ECM harness connector. GO TO 8.



8. CHECK CIRCUIT CONTINUITY BETWEEN A/C RELAY AND ECM HARNESS

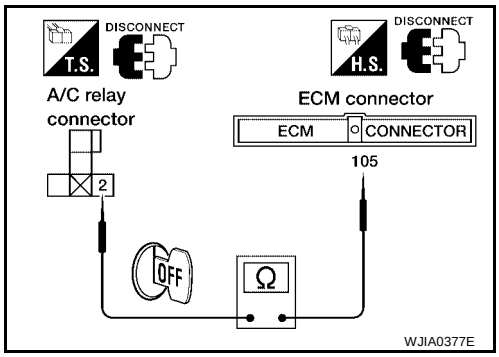
Check circuit continuity between A/C relay harness connector E50 terminal 2 (L) and ECM harness connector F59 terminal 105 (L).

Continuity should exist.

If OK, check harness for short.

OK or NG

OK >> Check ECM. Refer to EC-125, "ECM Terminals and Reference Value" (with QG18DE), or EC-782, "ECM Terminals and Reference Value" (with QR25DE).
NG >> Repair harness or connector.



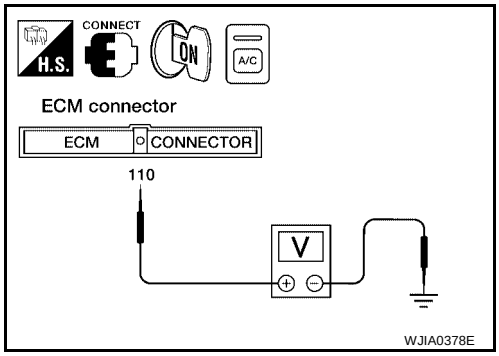
9. CHECK VOLTAGE FOR ECM

Do approx. 12 volts exist between ECM harness connector F59 terminal No. 110 (L/R) and body ground?

Battery voltage should exist.

Yes or No

Yes >> GO TO 10.
No >> Check ECM. Refer to EC-125, "ECM Terminals and Reference Value" (with QG18DE), or EC-782, "ECM Terminals and Reference Value" (with QR25DE).



10. CHECK REFRIGERANT PRESSURE SENSOR

Refer to MTC-52, "REFRIGERANT PRESSURE SENSOR" .

OK or NG

OK >> GO TO 11.
NG >> Replace refrigerant pressure sensor.

11. CHECK CIRCUIT CONTINUITY BETWEEN FAN CONTROL SWITCH AND AIR CONTROL

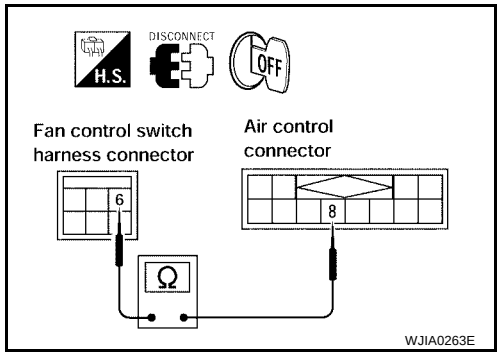
Disconnect air control and fan control switch.
Check circuit continuity between fan control switch harness connector M31 terminal No. 6 (Y/G) and air control harness connector M32 terminal No. 8 (Y/G).

Continuity should exist.

If OK, check harness for short.

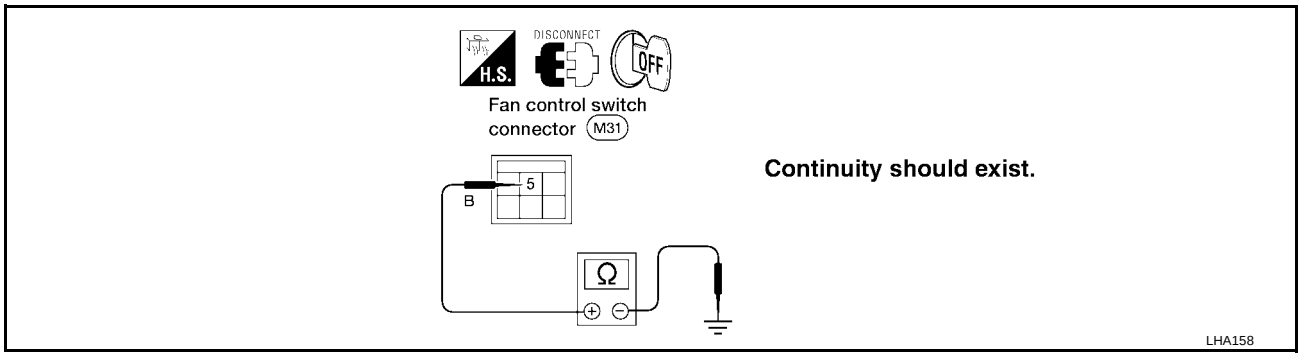
OK or NG

OK >> GO TO 12.
NG >> Repair harness or connector.



12. CHECK FAN CONTROL SWITCH GROUND

Disconnect fan control switch harness connector.
Does continuity exist between fan control switch harness terminal No. 5 and body ground?



Yes or No

Yes >> Replace air control.
No >> Repair harness or connector.

Electrical Component Inspection

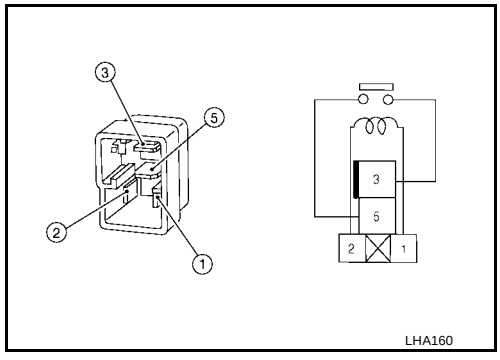
EJS001B6

A/C RELAY

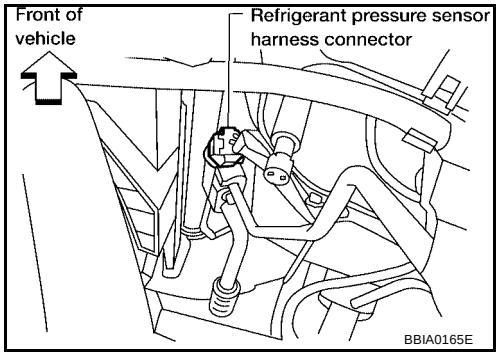
Check continuity between terminal Nos. 3 and 5.

Conditions	Continuity
12V direct current supply between terminal Nos. 1 and 2	Yes
No current supply	No

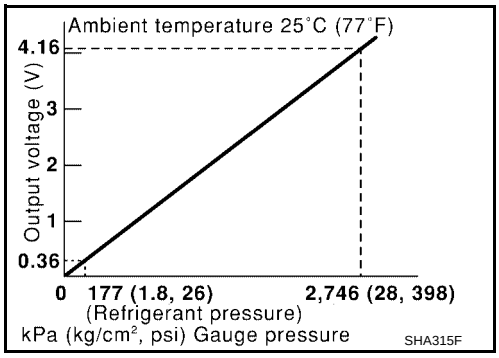
If NG, replace relay.



REFRIGERANT PRESSURE SENSOR



Make sure that higher A/C refrigerant pressure results in higher refrigerant pressure sensor output voltage.



INSUFFICIENT COOLING

PFP:00000

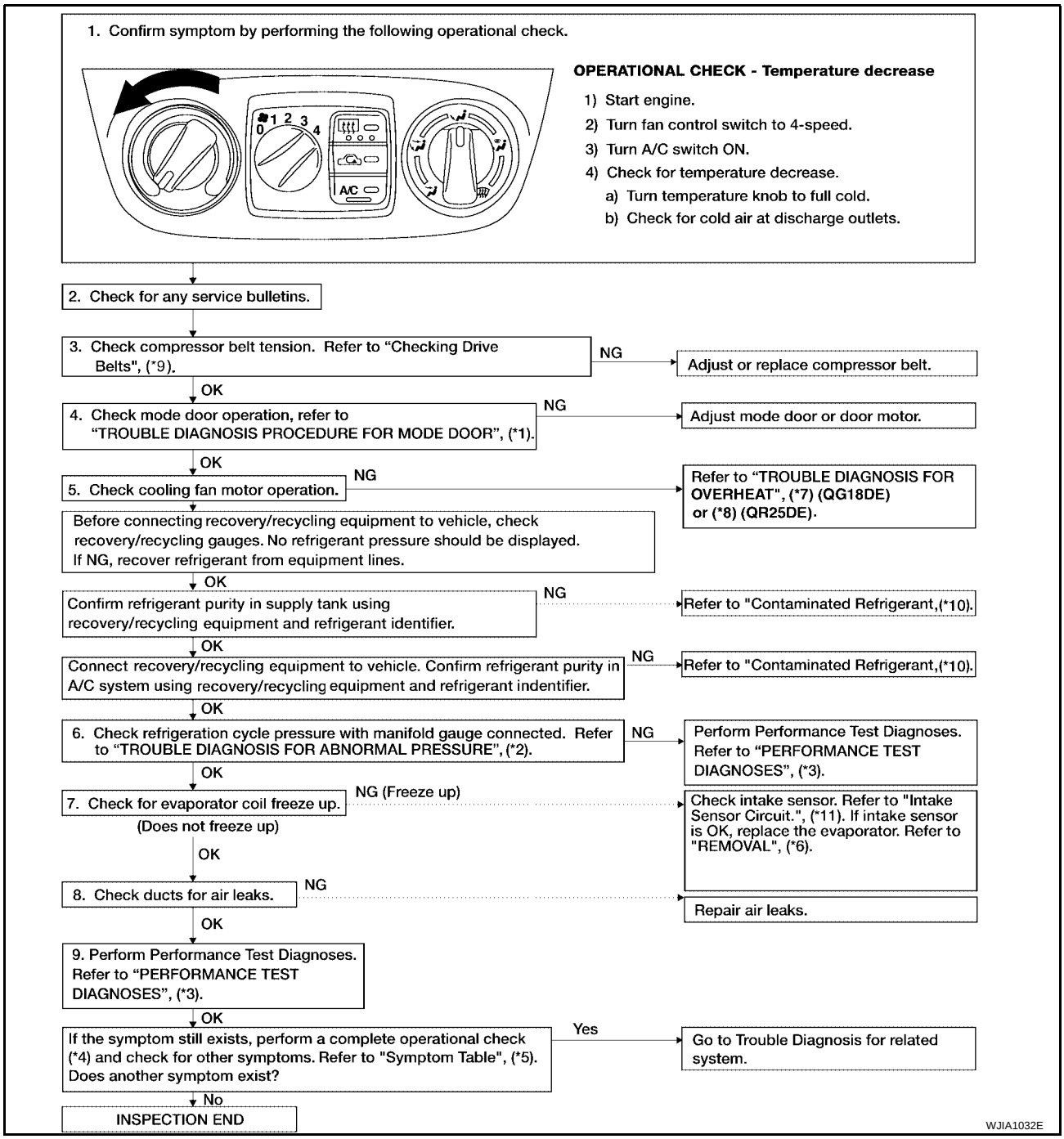
Trouble Diagnosis Procedure for Insufficient Cooling

EJS001B7

SYMPTOM:

- **Insufficient cooling**

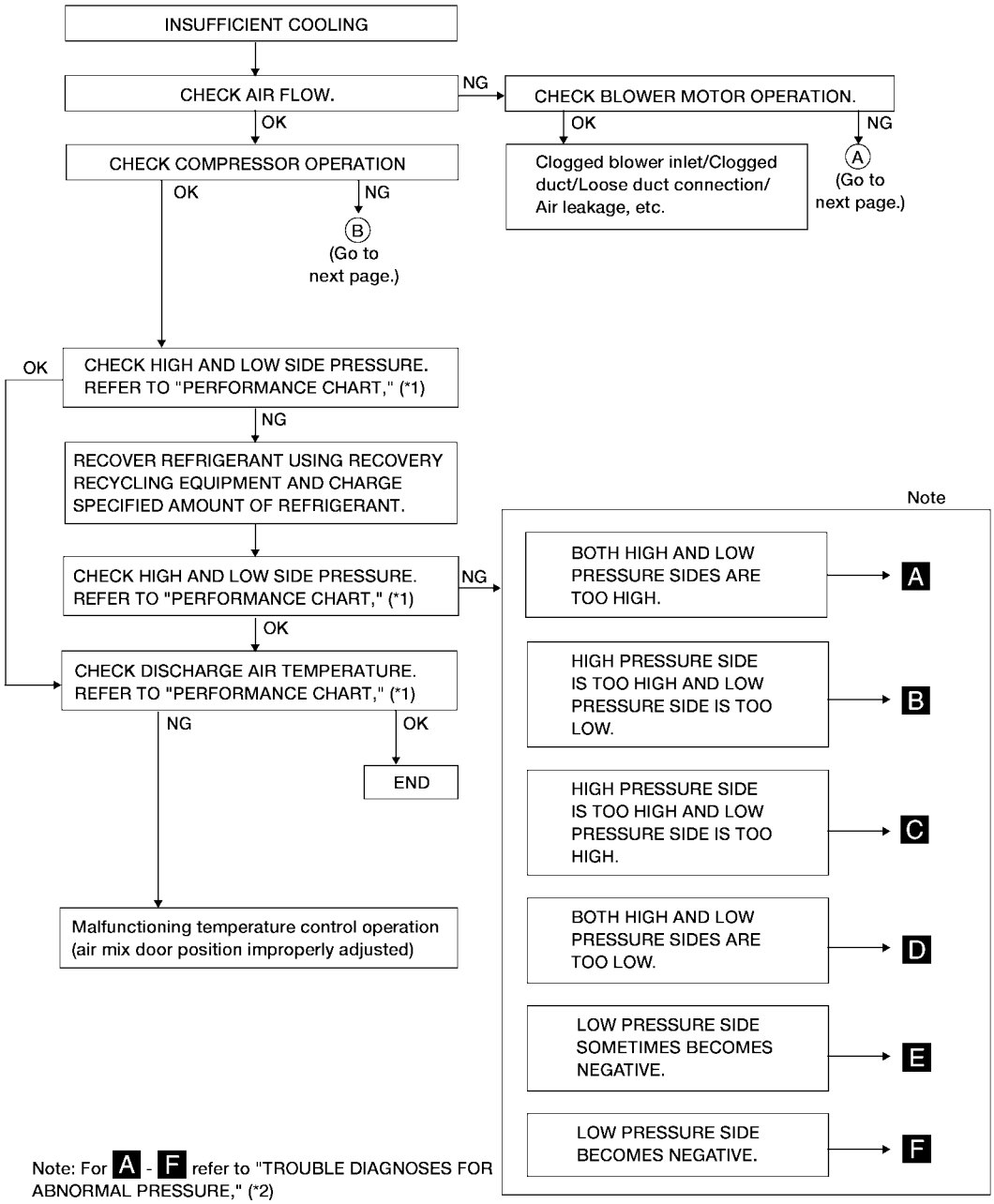
INSPECTION FLOW



*1	MTC-38	*2	MTC-57	*3	MTC-54
*4	MTC-31	*5	MTC-30	*6	MTC-76
*7	EC-454	*8	EC-1159	*9	MA-17 (QG18DE) or MA-24 (QR25DE)
*10	MTC-3	*11	MTC-62		

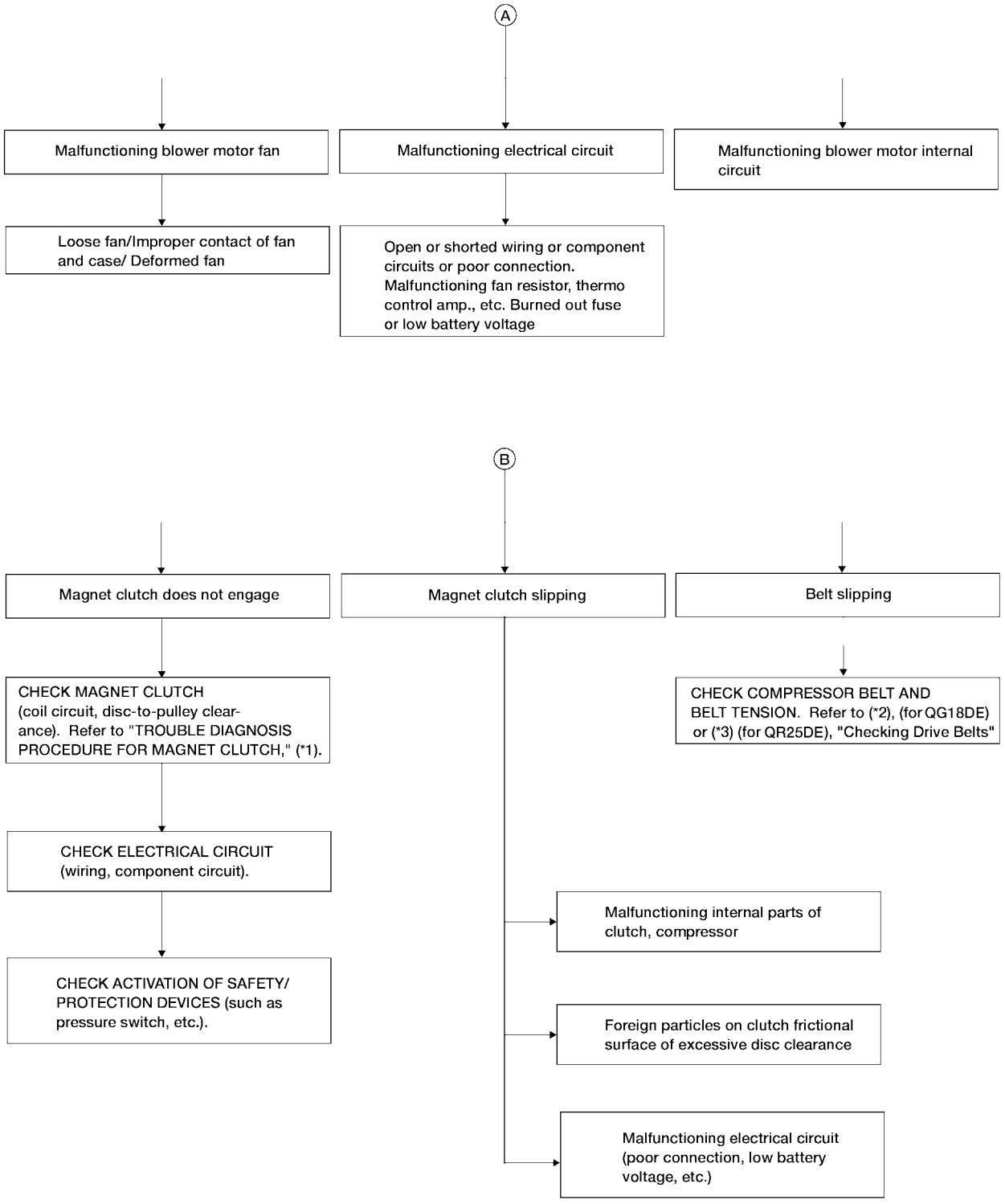
Performance Test Diagnoses

EJS001B8



LHA196

*1 MTC-56 *2 MTC-57



WJIA0008E

*1 MTC-47 *2 MA-16 *3 MA-23

Performance Chart

EJS001B9

The Nissan A/C system uses a thermal expansion valve to provide a restriction which causes a pressure change and also controls refrigerant flow through the evaporator.
The best way to diagnose a condition in the refrigerant system is to note the system pressures (shown by the manifold gauges) and the clutch cycle rate and times. Then, compare the findings to the charts.

- The system pressures are low (compressor suction) and high (compressor discharge).
- A clutch cycle is the time the clutch is engaged plus the time it is disengaged (time on plus time off).
- Clutch cycle times are the lengths of time (in seconds) that the clutch is ON and OFF.

TEST CONDITION

Testing must be performed as follows:

Vehicle location	Indoors or in the shade (in a well-ventilated place)
Doors	Closed
Door windows	Open
Hood	Open
TEMP. switch	Max. COLD
Mode switch	(Ventilation) set
REC switch	(Recirculation) set
(blower) speed	4-speed
Engine speed	1,500 rpm
Operate the air conditioning system for 10 minutes before taking measurements.	

TEST READING

Recirculating-to-Discharge Air Temperature Table

Inside air (Recirculating air) at blower assembly inlet		Discharge air temperature at center ventilator °C (°F)
Relative humidity %	Air temperature °C (°F)	
50 - 60	20 (68)	6.6 - 8.3 (44 - 47)
	25 (77)	10.4 - 12.4 (51 - 54)
	30 (86)	14.2 - 16.7 (58 - 62)
	35 (95)	18.2 - 21 (65 - 70)
	40 (104)	22.0 - 25.2 (72 - 77)
60 - 70	20 (68)	8.3 - 9.8 (47 - 50)
	25 (77)	12.4 - 14.4 (54 - 58)
	30 (86)	16.7 - 18.9 (62 - 66)
	35 (95)	21.0 - 23.6 (70 - 74)
	40 (104)	25.2 - 28.1 (77 - 83)

Ambient Air Temperature-to-Operating Pressure Table

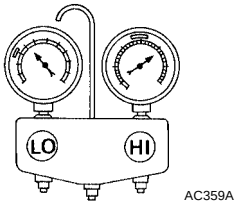
Ambient air		High-pressure (Discharge side) kPa (kg/cm^2 , psi)	Low-pressure (Suction side) kPa (kg/cm^2 , psi)
Relative humidity %	Air temperature °C (°F)		
50 - 70	20 (68)	961 - 1,187 (9.8 - 12.1, 139 - 172)	108 - 157 (1.1 - 1.6, 16 - 23)
	25 (77)	1,295 - 1,599 (13.2 - 16.3, 186 - 228)	161.8 - 215.8 (1.65 - 2.2, 23.5 - 31.3)
	30 (86)	1,285 - 1,599 (13.1 - 16.0, 186 - 228)	167 - 216 (1.7 - 2.2, 24 - 31)
	35 (95)	1,520 - 1,863 (15.5 - 19.0, 220 - 279)	235 - 284 (2.4 - 2.9, 34 - 41)
	40 (104)	1,765 - 2,158 (18 - 22, 256 - 313)	289.3 - 353.1 (2.95 - 3.6, 41.9 - 51.2)

Trouble Diagnoses for Abnormal Pressure

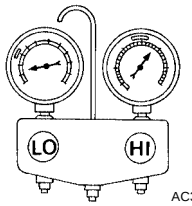
EJS001BA

Whenever system's high and/or low side pressure is abnormal, diagnose using a manifold gauge. The marker above the gauge scale in the following tables indicates the standard (normal) pressure range. However, since the standard (normal) pressure differs from vehicle to vehicle, refer to MTC-56, "Ambient Air Temperature-to-Operating Pressure Table" .

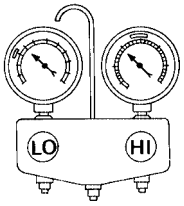
BOTH HIGH AND LOW-PRESSURE SIDES ARE TOO HIGH.

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high and low-pressure sides are too high. A  AC359A	● Pressure is reduced soon after water is splashed on condenser.	Excessive refrigerant charge in refrigeration cycle	Reduce refrigerant until specified pressure is obtained.
	Air suction by cooling fan is insufficient.	Insufficient condenser cooling performance ↓ 1. Condenser fins are clogged. 2. Improper fan rotation of cooling fan	● Clean condenser. ● Check and repair cooling fan as necessary.
	● Low-pressure pipe is not cold. ● When compressor is stopped high-pressure value quickly drops by approximately 196 kPa (2 kg/cm^2 , 28 psi). It then decreases gradually thereafter.	Poor heat exchange in condenser (After compressor operation stops, high pressure decreases too slowly.) ↓ Air in refrigeration cycle	Evacuate repeatedly and recharge system.
	Engine tends to overheat.	Engine cooling systems malfunction.	Check and repair each engine cooling system.
	● An area of the low-pressure pipe is colder than areas near the evaporator outlet. ● Plates are sometimes covered with frost.	● Excessive liquid refrigerant on low-pressure side ● Excessive refrigerant discharge flow ● Expansion valve is open a little compared with the specification. ↓ 1. Improper thermal valve installation 2. Improper expansion valve adjustment	Replace expansion valve.

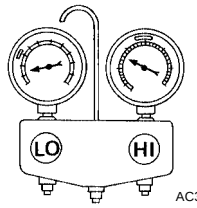
HIGH-PRESSURE SIDE IS TOO HIGH AND LOW-PRESSURE SIDE IS TOO LOW.

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too high and low-pressure side is too low. B  AC360A	Upper side of condenser and high-pressure side are hot, however, liquid tank is not so hot.	High-pressure tube or parts located between compressor and condenser are clogged or crushed.	● Check and repair or replace malfunctioning parts. ● Check lubricant for contamination.

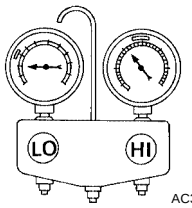
HIGH-PRESSURE SIDE IS TOO LOW AND LOW-PRESSURE SIDE IS TOO HIGH.

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too low and low-pressure side is too high. C  AC356A	High and low-pressure sides become equal soon after compressor operation stops.	Compressor pressure operation is improper. ↓ Damaged inside compressor packings	Replace compressor.
	No temperature difference between high and low-pressure sides	Compressor pressure operation is improper. ↓ Damaged inside compressor packings.	Replace compressor.

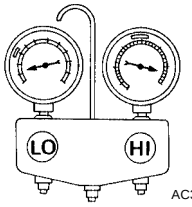
BOTH HIGH- AND LOW-PRESSURE SIDES ARE TOO LOW.

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high- and low-pressure sides are too low. D  AC353A	● There is a big temperature difference between receiver drier outlet and inlet. Outlet temperature is extremely low. ● Liquid tank inlet and expansion valve are frosted.	Compressor discharge capacity does not change. (Compressor stroke is set at maximum.)	● Replace liquid tank. ● Check lubricant for contamination.
	● Temperature of expansion valve inlet is extremely low as compared with areas near liquid tank. ● Expansion valve inlet may be frosted. ● Temperature difference occurs somewhere in high-pressure side	High-pressure pipe located between receiver drier and expansion valve is clogged.	● Check and repair malfunctioning parts. ● Check lubricant for contamination.
	● Expansion valve and liquid tank are warm or only cool when touched.	Low refrigerant charge ↓ Leaking fittings or components	Check refrigerant for leaks. Refer to MTC-82, "Checking Refrigerant Leaks" .
	There is a big temperature difference between expansion valve inlet and outlet while the valve itself is frosted.	Expansion valve closes a little compared with the specification. ↓ 1. Improper expansion valve adjustment 2. Malfunctioning thermal valve 3. Outlet and inlet may be clogged.	● Remove foreign particles by using compressed air. ● Check lubricant for contamination.
	An area of the low-pressure pipe is colder than areas near the evaporator outlet.	Low-pressure pipe is clogged or crushed.	● Check and repair malfunctioning parts. ● Check lubricant for contamination.
	Air flow volume is not enough or is too low.	Evaporator is frozen.	● Check intake sensor operation. Refer to MTC-62, "INTAKE SENSOR" . ● Replace expansion valve.

LOW-PRESSURE SIDE SOMETIMES BECOMES NEGATIVE.

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Low-pressure side sometimes becomes negative. E  AC354A	● Air conditioning system does not function and does not cyclically cool the compartment air. ● The system constantly functions for a certain period of time after compressor is stopped and restarted.	Refrigerant does not discharge cyclically. ↓ Moisture is frozen at expansion valve outlet and inlet. ↓ Water is mixed with refrigerant.	● Drain water from refrigerant or replace refrigerant. ● Replace liquid tank.

LOW-PRESSURE SIDE BECOMES NEGATIVE.

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Low-pressure side becomes negative. F  AC362A	Liquid tank or front/rear side of expansion valve's pipe is frosted or dewed.	High-pressure side is closed and refrigerant does not flow. ↓ Expansion valve or liquid tank is frosted.	Leave the system at rest until no frost is present. Start it again to check whether or not the problem is caused by water or foreign particles. ● If water is the cause, initially cooling is okay. Then the water freezes causing a blockage. Drain water from refrigerant or replace refrigerant. ● If due to foreign particles, remove expansion valve and remove particles with dry and compressed air (not shop air). ● If either of the above methods cannot correct the problem, replace expansion valve. ● Replace liquid tank. ● Check lubricant for contamination.

INSUFFICIENT HEATING

PFP:00000

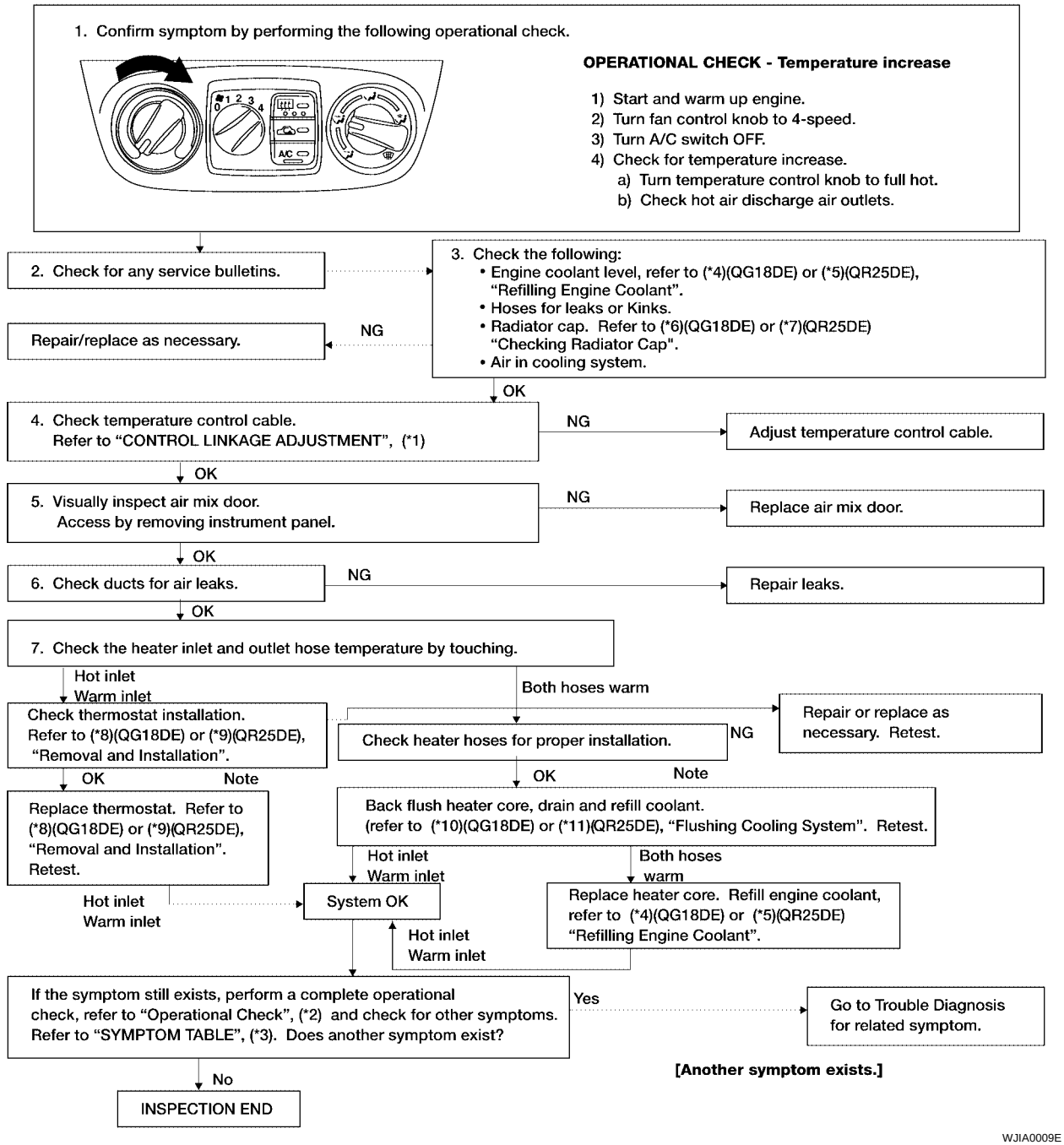
Trouble Diagnosis Procedure for Insufficient Heating

EJS001BB

Symptom:

- **Insufficient heating**

Inspection Flow



*1	MTC-37	*2	MTC-31	*3	MTC-30
*4	MA-17	*5	MA-24	*6	CO-9
*7	CO-36	*8	CO-12	*9	CO-30
*10	MA-19	*11	MA-25		

NOISE

PFP:00004

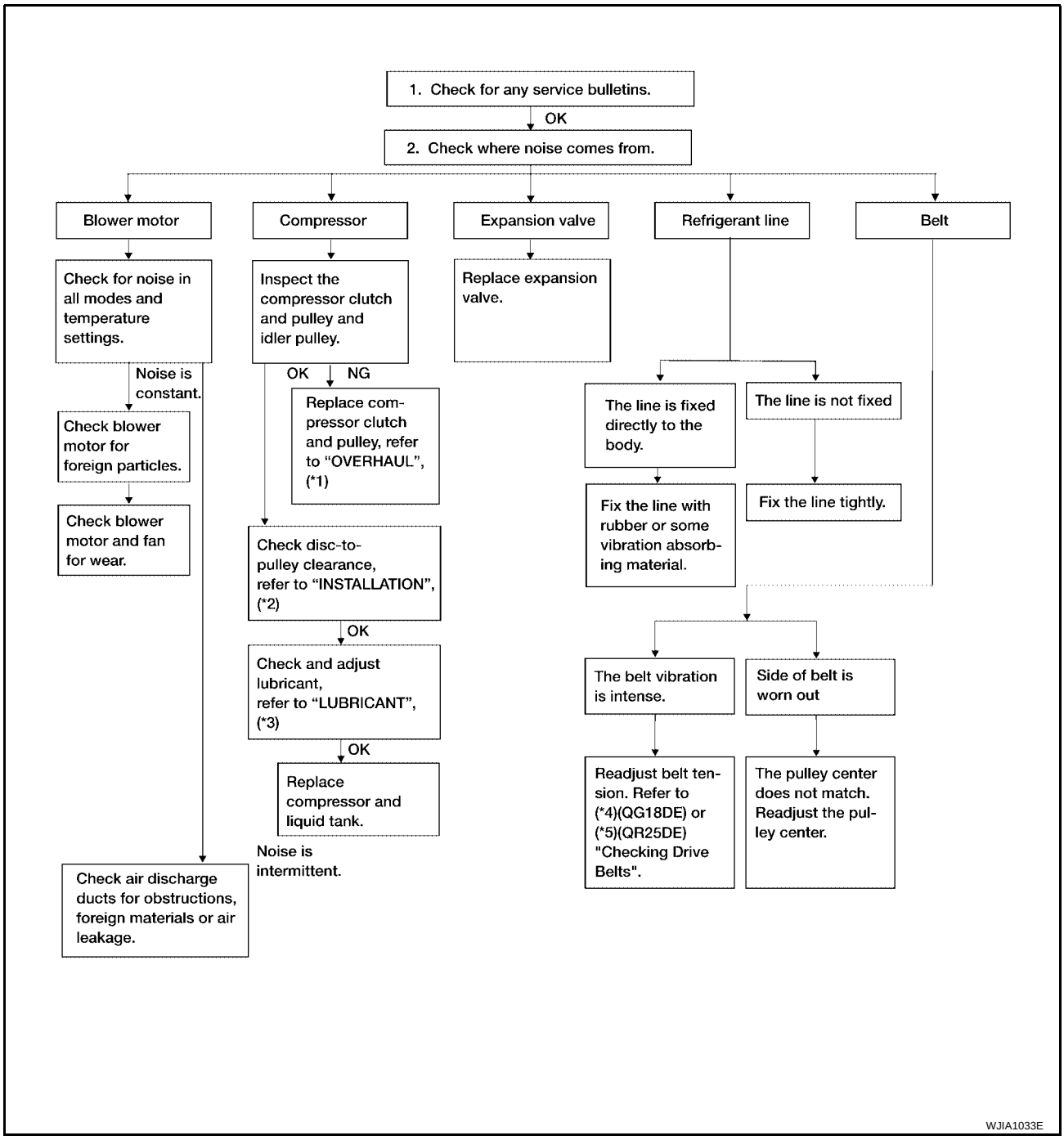
Trouble Diagnosis Procedure for Noise

EJS001BC

SYMPTOM:

- **Noise**

INSPECTION FLOW



*1 MTC-65 *2 MTC-68 *3 MTC-16

*4 MA-16 *5 MA-23

INTAKE SENSOR

PFP:27723

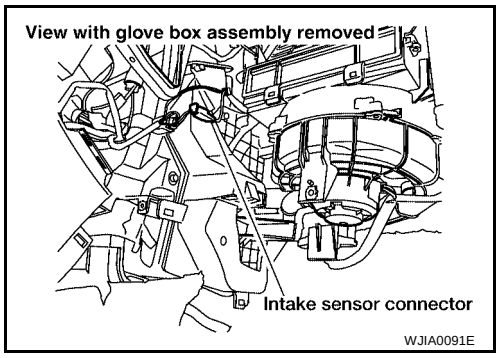
Intake Sensor Circuit

EJS001GW

COMPONENT DESCRIPTION

Intake Sensor

The intake sensor is located on the heater and cooling unit. It converts temperature of air after it passes through the evaporator into a resistance value which is then input to the air control.
After disconnecting intake sensor harness connector, measure resistance between terminals 1 and 2 at sensor harness side, using the table below.

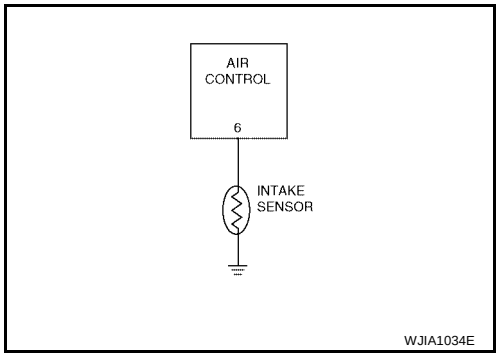


Temperature °C (°F)	Resistance kΩ
-15 (5)	12.34
-10 (14)	9.62
-5 (23)	7.56
0 (32)	6.00
5 (41)	4.80
10 (50)	3.87
15 (59)	3.15
20 (68)	2.57
25 (77)	2.12
30 (86)	1.76
35 (95)	1.47
40 (104)	1.23
45 (113)	1.04

If NG, replace intake sensor.

DIAGNOSTIC PROCEDURE

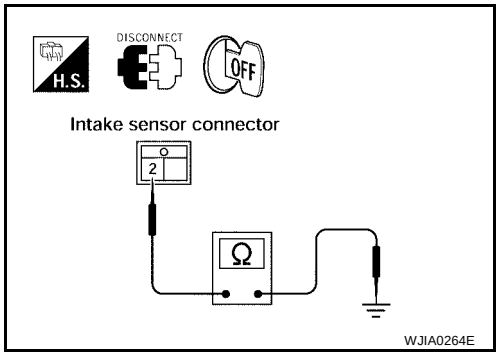
SYMPTOM: Intake sensor circuit is open or shorted.



1. CHECK INTAKE SENSOR CIRCUIT BETWEEN INTAKE SENSOR AND BODY GROUND

Disconnect intake sensor harness connector.

Terminals			Continuity
(+)		(–)	
Connector	Terminal No. (Wire color)	Body ground	Yes
M49	2 (B)		



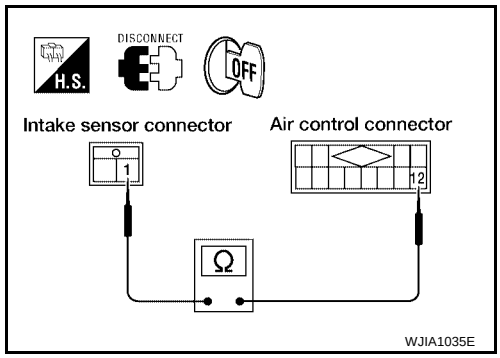
OK or NG

OK >> GO TO 2.
NG >> Repair harness or connector.

2. CHECK INTAKE SENSOR CIRCUIT BETWEEN INTAKE SENSOR AND AIR CONTROL

Disconnect air control harness connector.

Terminals				Continuity
(+)		(–)		
Connector	Terminal No. (Wire color)	Connector	Terminal No. (Wire color)	Yes
M49	1 (GY)	M32	12 (GY)	



OK or NG

OK >> GO TO 3.
NG >> Repair harness or connector.

3. CHECK INTAKE SENSOR

Refer to MTC-62, "Intake Sensor Circuit" .

OK or NG

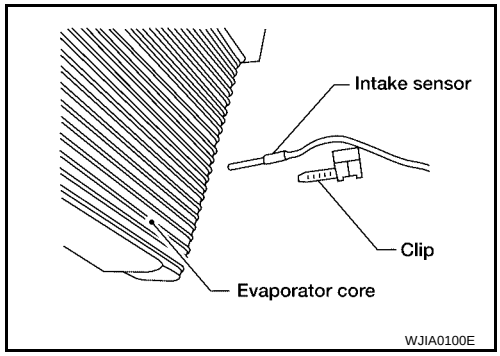
OK >> Replace air control.
NG >> Replace intake sensor.

Removal and Installation

EJS001GV

1. Remove the evaporator. Refer to MTC-76, "Removal" .
2. Remove the intake sensor clip and then the sensor.

CAUTION:
Be careful not to damage the core surface.

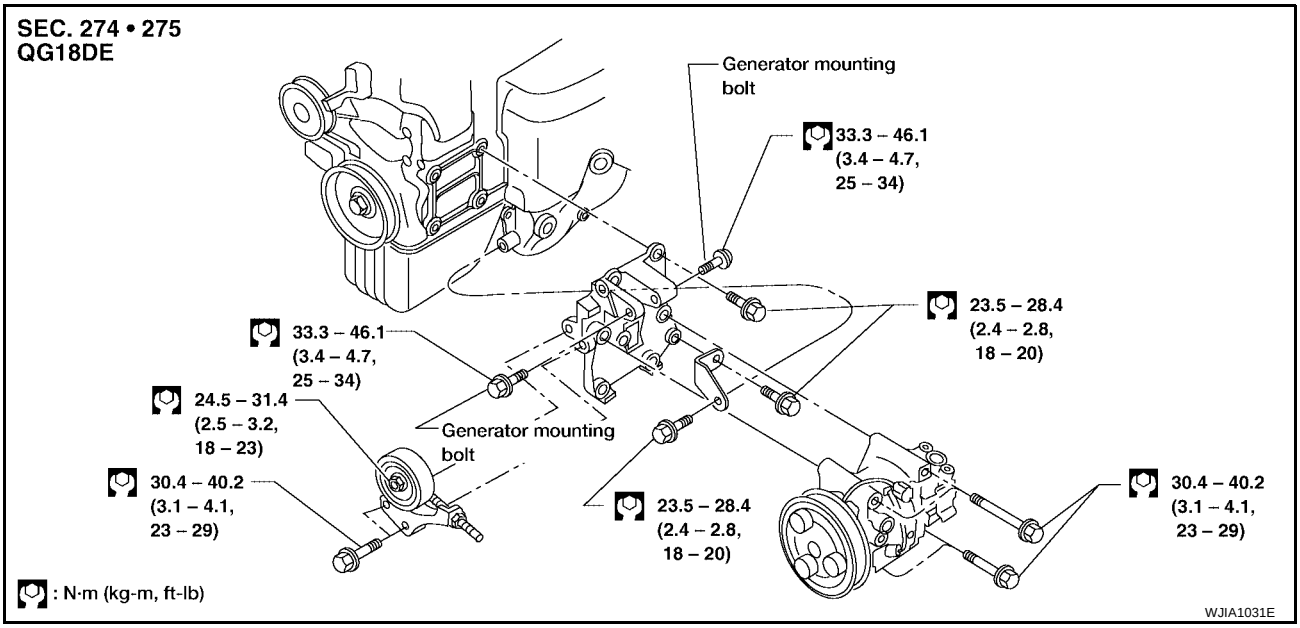


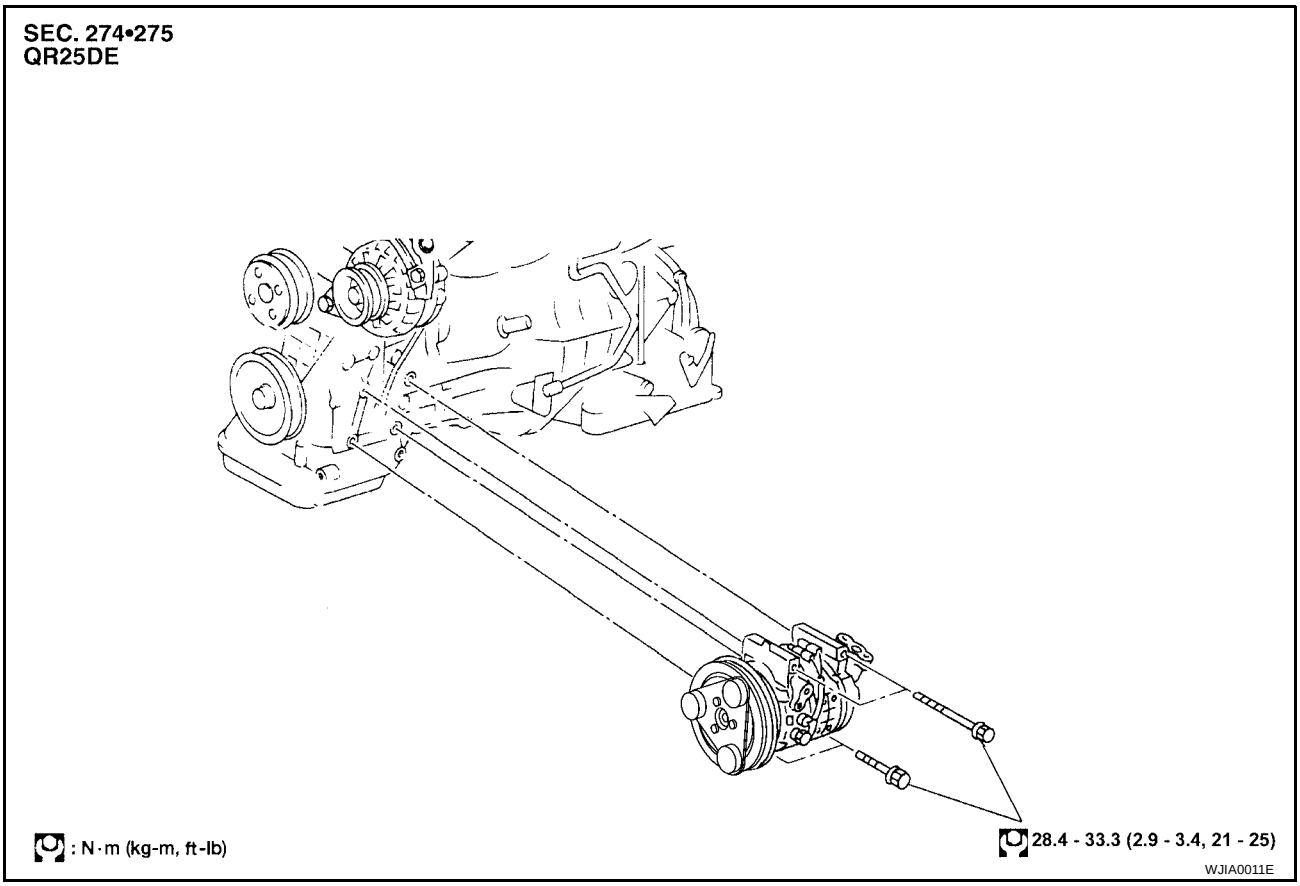
COMPRESSOR

PFP:92600

Removal and Installation

EJS001BD





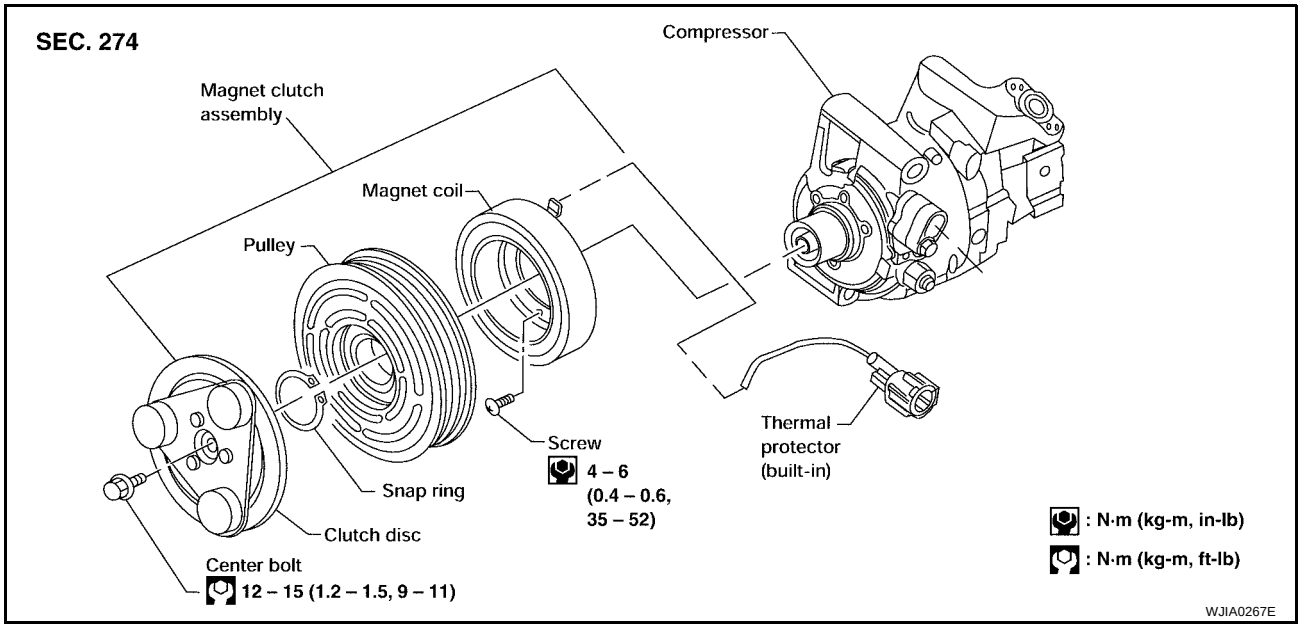
COMPRESSOR CLUTCH

PFP:92600

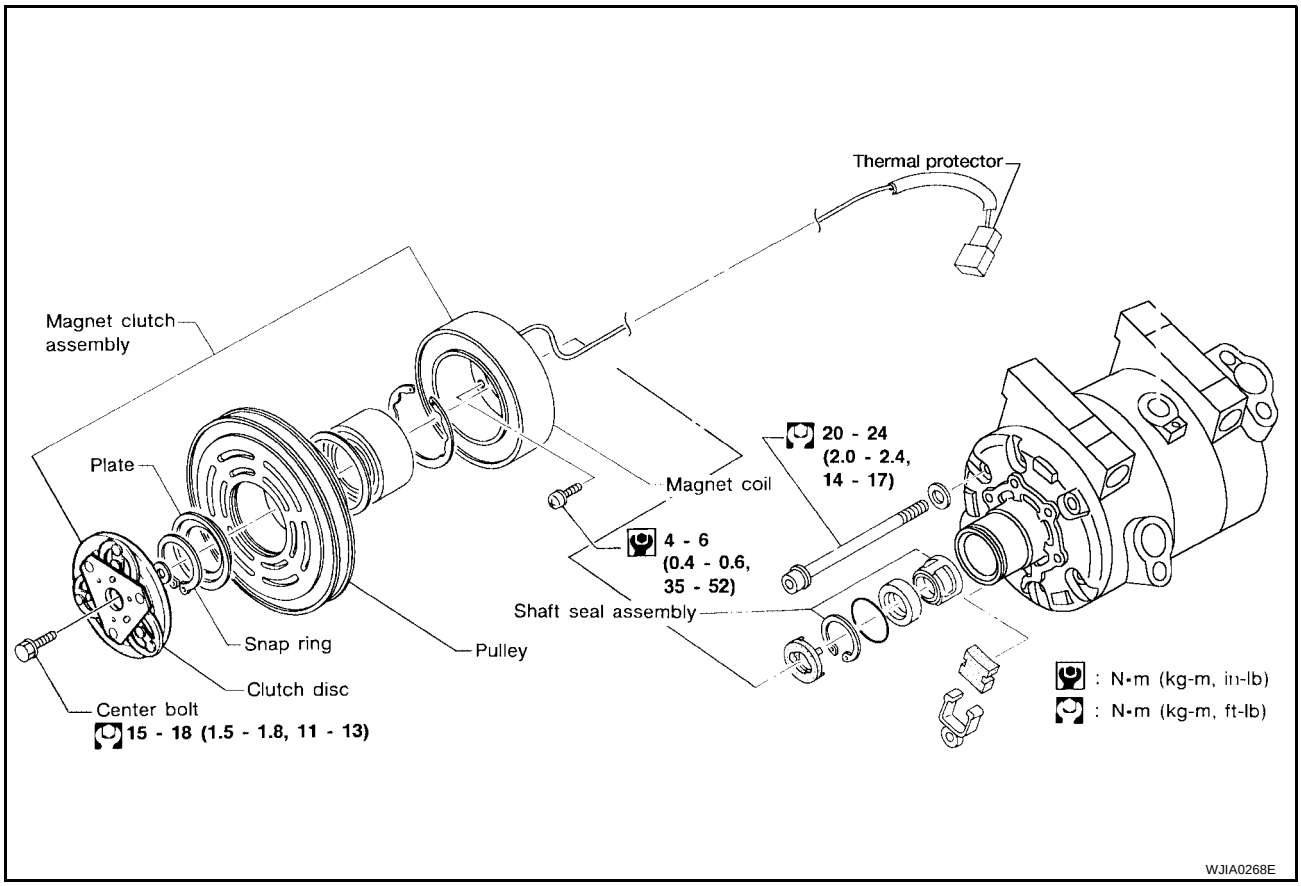
Overhaul

EJS001BE

QG18DE



QR25DE

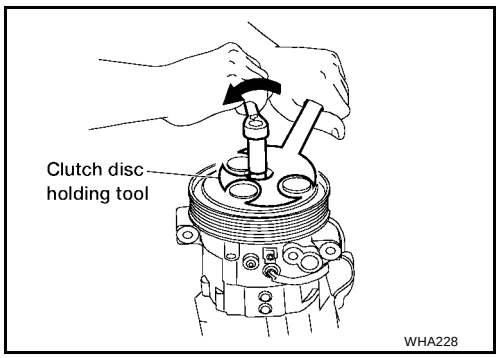


Removal

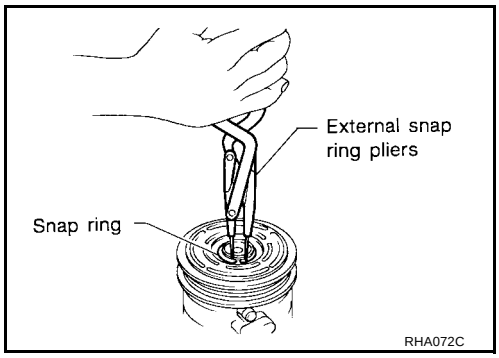
EJS001BF

QG18DE

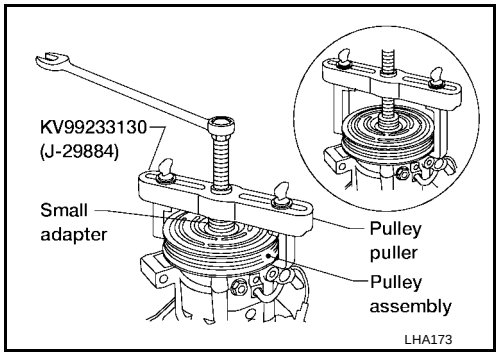
- When removing center bolt, hold clutch disc with clutch disc tool.
- Remove the clutch disc.
  Clutch disc holding tool:
  (J-44614) Commercial service tool

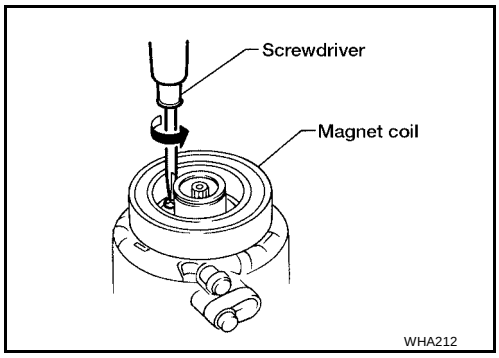


- Remove the snap ring using external snap ring pliers.



- Pulley removal:



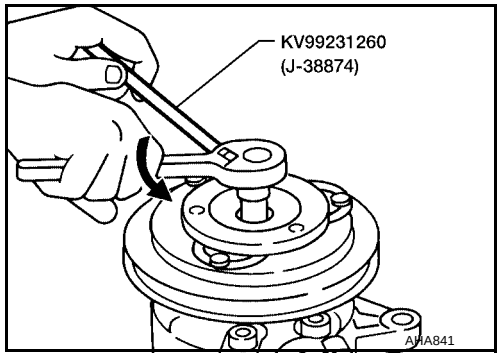


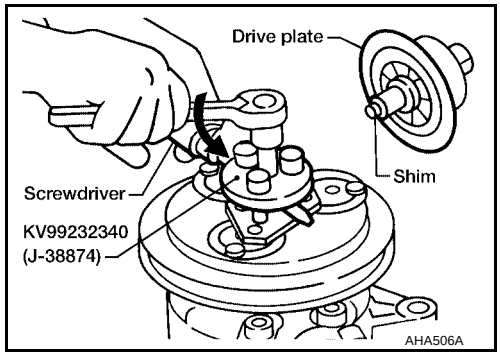
Use a pulley puller with small adapter. Position the small adapter on the end of the drive shaft and the center of the puller on the small adapter. Remove the pulley assembly with the puller.
To prevent deformation of the pulley groove, the puller claws should be hooked under (not into) the pulley groove.

- Remove the snap ring using external snap ring pliers.
- Remove the magnet coil harness clip using a screwdriver, the three magnet coil fixing screws and remove the magnet coil.

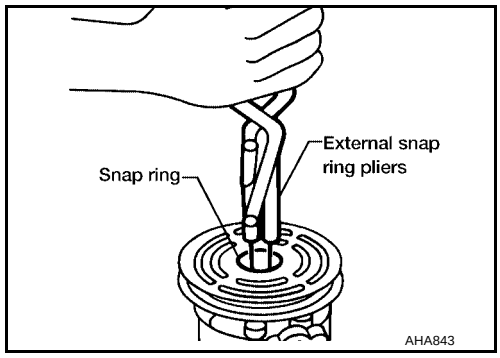
QR25DE

- When removing center bolt, hold clutch disc with clutch disc tool.
- Remove the drive plate using the clutch disc puller.
  Insert the holder's three pins into the drive plate. Rotate the holder clockwise to hook it onto the plate. Then tighten the center bolt to remove the drive plate.
  While tightening the center bolt, insert a round bar (screwdriver, etc.) between two of the pins (as shown in the figure) to prevent drive plate rotation. After removing the drive plate, remove the shims from either the drive shaft or the drive plate.

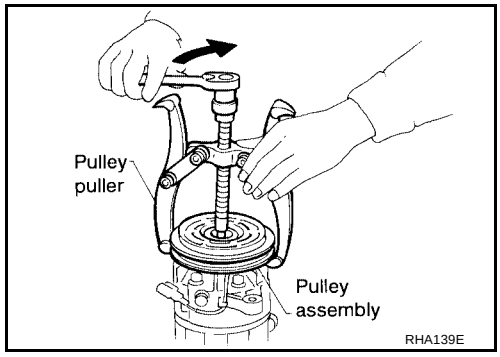




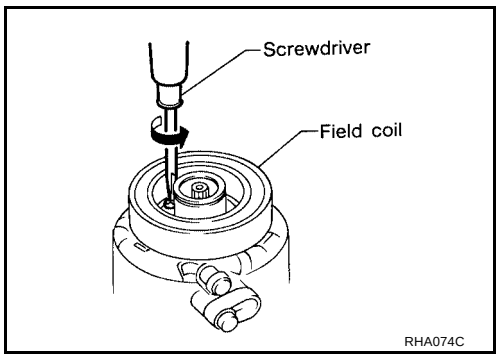
- Remove the snap ring using external snap ring pliers.



- For pulley removal, use pulley puller.
  Use a commercially available pulley puller. Position the center of the puller on the end of the drive shaft. Remove the pulley assembly with the puller.
  To prevent deformation of the pulley groove, the puller claws should be hooked under (not into) the pulley groove.
- Remove the field coil harness clip using a screwdriver.



- Remove the three field coil fixing screws and remove the field coil.

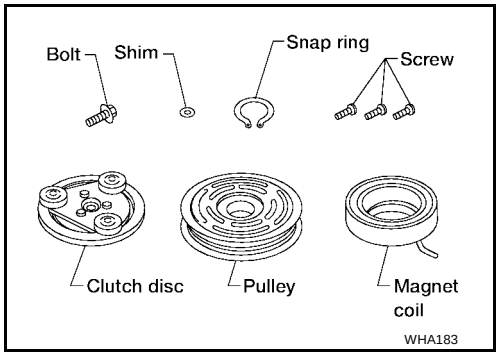


Inspection

EJS001BG

CLUTCH DISC

If the contact surface shows signs of damage due to excessive heat, replace clutch disc and pulley.



PULLEY

Check the appearance of the pulley assembly. If contact surface of pulley shows signs of excessive grooving, replace clutch disc and pulley. The contact surfaces of the pulley assembly should be cleaned with a suitable solvent before reinstallation.

COIL

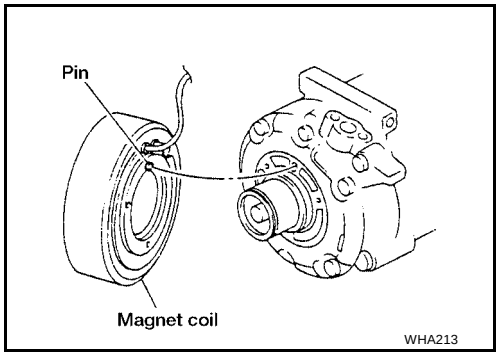
Check magnet coil for loose connection or cracked insulation.

Installation

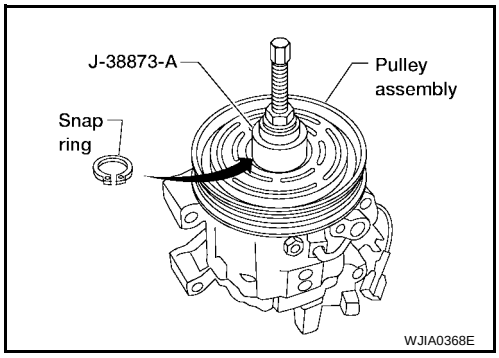
EJS001BH

QG18DE

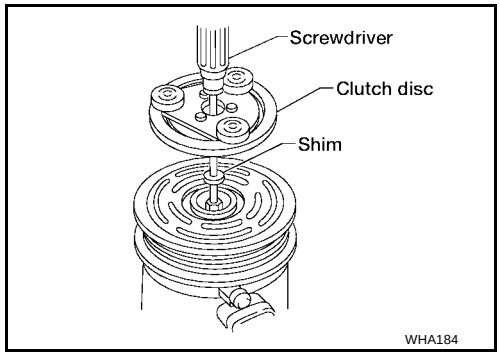
- Install the magnet coil.
  Be sure to align the magnet coil pin with the hole in the compressor front head.
- Install the magnet coil harness clip using a screwdriver.



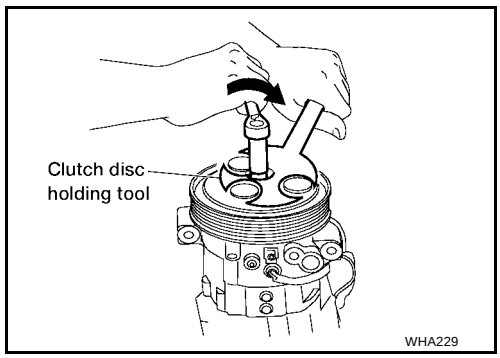
- Install the pulley assembly using the installer and a wrench, and then install the snap ring using snap ring pliers.



- Install the clutch disc on the drive shaft, together with the original shim(s). Press the clutch disc down using the drive plate installer.



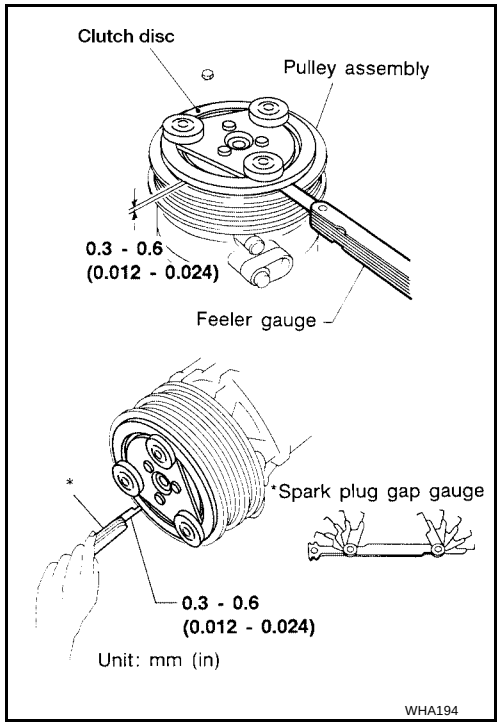
- Using the clutch disc tool to prevent clutch disc rotation, tighten the bolt to 12 to 15 N·m (1.2 to 1.5 kg-m, 9 to 11 ft-lb) torque.
- **After tightening the bolt, check that the pulley rotates smoothly.**



- Check clearance all the way around the clutch disc.

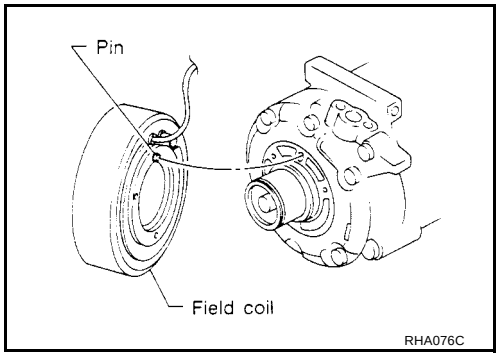
  Clutch disc-to-pulley clearance : 0.3 - 0.6 mm (0.012 - 0.024 in)

  If the specified clearance is not obtained, replace adjusting spacer and readjust.

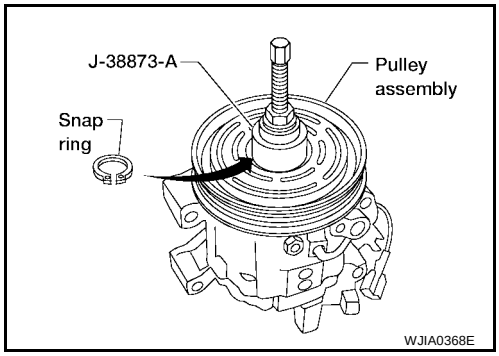


QR25DE

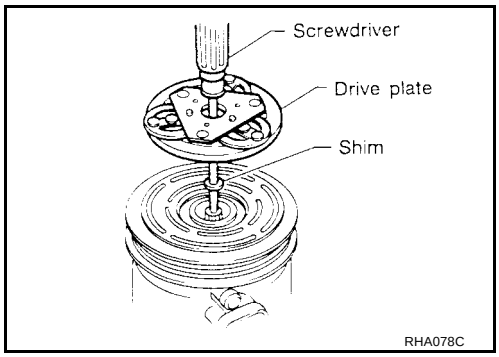
- Install the field coil.
  Be sure to align the magnet coil pin with the hole in the compressor front head.
- Install the magnet coil harness clip using a screwdriver.



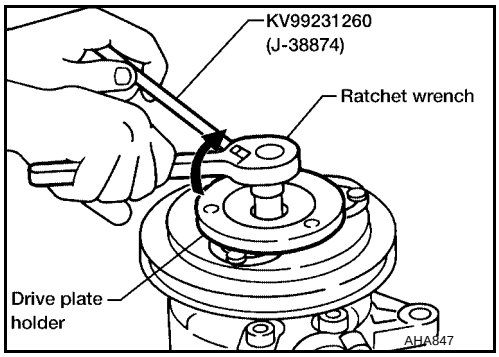
- Install the pulley assembly using the installer, and then install the snap ring using snap ring pliers.



- Install the drive plate on the drive shaft, together with the original shim(s). Press the drive plate down with the installer.



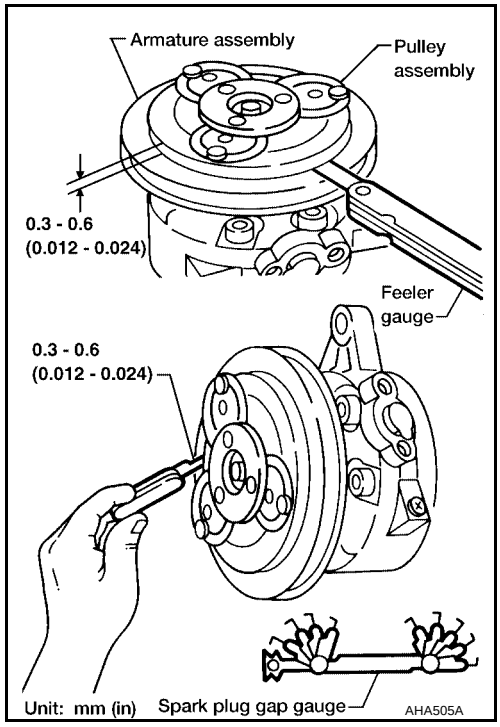
- Using the holder to prevent clutch disc rotation, tighten the bolt to 12 to 15 N-m (1.2 to 1.5 kg-m, 9 to 11 ft-lb) torque.
- **After tightening the bolt, check that the pulley rotates smoothly.**



- Check clearance all the way around the clutch disc.

  Clutch disc-to-pulley clearance : 0.3 - 0.6 mm (0.012 - 0.024 in)

  If the specified clearance is not obtained, replace adjusting spacer and readjust.



Break-In Operation

EJS001BI

When replacing compressor clutch assembly, always conduct the break-in operation. This is done by engaging and disengaging the clutch about 30 times. Break-in operation raises the level of transmitted torque.

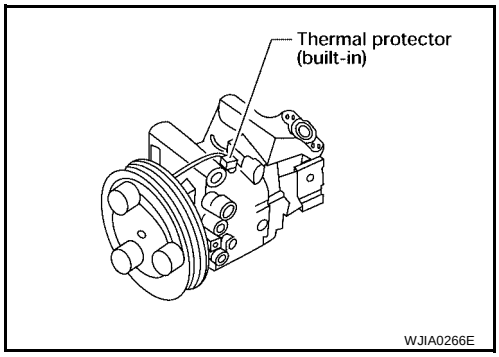
THERMAL PROTECTOR

PFP:27631

Inspection

EJS001BJ

- Check continuity between terminal and ground.



IN-CABIN MICROFILTER

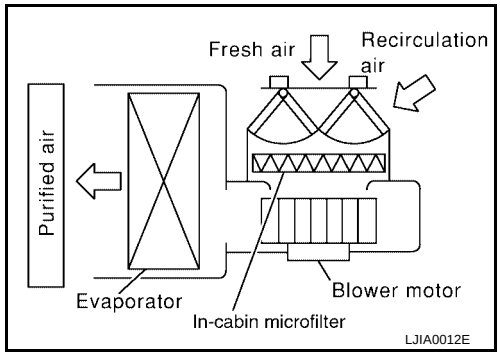
PFP:27277

Removal and Installation

EJS001GX

FUNCTION

Air inside passenger compartment is kept clean at either recirculation or fresh mode by installing in-cabin microfilter into blower unit.

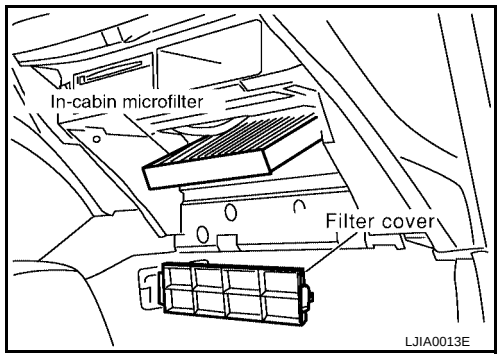


REPLACEMENT TIMING

Refer to MA-7, "Schedule 1" or MA-11, "Schedule 2" .
Caution label is affixed inside the glove box.

REPLACEMENT PROCEDURES

1. Remove glove box assembly. Refer to IP-10, "Removal and Installation" .
2. Remove in-cabin microfilter cover.
3. Remove the in-cabin microfilter from blower unit.
4. Replace with new in-cabin microfilter and reinstall cover on blower unit.
5. Reinstall glove box assembly.

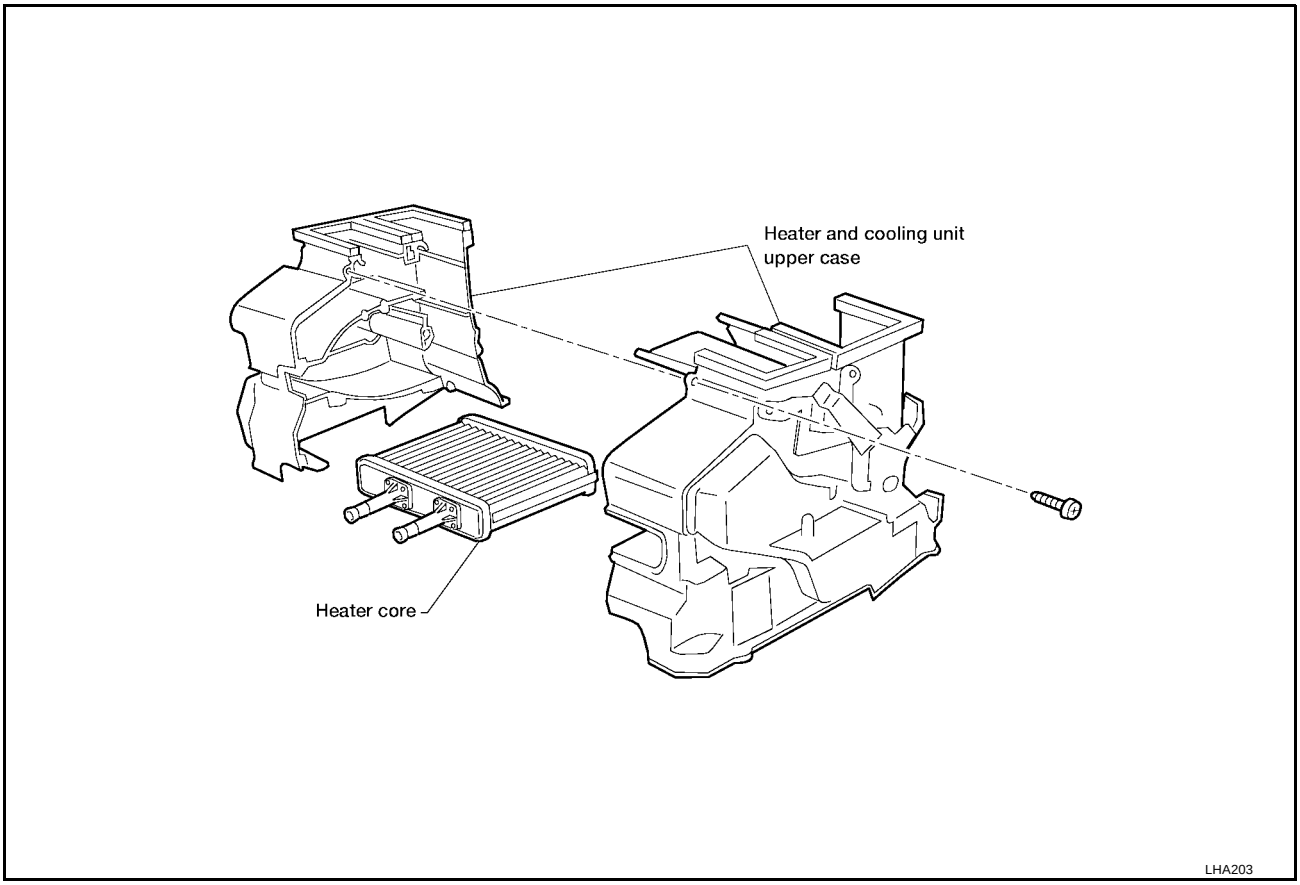


HEATER & COOLING UNIT (HEATER CORE)

PFP:27110

Removal

EJS001BK



1. Drain the cooling system. Refer to MA-16, "DRAINING ENGINE COOLANT" (QG18DE), or MA-23, "DRAINING ENGINE COOLANT" (QR25DE).
2. Discharge the A/C system. Refer to MTC-78, "Discharging Refrigerant" .
3. Disconnect the two heater hoses from inside the engine compartment.
4. Remove the instrument panel assembly and steering member assembly. Refer to IP-10, "INSTRUMENT PANEL ASSEMBLY" .
5. Remove blower unit. Refer to MTC-75, "Removal" .
6. Remove the heater and cooling unit.
7. Remove the heater core.

Installation

EJS001BL

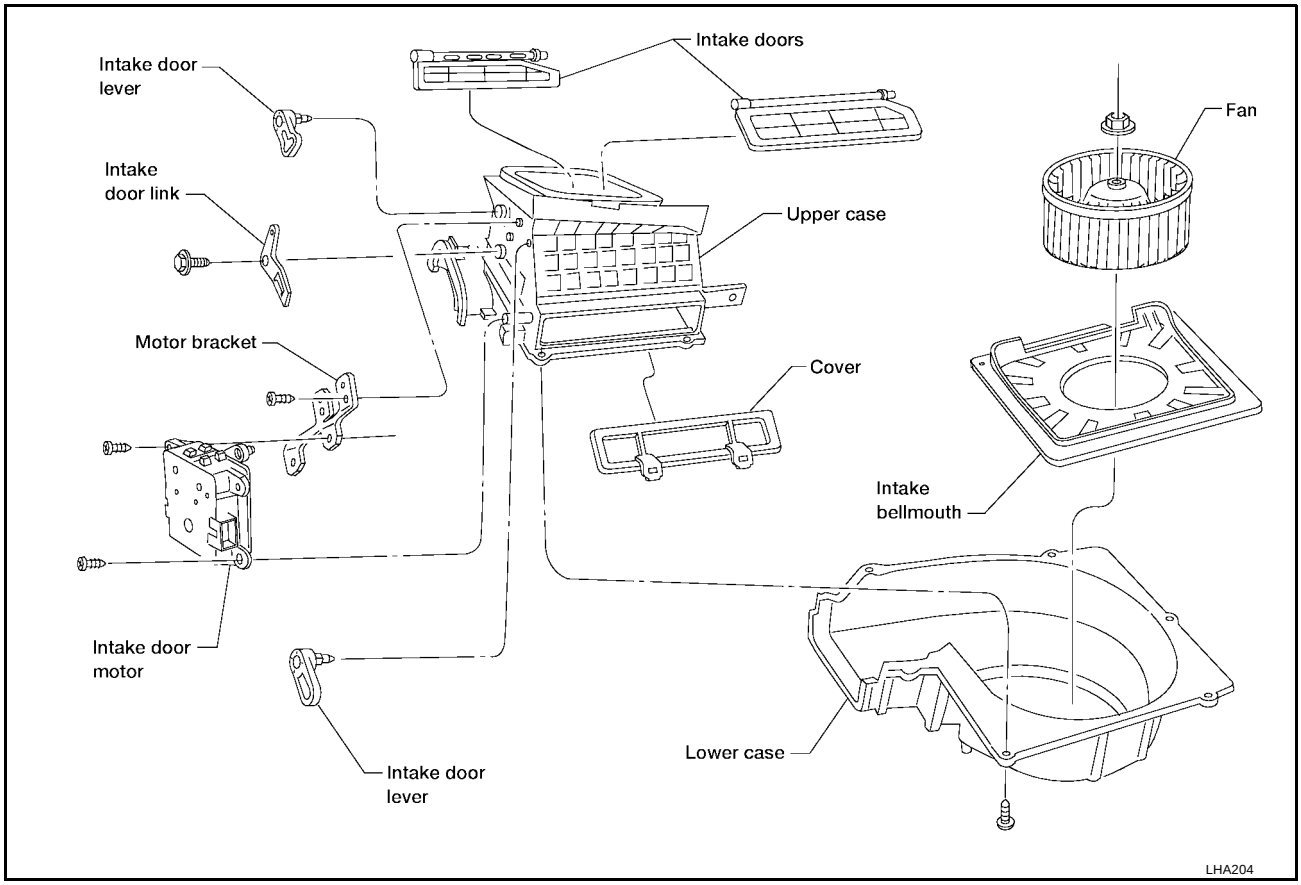
Install in the reverse order of removal.
When filling radiator with coolant, refer to MA-16, "DRAINING ENGINE COOLANT" (QG18DE), or MA-23, "DRAINING ENGINE COOLANT" (QR25DE).
Recharge the A/C system. Refer to MTC-78, "Evacuating System and Charging Refrigerant" .

BLOWER UNIT

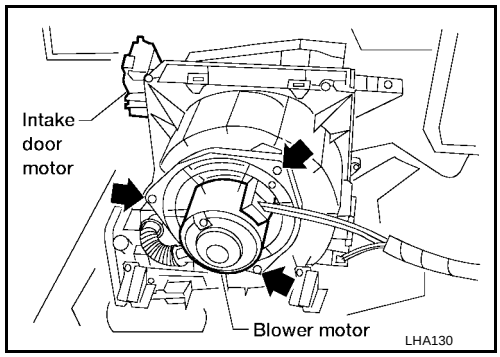
PFP:27200

Removal

EJS001BM



1. Discharge the A/C system. Refer to MTC-78, "Discharging Refrigerant" .
2. Disconnect the two refrigerant lines from the engine compartment.
   Cap the A/C lines to prevent moisture from entering the system.
3. Remove the glove box and mating trim. Refer to IP-10, "Removal and Installation" .
4. Remove cooling unit. Refer to MTC-76, "Removal" .
5. Disconnect the resistor and blower motor connector.
6. Remove blower unit.
7. Remove the three bolts and then remove the motor from the blower case.



Installation

EJS001BN

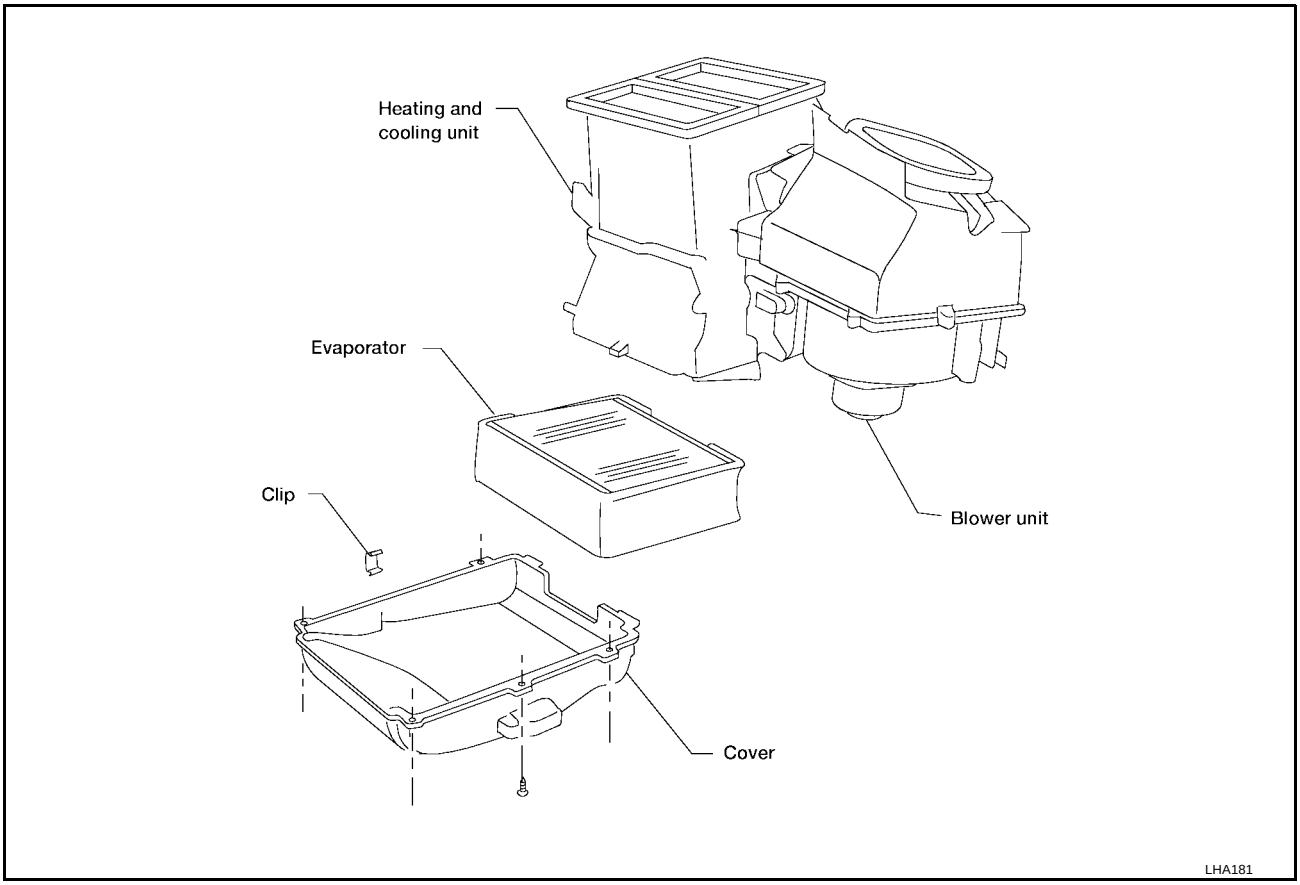
Install in the reverse order of removal.
Recharge the A/C system. Refer to MTC-78, "Evacuating System and Charging Refrigerant" .

A/C EVAPORATOR

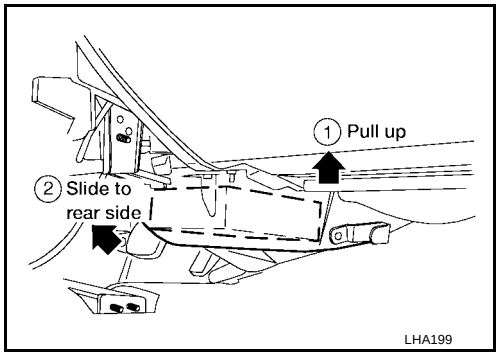
PFP:27280

Removal

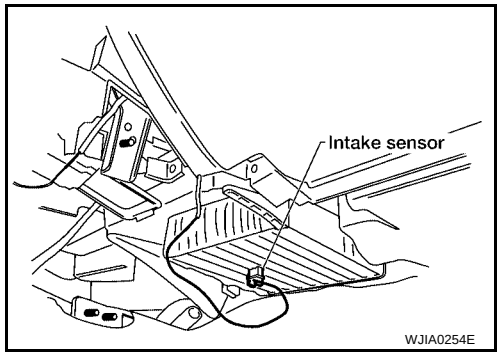
EJS001BO



1. Discharge the A/C system. Refer to MTC-78, "Discharging Refrigerant" .
2. Remove clamp bolt and remove low-pressure and high-pressure lines from cooling unit (expansion valve). Remove lines from retaining clip on dash panel and move lines away from dash panel for clearance.
3. Install caps over cooling unit (expansion valve) ports and lines.
4. Remove both side front console side covers.
5. Remove passenger side instrument panel lower cover and left lower instrument cover clip (from blower case).
6. Remove center console.
7. Remove instrument stay assemblies LH and RH.
8. Remove floor air duct risers on the right and left sides of the console front brackets (if equipped).
9. Disconnect cooling unit drain hose from lower cooling unit cover.
10. Remove five screws and clip from heating and cooling unit lower cover.
11. Drop lower cover as far as possible, reach inside of case and slide evaporator core rearward away from dash panel as far as possible so that rear of evaporator core slides up on case retaining tabs. Evaporator core may be pushed from engine compartment to ease movement. (This provides clearance at the front of the unit so that the cover can be removed).
12. Remove lower cover.



13. Mark installation point of intake sensor and remove intake sensor from evaporator core.
14. Remove evaporator core from case by sliding forward off of case retaining tabs.
15. Remove expansion valve from evaporator core (if necessary).



Installation

EJS001BP

Installation is the reverse of removal*.
Recharge the A/C system. Refer to MTC-78, "Evacuating System and Charging Refrigerant" .
*: When installing lower cover to cooling unit case, ensure that the thermo probe is in the same location as originally installed, and that the intake sensor wire is properly positioned in case slot.

NOTE:
Be sure that the evaporator core is fully seated against the dash panel before securing lower cover.

REFRIGERANT LINES

PFP:92600

HFC-134a (R-134a) Service Procedure

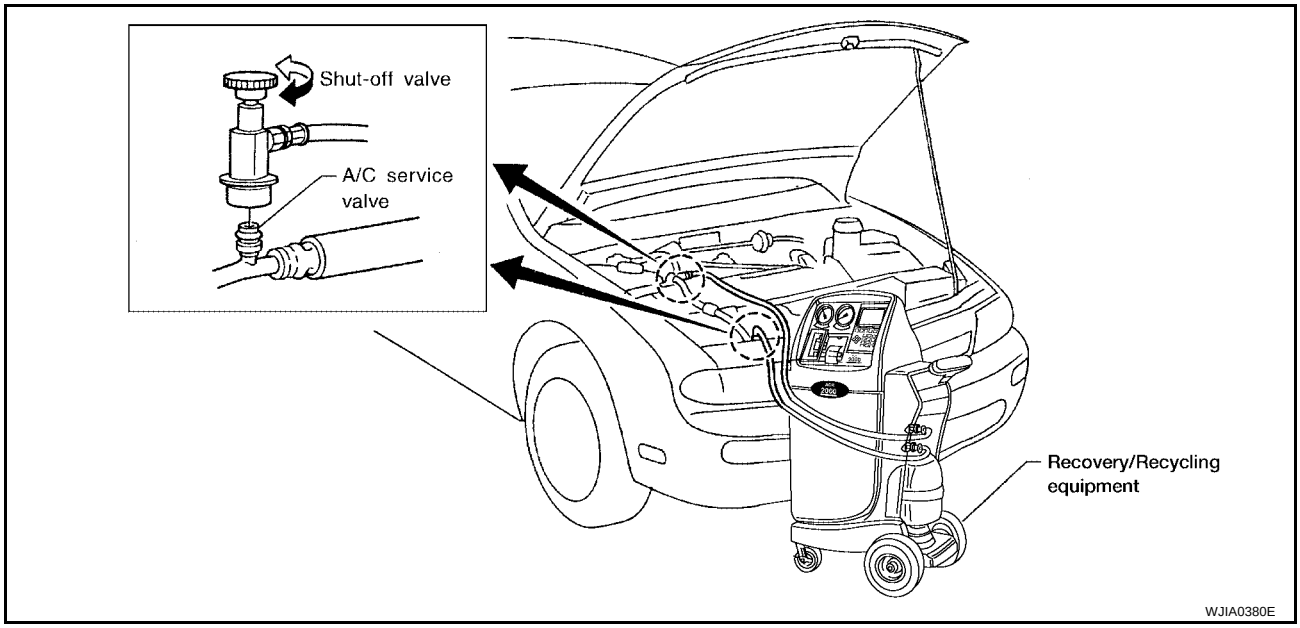
EJS001BQ

SETTING OF SERVICE TOOLS AND EQUIPMENT

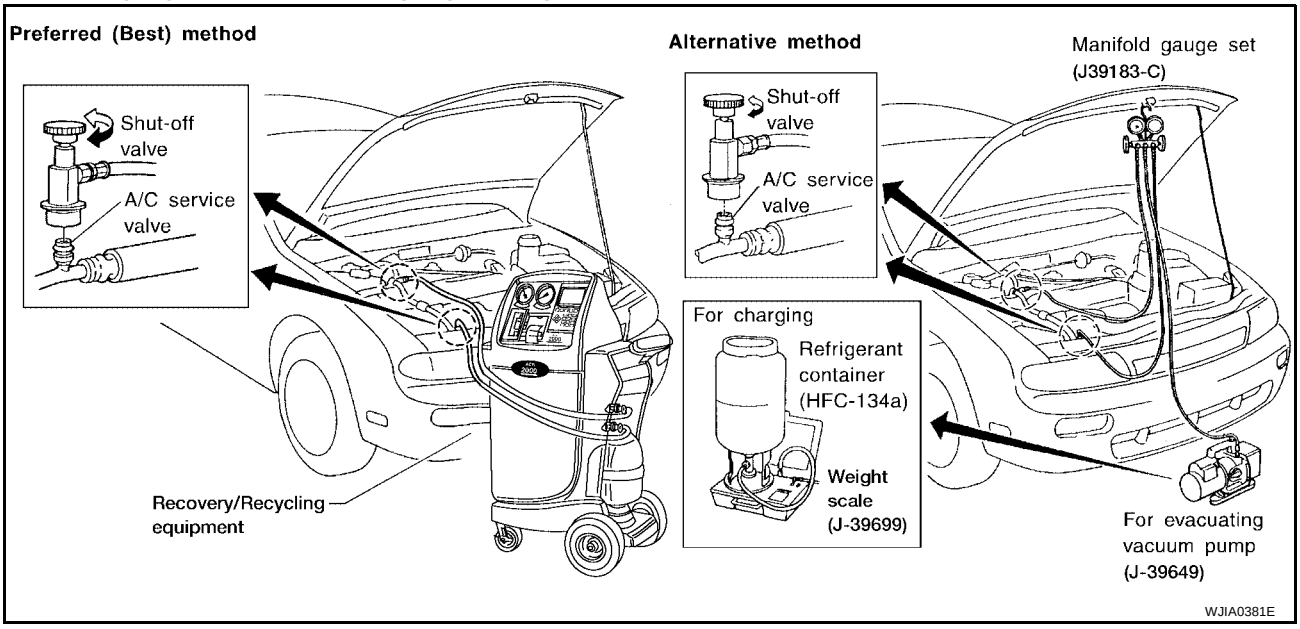
Discharging Refrigerant

WARNING:

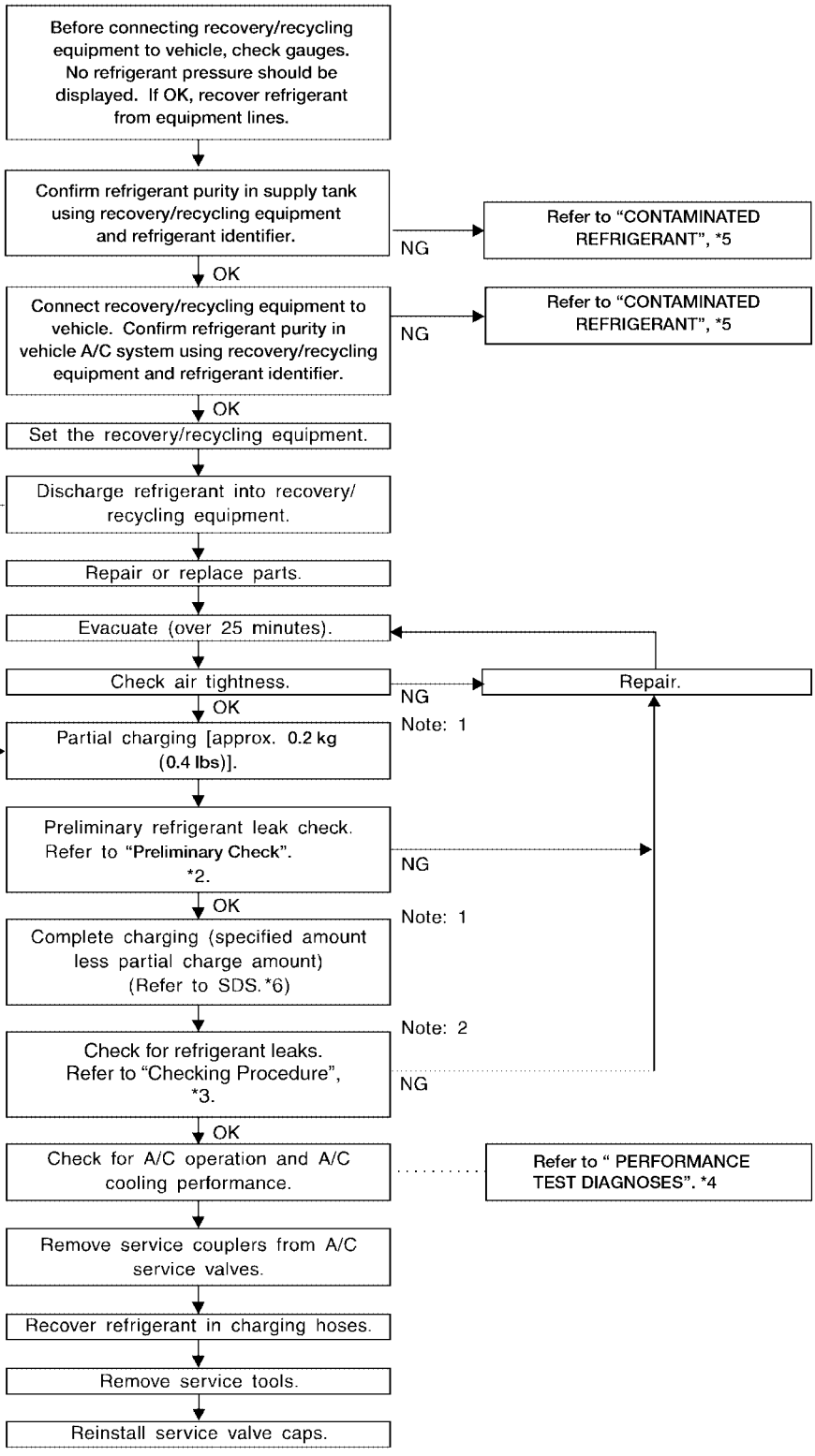
Avoid breathing A/C refrigerant and lubricant vapor or mist. Exposure may irritate eyes, nose and throat. Remove HFC-134a (R-134a) from A/C system using certified service equipment meeting requirements of SAE J2210 (R-134a recycling equipment) or J2209 (R-134a recovery equipment). If accidental system discharge occurs, ventilate work area before resuming service. Additional health and safety information may be obtained from refrigerant and lubricant manufacturers.



Evacuating System and Charging Refrigerant



Recovered lubricant. Refer to "CHECKING AND ADJUSTING", *1.



Note: 1 Before charging refrigerant, ensure engine is off.
Note: 2 Befofe checking for leaks, start engine to activate air conditioning system then turn engine off. Service valve caps must be installed to prevent leakage.

WJIA0382E

*1 MTC-16 *2 MTC-82 *3 MTC-83
*4 MTC-54 *5 MTC-3 *6 MTC-87

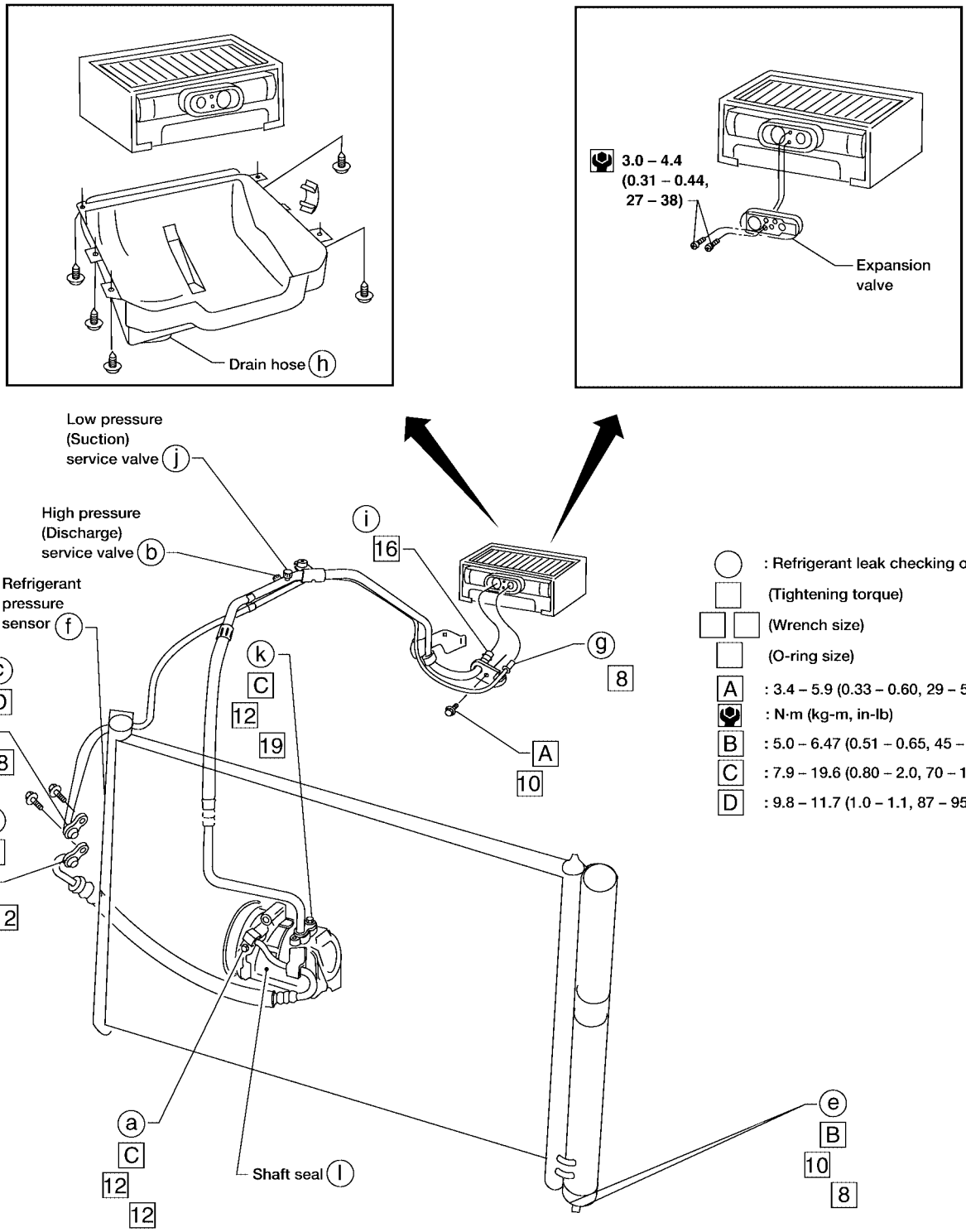
Removal and Installation

EJS001BR

- Refer to MTC-5, "Precautions for Refrigerant Connection" .

QG18DE

SEC. 271 • 274 • 276



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QR25DE

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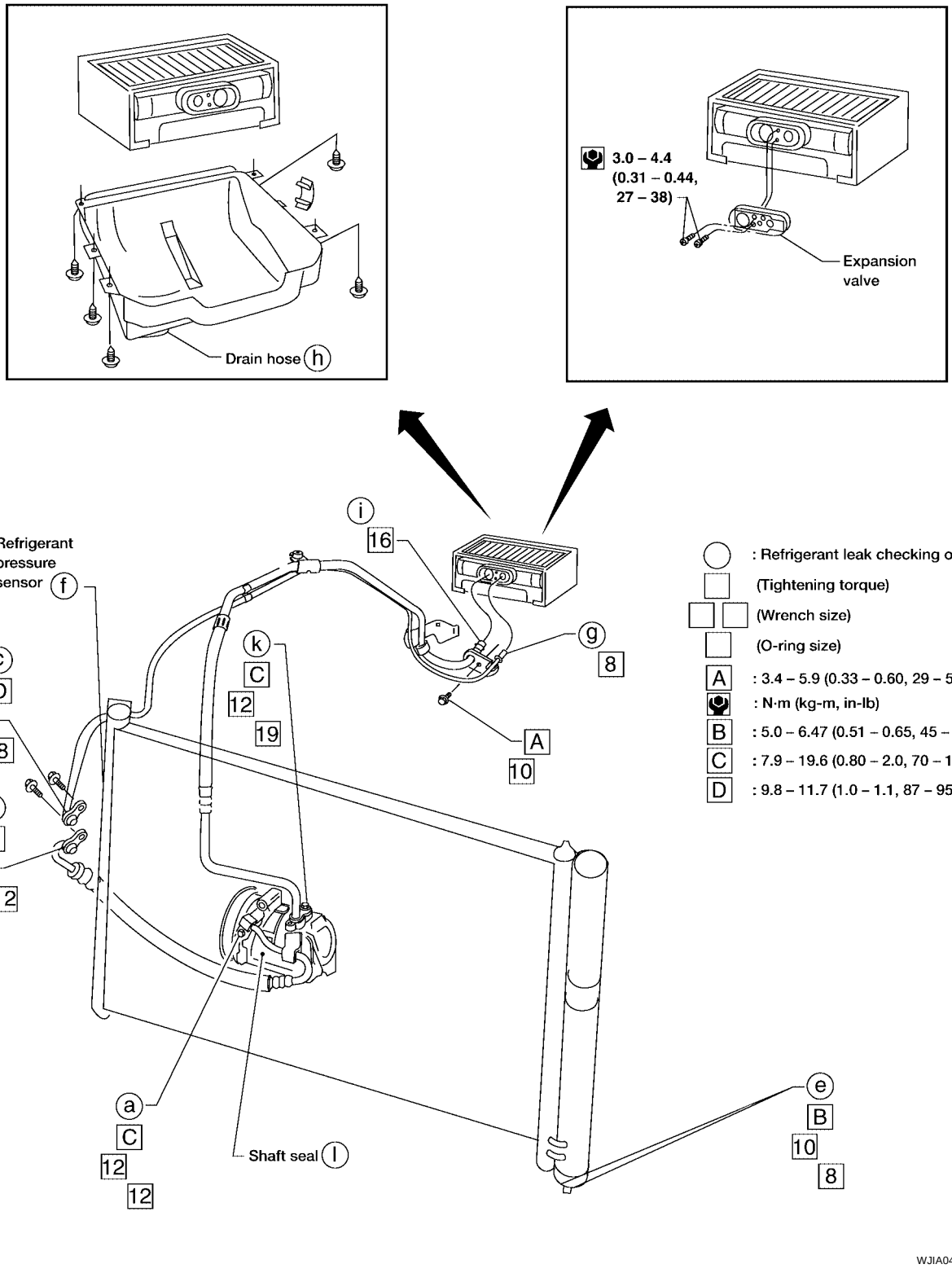


WJIA0421E

Checking Refrigerant Leaks

EJS001BS

PRELIMINARY CHECK

- Perform a visual inspection of all refrigeration parts, fittings, hoses and components for signs of A/C lubricant leakage, damage and corrosion. A/C lubricant leakage may indicate an area of refrigerant leakage. Allow extra inspection time in these areas when using either an electronic refrigerant leak detector or fluorescent dye leak detector.
- If dye is observed, confirm the leak with an approved electronic refrigerant leak detector. It is possible a prior leak was repaired and not properly cleaned.
- When searching for leaks, do not stop when one leak is found but continue to check for additional leaks at all system components and connections.
- When searching for refrigerant leaks using an electronic leak detector, move the probe along the suspected leak area at 25 - 50 mm (1 - 2 in) per second and no further than 1/4 inch from the component.

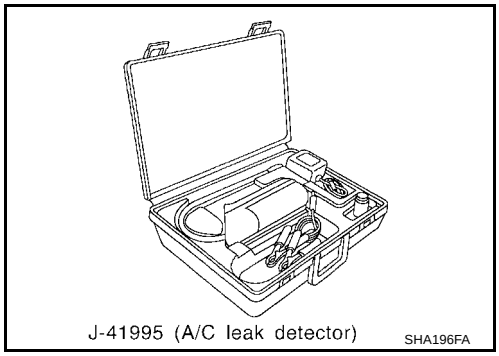
NOTE:
Moving the electronic leak detector probe slower and closer to the suspected leak area will improve the chances of finding a leak.

Electronic Refrigerant Leak Detector

EJS001BT

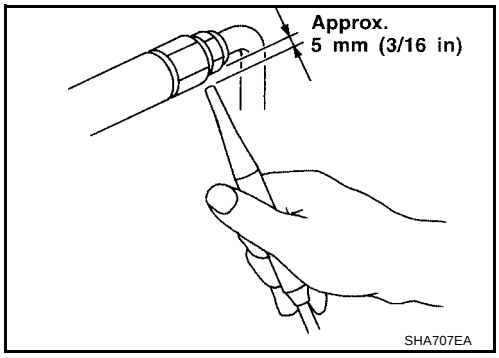
PRECAUTIONS FOR HANDLING LEAK DETECTOR

When performing a refrigerant leak check, use a J-41995 electronic refrigerant leak detector or equivalent. Ensure that the instrument is calibrated and set properly per the operating instructions.
The leak detector is a delicate device. In order to use the leak detector properly, read the operating instructions and perform any specified maintenance.


J-41995 (A/C leak detector) SHA196FA

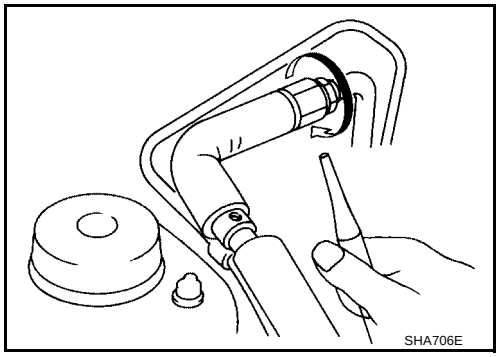
- **Other gases in the work area or substances on the A/C components, for example, anti-freeze, windshield washer fluid, solvents and lubricants, may falsely trigger the leak detector. Make sure the surfaces to be checked are clean. Clean with a dry cloth or blow off with shop air.**
- **Do not allow the sensor tip of the detector to contact with any substance. This can also cause false readings and may damage the detector.**

1. Position probe approximately 5 mm (3/16 in) away from point to be checked.

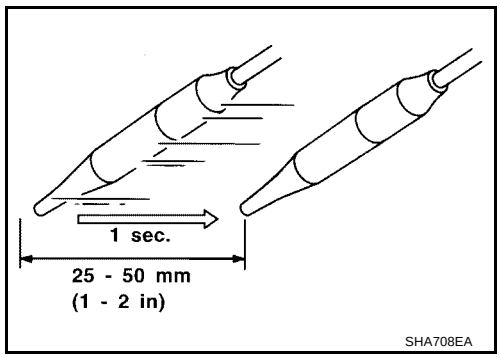


SHA707EA

2. When testing, circle each fitting completely with probe.


SHA706E

3. Move probe along component approximately 25 to 50 mm (1 to 2 in)/sec.



CHECKING PROCEDURE

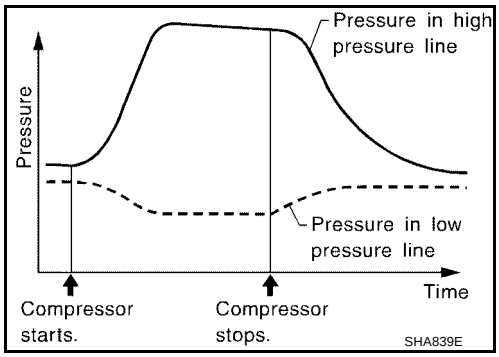
To prevent inaccurate or false readings, make sure there is no refrigerant vapor, shop chemicals, or cigarette smoke in the vicinity of the vehicle. Perform the leak test in calm area (low air/wind movement) so that the leaking refrigerant is not dispersed.

1. Turn engine off.
2. Connect a suitable A/C manifold gauge set to the A/C service ports.
3. Check if the A/C refrigerant pressure is at least 345 kPa (3.52 kg/cm^2 , 50 psi) above 16°C (61°F). If less than specification, recover/evacuate and recharge the system with the specified amount of refrigerant. Refer to MTC-78, "HFC-134a (R-134a) Service Procedure" .

   NOTE:
   At temperatures below 16°C (61°F), leaks may not be detected since the system may not reach 345 kPa (3.52 kg/cm^2 , 50 psi).
4. Conduct the leak test from the high side (compressor discharge **a** to evaporator inlet **g**) to the low side (evaporator drain hose **g** to shaft seal **l**). Refer to MTC-82, "Checking Refrigerant Leaks" . Perform a leak check for the following areas carefully. Clean the component to be checked and move the leak detector probe completely around the connection/component.
   - **Compressor**
     Check the fitting of high and low pressure hoses, relief valve and shaft seal.
   - **Liquid tank**
     Check the pressure switch, tube fitting, weld seams and the fusible plug mount.
   - **Service valves**
     Check all around the service valves. Ensure service valve caps are secured on the service valves (to prevent leaks).

     NOTE:
     After removing A/C manifold gauge set from service valves, wipe any residue from valves to prevent any false readings by leak detector.
   - **Cooling unit (Evaporator)**
     With engine OFF, turn blower fan on “High” for at least 15 seconds to dissipate any refrigerant trace in the cooling unit. Wait a minimum of 10 minutes accumulation time (refer to the manufacturer's recommended procedure for actual wait time) before inserting the leak detector probe into the drain hose. Keep the probe inserted for at least ten seconds. Use caution not to contaminate the probe tip with water or dirt that may be in the drain hose.
5. If a leak detector detects a leak, verify at least once by blowing compressed air into area of suspected leak, then repeat check as outlined above.
6. Do not stop when one leak is found. Continue to check for additional leaks at all system components.
   If no leaks are found, perform steps 7 - 10.
7. Start engine.
8. Set the heater A/C control as follows:
   1. A/C switch ON.
   2. Face mode
   3. Recirculation switch ON
   4. Max cold temperature
   5. Fan speed high

9. Run engine at 1,500 rpm for at least 2 minutes.
10. Turn engine off and perform leak check again following steps 4 through 6 above.
    Refrigerant leaks should be checked immediately after stopping the engine. Begin with the leak detector at the compressor. The pressure on the high pressure side will gradually drop after refrigerant circulation stops and pressure on the low pressure side will gradually rise, as shown in the graph. Some leaks are more easily detected when pressure is high.



11. Before connecting the recovery/recycling recharging equipment to the vehicle, check recovery/recycling recharging equipment gauges. No refrigerant pressure should be displayed. If pressure is displayed, recover refrigerant from equipment lines and then check refrigerant purity.
12. Confirm refrigerant purity in supply tank using recovery/recycling recharging equipment and refrigerant identifier. Refer to MTC-3, "Contaminated Refrigerant" .
13. Confirm refrigerant purity in vehicle A/C system using recovery/recycling recharging equipment and refrigerant identifier. Refer to MTC-3, "Contaminated Refrigerant" .
14. Discharge A/C system using approved recovery/recycling equipment. Refer to MTC-78, "Discharging Refrigerant" . Repair the leaking fitting or component as necessary.
15. Evacuate and recharge A/C system. Refer to MTC-78, "Evacuating System and Charging Refrigerant" . Perform the leak test to confirm no refrigerant leaks.
16. Conduct A/C performance test to ensure system works properly.

Fluorescent Dye Leak Detector

EJS001BU

PRECAUTIONS FOR FLUORESCENT DYE LEAK DETECTION

- The fluorescent dye leak detector is not a replacement for an electronic refrigerant leak detector. The fluorescent dye leak detector should be used in conjunction with an electronic refrigerant leak detector (J-41995) to pinpoint refrigerant leaks.
- For your safety and your customer's satisfaction, read and follow all manufacturer's operating instructions and precautions prior to performing the work.
- Refer to MTC-4, "Precautions for Leak Detection Dye" .

CHECKING SYSTEM FOR LEAKS USING THE FLUORESCENT LEAK DETECTOR

1. Check A/C system for leaks using the UV lamp and safety glasses (J-42220) in a low sunlight area (area without windows preferable). Illuminate all components, fittings and lines. The dye will appear as a bright green/yellow area at the point of leakage. Fluorescent dye observed at the evaporator drain opening indicates an evaporator core assembly (tubes, core or expansion valve) leak.
2. If the suspected area is difficult to see, use an adjustable mirror or wipe the area with a clean shop rag or cloth, then check the cloth with the UV lamp for dye residue.
3. Confirm any suspected leaks with an approved electronic refrigerant leak detector.
4. After the leak is repaired, remove any residual dye using dye cleaner (J-43872) to prevent future misdiagnosis.
5. Perform a system performance check and verify the leak repair with an approved electronic refrigerant leak detector.

DYE INJECTION

(This procedure is only necessary when re-charging the system or when the compressor has seized and was replaced.)
Refer to MTC-4, "Precautions for Leak Detection Dye" .

1. Check A/C system static (at rest) pressure. Pressure must be at least 345 kPa (3.52 kg/cm^2 , 50 psi).
2. Pour one bottle (1/4 ounce / 7.4 cc) of the A/C refrigerant dye into the injector tool (J-41459).
3. Connect the injector tool to the A/C LOW PRESSURE side service fitting.
4. Start engine and switch A/C ON.

5. With the A/C operating (compressor running), inject one bottle (1/4 ounce / 7.4 cc) of fluorescent dye through the low-pressure service valve using dye injector tool J-41459 (refer to the manufacturer's operating instructions).
6. With the engine still running, disconnect the injector tool from the service fitting.

CAUTION:
Be careful not to allow dye to spray or drip when disconnecting the injector from the system.

NOTE:
If repairing the A/C system or replacing a component, pour the dye directly into the open system connection and proceed with the service procedures.

7. Operate the A/C system for a minimum of 20 minutes to mix the dye with the system oil. Depending on the leak size, operating conditions and location of the leak, it may take from minutes to days for the dye to penetrate a leak and become visible.

BELT

PFP:92600

Tension Adjustment

EJS001BV

- **Refer to MA-16, "Checking Drive Belts" (QG18DE) or MA-23, "Checking Drive Belts" (QR25DE).**

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

EJS001BX

COMPRESSOR

Engine		QG18DE	QR25DE
Model		ZEXEL make DKV-11G	ZEXEL make DKV-14G
Type		Vane rotary	
Displacement cm^3 (cu in) / revolution		110 (6.71)	140 (8.54)
Direction of rotation		Clockwise (viewed from drive end)	
Drive belt		Poly V	

LUBRICANT

Name		NISSAN A/C System Lubricant Type R or equivalent
Part number		KLH00-PAGR0
Capacity m ℓ (US fl oz, Imp fl oz)	Total in system	180 (6.1, 6.3)

REFRIGERANT

Type	HFC-134a (R-134a)
Capacity kg (lb)	0.50 ± 0.05 (1.10 ± 0.11)

Inspection and Adjustment

EJS001BY

ENGINE IDLING SPEED (WHEN A/C IS ON)

- Refer to EC-79, "IDLE SPEED" (QG18DE), or EC-726, "IDLE SPEED" (QR25DE).

BELT TENSION

- Refer to MA-16, "Checking Drive Belts" (QG18DE) or MA-23, "Checking Drive Belts" (QR25DE).

SECTION SC
STARTING & CHARGING SYSTEM

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EKS006EZ

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Wiring Diagrams and Trouble Diagnosis

EKS0037M

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams"
- PG-3, "POWER SUPPLY ROUTING" for power distribution circuit.

When you perform trouble diagnosis, refer to the following:

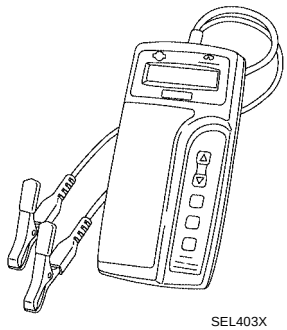
- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES".
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident"

PREPARATION

PFP:00002

Special Service Tool

EKS0037N

Tool number Tool name		Description
J-44373 Model 620 Battery/Starting/Charging system tester	 SEL403X	

BATTERY

PFP:AYBGL

How to Handle Battery

EKS0037O

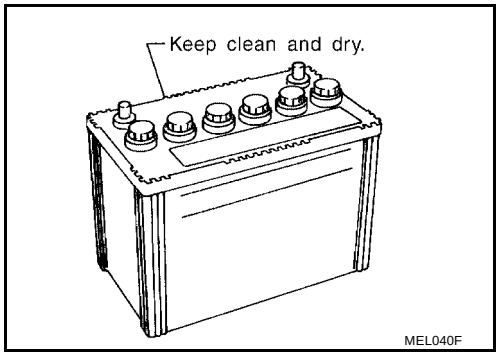
CAUTION:

- **If it becomes necessary to start the engine with a booster battery and jumper cables, use a 12-volt booster battery.**
- **After connecting battery cables, ensure that they are tightly clamped to battery terminals for good contact.**
- **Never add distilled water through the hole used to check specific gravity.**

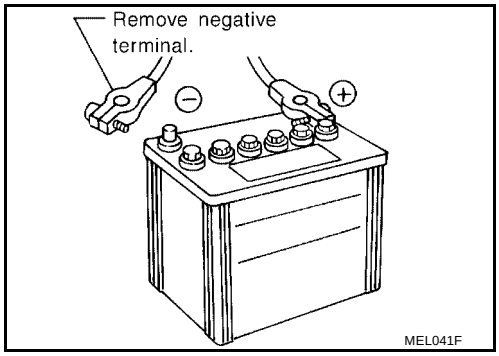
METHODS OF PREVENTING OVER-DISCHARGE

The following precautions must be taken to prevent over-discharging a battery.

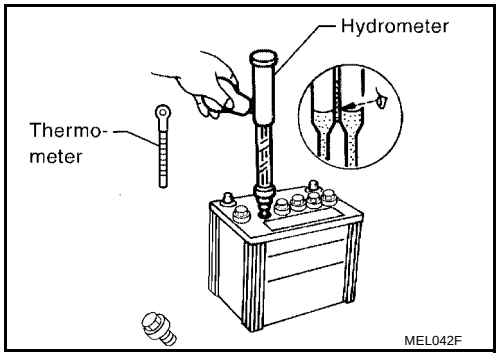
- The battery surface (particularly its top) should always be kept clean and dry.
- The terminal connections should be clean and tight.
- At every routine maintenance, check the electrolyte level.
  This also applies to batteries designated as “low maintenance” and “maintenance-free”.



- When the vehicle is not going to be used over a long period of time, disconnect the negative battery terminal.



- Check the charge condition of the battery.
  Periodically check the specific gravity of the electrolyte. Keep a close check on charge condition to prevent over-discharge.

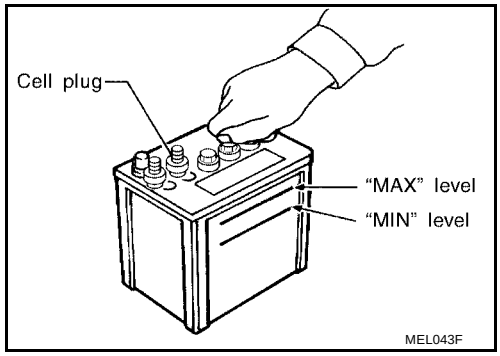


CHECKING ELECTROLYTE LEVEL

WARNING:

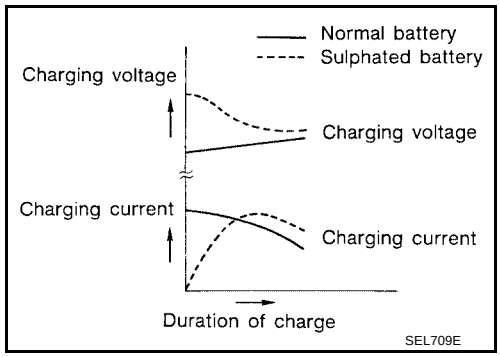
Do not allow battery fluid to come in contact with skin, eyes, fabrics, or painted surfaces. After touching a battery, do not touch or rub your eyes until you have thoroughly washed your hands. If acid contacts eyes, skin or clothing, immediately flush with water for 15 minutes and seek medical attention.

- Remove the cell plug using a suitable tool.
- Add distilled water up to the MAX level.



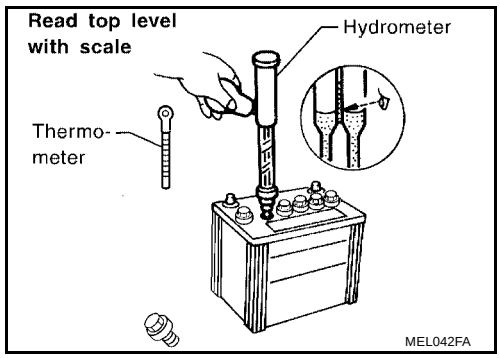
Sulphation

A battery will be completely discharged if it is left unattended for a long time and the specific gravity will become less than 1.100. This may result in sulphation on the cell plates.
To determine if a battery has been "sulphated", note its voltage and current when charging it. As shown in the figure, less current and higher voltage are observed in the initial stage of charging sulphated batteries.
A sulphated battery may sometimes be brought back into service by means of a long, slow charge, 12 hours or more, followed by a battery capacity test.



SPECIFIC GRAVITY CHECK

1. Read hydrometer and thermometer indications at eye level.
2. Use the following chart to correct your hydrometer reading according to electrolyte temperature.



Hydrometer Temperature Correction

Battery electrolyte temperature °C (°F)	Add to specific gravity reading
71 (160)	0.032
66 (150)	0.028
60 (140)	0.024
54 (130)	0.020
49 (120)	0.016
43 (110)	0.012
38 (100)	0.008
32 (90)	0.004
27 (80)	0
21 (70)	–0.004
16 (60)	–0.008
10 (50)	–0.012
4 (40)	–0.016
–1 (30)	–0.020
–7 (20)	–0.024

Battery electrolyte temperature °C (°F)	Add to specific gravity reading
–12 (10)	–0.028
–18 (0)	–0.032

Corrected specific gravity	Approximate charge condition
1.260 - 1.280	Fully charged
1.230 - 1.250	3/4 charged
1.200 - 1.220	1/2 charged
1.170 - 1.190	1/4 charged
1.140 - 1.160	Almost discharged
1.110 - 1.130	Completely discharged

CHARGING THE BATTERY

CAUTION:

- **Do not “quick charge” a fully discharged battery.**
- **Keep the battery away from open flame while it is being charged.**
- **When connecting the charger, connect the leads first, then turn on the charger. Do not turn on the charger first, as this may cause a spark.**
- **If battery electrolyte temperature rises above 60°C (140°F), stop charging. Always charge battery at a temperature below 60°C (140°F).**

Charging Rates

Amps	Time
50	1 hour
25	2 hours
10	5 hours
5	10 hours

Do not charge at more than 50 ampere rate.

NOTE:

The ammeter reading on your battery charger will automatically decrease as the battery charges. This indicates that the voltage of the battery is increasing normally as the state of charge improves. The charging amps indicated above refer to initial charge rate.

- If, after charging, the specific gravity of any two cells varies more than .050, the battery should be replaced.

Trouble Diagnoses with Battery/Starting/Charging System Tester

EKS0037P

CAUTION:

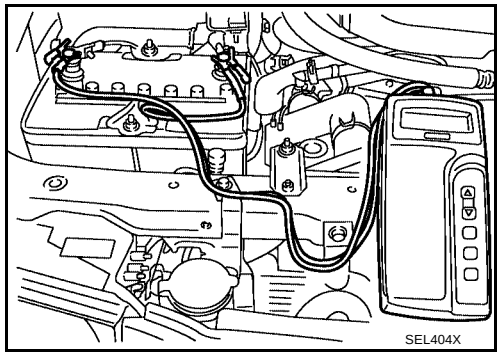
When working with batteries, always wear appropriate eye protection.

NOTE:

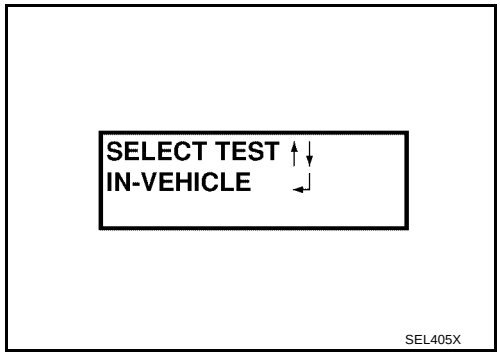
- To ensure a complete and thorough diagnosis, the battery, starter and generator test segments must be done as a set from start to finish.
- If battery surface charge is detected while testing, the tester will prompt you to turn on the headlights to remove the surface charge.
- If necessary, the tester will prompt you to determine if the battery temperature is above or below 0°C (32°F). Choose the appropriate selection by pressing the up or down arrow button, then press “ENTER” to make the selection.

1. Turn off all loads on the vehicle electrical system. Clean or repair as necessary.
2. Visually inspect the battery, battery terminals and cable ends with ignition switch in “OFF” position.

   NOTE:
   The contact surface between the battery terminals, cable ends and tester leads must be clean for a valid test. A poor connection will prevent testing and a “CHECK CONNECTION” message will appear during the test procedures. If this occurs, clean the battery post and terminals, reconnect them and restart the test.


SEL404X

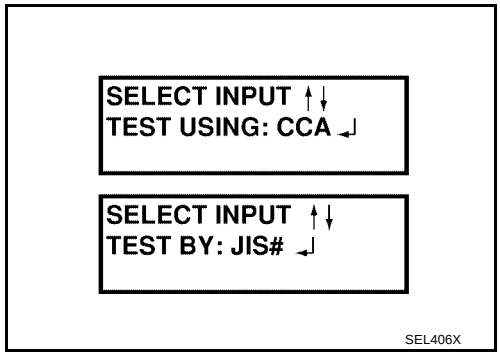
3. Connect the red tester lead clamp to the positive battery terminal, and the black to the negative terminal.
4. The tester will turn on automatically. Using the arrow keys, select “IN-VEHICLE” on the tester and then press the “ENTER” key.



SEL405X

5. Locate the battery type and rating stamped or written on the top case of the battery to be tested.

   NOTE:
   The battery type and rating will have either of the following.
   CCA: Cold Cranking Amps (490 CCA, 550 CCA, etc.)
   JIS: Japanese Industrial Standard.
   Battery is stamped with a number such as:
   80D26L: 80 (rank of output), D (physical size-depth), 26 (width in cm). The last character L (post configuration) is not input into the tester.
   The tester requires the rating for the battery be entered exactly as it is written or stamped on the battery. Do not attempt a CCA conversion for JIS stamped batteries. JIS must be input directly.

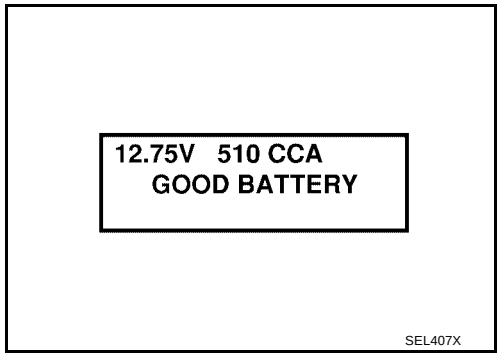


SEL406X

6. Using the arrow and “ENTER” keys alternately, select the battery type and rating.

   NOTE:
   The tester lists five choices; CCA, JIS, IEC, DIN, and EN. Only use CCA or JIS.

7. Press “ENTER” to begin the test. Diagnosis results are displayed on the tester. Refer to SC-8, "DIAGNOSTIC RESULT ITEM CHART" .

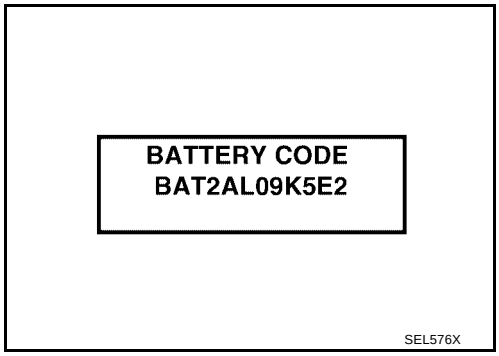


SEL407X

8. Press “ENTER”, then test output code is displayed. Record the test output code on the repair order.
9. Toggle back to the “DIAGNOSTIC SCREEN” for test results.

NOTE:

- If necessary, the tester will ask the user to determine if the battery has just been charged. Choose the appropriate selection by pressing the up or down arrow button and then press the “ENTER” button to make the selection.
- When testing a battery installed in a vehicle that has recently been driven, select “BEFORE CHARGE”.
- If the battery has just been slow charged due to a “CHARGE & RETEST” decision by the tester, and the tester asks the user “BEFORE CHARGE/AFTER CHARGE”, select “AFTER CHARGE”.



DIAGNOSTIC RESULT ITEM CHART

Diagnostic item	Service procedure
GOOD BATTERY	Battery is OK. Refer to SC-6, "Trouble Diagnoses with Battery/Starting/Charging System Tester" .
REPLACE BATTERY	Replace battery. Before replacing battery, clean the battery cable clamps and battery posts. Perform battery test again with Battery/Starting/Charging system tester. If second test result is “Replace Battery”, then do so. Perform battery test again to confirm repair.
BAD CELL-REPLACE	Replace the battery. Perform battery test again with Battery/Starting/Charging system tester to confirm repair.
GOOD-RECHARGE	Perform the slow battery charging procedure. (Initial rate of charge is 10A for 12 hours.) Perform battery test again with Battery/Starting/Charging system tester.
CHARGE & RETEST	Perform the slow battery charging. (Initial rate of charge is 10A for 12 hours.) Perform battery test again with Battery/Starting/Charging system tester to confirm repair. **NOTE:** **If the tester asks the user “BEFORE CHARGE/AFTER CHARGE”, select “AFTER CHARGE”.**

STARTING SYSTEM

PFP:23300

System Description

EKS0037Q

M/T MODEL

Power is supplied at all times:

- through 40A fusible link (letter **c** , located in the fuse and fusible link box)
- to ignition switch terminal B.

With the ignition switch in the START position, power is supplied:

- from ignition switch terminal St
- to clutch interlock relay terminal 5.

With the ignition switch in the ON or START position, power is supplied:

- through 10A fuse [No. 20, located in the fuse block (J/B)]
- to clutch interlock relay terminal 1.

When the clutch pedal is depressed, ground is supplied to clutch interlock relay terminal 2 through the clutch interlock switch and body grounds E7 and E37.
The clutch interlock relay is energized and power is supplied:

- from terminal 3 of the clutch interlock relay
- to terminal S of the starter motor windings.

The starter motor plunger closes and provides a closed circuit between the battery and the starter motor. The starter motor is grounded to the cylinder block. With power and ground supplied, the starter motor operates.

A/T MODEL

Power is supplied at all times:

- through 40A fusible link (letter **c** , located in the fuse and fusible link box)
- to ignition switch terminal B.

With the ignition switch in the START position, power is supplied:

- from ignition switch terminal St
- to park/neutral position relay terminal 5

With the ignition switch in the ON or START position, power is supplied:

- through 10A fuse [No. 20, located in the fuse block (J/B)]
- to park/neutral position relay terminal 1.

With the selector lever in the P or N position, ground is supplied:

- to park/neutral position relay terminal 2
- through park/neutral position switch.

The park/neutral position relay is energized and power is supplied:

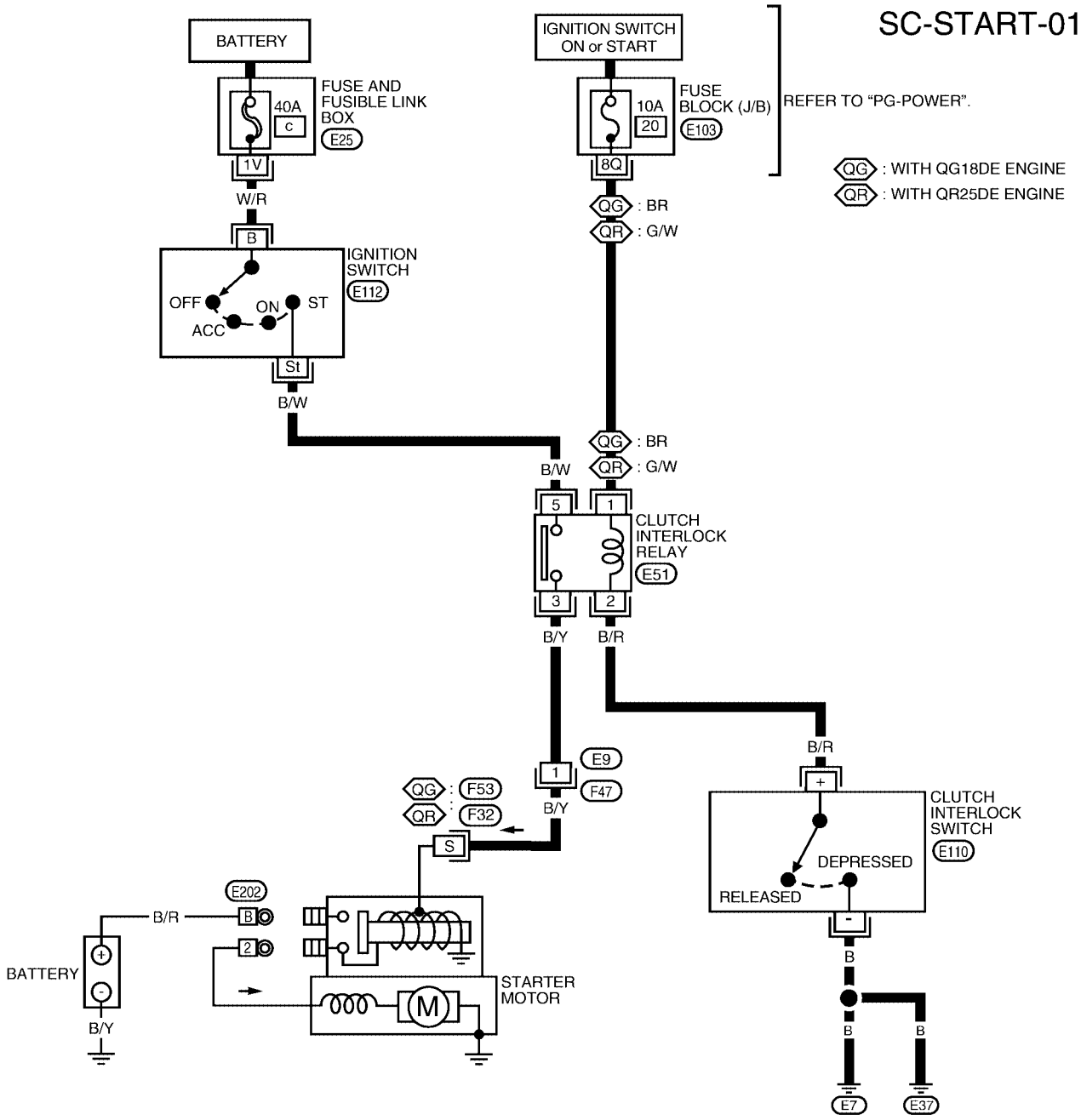
- from ignition switch terminal St
- through park/neutral position relay terminals 5 and 3
- to terminal S of the starter motor windings.

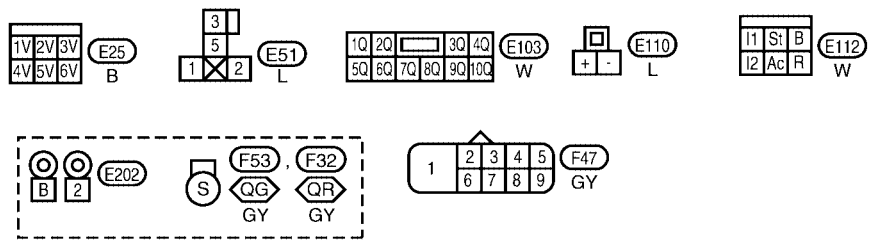
The starter motor plunger closes and provides a closed circuit between the battery and the starter motor. The starter motor is grounded to the cylinder block. With power and ground supplied, the starter motor operates.

Wiring Diagram — START —

EKS0037R

M/T MODEL

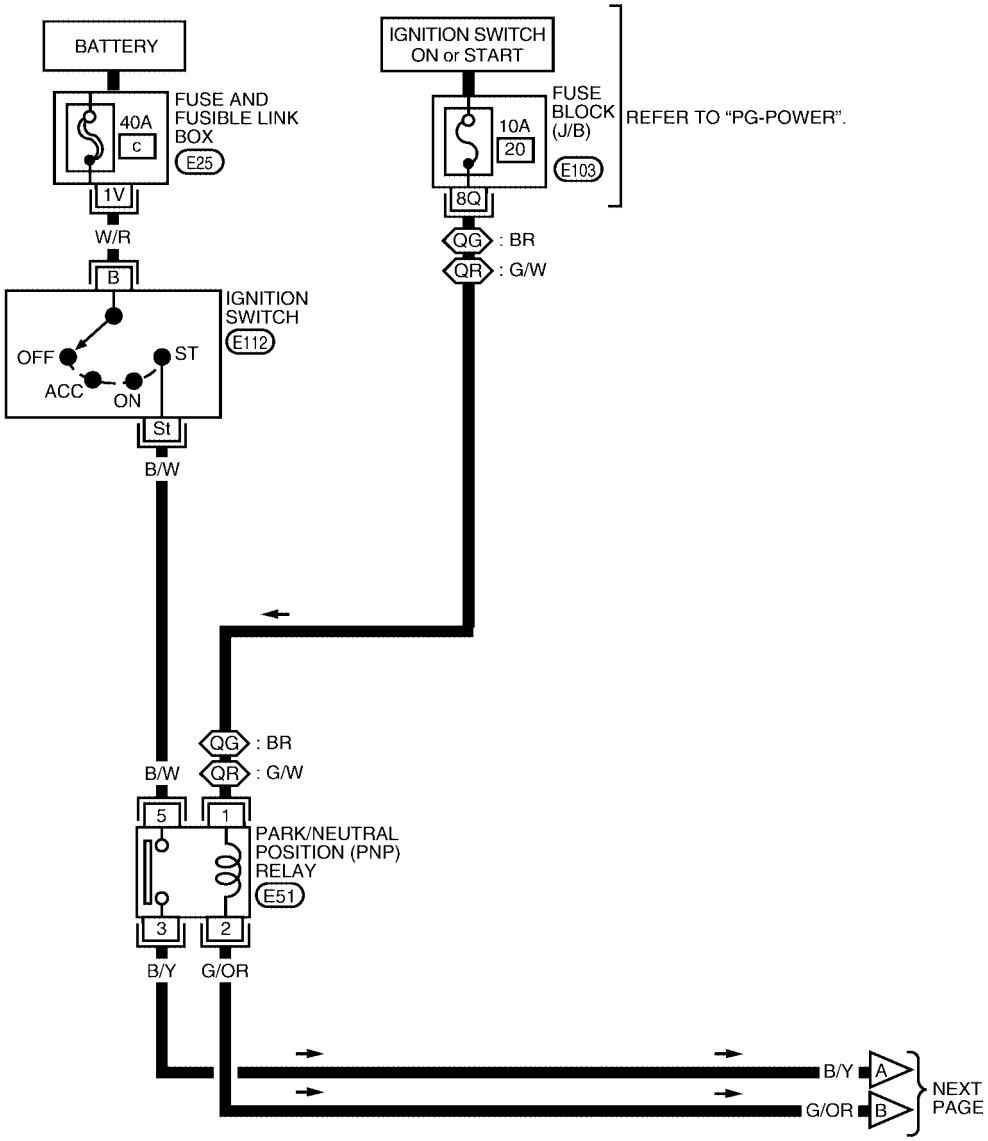


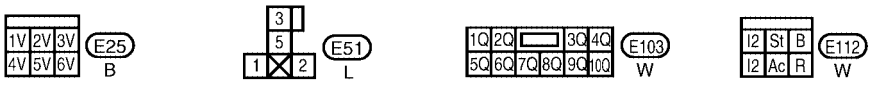


WKWA0644E

A/T MODEL

SC-START-02





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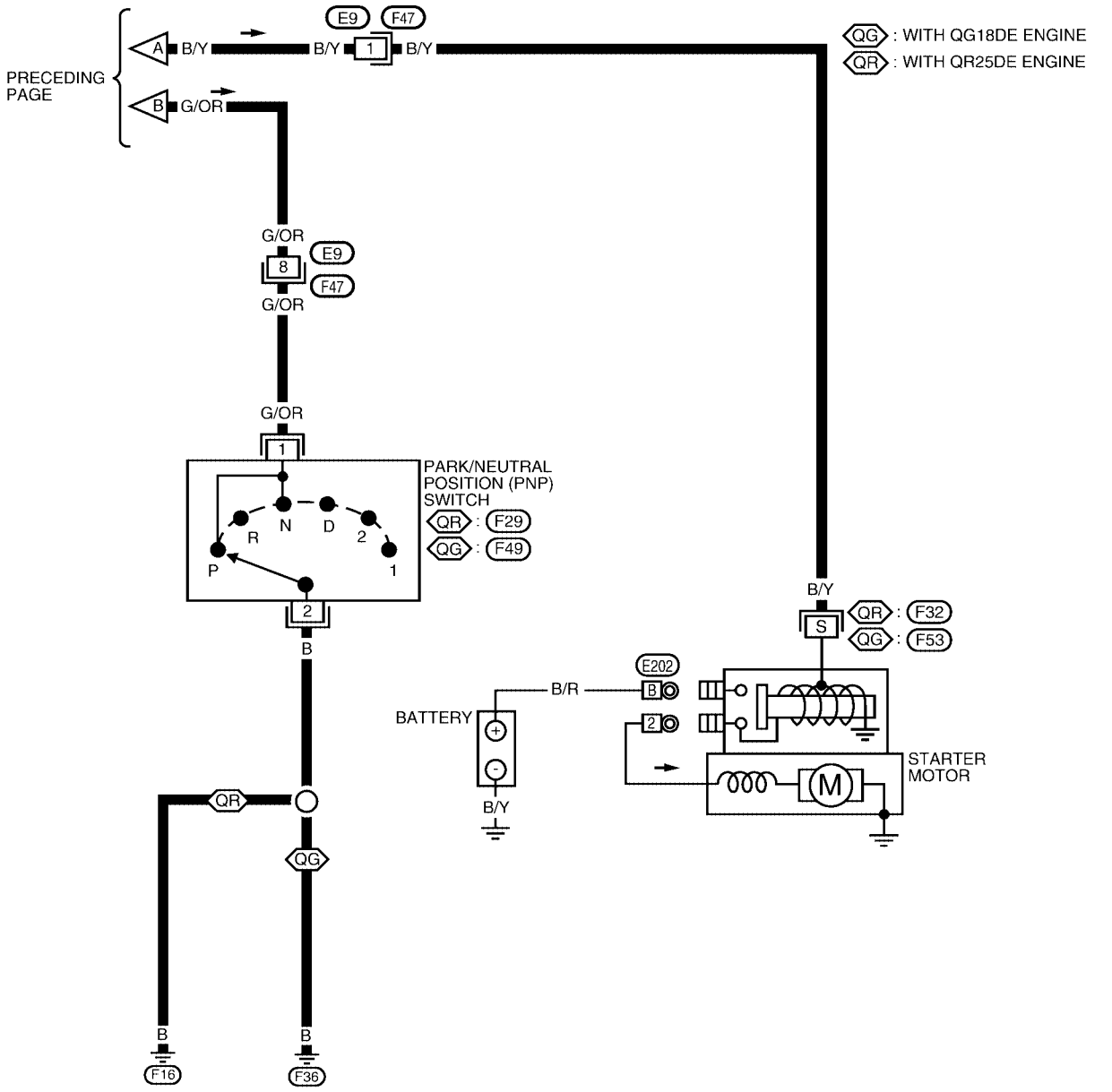
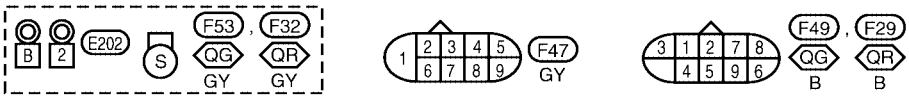
SC-START-03





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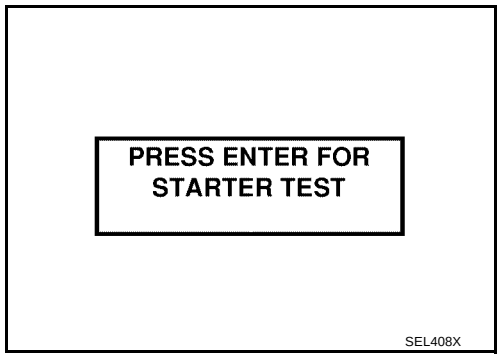
Trouble Diagnoses with Battery/Starting/Charging System Tester

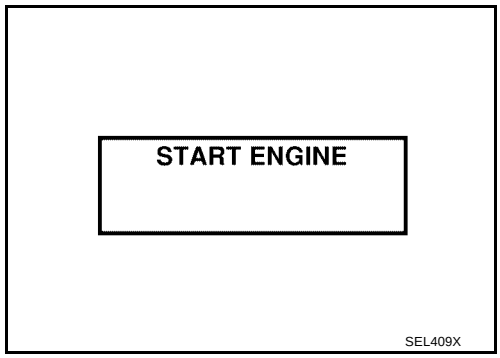
EKS0037S

NOTE:
To ensure a complete and thorough diagnosis, the battery, starter and generator test segments must be done as a set from start to finish.

1. Turn off all loads on the vehicle electrical system.
2. Perform battery test with Battery/Starting/Charging system tester. Refer to SC-13, "Trouble Diagnoses with Battery/Starting/Charging System Tester" .
3. Press “ENTER” to begin the starting system test.

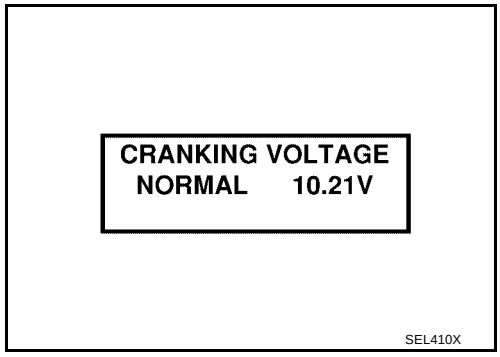


4. Start the engine.



5. Diagnosis result is displayed on the tester. Refer to SC-13, "DIAGNOSTIC RESULT ITEM CHART" .

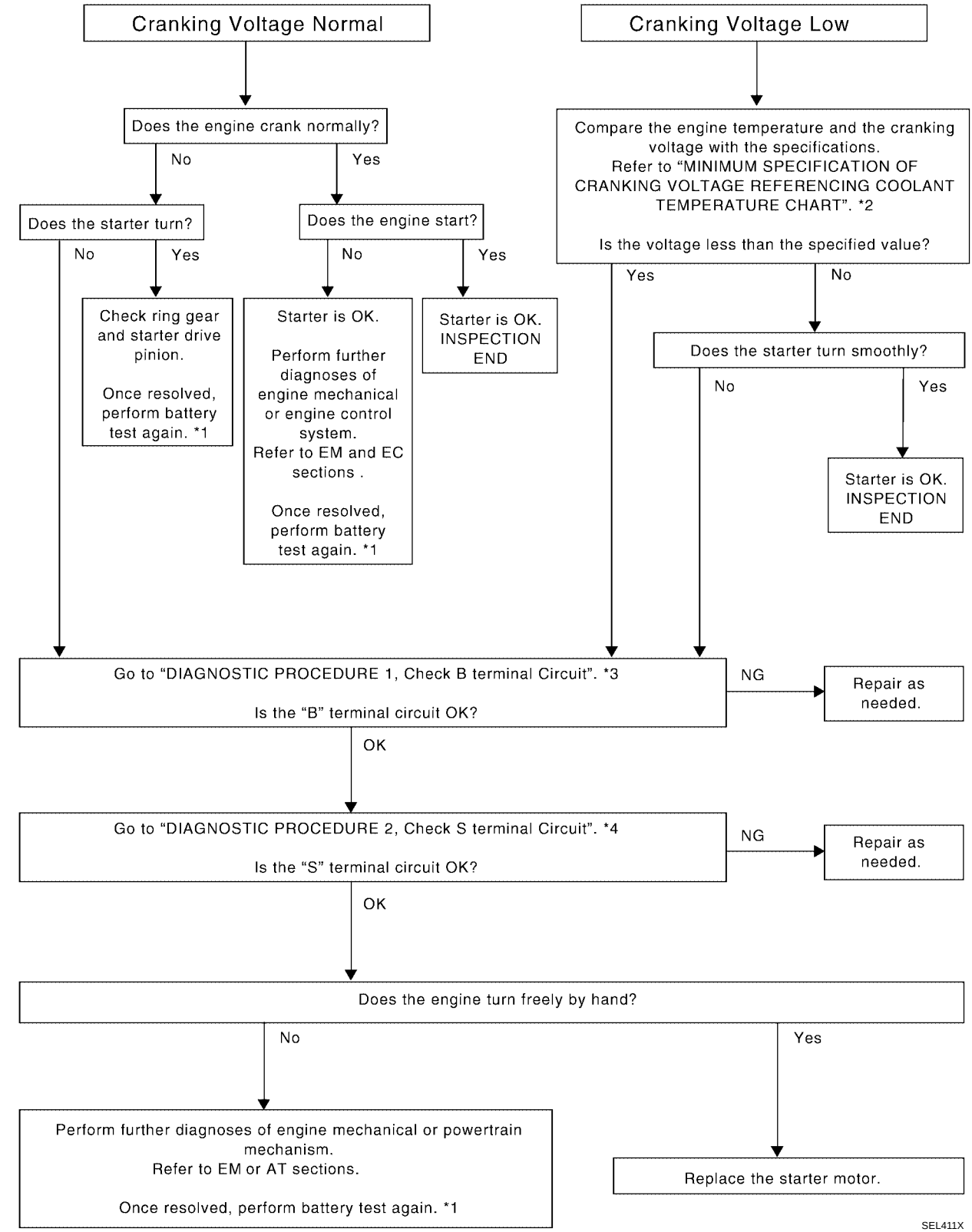
   NOTE:
   - If the starter performs normally but the engine does not start, perform engine diagnosis.
   - For intermittent “NO CRANK” or “NO STARTER OPERATION” incidents, refer to SC-17, "DIAGNOSTIC PROCEDURE 2" .



DIAGNOSTIC RESULT ITEM CHART

Diagnostic item	Service procedure
CRANKING VOLTAGE NORMAL	Go to “WORK FLOW”, SC-14, "WORK FLOW" .
CRANKING VOLTAGE LOW	Go to “WORK FLOW”, SC-14, "WORK FLOW" .
CHARGE BATTERY	Perform the slow battery charging procedure. (Initial rate of charge is 10A for 12 hours.) Perform battery test again with Battery/Starting/Charging system tester. Refer to SC-13, "Trouble Diagnoses with Battery/Starting/Charging System Tester" .
REPLACE BATTERY	Before replacing battery, clean the battery cable clamps and battery posts. Perform battery test again with Battery/Starting/Charging system tester. Refer to SC-13, "Trouble Diagnoses with Battery/Starting/Charging System Tester" . If second test result is “REPLACE BATTERY”, then do so. Perform battery test again to confirm repair.

WORK FLOW



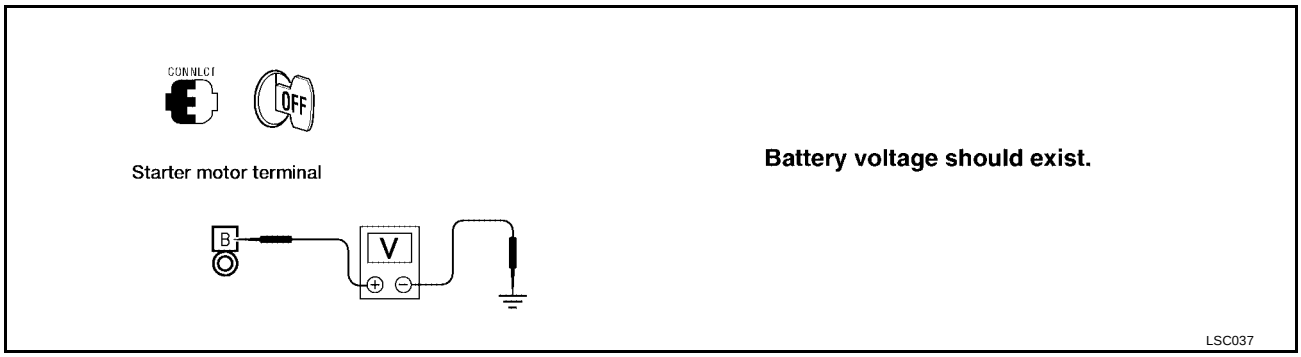
*1 SC-6 *2 SC-18 *3 SC-15

*4 SC-17

DIAGNOSTIC PROCEDURE 1
Check “B” Terminal Circuit

1. CHECK POWER SUPPLY FOR STARTER MOTOR “B” TERMINAL

1. Remove the fuel pump fuse.
2. Crank or start the engine (where possible) until the fuel pressure is released.
3. Turn the ignition switch OFF.
4. Check that the starter motor connector E202 terminal B (B/R) connection is clean and tight.
5. Check voltage between starter motor connector E202 terminal B (B/R) and ground using a digital circuit tester.

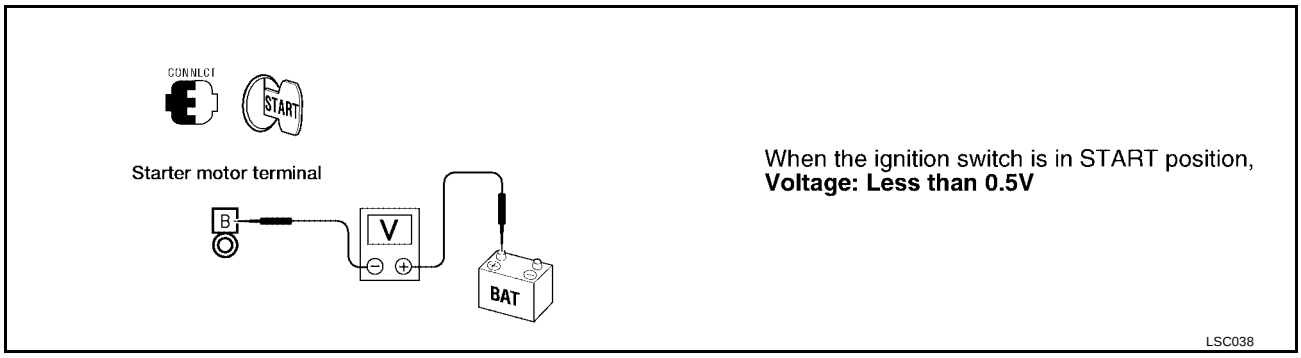


OK or NG

OK >> GO TO 2.
NG >> Check harness between the battery and the starter motor for open circuit.

2. CHECK BATTERY CABLE CONNECTION QUALITY (VOLTAGE DROP TEST)

1. Check voltage between starter motor connector E202 terminal B (B/R) and battery positive terminal using a digital circuit tester.

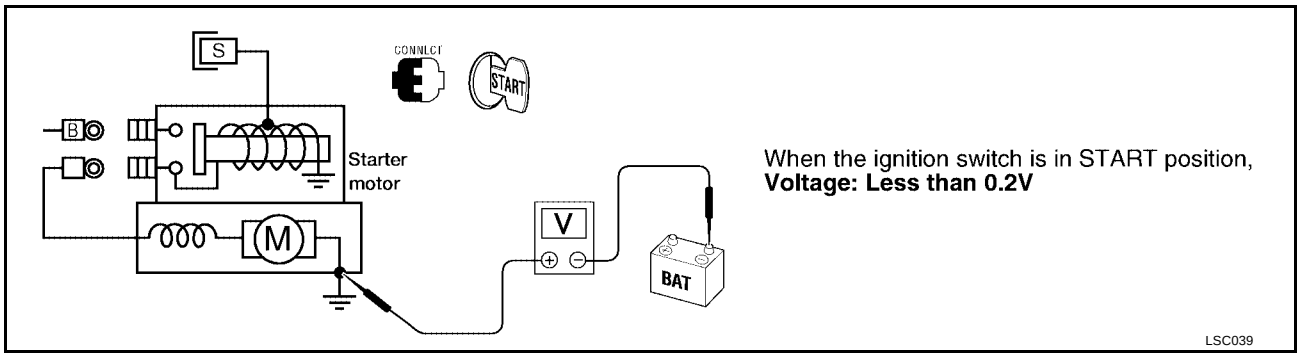


OK or NG

OK >> GO TO 3.
NG >> Check harness between the battery and the starter motor for poor continuity.

3. CHECK STARTER MOTOR GROUND CIRCUIT (VOLTAGE DROP TEST)

1. Check voltage between starter motor case and battery negative terminal using a digital circuit tester.



OK or NG

OK >> Starter motor “B” terminal circuit is OK. Further inspection is necessary. Refer to SC-14, "WORK FLOW" .

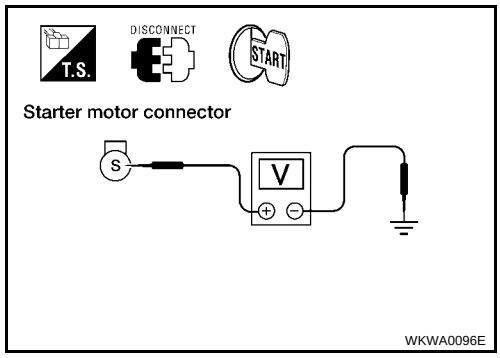
NG >> Check the starter motor case and ground for poor continuity.

DIAGNOSTIC PROCEDURE 2
Check “S” Terminal Circuit

1. CHECK POWER SUPPLY FOR STARTER MOTOR “S” TERMINAL

1. Remove the fuel pump fuse.
2. Crank or start the engine (where possible) until the fuel pressure is released.
3. Turn the ignition switch OFF.
4. Disconnect starter motor connector F53 (QG18DE), F32 (QR25DE) terminal S (B/Y) connector.
5. Check voltage between starter motor connector F53 (QG18DE), F32 (QR25DE) terminal S (B/Y) and ground using a digital circuit tester.

With the ignition switch ON : **Battery voltage should exist**



OK or NG

OK >> GO TO 2.

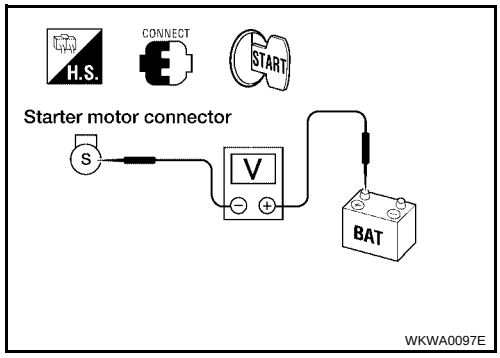
NG >> Check the following.

- 40A fusible link (letter **c** , located in fuse and fusible link box)
- Clutch interlock relay
- Park/neutral position relay
- Harness for open or short

2. CHECK “S” TERMINAL CONNECTION QUALITY (VOLTAGE DROP TEST)

1. Connect starter motor connector F53 (QG18DE), F32 (QR25DE) terminal S (B/Y) connector.
2. Check voltage between starter motor connector F53 (QG18DE), F32 (QR25DE) terminal S (B/Y) and battery positive terminal using a digital tester.

With the ignition switch in START : **Voltage less than 1V**



OK or NG

OK >> Starter motor “S” terminal circuit is OK. Further inspection is necessary. Refer to SC-14, "WORK FLOW" .

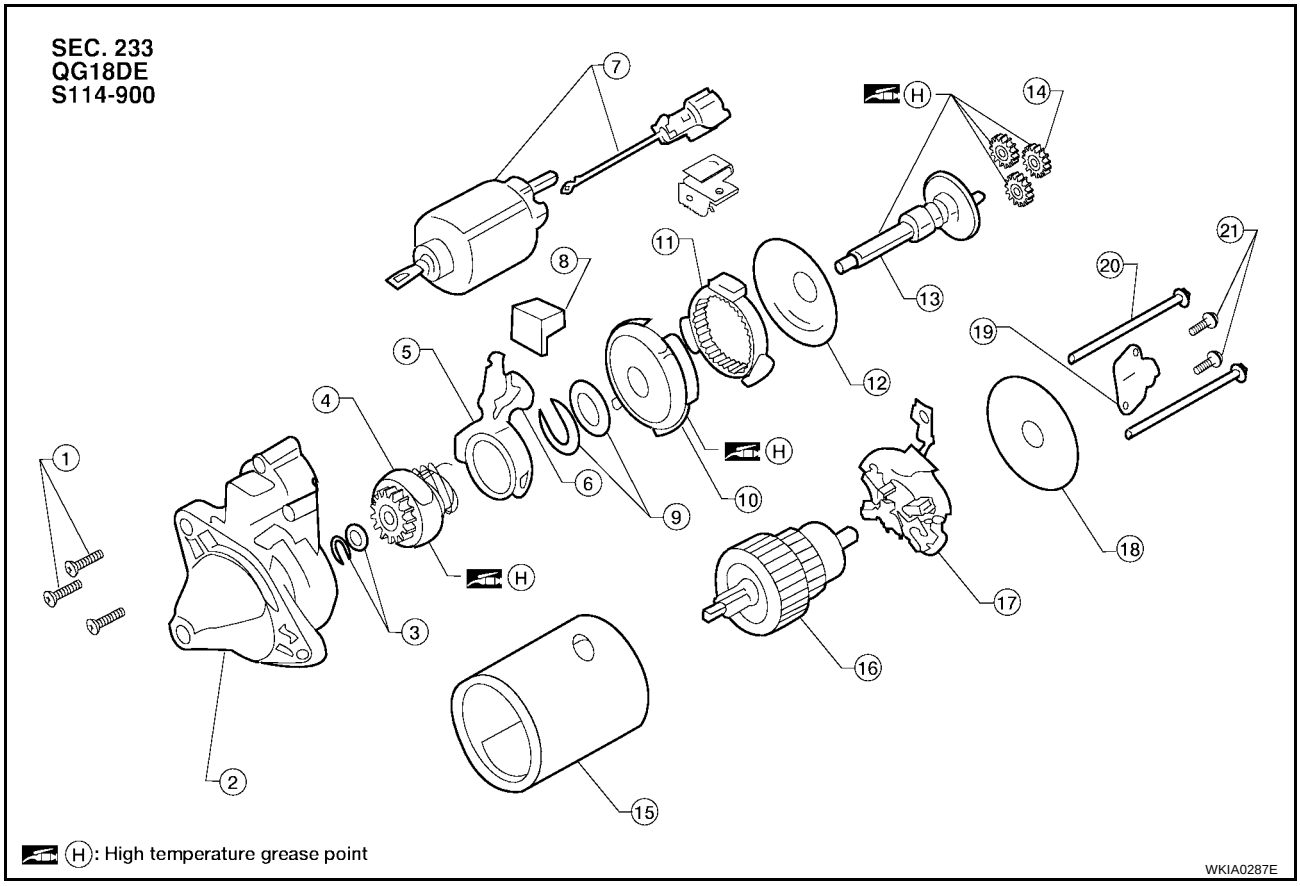
NG >> Check harness between the battery and the starter motor “S” terminal for poor continuity.

MINIMUM SPECIFICATION OF CRANKING VOLTAGE REFERENCING COOLANT TEMPERATURE

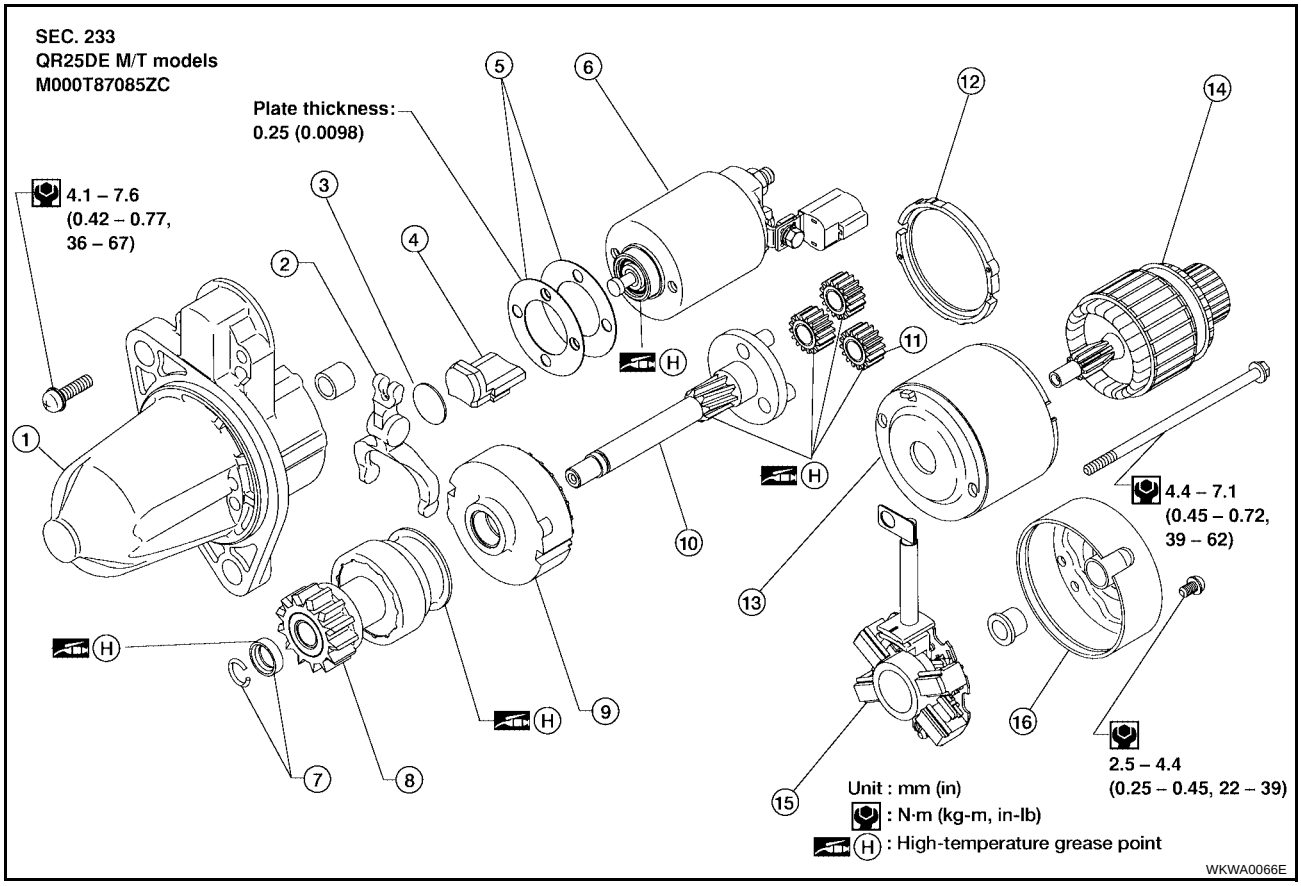
Engine coolant temperature	Voltage V	
	QG18DE	QR25DE
–30°C to –20°C (–22°F to –4°F)	7.4	8.7
–19°C to –10°C (–2°F to 14°F)	8.2	9.2
–9°C to 0°C (16°F to 32°F)	9.3	9.6
More than 1°C (More than 34°F)	9.5	10.0

Construction

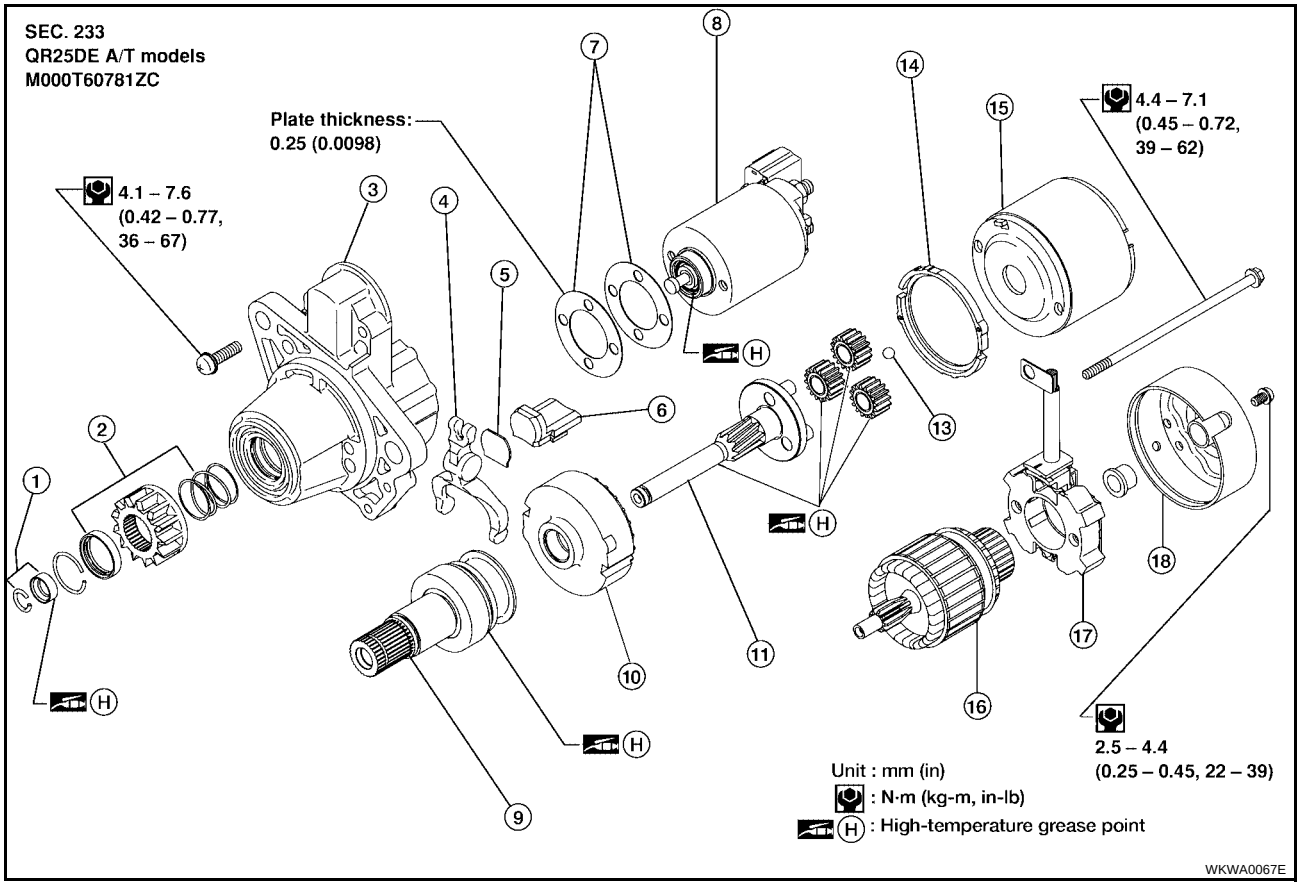
EKS0037T



1. Solenoid through bolts
2. Drive end shield
3. Retainers
4. Pinion assembly
5. Fork lever
6. Bearing pedestal
7. Solenoid switch assembly
8. Seal
9. Locking washers
10. Intermediate bearing
11. Internal gear
12. Cover disc
13. Drive shaft
14. Planetary gears
15. Yoke assembly
16. Armature assembly
17. Brush holder
18. Commutator end shield
19. Closure cap
20. Starter through bolts
21. Closure cap screws



1. Gear case
2. Shift lever
3. Plate
4. Packing
5. Adjusting plate
6. Magnetic switch assembly
7. Pinion stopper set
8. Pinion assembly
9. Internal gear
10. Pinion shaft
11. Planetary gear
12. Packing
13. Yoke
14. Armature
15. Brush holder assembly
16. Rear cover



1. Pinion stopper set
2. Pinion assembly
3. Front bracket
4. Shift lever
5. Plate
6. Packing
7. Adjusting plate
8. Magnetic switch assembly
9. Clutch gear
10. Internal gear
11. Gear shaft
12. Planetary gears
13. Ball
14. Center bracket
15. Yoke assembly
16. Armature
17. Brush assembly
18. Rear bracket

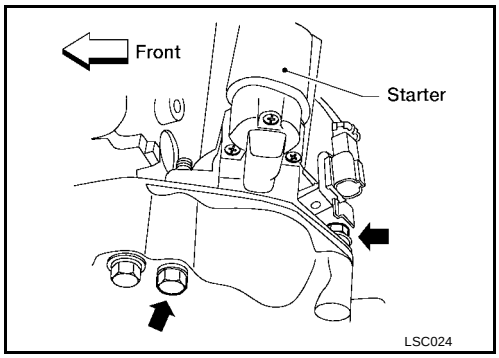
Removal and Installation

EKS0037U

QG18DE

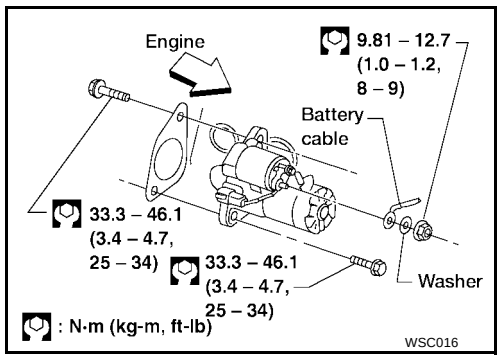
Removal

1. Disconnect the negative battery terminal.
2. Remove the upper starter mounting bolt.
3. Remove the harness protector from the starter engine room harness.
4. Disconnect the starter harness connectors.
5. Remove the lower starter mounting bolt.
6. Remove the starter.



Installation

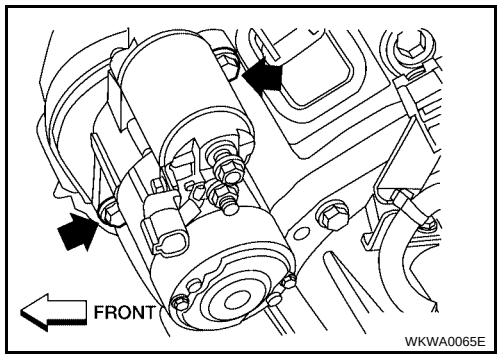
To install, reverse the removal procedure.



QR25DE

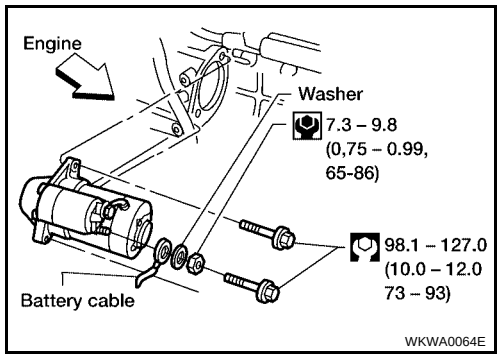
Removal

1. Disconnect the negative and positive battery cables.
2. Remove the engine undercover (M/T) or the air duct, fresh air intake hose, and air cleaner lid (A/T).
3. Disconnect the starter harness connectors.
4. Remove the two starter mounting bolts.
5. Remove the starter.



Installation

To install, reverse the removal procedure.



Pinion/Clutch Check

EKS0037V

1. Inspect pinion assembly teeth.
   - Replace pinion assembly if teeth are worn or damaged. (Also check condition of ring gear teeth.)
2. Inspect planetary gears/planetary gear teeth.
   - Replace planetary gears if teeth are worn or damaged. (Also check condition of pinion shaft/drive shaft gear teeth.)
3. Check to see if pinion assembly locks in one direction and rotates smoothly in the opposite direction.
   - If it locks or rotates in both directions, or unusual resistance is evident, replace.

CHARGING SYSTEM

PFP:23100

System Description

EKS0037W

The generator provides DC voltage to operate the vehicle's electrical system and to keep the battery charged. The voltage output is controlled by the IC regulator.
Power is supplied at all times to generator terminal B through:

- 100A (QG18DE) or 120A (QR25DE) fusible link (letter **a** , located in the fuse and fusible link box).

Power is supplied at all times to generator terminal S through:

- 10A fuse (No. 33, located in the fuse and fusible link box).

Terminal B supplies power to charge the battery and operate the vehicle's electrical system. Output voltage is controlled by the IC regulator at terminal S detecting the input voltage. The charging circuit is protected by the 100A (QG18DE) or 120A (QR25DE) fusible link.
The generator is grounded to the engine block.
With the ignition switch in the ON or START position, power is supplied:

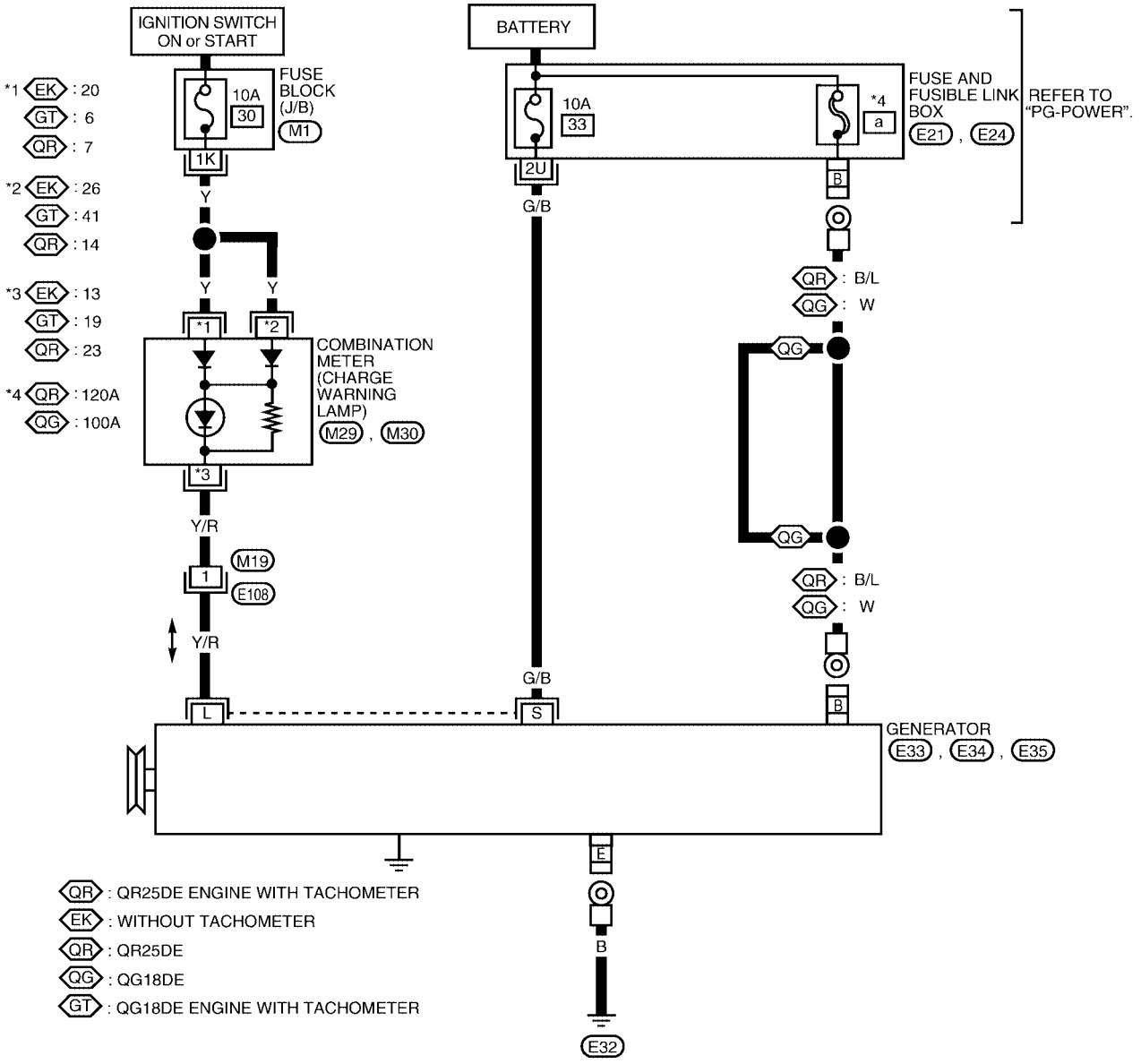
- through 10A fuse [No. 30, located in the fuse block (J/B)]
- to combination meter terminals 20 and 26 (without tachometer), terminals 6 and 41 (QG18DE with tachometer) or terminals 7 and 14 (QR25DE engine) for the charge warning lamp.

Ground is supplied to terminal 13 (without tachometer), terminal 19 (QG18DE with tachometer) or terminal 23 (QR25DE engine) of the combination meter through terminal L of the generator. With power and ground supplied, the charge warning lamp will illuminate. When the generator is providing sufficient voltage with the engine running, the ground is opened and the charge warning lamp will go off.
If the charge warning lamp illuminates with the engine running, a fault is indicated.

Wiring Diagram — CHARGE —

EKS0037X

SC-CHARGE-01



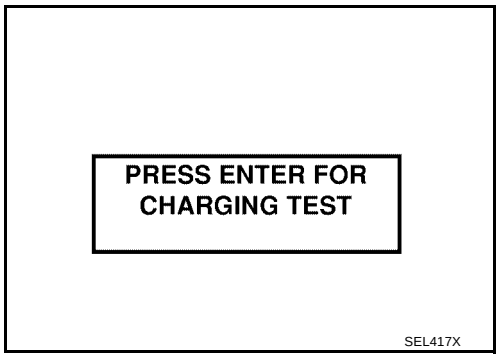
WKWA1149E

Trouble Diagnoses with Battery/Starting/Charging System Tester

EKS0037Y

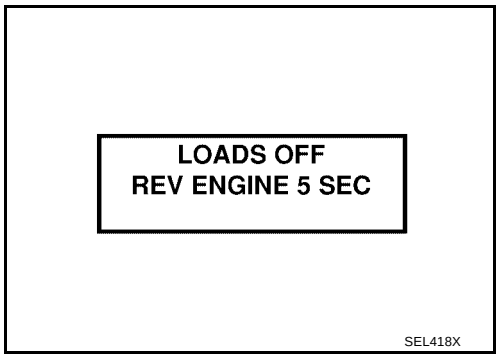
NOTE:
To ensure a complete and thorough diagnosis, the battery, starter and generator test segments must be done as a set from start to finish.

1. Turn off all loads on the vehicle electrical system.
2. Perform battery and starting system test with Battery/Starting/ Charging system tester.
3. Press “ENTER” to begin the charging system test.
4. Start engine.



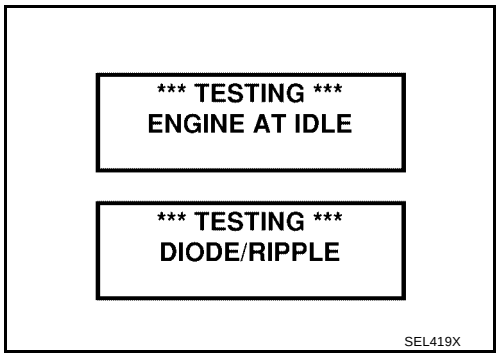
5. Press “ENTER” until “LOADS OFF REV ENGINE 5 SEC” is displayed.
6. Raise and hold the engine speed at 1,500 to 2,000 rpm for about 5 seconds, then return the engine to idle.
   Once the increase in engine rpm is detected, press “ENTER” to continue.

   NOTE:
   - If after 30 seconds an increase in engine idle speed is not detected, “RPM NOT DETECTED” will display.
   - Some engines may have a higher idle initially after starting, particularly when the engine is cold. The tester may detect this without any other action being taken. If this occurs, continue on with the testing process. The final results will not be affected.

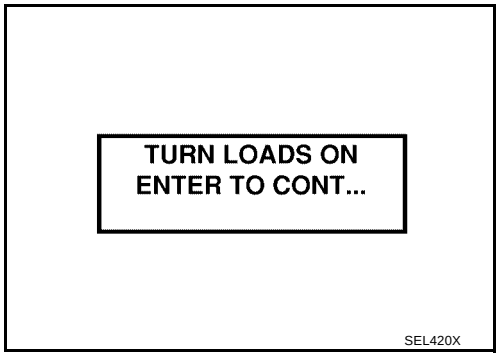


7. The tester now checks the engine at idle and performs the DIODE/RIPPLE check.
8. When complete, the tester will prompt you to turn on the following electrical loads.
   - Heater fan set to highest speed. Do not run the A/C or windshield defroster.
   - Headlamp high beam
   - Rear window defogger

   NOTE:
   Do not run the windshield wipers or any other cyclical loads.

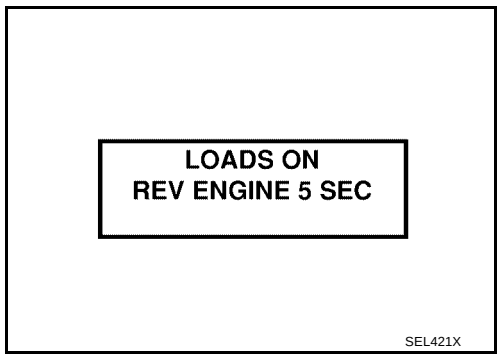


9. Press “ENTER” to continue.

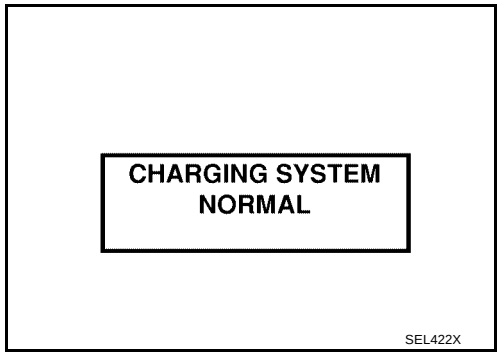


10. Raise and hold the engine speed at 1,500 to 2,000 rpm for about 5 seconds, then return the engine to idle. Once the increase in engine rpm is detected, press “ENTER” to continue.

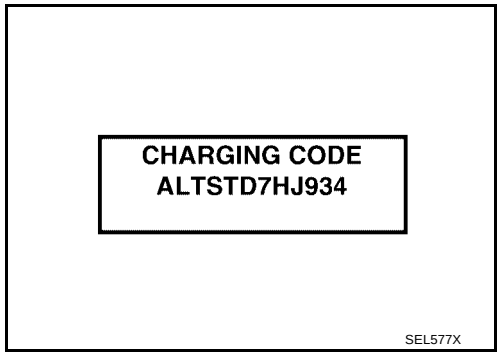
    NOTE:
    If after 30 seconds an increase in engine idle speed is not detected, “RPM NOT DETECTED” will be displayed. Press “ENTER” to restart the test.



11. Diagnostic result is displayed on the tester. Refer to SC-25, "DIAGNOSTIC RESULT ITEM CHART" .



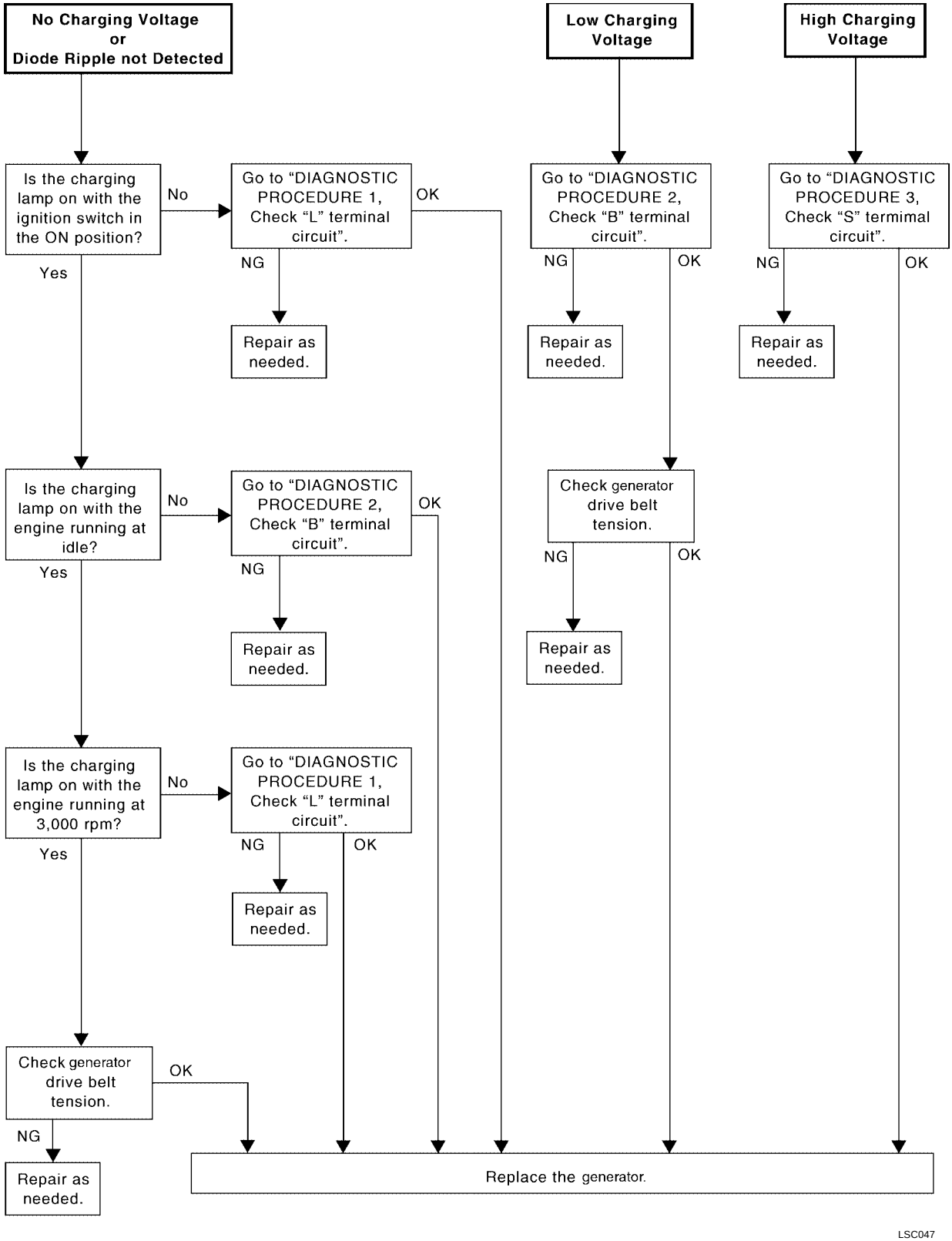
12. Press “ENTER” then test output code is displayed. Record the test output code on the repair order.
13. Toggle back to the “DIAGNOSTIC SCREEN” for test results.



DIAGNOSTIC RESULT ITEM CHART

Diagnostic item	Service procedure
CHARGING SYSTEM NORMAL	Charging system is normal and will also show DIODE RIPPLE test result.
NO CHARGING VOLTAGE	Go to SC-26, "WORK FLOW" .
LOW CHARGING VOLTAGE	Go to SC-26, "WORK FLOW" .
HIGH CHARGING VOLTAGE	Go to SC-26, "WORK FLOW" .
DIODE RIPPLE NORMAL	Diode ripple is OK and will also show CHARGING VOLTAGE test result.
EXCESS RIPPLE DETECTED	Replace the generator. Perform “DIODE RIPPLE” test again using Battery/Starting/Charging system tester to confirm repair.
DIODE RIPPLE NOT DETECTED	Go to SC-26, "WORK FLOW" .

WORK FLOW


No Charging Voltage or Diode Ripple not Detected
Low Charging Voltage
High Charging Voltage
Is the charging lamp on with the ignition switch in the ON position?
No
Yes
Go to "DIAGNOSTIC PROCEDURE 1, Check "L" terminal circuit".
OK
NG
Repair as needed.
Go to "DIAGNOSTIC PROCEDURE 2, Check "B" terminal circuit".
NG
OK
Repair as needed.
Go to "DIAGNOSTIC PROCEDURE 3, Check "S" termimal circuit".
NG
OK
Repair as needed.
Is the charging lamp on with the engine running at idle?
No
Yes
Go to "DIAGNOSTIC PROCEDURE 2, Check "B" terminal circuit".
OK
NG
Repair as needed.
Check generator drive belt tension.
NG
OK
Repair as needed.
Is the charging lamp on with the engine running at 3,000 rpm?
No
Yes
Go to "DIAGNOSTIC PROCEDURE 1, Check "L" terminal circuit".
NG
OK
Repair as needed.
Check generator drive belt tension.
OK
NG
Repair as needed.
Replace the generator.
LSC047

DIAGNOSTIC PROCEDURE 1
Check “L” Terminal Circuit

1. CHECK “L” TERMINAL CONNECTION

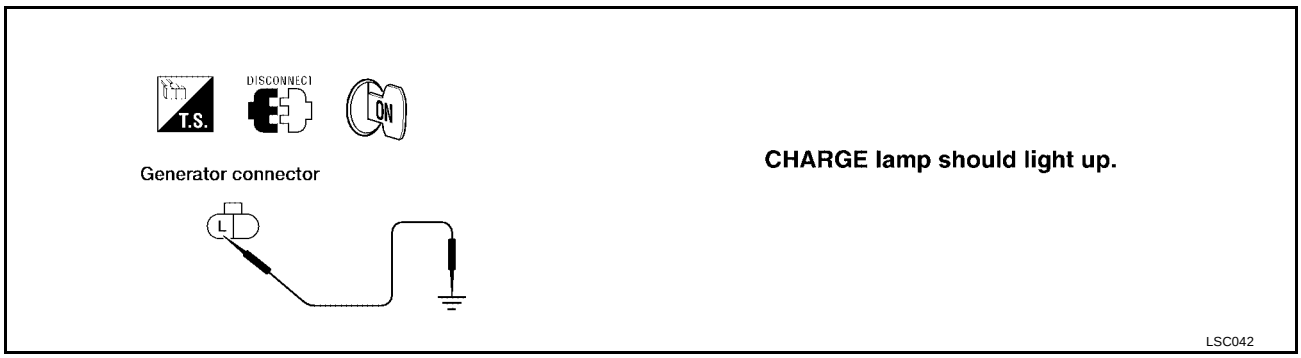
Check to see if “L” terminal is clean and tight.

OK or NG

OK >> GO TO 2.
NG >> Repair “L” terminal connection. Confirm repair by performing complete Battery/Starting/Charging system test.

2. CHECK “L” TERMINAL CIRCUIT

1. Disconnect E35 connector from generator.
2. Apply ground to connector E35 terminal L (Y/R) with the ignition switch in the ON position.



OK or NG

OK >> Replace the generator. Confirm repair by performing complete Battery/Starting/Charging system test.
NG >> Check the following.
- 10A fuse [No. 30, located in fuse block (J/B)]
- CHARGE lamp
- Harness for open or short between combination meter and fuse
- Harness for open or short between combination meter and generator

DIAGNOSTIC PROCEDURE 2
Check “B” Terminal Circuit

1. CHECK “B” TERMINAL CONNECTION

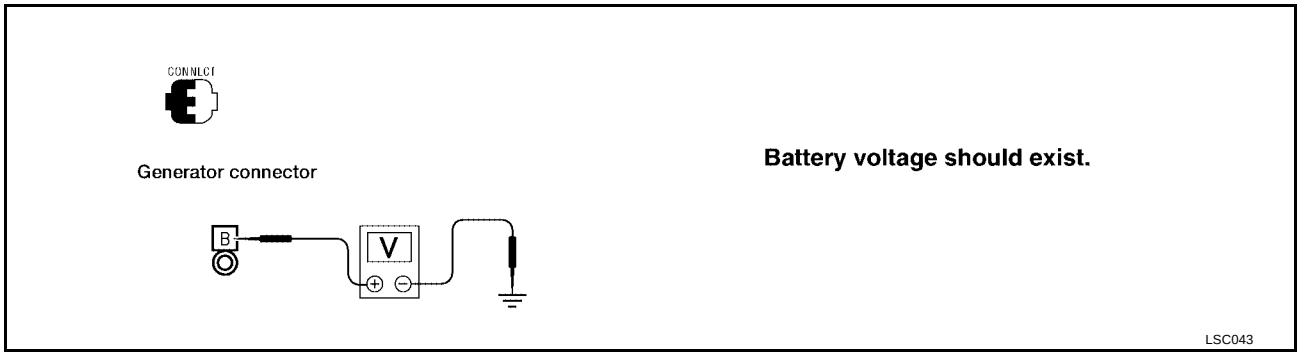
Check to see if “B” terminal is clean and tight.

OK or NG

OK >> GO TO 2.
NG >> Repair “B” terminal connection. Confirm repair by performing complete Battery/Starting/Charging system test.

2. CHECK GENERATOR “B” TERMINAL CIRCUIT

Check voltage between generator connector E34 terminal B (B/L) (QG18DE), (W) (QR25DE) and ground using a digital circuit tester.



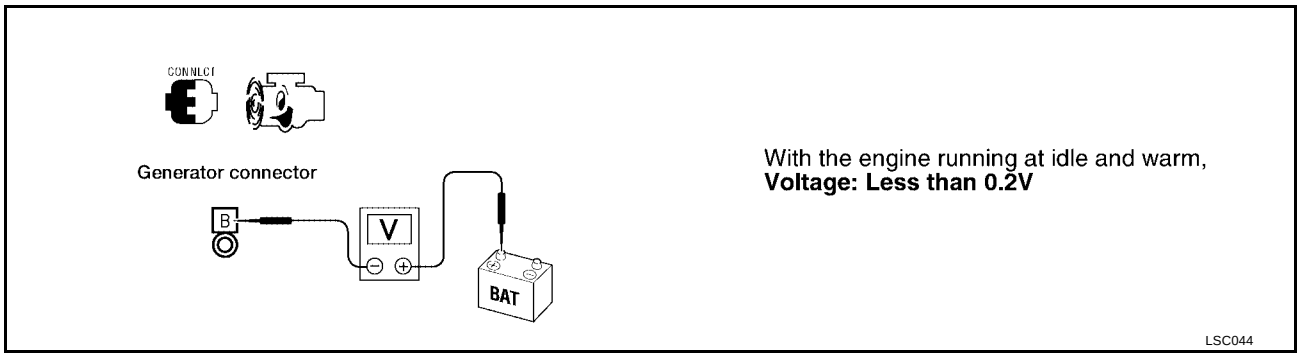
OK or NG

OK >> GO TO 3.
NG >> Check the following.

- 100A (QG18DE), 120A (QR25DE) fusible link (letter **a** , located in fuse and fusible link box)
- Harness for open or short between generator and fusible link

3. CHECK “B” TERMINAL CONNECTION QUALITY (VOLTAGE DROP TEST)

Check voltage between generator connector E34 terminal B (B/L) (QG18DE), (W) (QR25DE) and battery positive terminal using a digital circuit tester.



OK or NG

OK >> Replace the generator. Confirm repair by performing complete Battery/Starting/Charging system test.
NG >> Check harness between the battery and the generator for poor continuity.

DIAGNOSTIC PROCEDURE 3
Check “S” Terminal Circuit

1. CHECK “S” TERMINAL CONNECTION

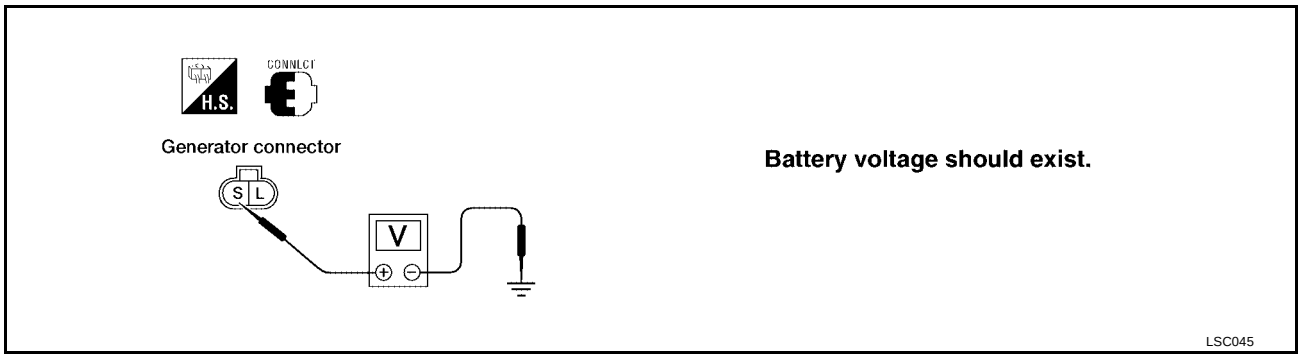
Check to see if “S” terminal is clean and tight.

OK or NG

OK >> GO TO 2.
NG >> Repair “S” terminal connection. Confirm repair by performing complete Battery/Starting/Charging system test.

2. CHECK GENERATOR “S” TERMINAL CIRCUIT

Check voltage between generator connector E35 terminal S (G/B) and ground using a digital circuit tester.



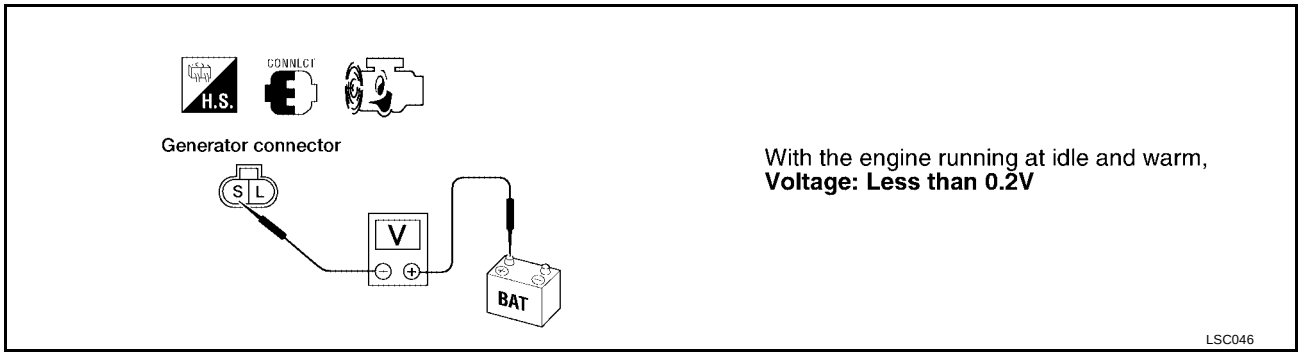
OK or NG

OK >> GO TO 3.
NG >> Check the following.

- 10A fuse (No. 33, located in fuse and fusible link box)
- Harness for open or short between generator and fuse

3. CHECK “S” TERMINAL CONNECTION QUALITY (VOLTAGE DROP TEST)

Check voltage between generator connector E35 terminal S (G/B) and battery positive terminal using a digital circuit tester.



OK or NG

OK >> Replace the generator. Confirm repair by performing complete Battery/Starting/Charging system test.
NG >> Check harness between the battery and the generator for poor continuity.

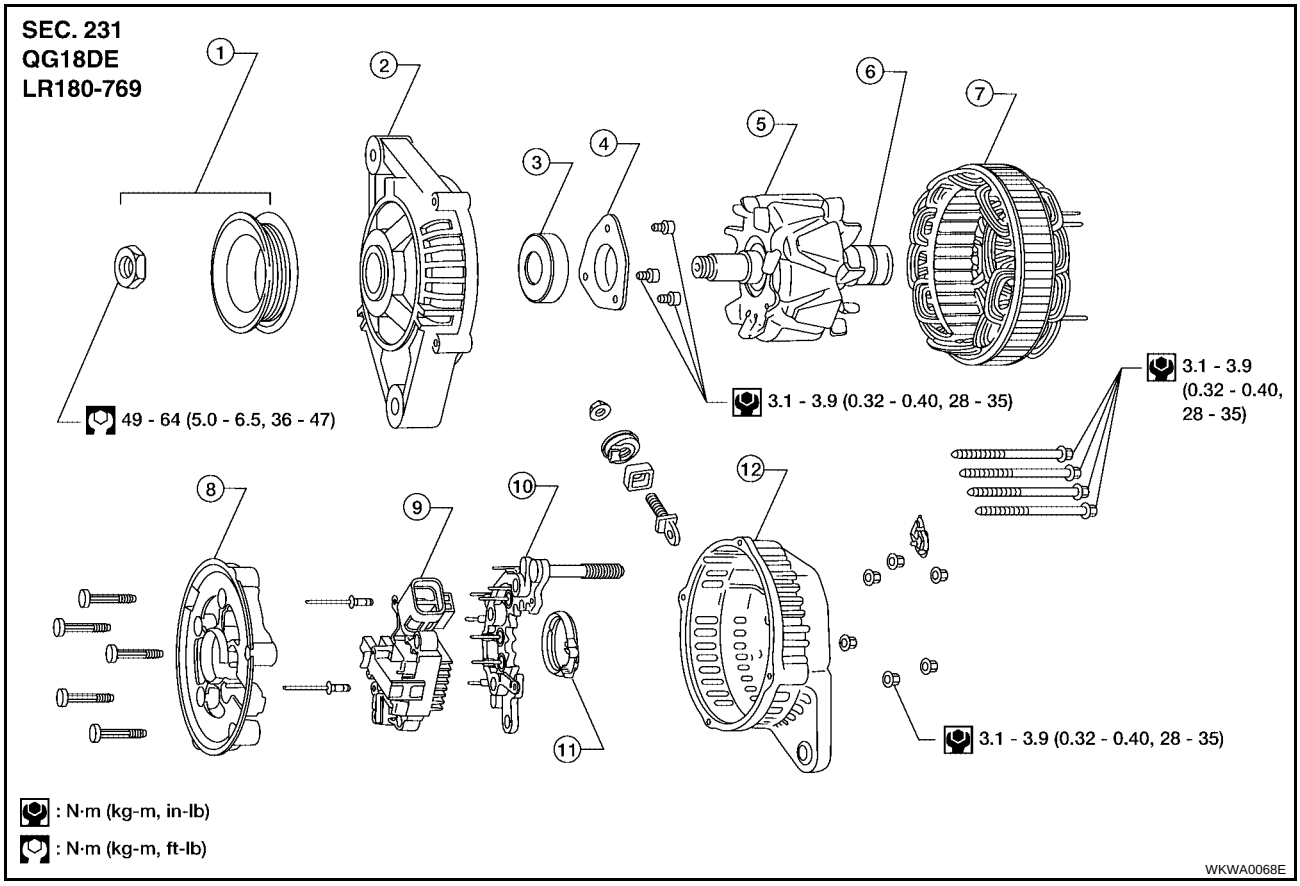
MALFUNCTION INDICATOR

The IC regulator warning function activates to illuminate “CHARGE” warning lamp, if any of the following symptoms occur while generator is operating:

- Excessive voltage is produced.
- No voltage is produced.

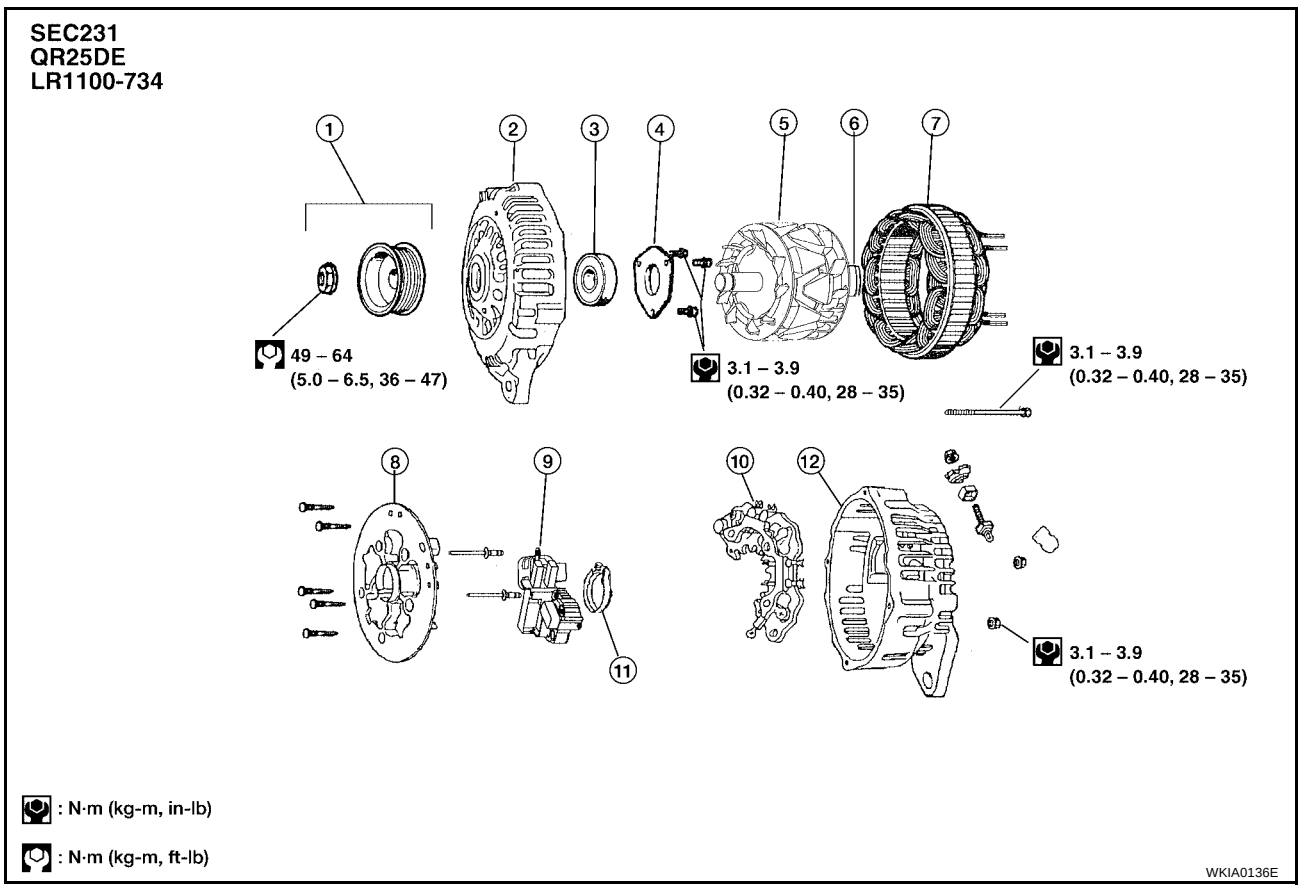
Construction

EKS0037Z



1. Pulley assembly
2. Front cover
3. Front bearing
4. Retainer
5. Rotor
6. Slip ring
7. Stator
8. Fan guide
9. IC regulator assembly
10. Diode assembly
11. Packing
12. Rear cover

SEC231
QR25DE
LR1100-734



1. Pulley assembly
2. Front cover
3. Front bearing
4. Retainer
5. Rotor
6. Slip ring
7. Stator
8. Fan guide
9. IC regulator assembly
10. Diode assembly
11. Packing
12. Rear cover

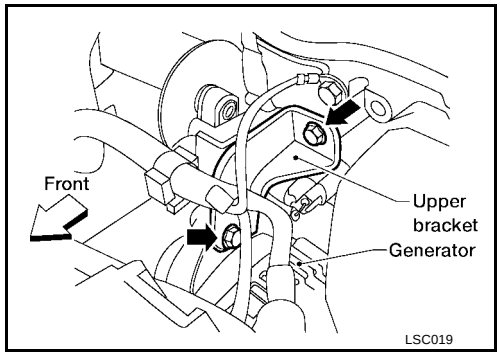
Removal and Installation

EKS00380

QG18DE

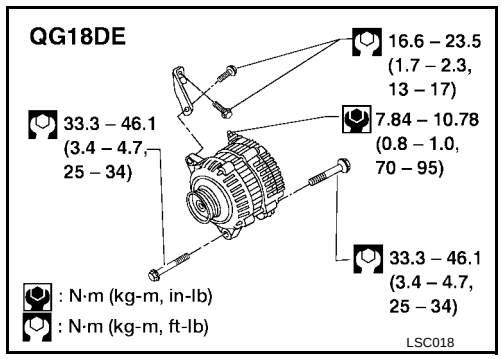
Removal

1. Disconnect the negative battery terminal.
2. Remove the front/right-side engine undercover.
3. Remove the drive belt.
4. Disconnect the A/C compressor harness connector.
5. Remove the four A/C compressor mounting bolts.
6. Slide the A/C compressor forward and support it.
7. Remove the two generator lower mounting bolts.
8. Disconnect the generator harness connectors.
9. Remove the generator upper bracket.
10. Remove the generator.



Installation

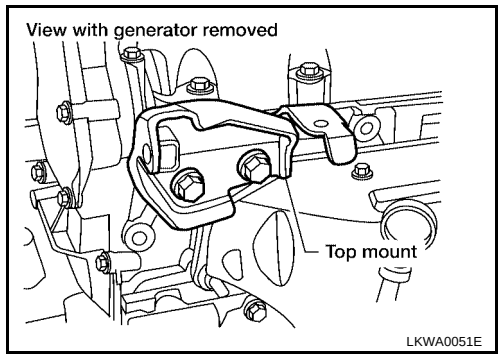
To install, reverse the removal procedure.



QR25DE

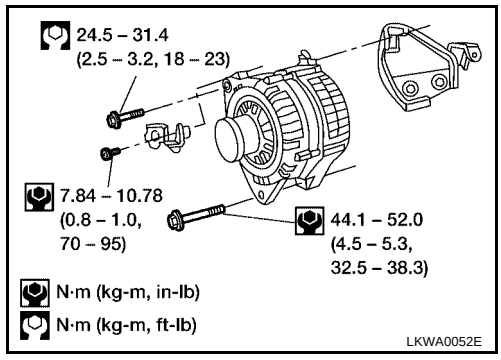
Removal

1. Disconnect the negative battery cable.
2. Remove the front/right-side engine undercover.
3. Remove the drive belt.
4. Disconnect the generator harness connectors.
5. Disconnect the engine ground wire from the top mount.
6. Remove the generator upper and lower mount bolts.
7. Set the generator aside and remove the generator top mount.
8. Slide the generator out and remove.



Installation

To install, reverse the removal procedure.



SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Battery

EKS00381

Application	QG18DE	QR25DE
Type	GR.21R (BCI)	GR.24R (BCI)
Capacity (20 HR) minimum V-AH	12-49	12-63
Cold cranking current A (For reference value)	356 @ -18°C (0°F)	550 @ -18°C (0°F)

Starter

EKS00382

Application		QG18DE	QR25DE	
Manufacturer		Hitachi S114-900	Mitsubishi M000T87085ZC	Mitsubishi M000T60781ZC
			M/T models	A/T models
Type		Reduction gear type	Reduction gear type	
System voltage		12V	12V	
No-load	Terminal voltage	11V	11V	
	Current	90A Max.	90A Max.	
	Revolution	2,600 rpm Min.	2,500 rpm Min.	
Minimum diameter of commutator		32.1 mm	28.8 mm	
Minimum length of brush		10.7 mm	5.5 mm	7.0 mm
Brush spring tension		11.5 N (1.17 kg, 2.58 lb)	15.0 - 20.4 (1.53 - 2.08 kg, 3.37 - 4.59 lb)	18.3 - 24.8 (1.87 - 2.53 kg, 4.11 - 5.58 lb)
Clearance between pinion front edge and pinion stopper		1.8 mm	0.5 - 2.0 mm	

Generator

EKS00383

Application	QG18DE	QR25DE
Type	LR180-769	LR1100-734
	HITACHI	
Nominal rating	12V-80A	12V-110A
Ground polarity	Negative	
Minimum revolution under no-load (When 13.5 volts is applied)	1,000 rpm	950 rpm
Hot output current (When 13.5 volts is applied)	23A/1,300 rpm 66A/2,500 rpm 79A/5,000 rpm	35A/1,300 rpm 83A/2,500 rpm 95A/5,000 rpm
Regulated output voltage	14.1 - 14.7V	
Minimum length of brush	6 mm (0.236 in)	
Brush spring pressure	1.000 - 3.432 N (0.102 - 0.350 kg, 0.225 - 0.772 lbs)	
Slip ring minimum outer diameter	26.0 mm (1.024 in)	
Rotor (Field coil) resistance	2.67 ohms	2.31 ohms

SECTION LT
LIGHTING SYSTEM

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EKS006AD

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Wiring Diagrams and Trouble Diagnosis

EKS00385

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams"
- PG-3, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident"

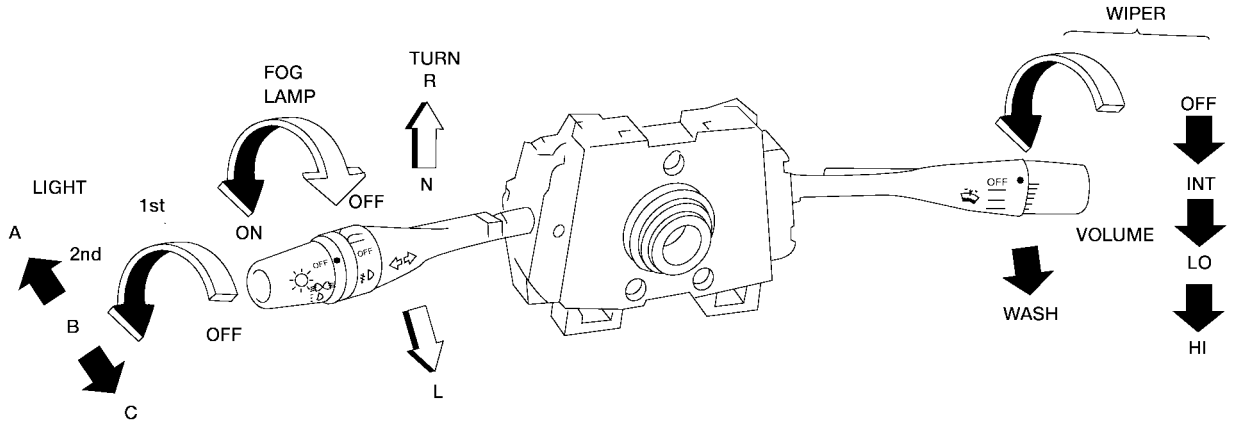
Check for any Service bulletins before servicing the vehicle.

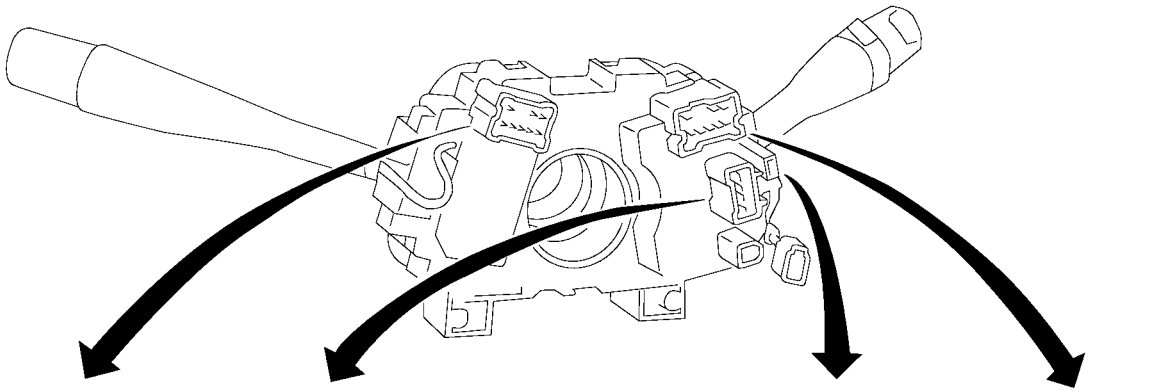
COMBINATION SWITCH

PFP:25567

Check

EKS00386





FRONT WIPER AND WASHER SWITCH
(WITH INTERMITTENT OPERATION)

	LO	AUTO STOP	AMP	WASH	HI	EARTH
OFF	○	○				
INT	○	○	○			○
LO	○					○
HI					○	○
WASH				○		○

VARIABLE INTERMITTENT WIPER VOLUME

WIPER AMP.

14 15 13 16 17 18

WIPER SWITCH (WITHOUT INTERMITTENT OPERATION)

	OFF	LO	HI	WASH
13	○			
14	○	○		
16			○	
17		○	○	
18				○

LIGHTING SWITCH

	OFF			1ST			2ND		
	A	B	C	A	B	C	A	B	C
5			○			○	○	○	○
6			○			○	○		○
7								○	
8			○			○	○	○	○
9			○			○	○		○
10								○	
11				○	○	○	○	○	○
12				○	○	○	○	○	○

TURN SIGNAL LAMP SWITCH

	R	N	L
1	○		○
2	○		
3			○

FRONT FOG LAMP SWITCH

	OFF	ON
1		○
2		○

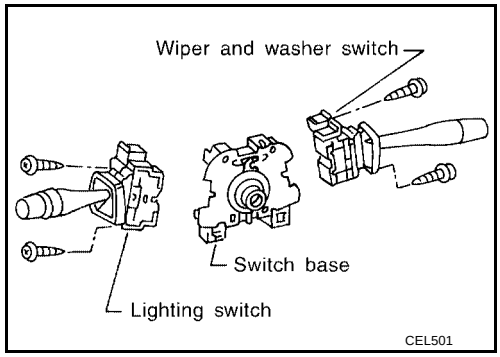
LEL576

Replacement

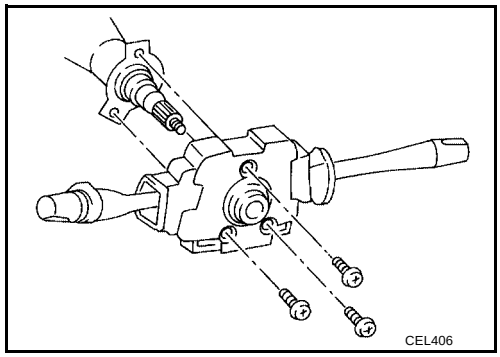
EKS00387

For removal and installation of spiral cable, refer to SRS-43, "Removal and Installation" .

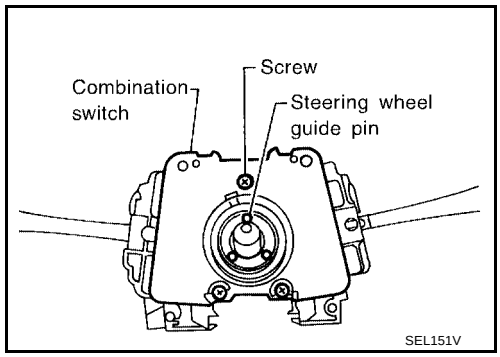
- Each switch can be replaced without removing switch base.



- To remove switch base, remove switch base attaching screws.



- Before installing the steering wheel, align the steering wheel guide pins with the screws which secure the combination switch as shown in the figure.



HEADLAMP (FOR USA)

PFP:26010

System Description

EKS0069V

The headlamps are controlled by the lighting switch which is built into the combination switch.
Power is supplied at all times

- to lighting switch terminal 5
- through 15A fuse (No. 39, located in the fuse and fusible link box), and
- to lighting switch terminal 8
- through 15A fuse (No. 40, located in the fuse and fusible link box).

LOW BEAM OPERATION

When the lighting switch is turned to headlamp “ON” (2ND) position, “LOW BEAM” (B), power is supplied

- from lighting switch terminal 10
- to terminal LO of the LH headlamp, and
- from lighting switch terminal 7
- to terminal LO of the RH headlamp.

Ground is supplied

- to RH and LH headlamp terminal E
- through body grounds E7 and E37.

With power and ground supplied, the headlamps will illuminate.

HIGH BEAM OPERATION/FLASH-TO-PASS OPERATION

When the lighting switch is turned to headlamp “ON” (2ND) position, “HIGH BEAM” (A) or “FLASH TO PASS” (C) position, power is supplied

- from lighting switch terminal 9
- to terminal HI of the LH headlamp, and
- from lighting switch terminal 6
- to terminal HI of the RH headlamp, and
- to combination meter terminal 2 (with tachometer), 12 (without tachometer) for the high beam indicator.

Ground is supplied

- to combination meter terminal 3 (with tachometer), 14 (without tachometer)
- through body grounds M28 and M54.

With power and ground supplied, the high beams and the high beam indicator illuminate.

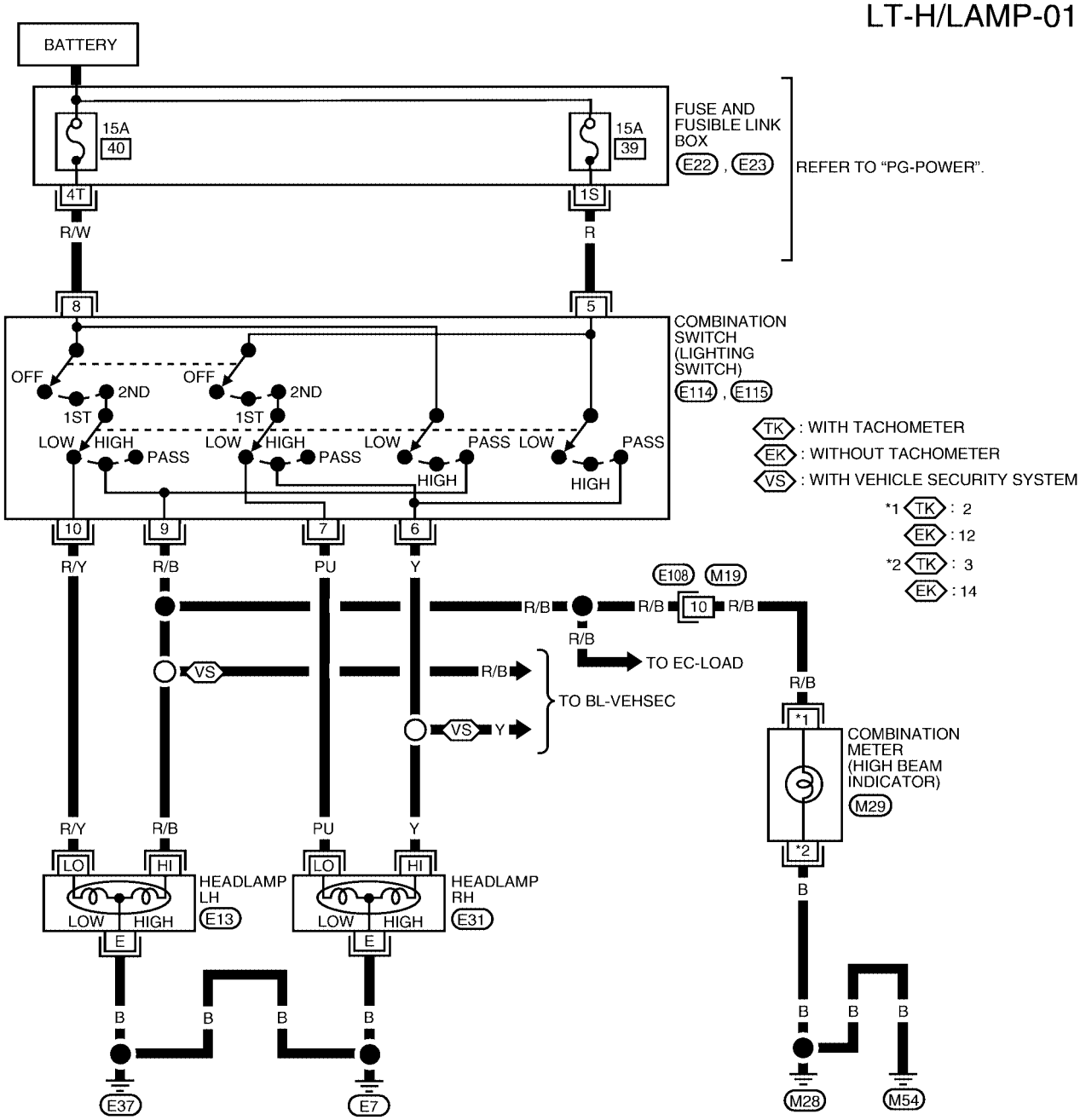
VEHICLE SECURITY SYSTEM

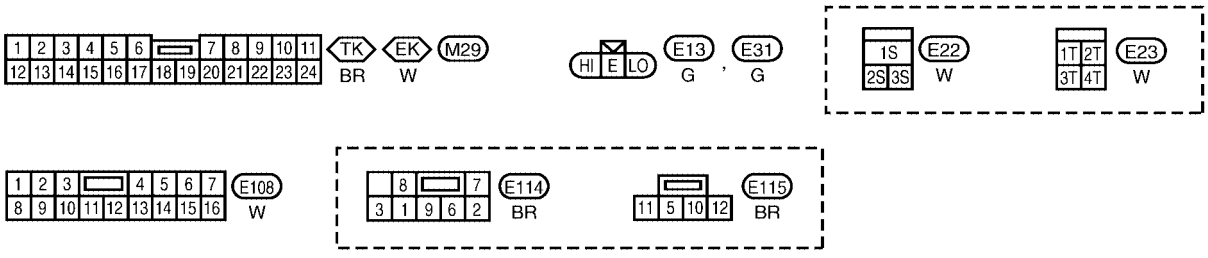
The vehicle security system will flash the high beams if the system is triggered. Refer to BL-66, "VEHICLE SECURITY (THEFT WARNING) SYSTEM" .

Wiring Diagram — H/LAMP —

EKS0069W

LT-H/LAMP-01





WKWA0634E

Trouble Diagnoses

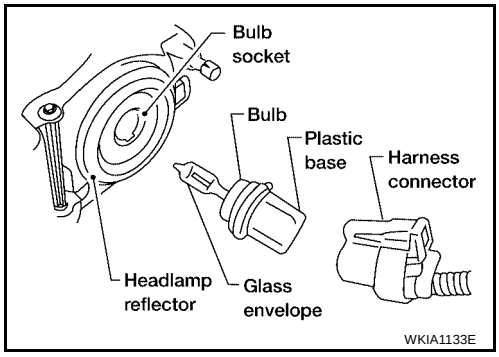
EKS0069X

Symptom	Possible cause	Repair order
LH headlamp does not operate.	1. Bulb 2. Grounds E7 and E37 3. 15A fuse 4. Lighting switch	1. Check bulb. 2. Check grounds E7 and E37. 3. Check 15A fuse (No. 40, located in fuse and fusible link box.) Verify battery positive voltage is present at terminal 8 of lighting switch. 4. Check lighting switch.
RH headlamp does not operate.	1. Bulb 2. Grounds E7 and E37 3. 15A fuse 4. Lighting switch	1. Check bulb. 2. Check grounds E7 and E37. 3. Check 15A fuse (No. 39, located in fuse and fusible link box). Verify battery positive voltage is present at terminal 5 of lighting switch. 4. Check lighting switch.
LH high beam does not operate, but LH low beam operates.	1. Bulb 2. Open in LH high beam circuit 3. Lighting switch	1. Check bulb. 2. Check R/B wire between lighting switch and LH headlamp for an open circuit. 3. Check lighting switch.
LH low beam does not operate, but LH high beam operates.	1. Bulb 2. Open in LH low beam circuit 3. Lighting switch	1. Check bulb. 2. Check R/Y wire between lighting switch and LH headlamp for an open circuit. 3. Check lighting switch.
RH high beam does not operate, but RH low beam operates.	1. Bulb 2. Open in RH high beam circuit 3. Lighting switch	1. Check bulb. 2. Check Y wire between lighting switch and RH headlamp for an open circuit. 3. Check lighting switch.
RH low beam does not operate, but RH high beam operates.	1. Bulb 2. Open in RH low beam circuit 3. Lighting switch	1. Check bulb. 2. Check PU wire between lighting switch and RH headlamp for an open circuit. 3. Check lighting switch.
High beam indicator does not work.	1. Bulb 2. Grounds M28 and M54 3. Open in high beam circuit	1. Check bulb in combination meter. 2. Check grounds M28 and M54. 3. Check R/B wire between lighting switch and combination meter for an open circuit.

Bulb Replacement

EKS006AN

The headlamp is a semi-sealed beam type which uses a replaceable halogen bulb. The bulb can be replaced from the engine compartment side without removing the headlamp body.



- **Grasp only the plastic base when handling the bulb. Never touch the glass envelope.**

1. Disconnect the negative battery cable.
2. Disconnect the harness connector from the back side of the headlamp bulb.
3. Turn the bulb counterclockwise and pull the bulb straight out of the headlamp assembly.

Installation is in the reverse order of removal.

CAUTION:

Do not leave headlamp reflector without bulb for a long period of time. Dust, moisture, smoke, etc. entering headlamp body may affect the performance of the headlamp. Remove headlamp bulb from the headlamp reflector just before a replacement bulb is installed.

Aiming Adjustment

EKS006AO

For details, refer to the regulations in your own country.

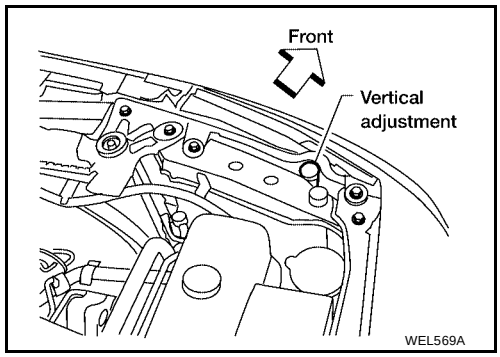
NOTE:
By regulation, no means for horizontal adjustment is provided from the factory on a finished vehicle. Horizontal aim will only be serviced in the case of headlamp replacement. After initial aim is set on the replacement headlamp, access to the horizontal adjusting screw must be prevented by installation of the headlamp aim locking cap that is provided with the replacement headlamp assembly.
Before performing aiming adjustment, check the following.

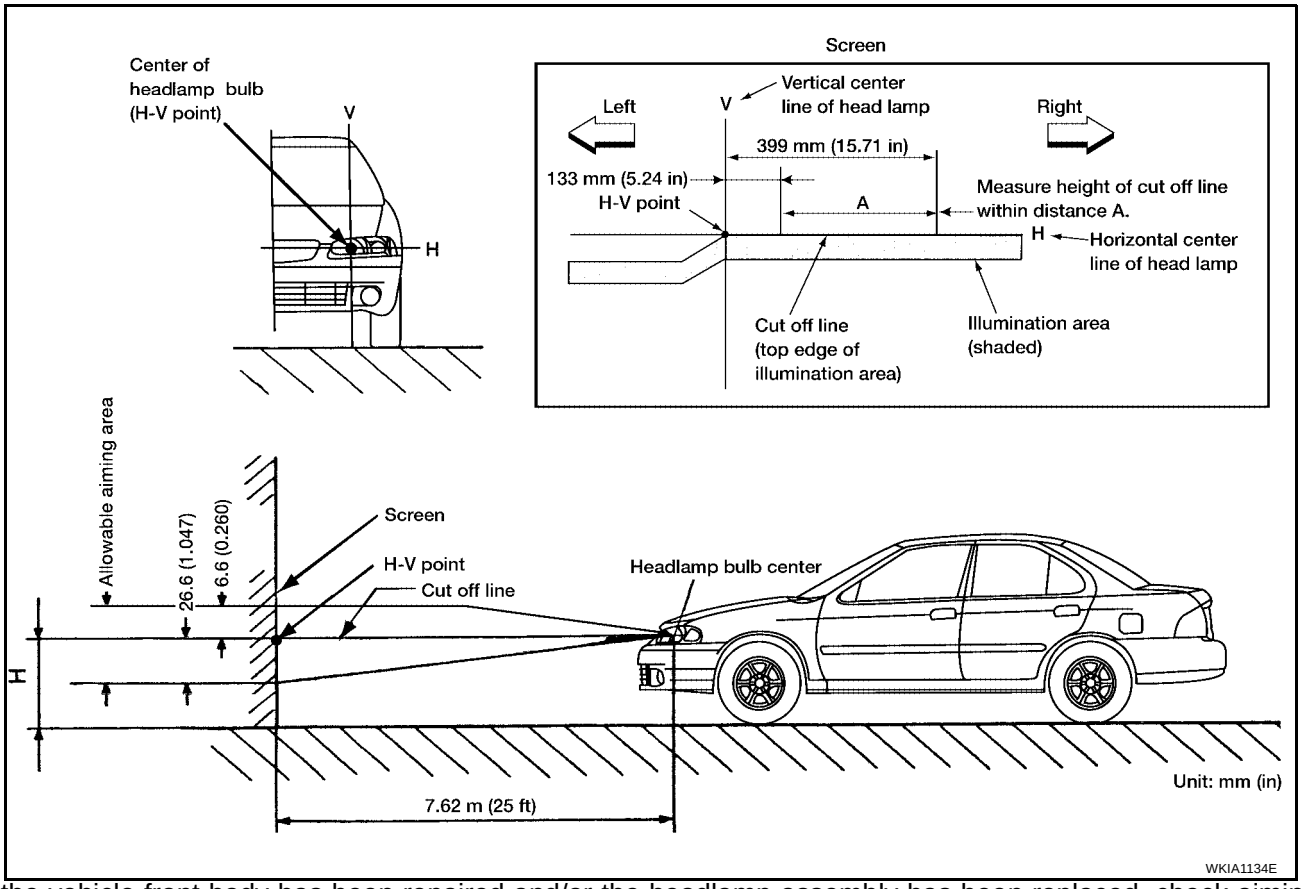
1. Inflate all tires to correct pressures.
2. Place vehicle on flat surface.
3. See that the vehicle is unloaded (except for full levels of coolant, engine oil and fuel, and spare tire, jack, and tools). Have the driver or equivalent weight placed in the driver's seat.

LOW BEAM

1. Turn headlamp low beam on.
2. Use adjusting screw to perform aiming adjustment.

CAUTION:
Do not tighten adjusting screw beyond a torque of 1.67 N-m (17 kg-cm, 14.8 in-lb) or damage may occur.





If the vehicle front body has been repaired and/or the headlamp assembly has been replaced, check aiming. Use the aiming chart shown in the figure.

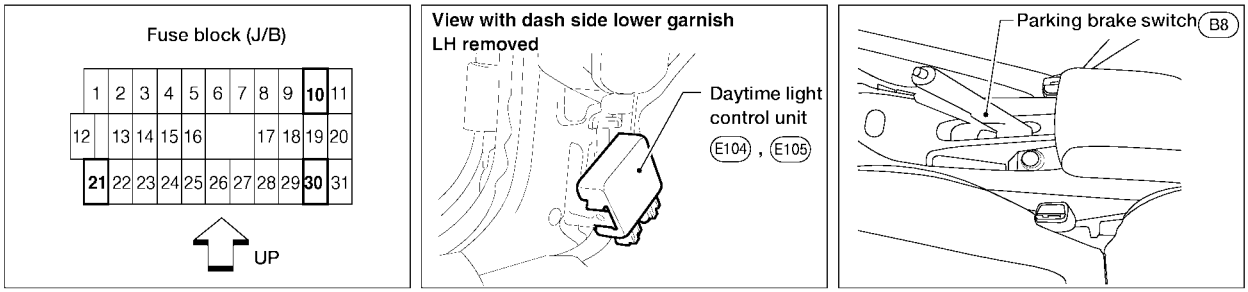
- **Basic illuminating area for adjustment should be within the range shown on the aiming chart. Adjust headlamps accordingly.**

HEADLAMP (FOR CANADA) — DAYTIME LIGHT SYSTEM —

PFP:26010

Component Parts and Harness Connector Location

EKS006A0



LEL556

System Description

EKS006A1

The headlamp system for Canada vehicles contains a daytime light control unit. This unit activates the high beam headlamps at approximately half illumination whenever the engine is running. If the parking brake is applied before the engine is started, daytime lights will not be illuminated. The daytime lights will illuminate once the parking brake is released. Thereafter, the daytime lights will continue to operate when the parking brake is applied. If the daytime light control unit receives a ground signal from the generator, the daytime lights will not be illuminated. The daytime lights will illuminate once a battery positive voltage signal is sent to the daytime light control unit from the generator.

Power is supplied at all times

- through 15A fuse (No. 39, located in the fuse and fusible link box)
- to daytime light control unit terminal 2 and
- to lighting switch terminal 5
- through 15A fuse (No. 40, located in the fuse and fusible link box)
- to daytime light control unit terminal 3 and
- to lighting switch terminal 8.

With the ignition switch in the ON or START position, power is supplied

- through 10A fuse (No. 10, located in the fuse block [J/B])
- to daytime light control unit terminal 12.

With the ignition switch in the START position, power is supplied

- through 10A fuse (No. 21, located in the fuse block [J/B])
- to daytime light control unit terminal 1.

Ground is supplied

- to daytime light control unit terminal 9
- through body grounds E7 and E37.

HEADLAMP OPERATION

Low Beam Operation

When the lighting switch is turned to headlamp "ON" (2ND) position, "LOW BEAM" (B) position, power is supplied

- from lighting switch terminal 7
- to RH headlamp terminal LO.

Ground is supplied

- to RH headlamp terminal E
- through body grounds E7 and E37.

Also, when the lighting switch is moved to headlamp "ON" (2ND) position, "LOW BEAM" (B) position, power is supplied

- from lighting switch terminal 10
- to LH headlamp terminal LO.

Ground is supplied

- to LH headlamp terminal E
- from daytime light control unit terminal 7
- through daytime light control unit terminal 9
- through body grounds E7 and E37.

With power and ground supplied, the low beam headlamps illuminate.

High Beam Operation/Flash-to-pass Operation

When the lighting switch is moved to headlamp "ON" (2ND) position, "HIGH BEAM" (A) or "FLASH TO PASS" (C) position, power is supplied

- from lighting switch terminal 6
- to RH headlamp terminal HI, and
- from lighting switch terminal 9
- to daytime light control unit terminal 5, and
- to combination meter terminal 2 (with tachometer), 12 (without tachometer) for the high beam indicator
- through daytime light control unit terminal 6
- to LH headlamp terminal HI.

Ground is supplied in the same manner as low beam operation.
For the combination meter, ground is supplied

- to terminal 3 (with tachometer), 14 (without tachometer)
- through body grounds M28 and M54.

With power and ground supplied, the high beam headlamps and high beam indicator illuminate.

DAYTIME LIGHT OPERATION

With the engine running and the lighting switch in the "OFF" or parking lamp (1ST) position and parking brake released, power is supplied

- to daytime light control unit terminal 3
- through daytime light control unit terminal 6
- to LH headlamp terminal HI
- through LH headlamp terminal E
- to daytime light control unit terminal 7
- through daytime light control unit terminal 8
- to RH headlamp terminal HI.

Ground is supplied

- to RH headlamp terminal E
- through body grounds E7 and E37.

Because the high beam headlamps are wired in series during daytime light operation, they operate at half illumination.

OPERATION (FOR CANADA)

The headlamps' high beams automatically turn on after starting the engine with the lighting switch in the "OFF" or parking lamp (1st) position. All other lighting switch functions operate the same as conventional light systems.

Engine		With engine stopped									With engine running								
Lighting switch		OFF			1ST			2ND			OFF			1ST			2ND		
		A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
Headlamp	High beam	X	X	O	X	X	O	O	X	O	*	*	O	*	*	O	O	X	O
	Low beam	X	X	X	X	X	X	X	O	X	X	X	X	X	X	X	X	O	X
Front parking and tail lamp		X	X	X	O	O	O	O	O	O	X	X	X	O	O	O	O	O	O
License and instrument illumination lamp		X	X	X	O	O	O	O	O	O	X	X	X	O	O	O	O	O	O

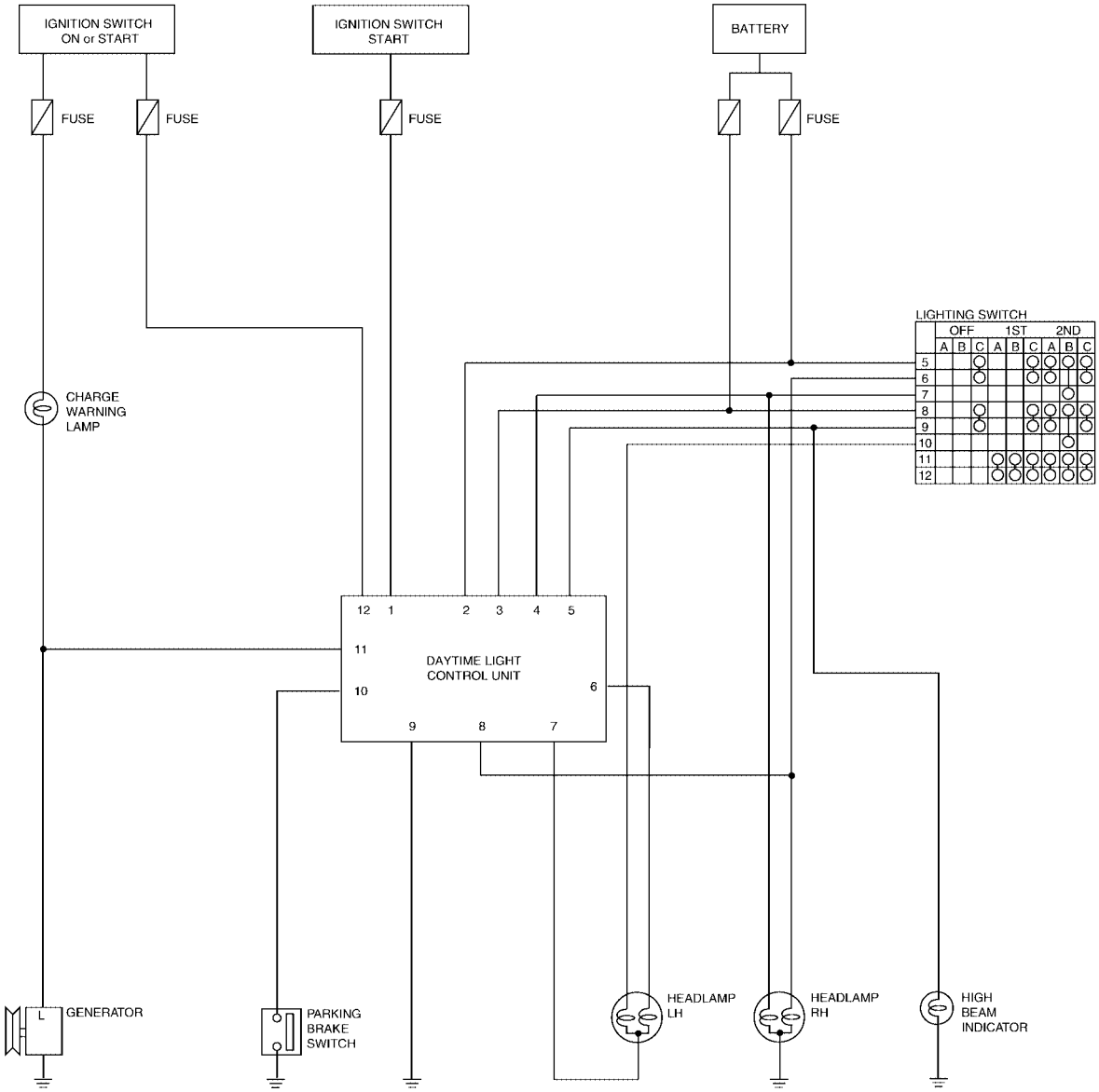
- A: "HIGH BEAM" position
- B: "LOW BEAM" position
- C: "FLASH TO PASS" position
- O: Lamp ON
- X: Lamp OFF
- : Lamp on at half brightness
- *: When starting the engine with the parking brake released, the daytime light will come ON.
  When starting the engine with the parking brake applied, the daytime light will not come ON. Once the parking brake is released, the daytime light will come ON. Thereafter, the daytime light will continue to operate when the parking brake is applied. If the daytime light control unit receives a ground signal from the generator, the daytime light will not come ON. The daytime light will come ON when battery voltage is sent to the daytime light control unit from the generator (engine is running).

VEHICLE SECURITY SYSTEM

The vehicle security system will flash the high beams if the system is triggered. Refer to BL-66, "VEHICLE SECURITY (THEFT WARNING) SYSTEM" .

Schematic

EKS006A2



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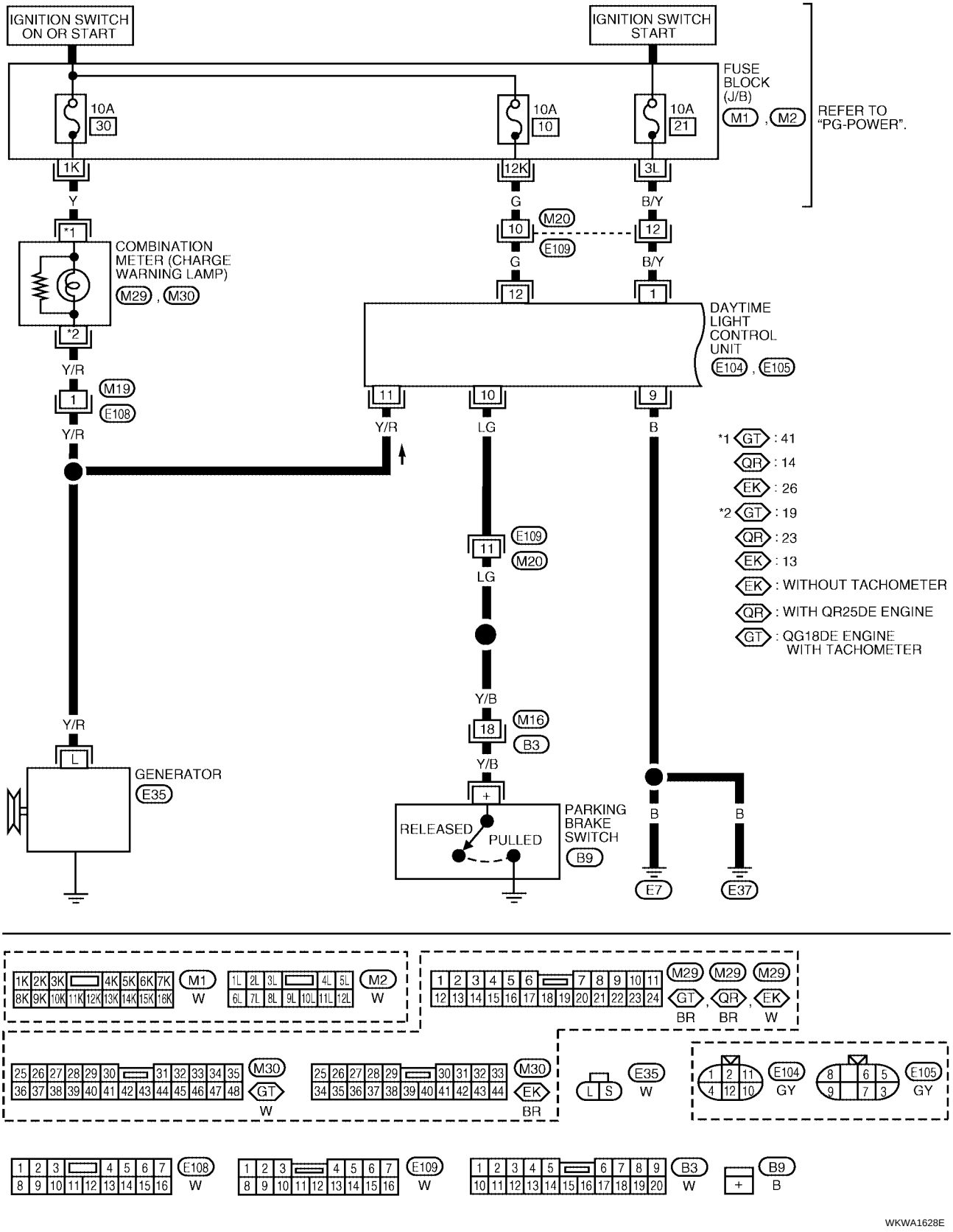
Wiring Diagram — DTRL —

EKS006A3

LT-DTRL-01



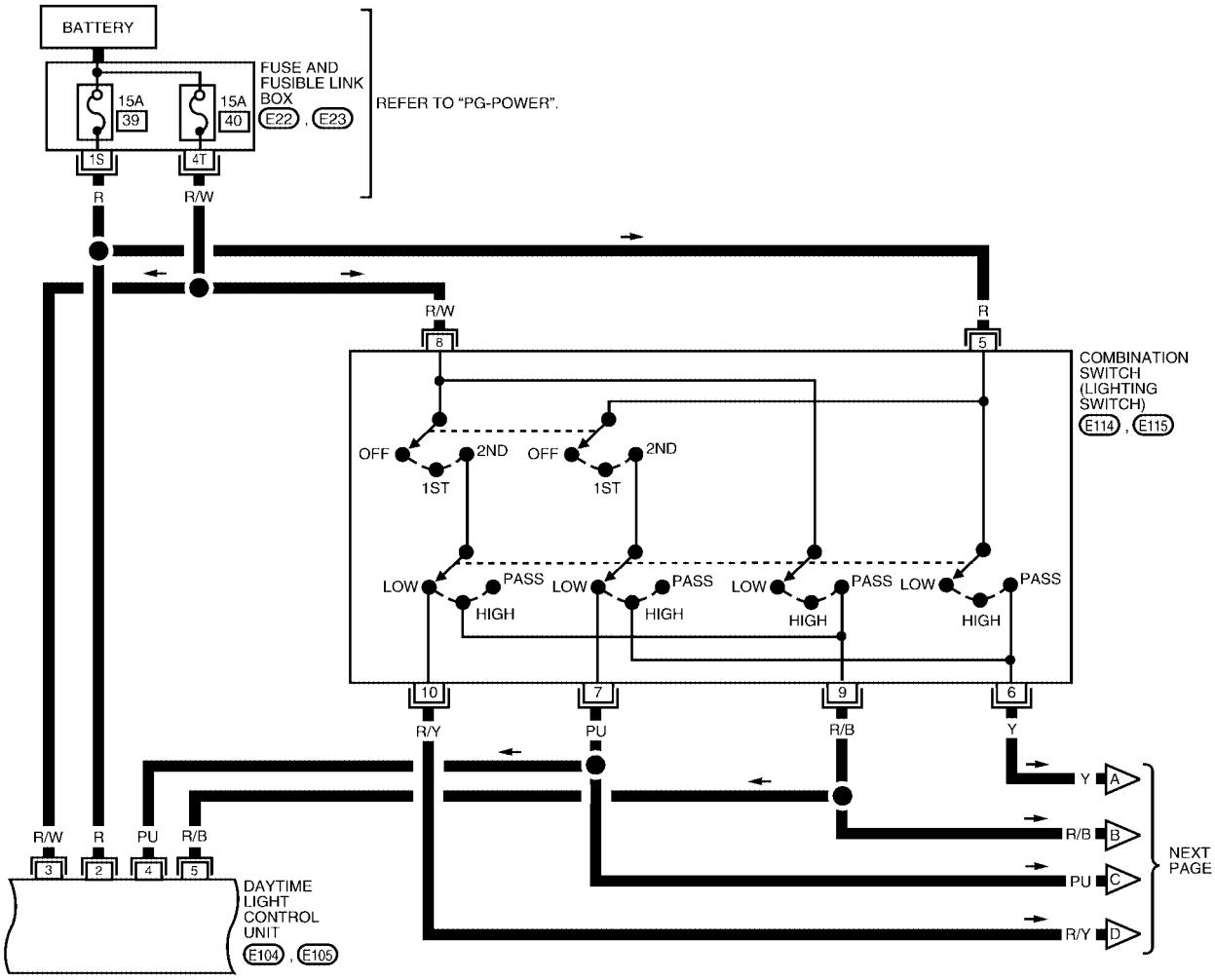
WKWA1628E

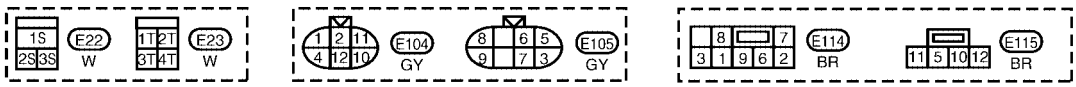
DAYTIME LIGHT CONTROL UNIT TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
1	B/Y	IGNITION SWITCH (START)	WHEN TURNING IGNITION SWITCH TO START POSITION	BATTERY VOLTAGE
9	B	DAYTIME LIGHT CONTROL UNIT GROUND	—	—
10	LG	PARKING BRAKE SWITCH	WHEN PARKING BRAKE IS RELEASED	BATTERY VOLTAGE
			WHEN PARKING BRAKE IS APPLIED	1.5V OR LESS
11	Y/R	GENERATOR	WHEN TURNING IGNITION SWITCH TO ON POSITION	4.6V OR LESS
			WHEN ENGINE IS RUNNING	B+ VOLTAGE
			WHEN TURNING IGNITION SWITCH TO OFF POSITION	1V OR LESS
12	G	IGNITION SWITCH (ON OR START)	WHEN TURNING IGNITION SWITCH TO ON POSITION	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO START POSITION	BATTERY VOLTAGE

LEL592

LT-DTRL-02





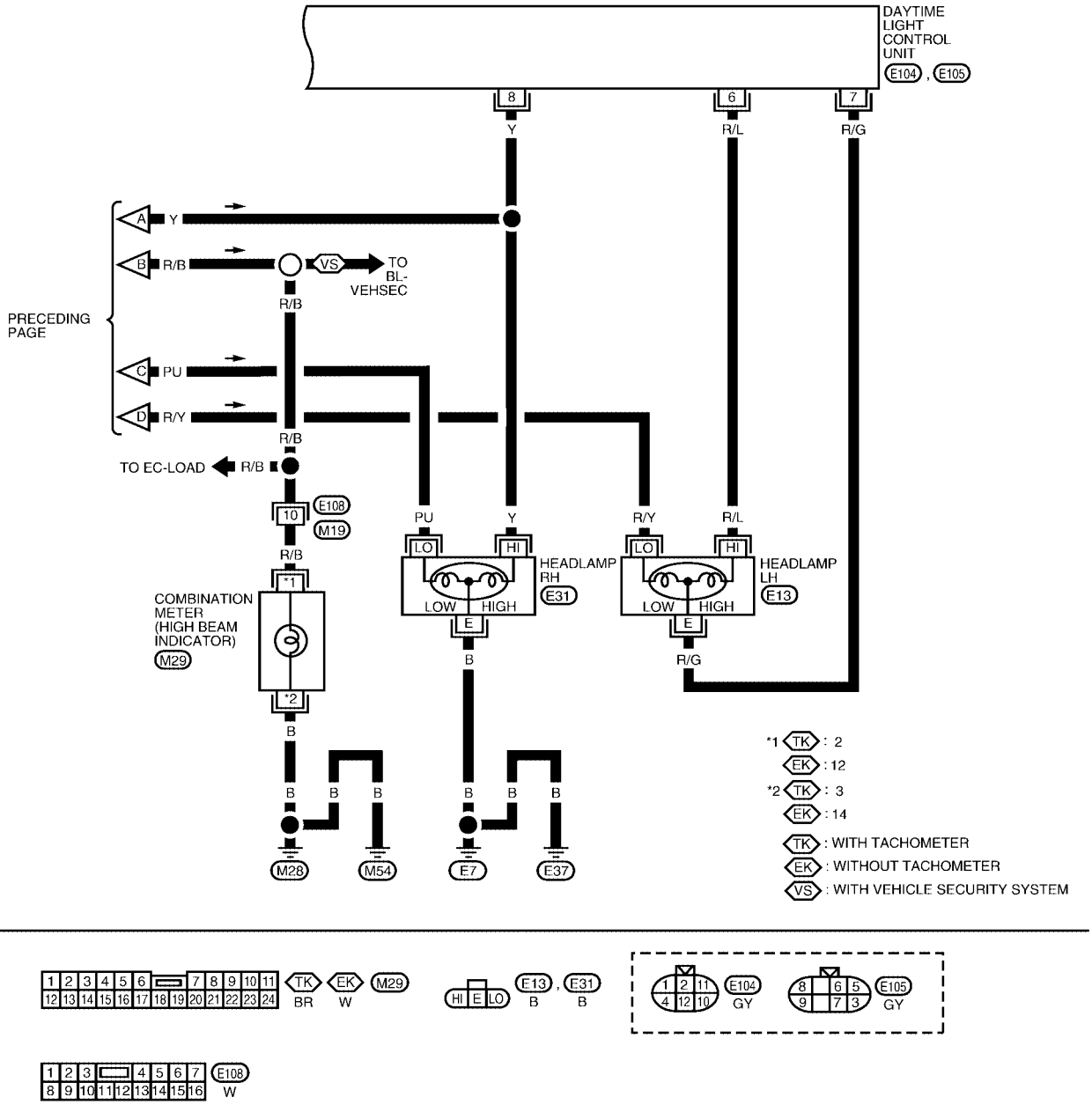
WKWA0076E

DAYTIME LIGHT CONTROL UNIT TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
2	R	POWER SOURCE	WHEN TURNING IGNITION SWITCH TO ON POSITION	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO OFF POSITION	BATTERY VOLTAGE
3	R/W	POWER SOURCE	WHEN TURNING IGNITION SWITCH TO ON POSITION	BATTERY VOLTAGE
			WHEN TURNING IGNITION SWITCH TO OFF POSITION	BATTERY VOLTAGE
4	PU	LIGHTING SWITCH (LOW BEAM)	WHEN TURNING LIGHTING SWITCH TO HEADLAMP ON (2ND) POSITION, LOW BEAM	BATTERY VOLTAGE
5	R/B	LIGHTING SWITCH (HIGH BEAM)	WHEN TURNING LIGHTING SWITCH TO HIGH (A)	BATTERY VOLTAGE
			WHEN TURNING LIGHTING SWITCH TO FLASH TO PASS	BATTERY VOLTAGE

LEL593

LT-DTRL-03



WKWA0528E

DAYTIME LIGHT CONTROL UNIT TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

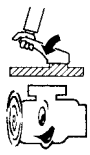
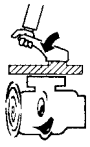
TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
6	R/L	LH HIGH BEAM	WHEN TURNING LIGHTING SWITCH TO HIGH (A)	BATTERY VOLTAGE
			WHEN RELEASING PARKING BRAKE WITH ENGINE RUNNING AND TURNING LIGHTING SWITCH TO OFF (DAYTIME LIGHT OPERATION) **CAUTION: BLOCK WHEELS AND ENSURE SELECTOR LEVER IS IN N OR P POSITION**	BATTERY VOLTAGE
7	R/G	LH HEADLAMP CONTROL (GROUND)	WHEN LIGHTING SWITCH IS TURNED TO HEADLAMP ON (2ND) POSITION, LOW BEAM	1V OR LESS
			WHEN RELEASING PARKING BRAKE WITH ENGINE RUNNING AND TURNING LIGHTING SWITCH TO OFF (DAYTIME LIGHT OPERATION) **CAUTION: BLOCK WHEELS AND ENSURE SELECTOR LEVER IS IN N OR P POSITION.**	APPROX. HALF OF BATTERY VOLTAGE
8	Y	RH HIGH BEAM	WHEN TURNING LIGHTING SWITCH TO HIGH (A)	BATTERY VOLTAGE
			WHEN RELEASING PARKING BRAKE WITH ENGINE RUNNING AND TURNING LIGHTING SWITCH TO OFF (DAYTIME LIGHT OPERATION) **CAUTION: BLOCK WHEELS AND ENSURE SELECTOR LEVER IS IN N OR P POSITION.**	APPROX. HALF OF BATTERY VOLTAGE

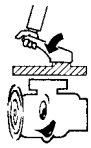
LEL594

Trouble Diagnoses

EKS006A4

DAYTIME LIGHT CONTROL UNIT INSPECTION TABLE

Terminal No.	Wire color	Item	Condition		Voltage (Approx. values)
1	B/Y	Start signal		When turning ignition switch to ST	Battery voltage
				When turning ignition switch to ON from ST	Less than 1V
				When turning ignition switch to OFF	Less than 1V
2	R	Power source		When turning ignition switch to ON	Battery voltage
				When turning ignition switch to OFF	Battery voltage
3	R/W	Power source		When turning ignition switch to ON	Battery voltage
				When turning ignition switch to OFF	Battery voltage
4	PU	Lighting switch (Low beam)		When turning lighting switch to headlamp ON (2ND) position, LOW BEAM	Battery voltage
5	R/B	Lighting switch (High beam)		When turning lighting switch to HIGH (A)	Battery voltage
				When turning lighting switch to FLASH TO PASS	Battery voltage
6	R/L	LH high beam		When turning lighting switch to HIGH (A)	Battery voltage
				When releasing parking brake with engine running and turning lighting switch to OFF (daytime light operation) **CAUTION: Block wheels and ensure selector lever is in N or P position.**	Battery voltage
7	R/G	LH headlamp control (ground)		When lighting switch is turned to headlamp ON (2ND) position, LOW BEAM	1V or less
				When releasing parking brake with engine running and turning lighting switch OFF (daytime light operation) **CAUTION: Block wheels and ensure selector lever is in N or P position.**	Half battery voltage

Terminal No.	Wire color	Item	Condition		Voltage (Approx. values)
8	Y	RH high beam		When turning lighting switch to HIGH (A)	Battery positive voltage
				When releasing parking brake with engine running and turning lighting switch OFF (daytime light operation) **CAUTION:** **Block wheels and ensure selector level is in N or P position.**	Half battery voltage
9	B	Ground		—	—
10	LG	Parking brake switch		When parking brake is released	Battery voltage
				When parking brake is applied	1.5V or less
11	Y/R	Generator		When turning ignition switch ON	4.6V or less
				When engine is running	Battery voltage
				When turning ignition switch OFF	1V or less
12	G	Power source		When turning ignition switch ON	Battery voltage
				When turning ignition switch to ST	Battery voltage
				When turning ignition switch OFF	1V or less

Bulb Replacement

EKS006A5

Refer to LT-8, "Bulb Replacement" .

Aiming Adjustment

EKS006A6

Refer to LT-8, "Aiming Adjustment" .

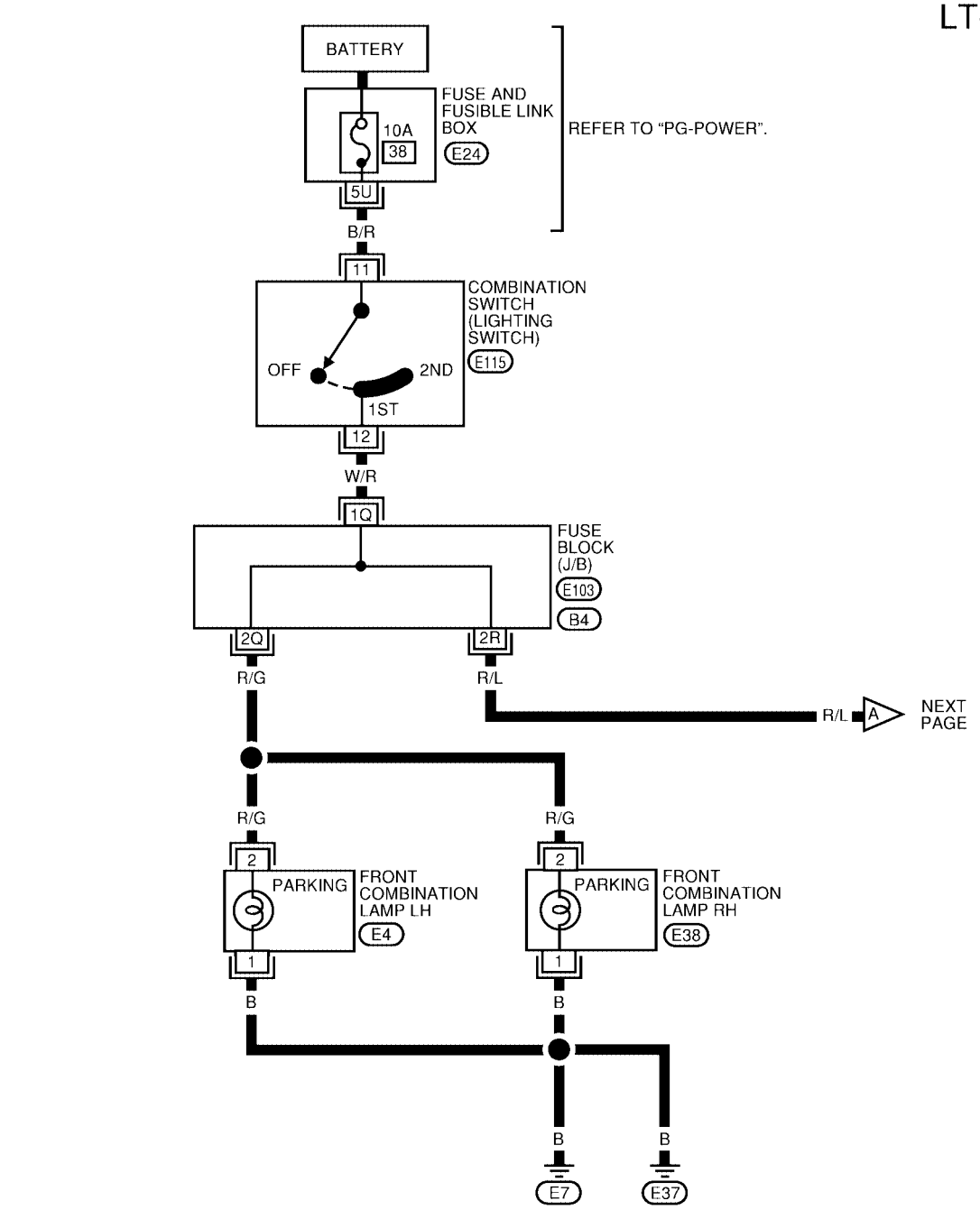
PARKING, LICENSE AND TAIL LAMPS

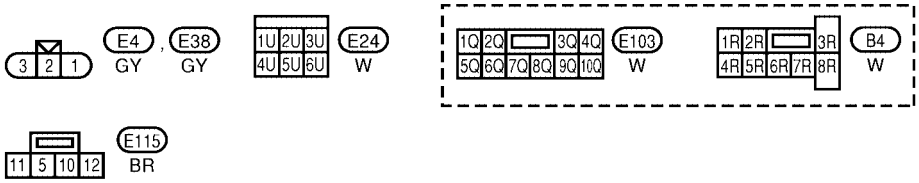
PFP:26550

Wiring Diagram — TAIL/L —

EKS0038K

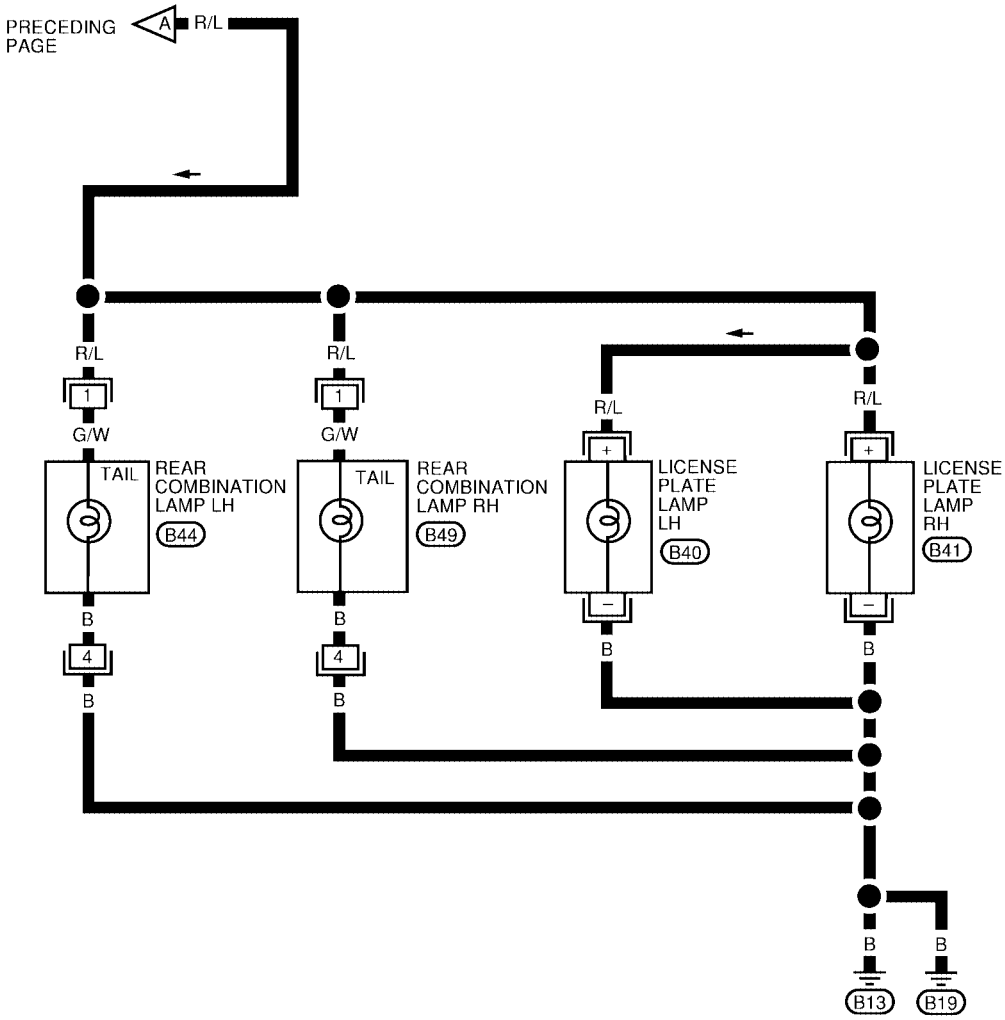
LT-TAIL/L-01

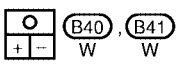


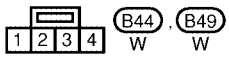


WKWA1629E

LT-TAIL/L-02







WKWA1630E

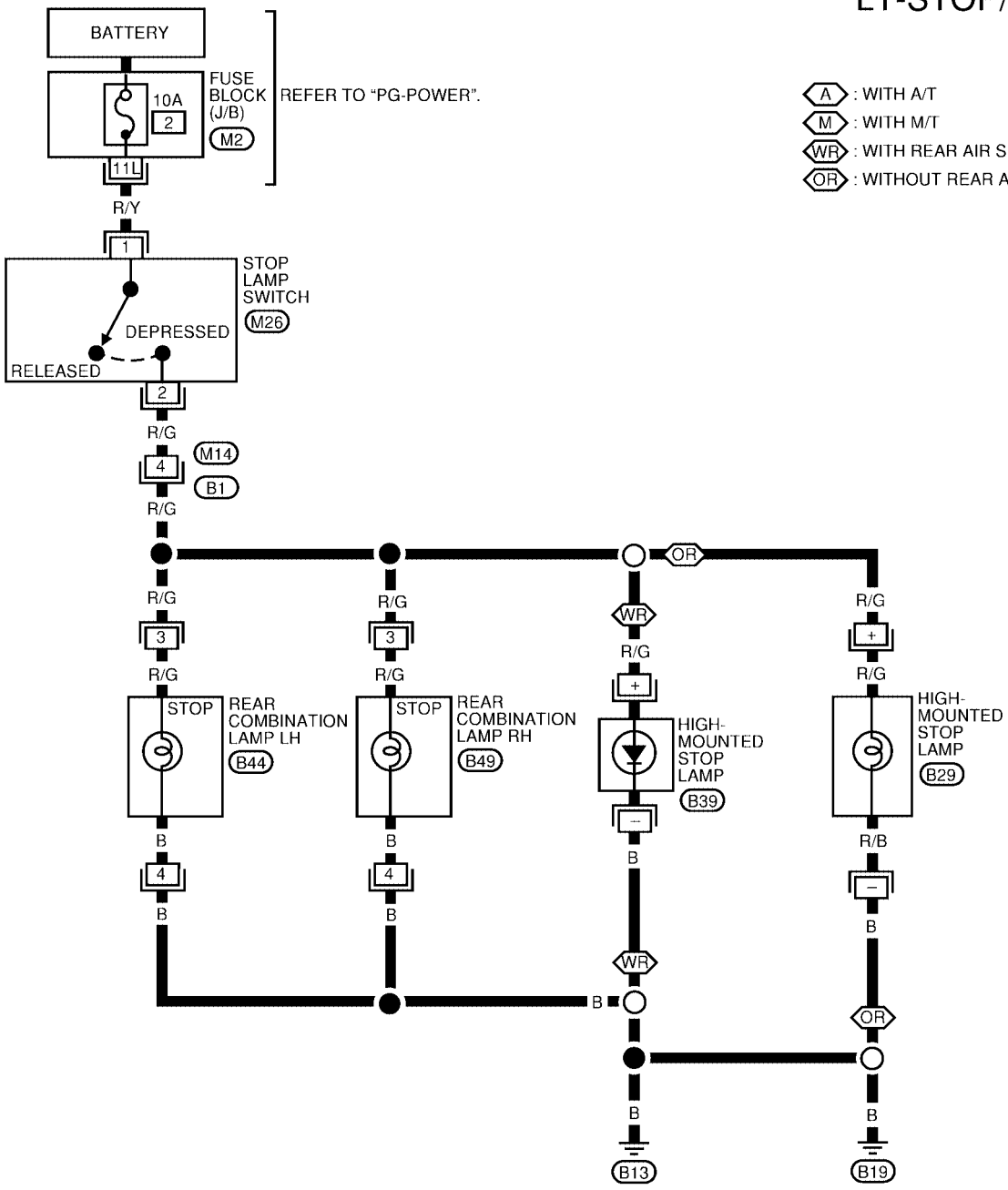
STOP LAMP

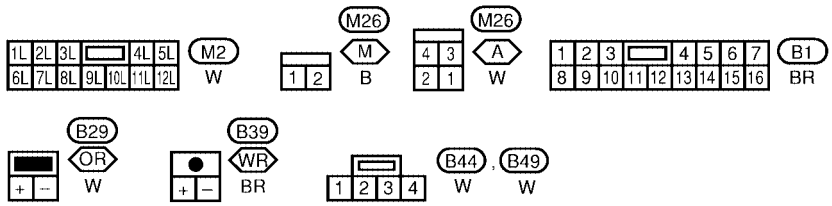
PFP:26550

Wiring Diagram — STOP/L —

EKS0038L

LT-STOP/L-01





WKWA1631E

BACK-UP LAMP

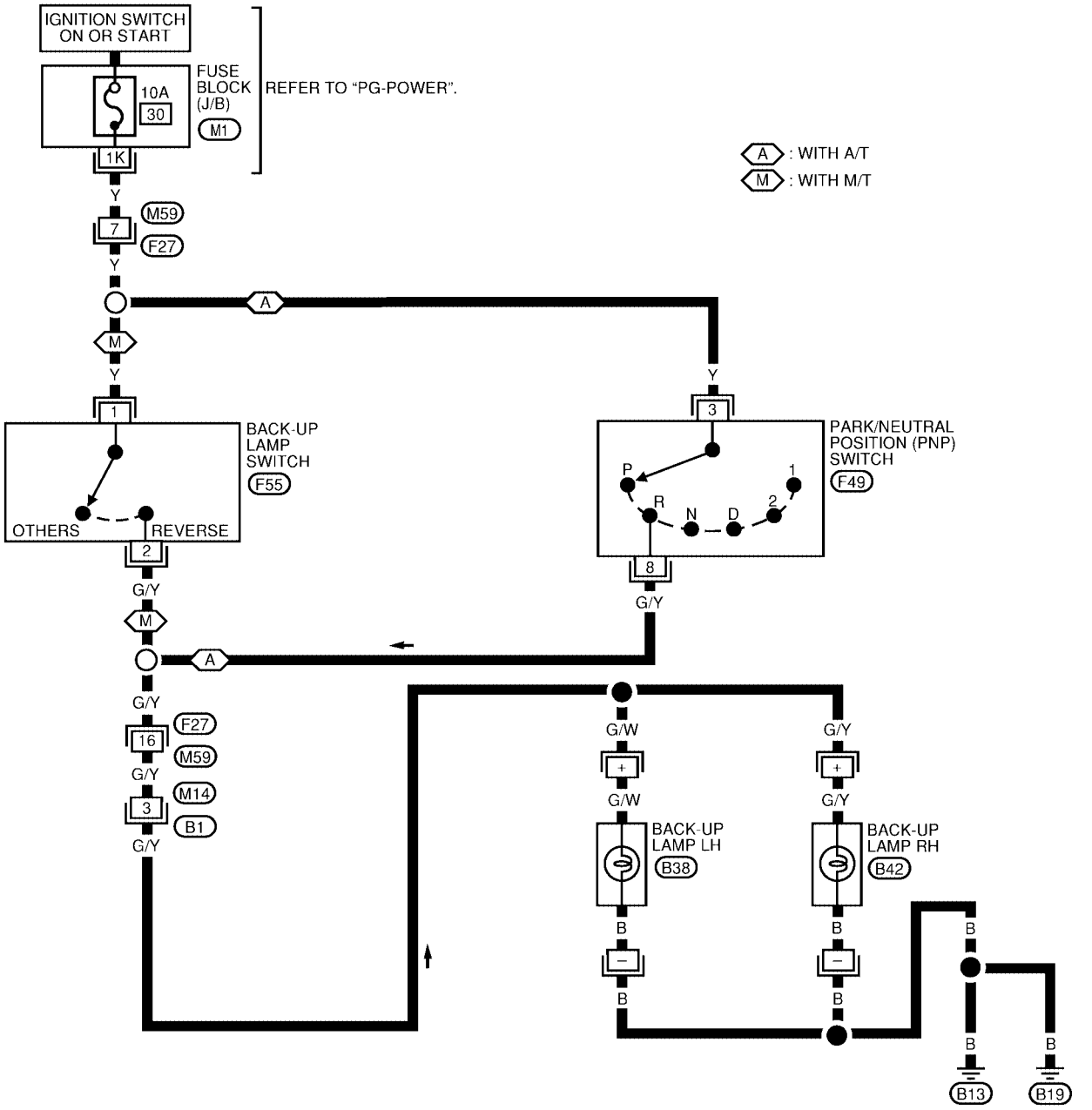
PFP:26550

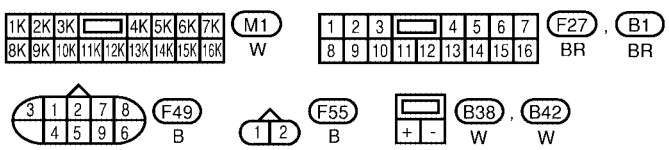
Wiring Diagram — BACK/L —

EKS006A7

QG18DE

LT-BACK/L-01

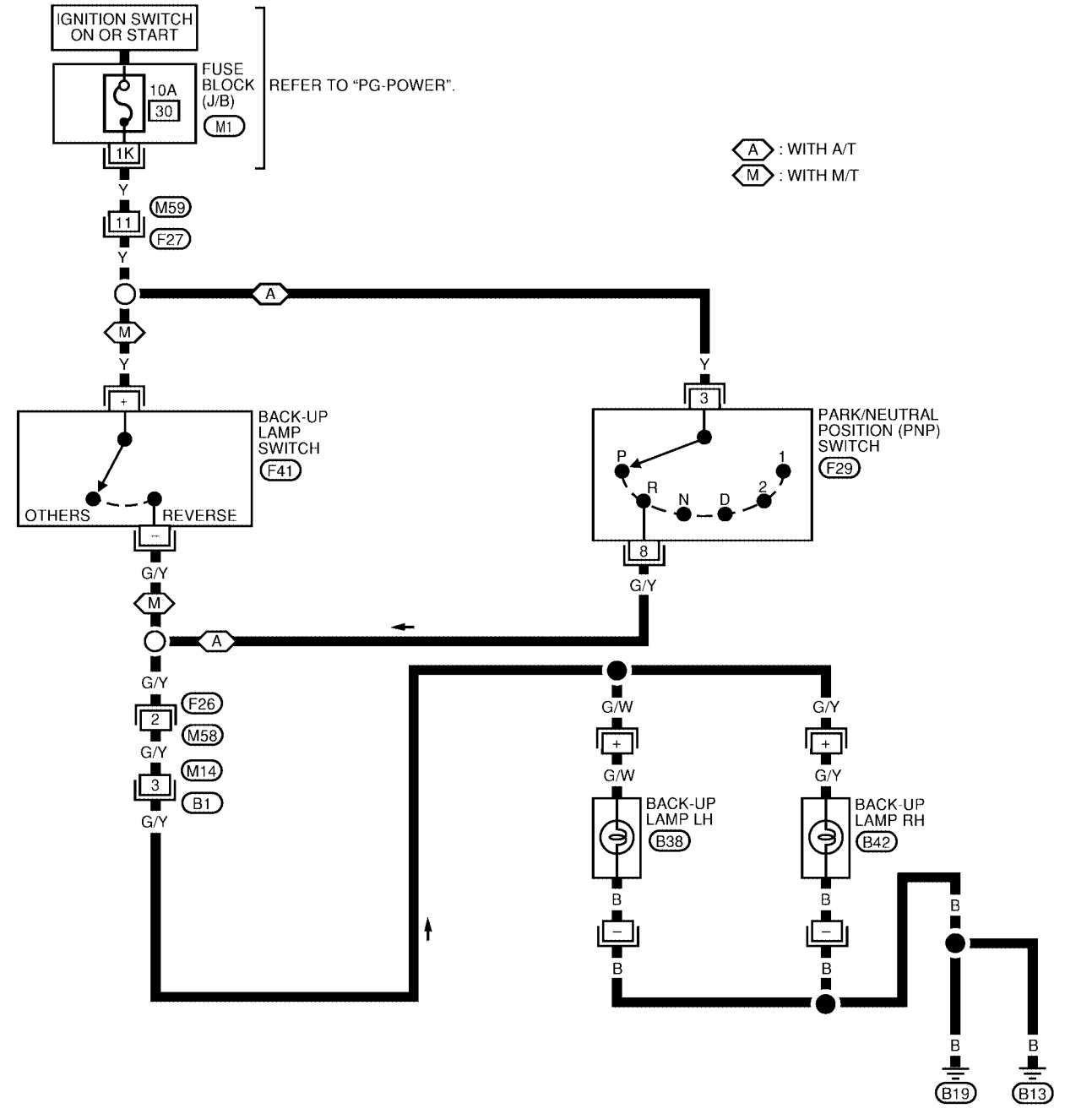


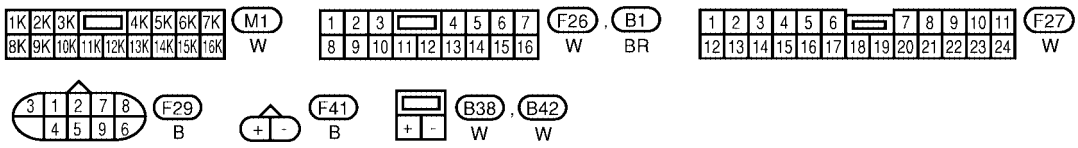


WKWA1632E

QR25DE

LT-BACK/L-02





WKWA1633E

FRONT FOG LAMP

PFP:26150

System Description

EKS006AF

Power is supplied at all times

- through 15A fuse (No. 43, located in the fuse and fusible link box)
- to front fog lamp relay terminal 5.

With the lighting switch in headlamp “ON” (2ND) position, “LOW BEAM” (B) position, power is supplied

- through 15A fuse (No. 39, located in the fuse and fusible link box)
- to lighting switch terminal 5
- through terminal 7 of the lighting switch
- to front fog lamp relay terminal 1.

FOG LAMP OPERATION

The front fog lamp switch is built into the combination switch. The lighting switch must be in headlamp “ON” (2ND) position and “LOW BEAM” (B) position for fog lamp operation.
With the front fog lamp switch in the ON position ground is supplied

- to front fog lamp relay terminal 2
- through the front fog lamp switch
- to body grounds E7 and E37.

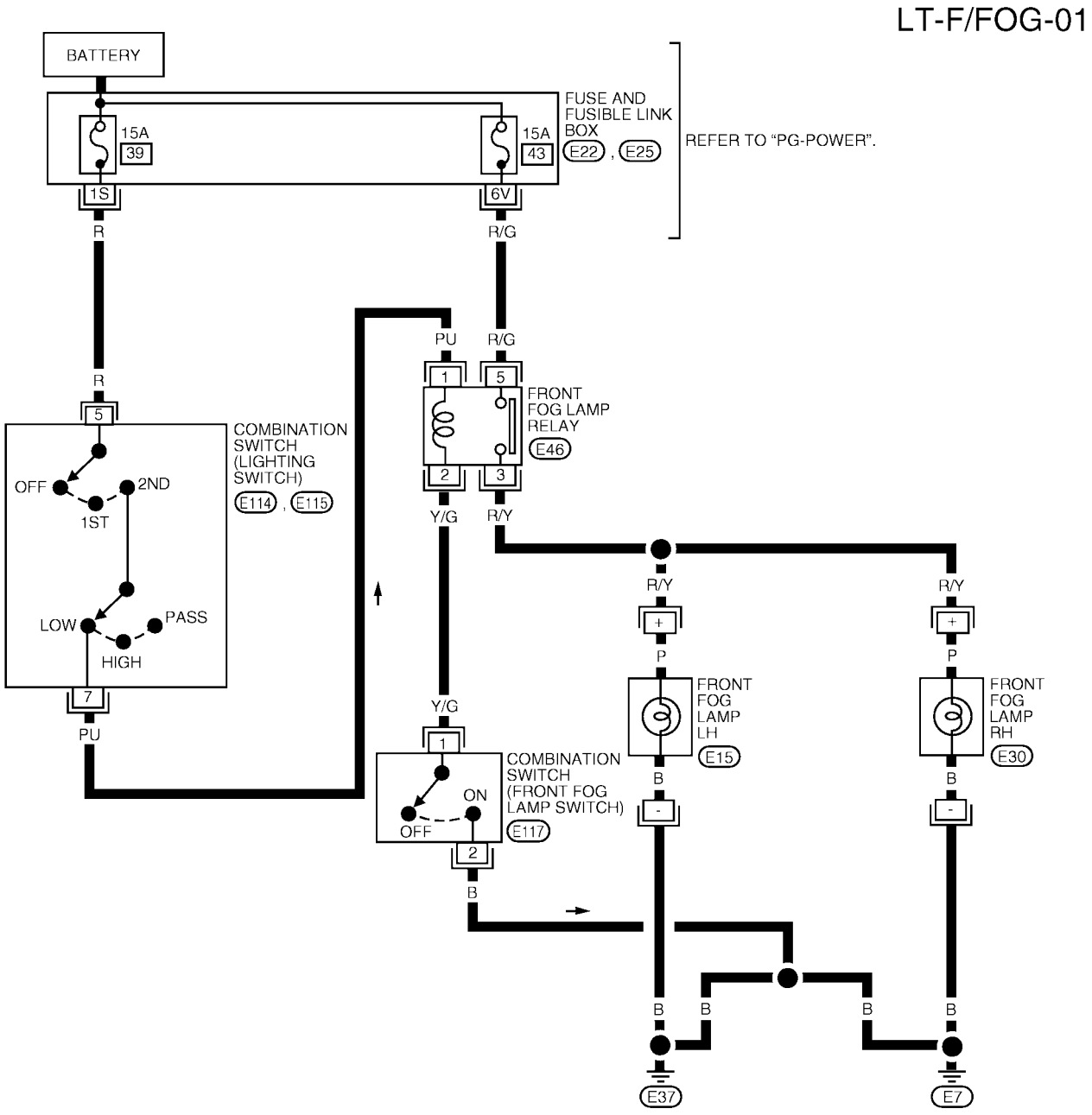
The front fog lamp relay is energized and power is supplied

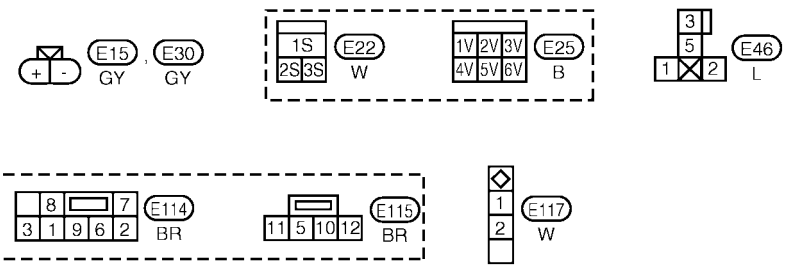
- from front fog lamp relay terminal 3
- to terminal + of each front fog lamp.

Ground is supplied to terminal - of each front fog lamp through body grounds E7 and E37.
With power and ground supplied, the front fog lamps illuminate.

Wiring Diagram — F/FOG —

EKS006AG





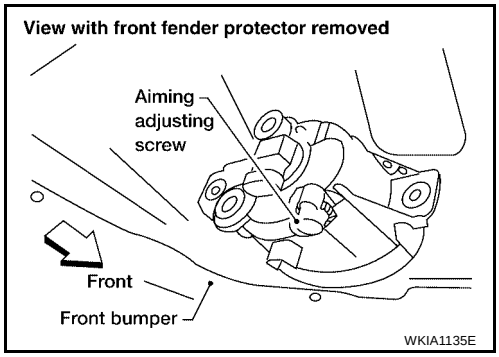
WKWA0024E

Aiming Adjustment

EKS006AH

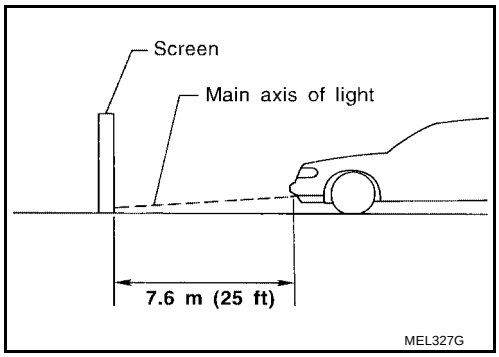
Before performing aiming adjustment, make sure of the following.

1. Inflate all tires to correct pressure.
2. Place vehicle on level ground.
3. See that vehicle is unloaded (except for full levels of coolant, engine oil and fuel, and spare tire, jack, and tools). Have the driver or equivalent weight placed in driver's seat.

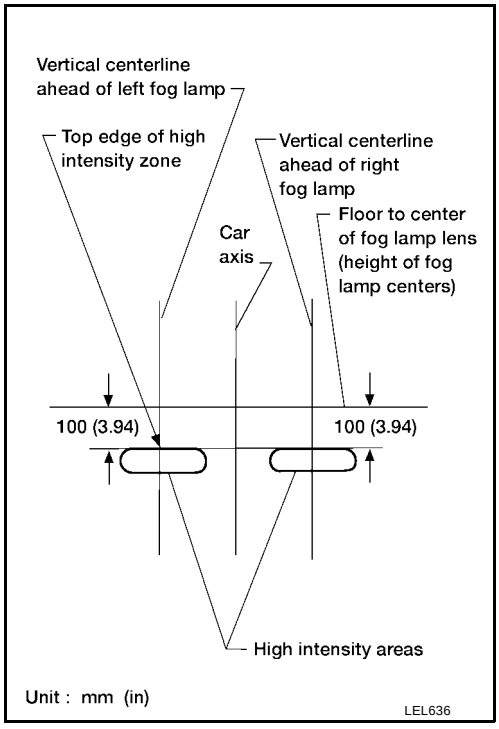


Adjust aiming in the vertical direction by turning the adjusting screw.

1. Set the distance between the screen and the center of the fog lamp lens as shown.



2. Turn front fog lamps ON.
3. Adjust front fog lamps so that the top edge of the high intensity zone is 100 mm (3.94 in) below the height of the fog lamp centers as shown.
   - When performing adjustment, if necessary, cover the headlamps and opposite fog lamp.



TURN SIGNAL AND HAZARD WARNING LAMPS

PFP:26120

System Description

EKS0038Q

TURN SIGNAL OPERATION

With the hazard switch in the OFF position and the ignition switch in the ON or START position, power is supplied

- through 10A fuse [No. 26, located in the fuse block (J/B)]
- to hazard switch terminal 2
- through terminal 1 of the hazard switch
- to combination flasher unit terminal B
- through terminal L of the combination flasher unit
- to turn signal switch terminal 1.

Ground is supplied

- to combination flasher unit terminal E
- through body grounds M28 and M54.

LH Turn

When the turn signal switch is moved to the LH position, power is supplied

- from turn signal switch terminal 3
- to front combination lamp LH terminal 3
- to combination meter terminal 35 (with tachometer) or 40 (without tachometer)
- to rear combination lamp LH terminal 2.

Ground is supplied

- to the front combination lamp LH terminal 1
- through body grounds E7 and E37, and
- to the rear combination lamp LH terminal 4
- through body grounds B13 and B19, and
- to combination meter terminal 12 (with tachometer) or 39 (without tachometer)
- through body grounds M28 and M54.

With power and ground supplied, the combination flasher unit controls the flashing of the LH turn signal lamps.

RH Turn

When the turn signal switch is moved to the RH position, power is supplied

- from turn signal switch terminal 2
- to front combination lamp RH terminal 3
- to combination meter terminal 4 (with tachometer) or 41 (without tachometer)
- to rear combination lamp RH terminal 2.

Ground is supplied

- to the front combination lamp RH terminal 1
- through body grounds E7 and E37, and
- to the rear combination lamp RH terminal 4
- through body grounds B13 and B19, and
- to combination meter terminal 12 (with tachometer) or 39 (without tachometer)
- through body grounds M28 and M54.

With power and ground supplied, the combination flasher unit controls the flashing of the RH turn signal lamps.

HAZARD LAMP OPERATION

Power is supplied at all times

- through 15A fuse [No. 5, located in the fuse block (J/B)]
- to hazard switch terminal 3.

With the hazard switch in the ON position, power is supplied

- through terminal 1 of the hazard switch
- to combination flasher unit terminal B
- through terminal L of the combination flasher unit
- to hazard switch terminal 4.

Ground is supplied

- to combination flasher unit terminal E
- through body grounds M28 and M54.

Power is supplied

- through terminal 5 of the hazard switch
- to front combination lamp LH terminal 3
- to combination meter terminal 35 (with tachometer) or 40 (without tachometer)
- to rear combination lamp LH terminal 2.

Power is supplied

- through terminal 6 of the hazard switch
- to front combination lamp RH terminal 3
- to combination meter terminal 4 (with tachometer) or 41 (without tachometer)
- to rear combination lamp RH terminal 2.

Ground is supplied

- to each front combination lamp terminal 1
- through body grounds E7 and E37, and
- to each rear combination lamp terminal 4
- through body grounds B13 and B19, and
- to combination meter terminal 12 (with tachometer) or 39 (without tachometer)
- through body grounds M28 and M54.

With power and ground supplied, the combination flasher unit controls the flashing of the hazard warning lamps.

REMOTE KEYLESS ENTRY SYSTEM OPERATION

Power is supplied at all times

- through 15A fuse [No. 5, located in the fuse block (J/B)]
- to remote keyless entry relay terminals 1, 6 and 3.

When the remote keyless entry system is triggered through the smart entrance control unit, ground is supplied to remote keyless entry relay terminal 2.
Refer to BL-34, "REMOTE KEYLESS ENTRY SYSTEM" .
The remote keyless entry relay is energized.
Power is supplied

- through terminal 5 of the remote keyless entry relay
- to front combination lamp LH terminal 3
- to combination meter terminal 35 (with tachometer) or 40 (without tachometer)
- to rear combination lamp LH terminal 2.

Power is supplied

- through terminal 7 of the remote keyless entry relay
- to front combination lamp RH terminal 3
- to combination meter terminal 4 (with tachometer) or 41 (without tachometer)
- to rear combination lamp RH terminal 2.

Ground is supplied

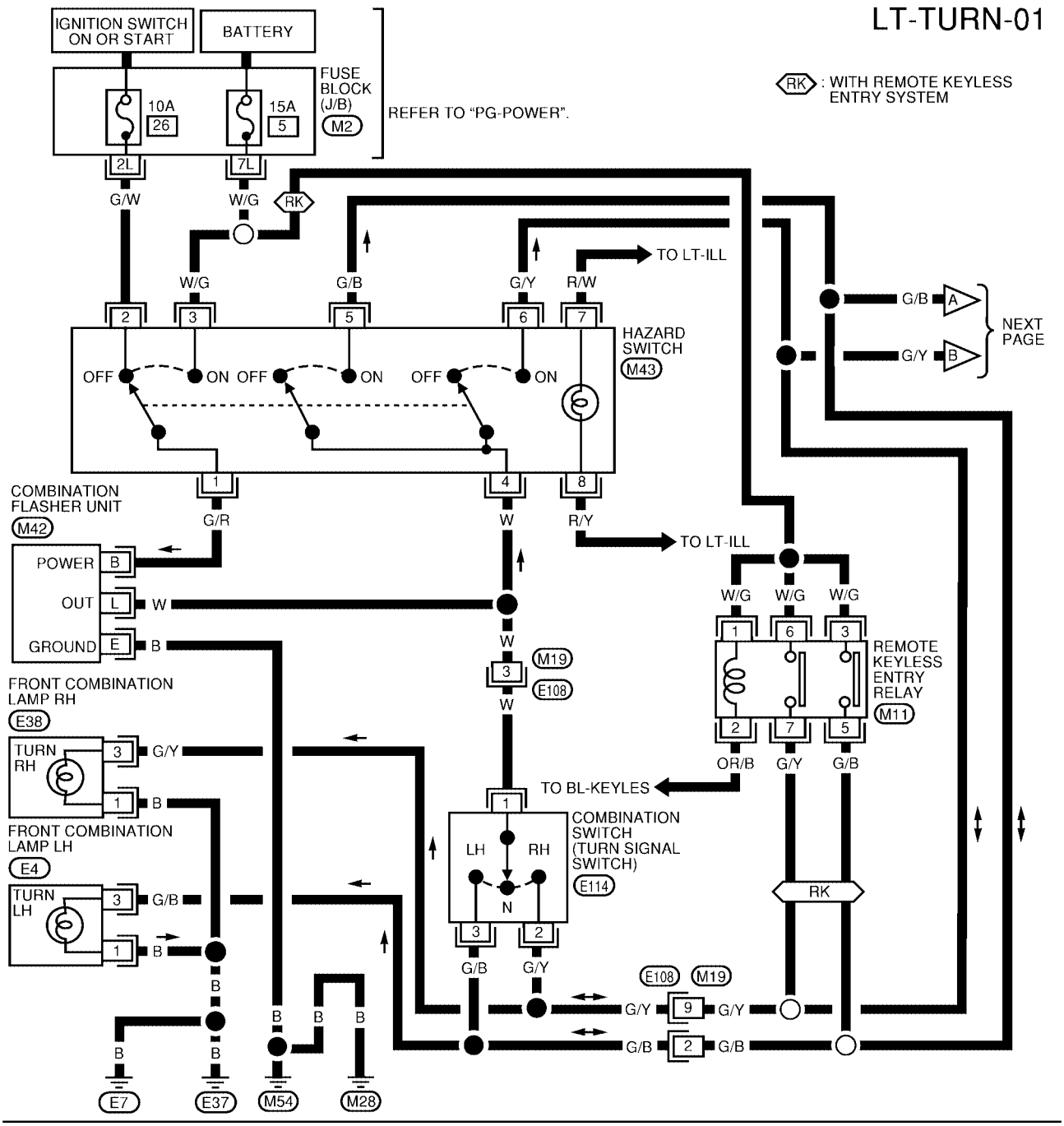
- to each front combination lamp terminal 1
- through body grounds E7 and E37, and
- to each rear combination lamp terminal 4
- through body grounds B13 and B19, and

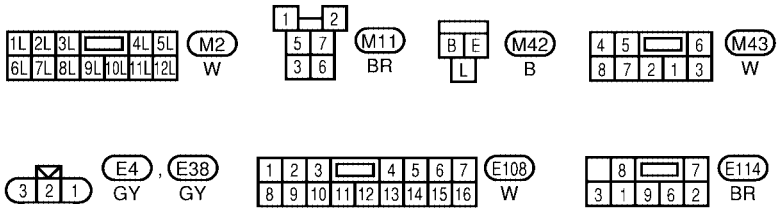
- to combination meter terminal 12 (with tachometer) or 39 (without tachometer)
- through body grounds M28 and M54.

With power and ground supplied, the smart entrance control unit controls the flashing of the hazard warning lamps.

Wiring Diagram — TURN —

EKS0038R

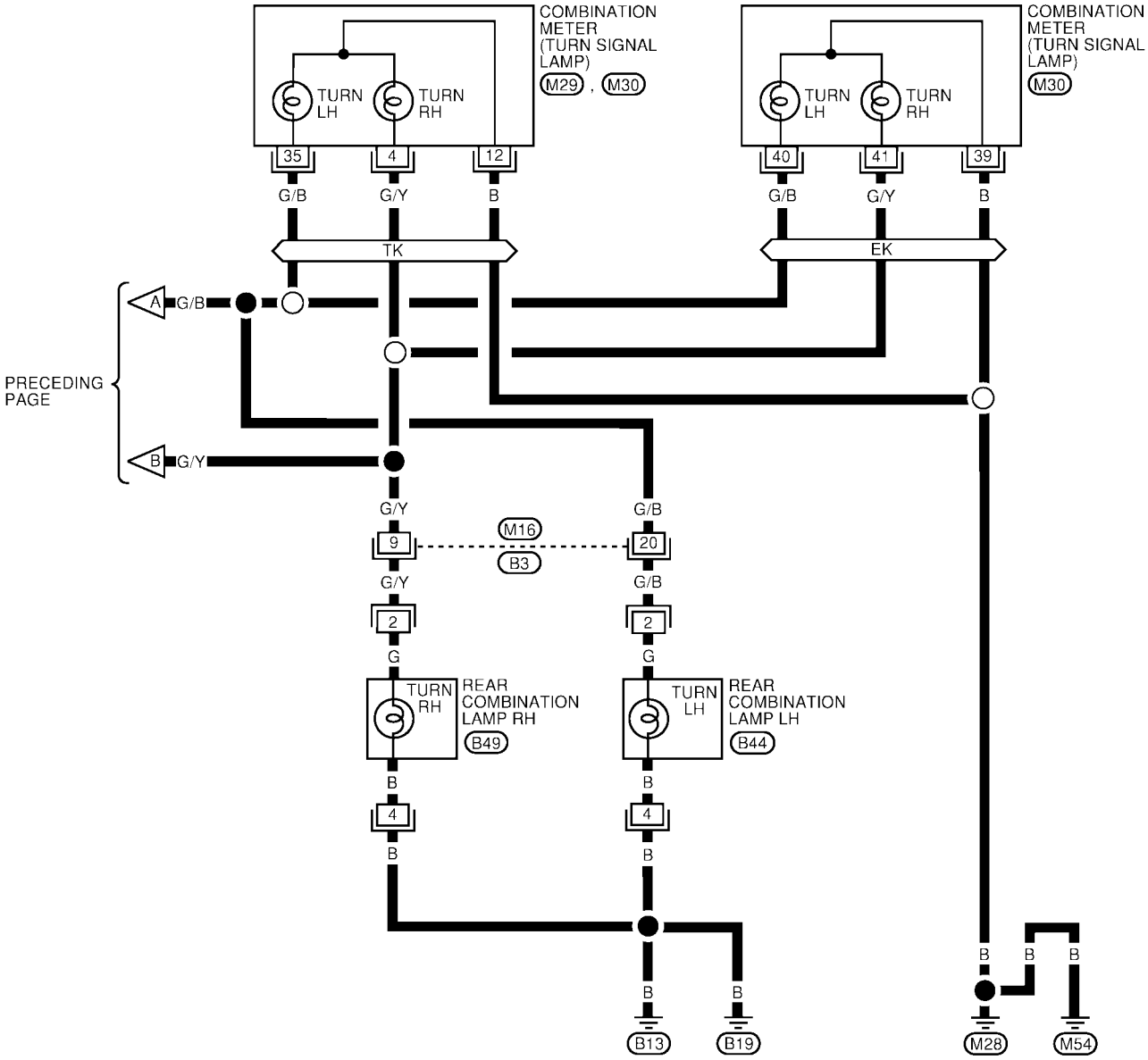


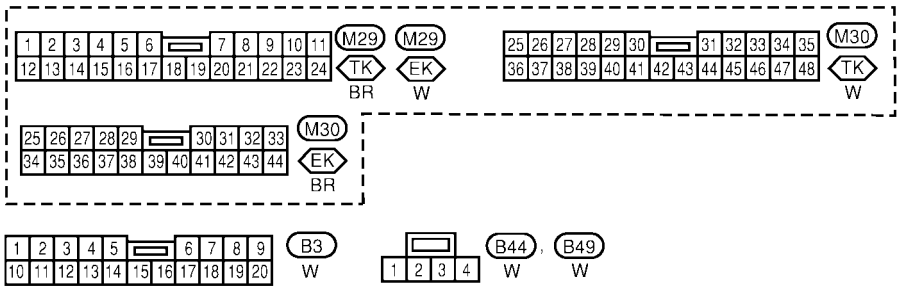


WKWA1634E

LT-TURN-02

TK : WITH TACHOMETER
EK : WITHOUT TACHOMETER





WKWA1635E

Trouble Diagnoses

EKS0038S

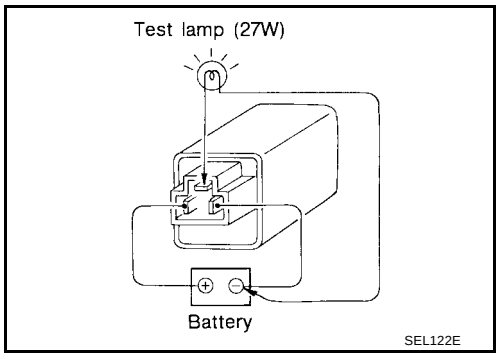
Symptom	Possible cause	Repair order
Turn signal and hazard warning lamps do not operate.	1. Hazard switch 2. Combination flasher unit 3. Open in combination flasher unit circuit	1. Check hazard switch. 2. Refer to combination flasher unit check. 3. Check wiring to combination flasher unit for open circuit.
Turn signal lamps do not operate but hazard warning lamps operate.	1. 10A fuse 2. Hazard switch 3. Turn signal switch 4. Open in turn signal switch circuit	1. Check 10A fuse [No. 26, located in fuse block (J/B)]. Turn ignition switch ON and verify battery positive voltage is present at terminal 2 of hazard switch. 2. Check hazard switch. 3. Check turn signal switch. 4. Check the wire between combination flasher unit terminal L and turn signal switch terminal 1 for open circuit.
Hazard warning lamps do not operate but turn signal lamps operate.	1. 15A fuse 2. Hazard switch 3. Open in hazard switch circuit	1. Check 15A fuse [No. 5, located in fuse block (J/B)]. Verify battery positive voltage is present at terminal 3 of hazard switch. 2. Check hazard switch. 3. Check the wire between combination flasher unit terminal L and hazard switch terminal 4 for open circuit.
Front turn signal lamp LH or RH does not operate.	1. Bulb 2. Grounds E7 and E37 3. Open in front combination lamp circuit	1. Check bulb. 2. Check grounds E7 and E37. 3. Check the wire between combination switch terminal 3 (LH) or terminal 2 (RH) and front combination lamp terminal 3.
Rear turn signal lamp LH or RH does not operate.	1. Bulb 2. Grounds B13 and B19 3. Open in rear combination lamp circuit	1. Check bulb. 2. Check grounds B13 and B19. 3. Check the wire between combination switch terminal 3 (LH) or terminal 2 (RH) and rear combination lamp terminal 2.
LH and RH turn indicators do not operate.	1. Ground	1. Check grounds M28 and M54.
LH or RH turn indicator does not operate.	1. Bulb 2. Turn indicator circuit	1. Check bulb in combination meter. 2. Check the wire between combination switch and combination meter.

Electrical Components Inspection

EKS0038T

COMBINATION FLASHER UNIT CHECK

- Before checking, ensure that bulbs meet specifications.
- Connect a battery and test lamp to the combination flasher unit, as shown. Combination flasher unit is properly functioning if it blinks when power is supplied to the circuit.



ILLUMINATION

PFP:27545

System Description

EKS0038U

Power is supplied at all times

- through 10A fuse (No. 38, located in the fuse and fusible link box)
- to lighting switch terminal 11.

With the ignition switch in the ACC or ON position, power is supplied

- through 10A fuse [No. 1, located in the fuse block (J/B)]
- to CD auto changer (if equipped) terminal 6.

The lighting switch must be in parking lamp (1ST) or headlamp "ON" (2ND) position for illumination. The illumination control switch controls the amount of current to the illumination system. As the amount of current increases, the illumination becomes brighter.
The following chart shows the power and ground connector terminals for the components included in the illumination system.

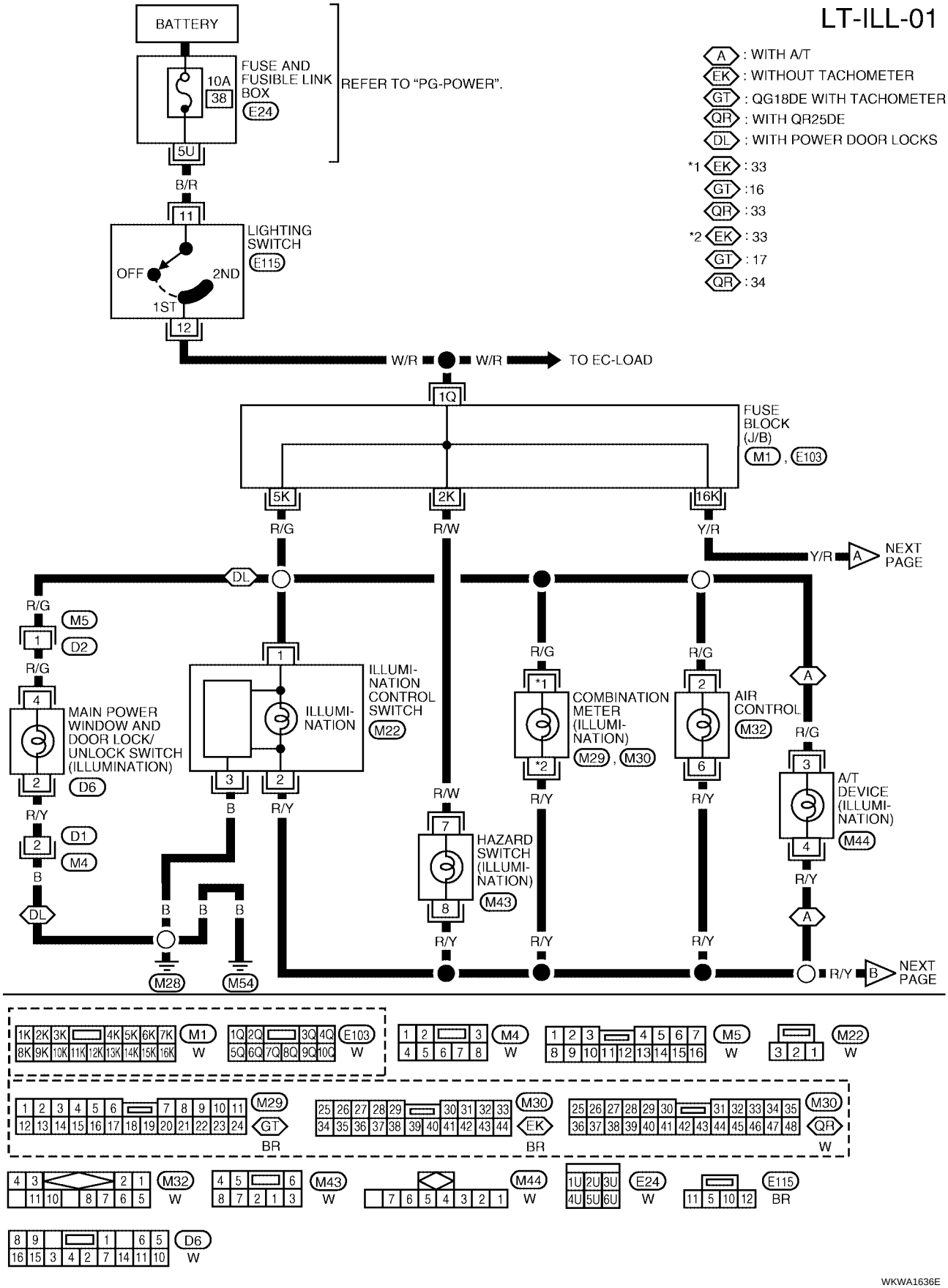
Component	Connector No.	Power terminal	Ground terminal
Illumination control switch	M22	1	3
Combination meter	M29 or M30	16 or 33	17, 33 or 34
Hazard switch	M43	7	8
Air control	M32	2	6
A/T device indicator*	M44	3	4
Main power window and door lock/unlock switch*	D6	4	2
Audio unit	M45	8	7
CD auto changer*	M71	6	5

* If equipped.

The ground for all of the components is controlled through terminals 2 and 3 of the illumination control switch to body grounds M28 and M54.

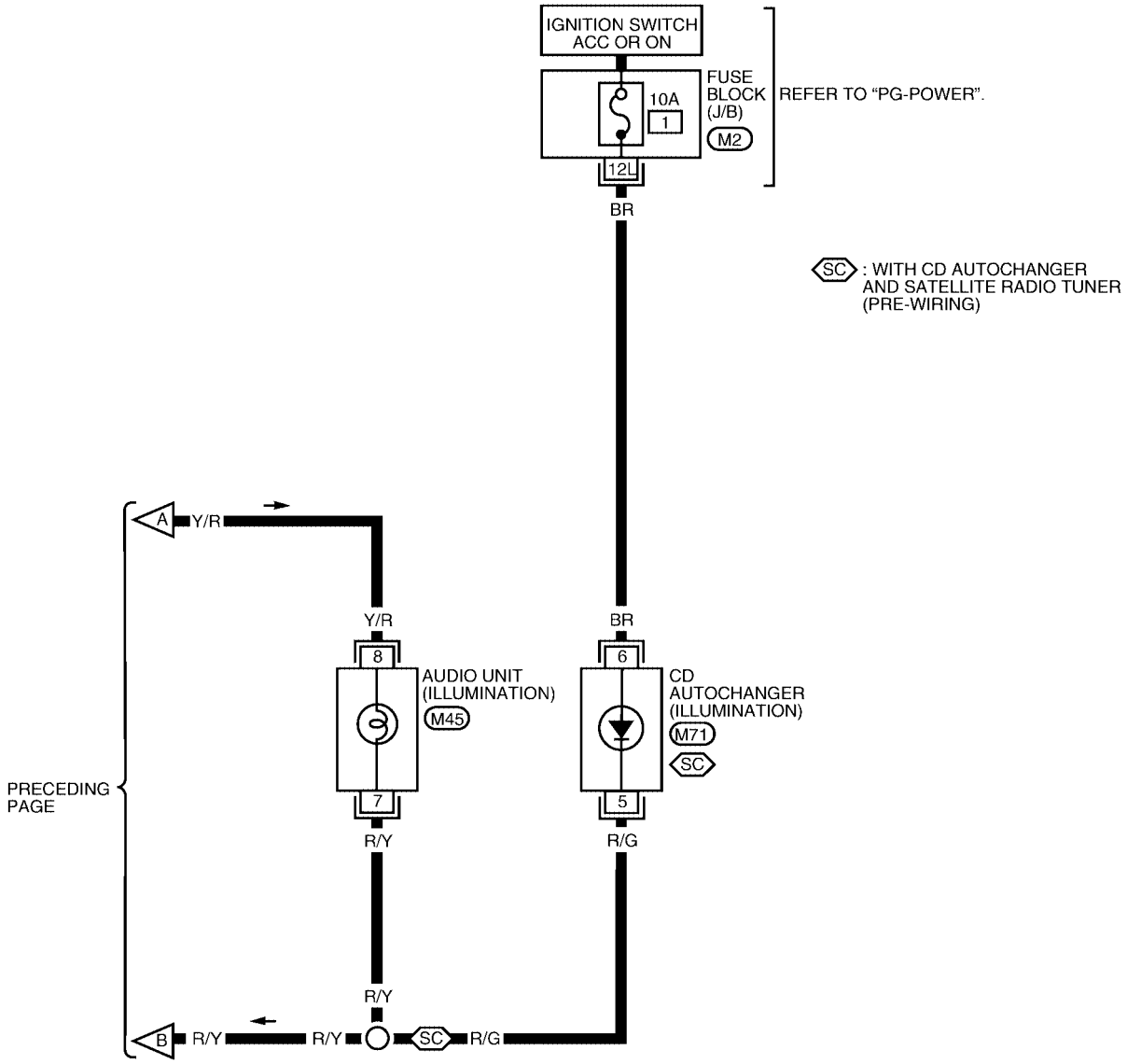
Wiring Diagram — ILL —

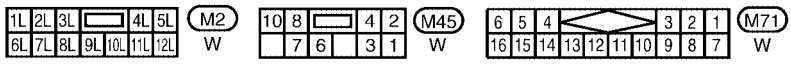
EKS0038V



WKWA1636E

LT-ILL-02





WKWA1912E

INTERIOR, MAP, VANITY AND TRUNK ROOM LAMPS

PFP:26410

System Description

EKS006A8

WITHOUT POWER DOOR LOCKS

Power Supply and Ground

Power is supplied at all times

- through 10A fuse [No. 13, located in the fuse block (J/B)]
- to interior lamp terminal +.

Switch Operation

When interior lamp switch is in the DOOR position and any door is opened, ground is supplied to interior lamp through the door switches.
When interior lamp switch is in the ON position, ground is supplied

- through case ground of interior lamp
- to interior lamp.

WITH POWER DOOR LOCKS

Power Supply and Ground

Power is supplied at all times

- through 10A fuse (No. 37, located in the fuse and fusible link box)
- to smart entrance control unit terminal 10
- through 10A fuse [No. 12, located in the fuse block (J/B)]
- to key switch terminal 2
- through 10A fuse [No. 13, located in the fuse block (J/B)]
- to trunk room lamp terminal 1.

When the key is removed from ignition key cylinder, power is interrupted

- through key switch terminal 1
- to smart entrance control unit terminal 32.

With the ignition switch in the ON or START position, power is supplied

- through 10A fuse [No. 10, located in the fuse block (J/B)]
- to smart entrance control unit terminal 33.

Ground is supplied

- to smart entrance control unit terminal 16
- through body grounds M28 and M54.

Switch Operation

When map lamp (LH and/or RH) is ON, ground is supplied

- through body grounds M28 and M54
- to map lamp terminal -.

Power is supplied

- to map lamp terminal +
- from smart entrance control unit terminal 17.

When vanity lamp (LH and/or RH) is ON, ground is supplied

- through body grounds M28 and M54
- to vanity lamps (LH and RH) terminal 2.

Power is supplied

- to vanity lamps (LH and RH) terminal 1
- from smart entrance control unit terminal 17.

When trunk room lamp switch is ON (trunk lid is opened), ground is supplied

- through body grounds B13 and B19
- to trunk room lamp switch terminal -
- from trunk room lamp switch terminal +

- to trunk room lamp terminal 2

With power and ground supplied, interior lamps turn ON.

Battery Saver

The lamps turn off automatically when interior lamp, map lamp and/or vanity lamps are illuminated with the ignition key in OFF position if the lamp remains lit by the door switch open signal or if the lamp switch is in ON position for approximately 10 minutes.
After lamps turn OFF by the battery saver system, the lamps illuminate again when

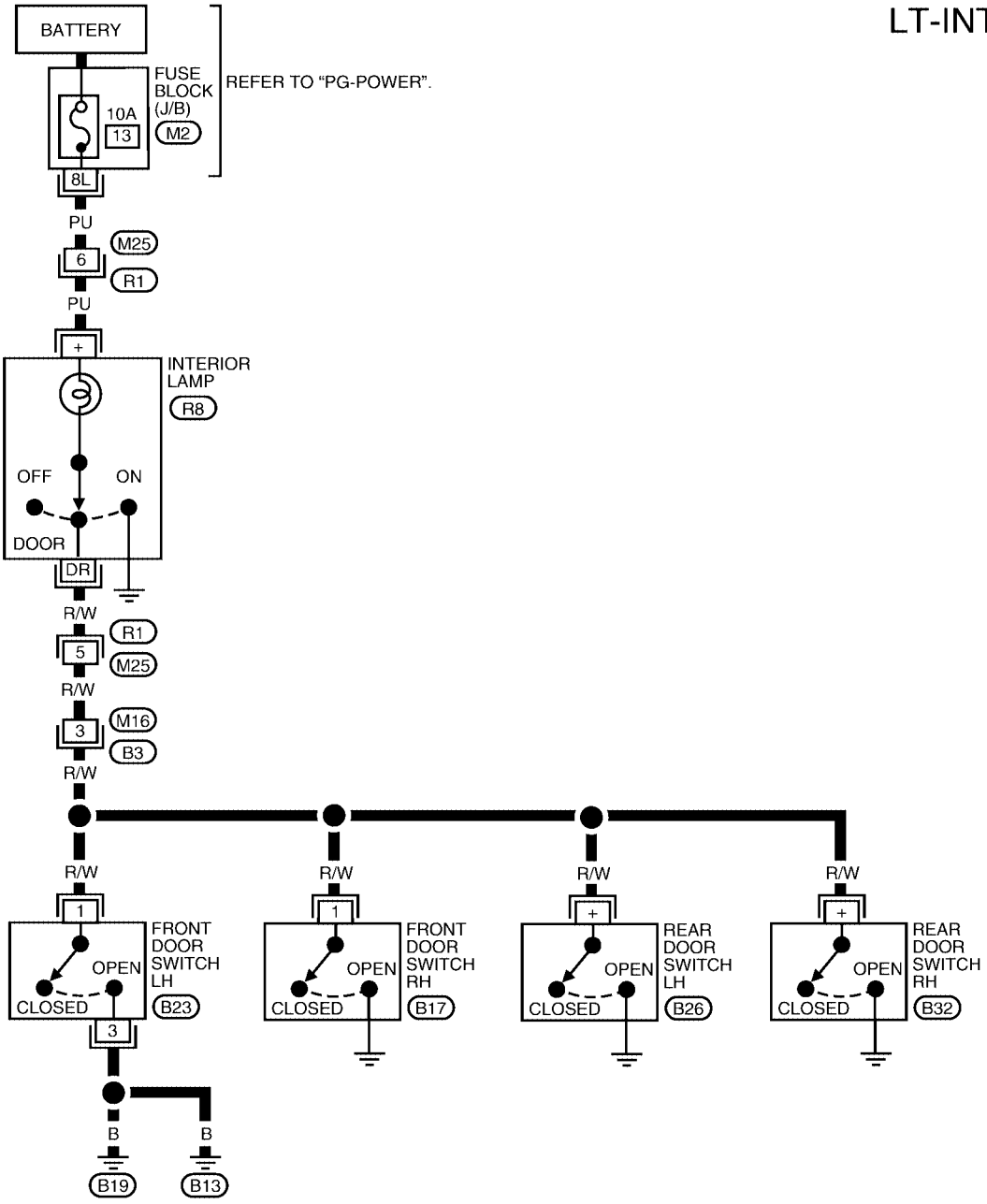
- driver door is locked or unlocked
- door is opened or closed
- key is inserted in or removed from ignition key cylinder.

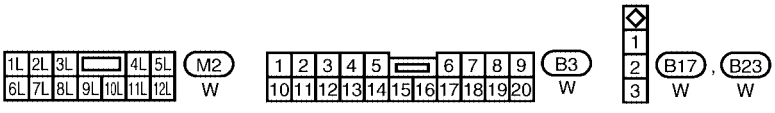
Wiring Diagram — INT/L —

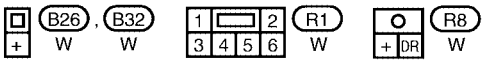
EKS006A9

WITHOUT POWER DOOR LOCKS

LT-INT/L-01

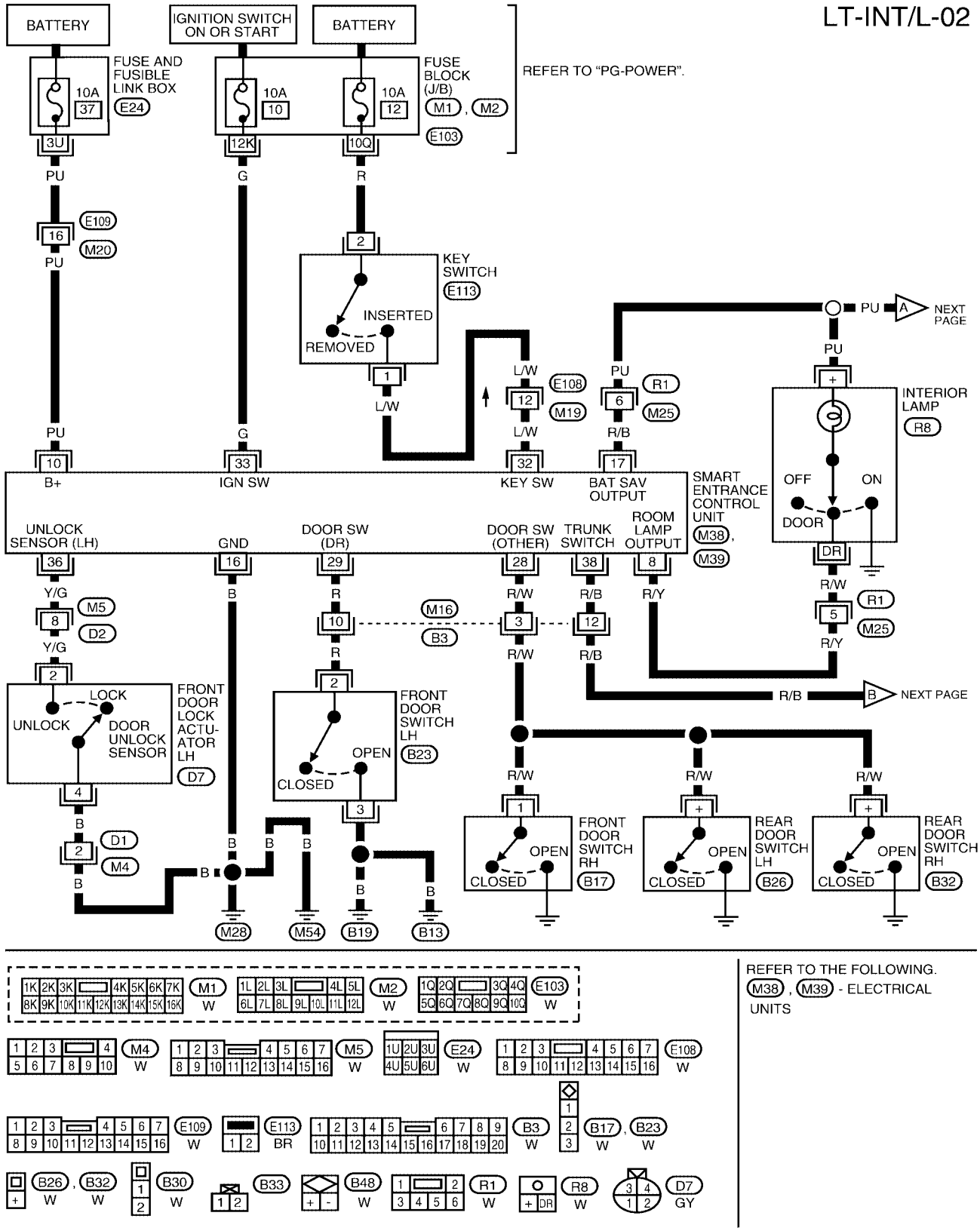






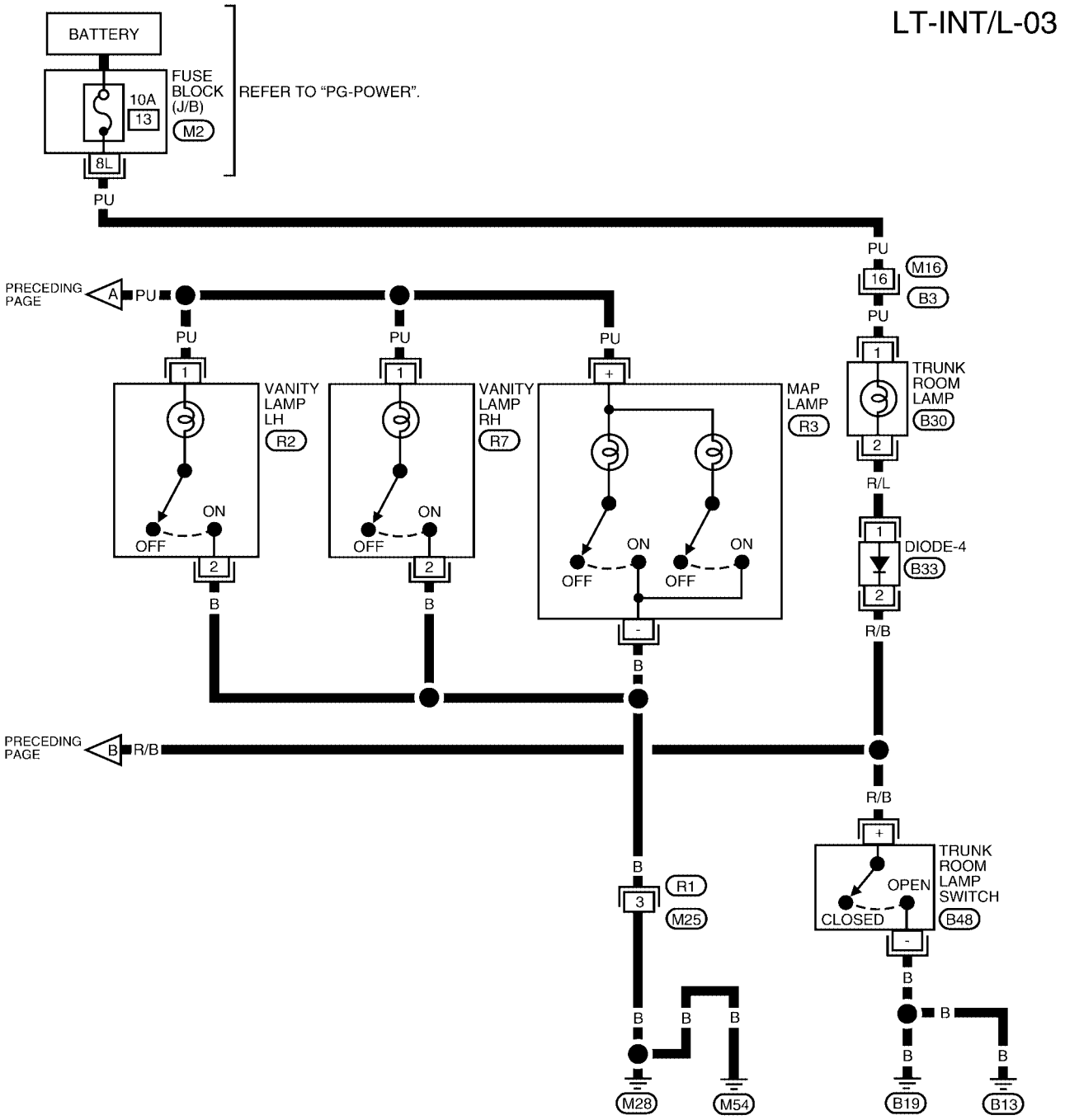
WKWA0529E

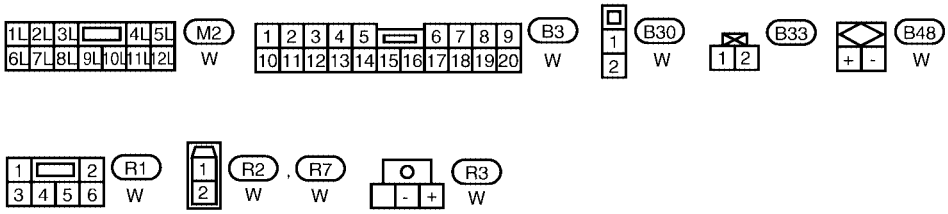
WITH POWER DOOR LOCKS



WKWA0530E

LT-INT/L-03





WKWA0531E

SMART ENTRANCE CONTROL UNIT TERMINALS AND REFERENCE VALUE MEASURED BETWEEN EACH TERMINAL AND GROUND

TERMINAL	WIRE COLOR	ITEM	CONDITION	DATA (DC)
8	R/Y	INTERIOR LAMP	LAMP SWITCH IN DOOR POSITION	12V
10	PU	POWER SOURCE (FUSE)	—	12V
16	B	GROUND	—	—
17	R/B	BATTERY SAVER (INTERIOR LAMP)	BATTERY SAVER DOES NOT OPERATE	12V
			BATTERY SAVER OPERATES	0V
28	R/W	OTHER DOOR SWITCHES	OFF (CLOSED)	5V
			ON (OPEN)	0V
29	R	FRONT DOOR SWITCH LH	OFF (CLOSED)	5V
			ON (OPEN)	0V
32	L/W	IGNITION KEY SWITCH (INSERT)	IGNITION KEY IS INSERTED	12V
			IGNITION KEY IS REMOVED	0V
33	G	IGNITION SWITCH (ON)	IGNITION KEY IS IN ON POSITION	12V
		IGNITION SWITCH (START)	IGNITION KEY IS IN START POSITION	12V
36	Y/G	DOOR UNLOCK SENSOR LH	DRIVER DOOR: LOCKED	5V
			DRIVER DOOR: UNLOCKED	0V
38	R/B	TRUNK ROOM LAMP SWITCH	ON (OPEN)	0V
			OFF (CLOSED)	12V

CONSULT-II Function (SMART ENTRANCE)

EKS006AA

CONSULT-II can display each diagnostic item using the diagnostic test modes shown following.

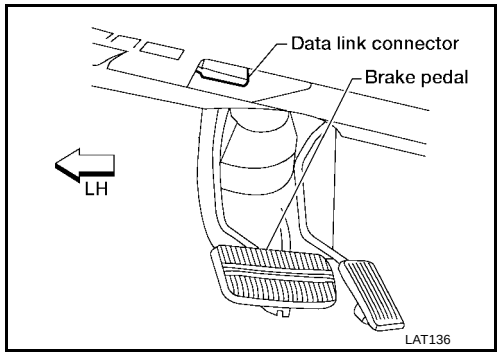
SMART ENTRANCE diagnostic test item	Diagnostic mode	Description
Inspection by part	DATA MONITOR	Displays BCM input/output data in real time.
	ACTIVE TEST	Operation of electrical loads can be checked by sending drive signal to them.

CAUTION:

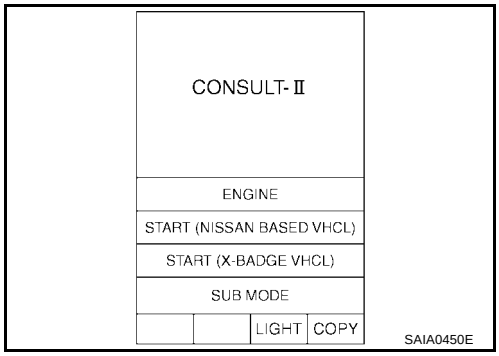
If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carries out CAN communication.

"INT LAMP"/"BATTERY SAVER"

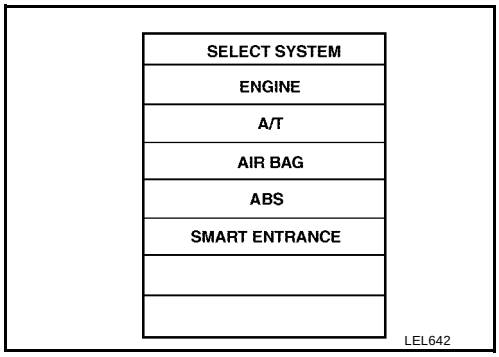
1. With the ignition switch OFF, connect CONSULT-II and CONSULT-II CONVERTER to the data link connector, then turn ignition switch ON.



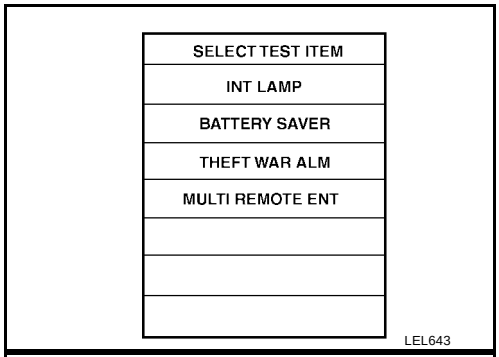
2. Touch "START (NISSAN BASED VHCL)".



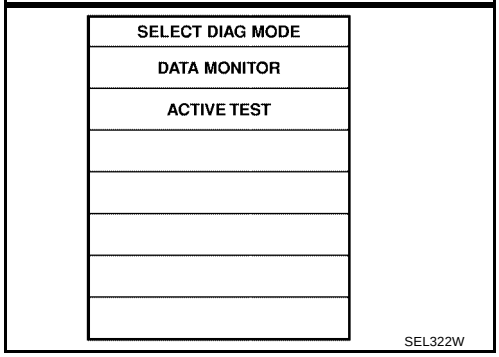
3. Touch "SMART ENTRANCE".



4. Touch "INT LAMP" or "BATTERY SAVER".



5. Select diagnosis mode.
"DATA MONITOR" and "ACTIVE TEST" are available for "INT LAMP" and "BATTERY SAVER".



CONSULT-II Application Items (With Power Door Locks)

EKS006AB

"INT LAMP"

Data Monitor

Monitored Item	Description
IGN ON SW	Indicates [ON/OFF] condition of ignition switch.
KEY ON SW	Indicates [ON/OFF] condition of key switch.
DOOR SW DR	Indicates [ON/OFF] condition of front door switch LH.
DOOR SW-ALL	Indicates [ON/OFF] condition of door switch (All).

Monitored Item	Description
LOCK SIG DR	Indicates [ON/OFF] condition of front door unlock sensor LH.
UN BUTTON/SIG	Indicates [ON/OFF] condition of unlock signal from remote controller.

Active Test

Test Item	Description
INT LAMP	This test enables to check interior lamp, map lamp, and vanity lamps operations. When touch "ON" on CONSULT-II screen. ● Interior lamp turns on when the switch is in DOOR or ON. (Smart entrance control unit supplies power and ground to interior lamp.) ● Map lamp and vanity lamps turn on when the switch is in ON. (Smart entrance control unit supplies power to map lamp and vanity lamps.)

"BATTERY SAVER"
Data Monitor

Monitored Item	Description
IGN ON SW	Indicates [ON/OFF] condition of ignition switch.
KEY ON SW	Indicates [ON/OFF] condition of key switch.
DOOR SW DR	Indicates [ON/OFF] condition of front door switch LH.
DOOR SW-ALL	Indicates [ON/OFF] condition of door switch (ALL).
LOCK SIG DR	Indicates [ON/OFF] condition of front door unlock sensor LH.
TRUNK SW	Indicates [ON/OFF] condition of trunk room lamp switch.

Active Test

Test Item	Description
BATTERY SAVER	This test enables to check interior lamp, map lamp, and vanity lamp operations. When touch "ON" on CONSULT-II screen. ● Interior lamp turns on when the switch is in ON. (Smart entrance control unit supplies power to interior lamp.) ● Map lamp and vanity lamps turn on when the switch is in ON. (Smart entrance control unit supplies power to map lamps and vanity lamps.)

Trouble Diagnoses for Interior Lamp Timer (With Power Door Locks)

EKS006AC

DIAGNOSTIC PROCEDURE 1 (SYMPTOM: INTERIOR LAMP TIMER DOES NOT OPERATE PROPERLY)

1. CHECK IGNITION ON SIGNAL

With CONSULT-II

Check ignition switch ON signal ("IGN ON SW") in "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	
IGN ON SW	ON

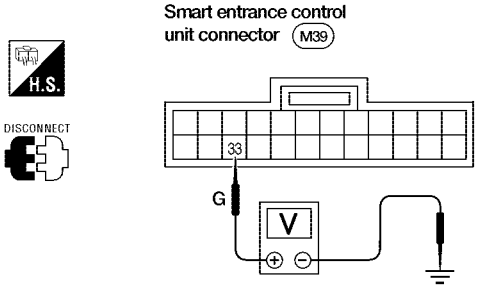
When ignition switch is ON:
IGN ON SW ON

When ignition switch is OFF:
IGN ON SW OFF

SEL318W

Without CONSULT-II

Check voltage between smart entrance control unit harness connector terminal 33 and ground.



Terminals		Ignition switch position		
(+)	(–)	OFF	ACC	ON
33	Ground	0V	0V	Battery voltage

LEL450

OK or NG

OK >> GO TO 2.
NG >> Check the following.

- 10A fuse [No. 10, located in fuse block (J/B)]
- Harness for open or short between smart entrance control unit and fuse

2. CHECK DOOR SWITCH INPUT SIGNAL

With CONSULT-II

Check driver door switch signal ("DOOR SW-DR") in "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	
DOOR SW-DR	OFF

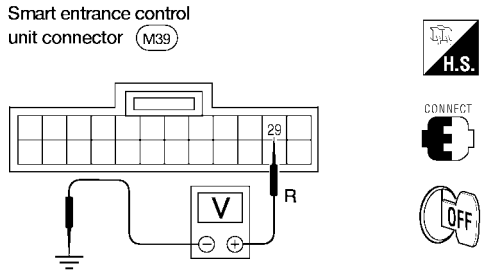
When driver's door is open:
DOOR SW-DR ON

When driver's door is closed:
DOOR SW-DR OFF

SEL319W

Without CONSULT-II

Check voltage between smart entrance control unit harness connector terminal 29 and ground.



Voltage [V]:
Condition of driver's door: CLOSED
Approx. 5
Condition of driver's door: OPENED
0

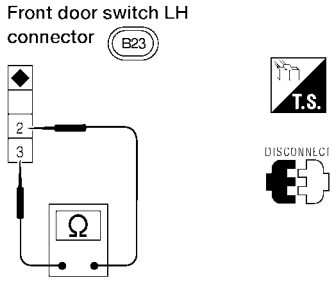
LEL451

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. CHECK FRONT DOOR SWITCH LH

Check continuity between front door switch LH terminals 2 and 3.



Continuity:
Door switch is pushed.
No
Door switch is released.
Yes

LEL443

OK or NG

OK >> Check the following.
- Front door switch LH ground circuit and condition
- Harness for open or short between smart entrance control unit and front door switch LH

NG >> Replace front door switch LH.

4. CHECK DOOR UNLOCK SENSOR LH INPUT SIGNAL

With CONSULT-II

Perform "LOCK SIG DR" in "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	
LOCK SIG DR	OFF

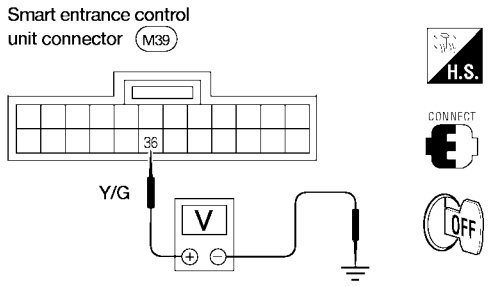
When front LH door is locked:
LOCK SIG DR OFF

When front LH door is unlocked:
LOCK SIG DR ON

SEL344W

Without CONSULT-II

Check voltage between smart entrance control unit harness connector terminal 36 and ground.



	Terminals		Condition	Voltage [V]
	(+)	(–)		
Front LH door	36	Ground	Locked	Approx. 5
			Unlocked	0

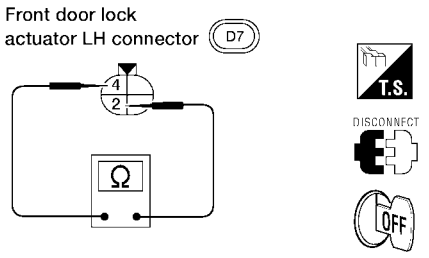
LEL452

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. CHECK DOOR UNLOCK SENSOR LH

1. Disconnect door unlock sensor LH harness connector.
2. Check continuity between door unlock sensor LH terminals.



Continuity:
Condition: Locked
No
Condition: Unlocked
Yes

WEL497

OK or NG

OK >> Check the following.
- Door unlock sensor LH ground circuit
- Harness for open or short between smart entrance control unit and door unlock sensor LH

NG >> Replace door unlock sensor LH.

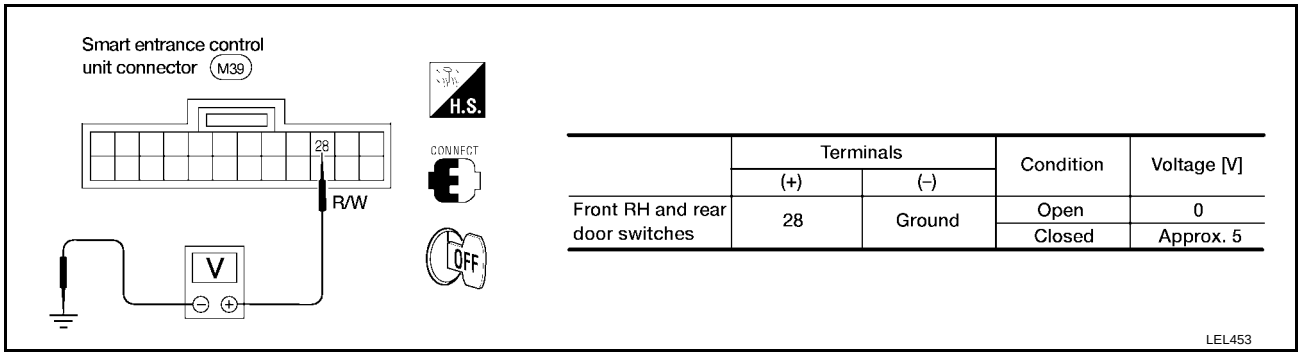
6. CHECK DOOR SWITCHES INPUT SIGNAL

With CONSULT-II

Check door switches ("DOOR SW-ALL") in "DATA MONITOR" mode with CONSULT-II.

Without CONSULT-II

Check voltage between smart entrance control unit harness connector terminal 28 and ground.



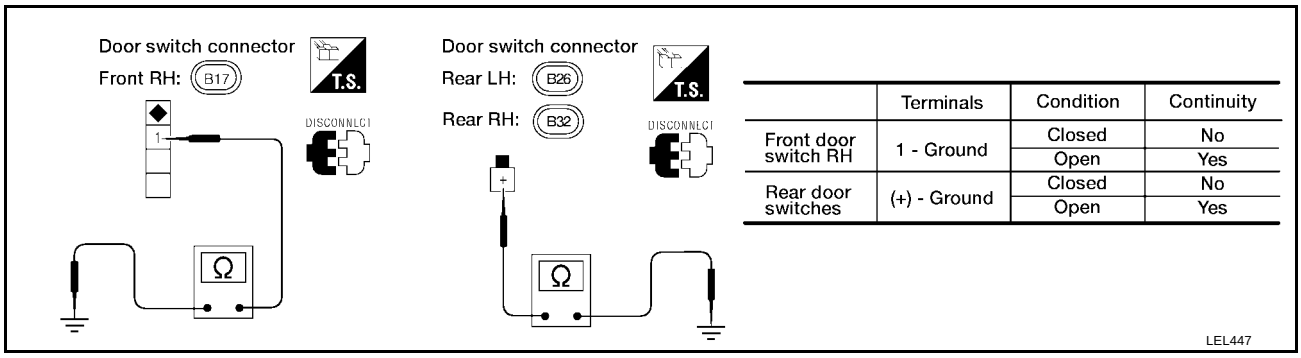
	Terminals		Condition	Voltage [V]
	(+)	(–)		
Front RH and rear door switches	28	Ground	Open	0
			Closed	Approx. 5

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. CHECK DOOR SWITCHES

1. Disconnect door switch harness connector.
2. Check continuity between door switch terminals 1, + and ground.



	Terminals	Condition	Continuity
Front door switch RH	1 - Ground	Closed	No
		Open	Yes
Rear door switches	(+) - Ground	Closed	No
		Open	Yes

OK or NG

OK >> Check the following.
- Door switch ground circuit or door switch ground condition
- Harness for open or short between smart entrance control unit and door switch

NG >> Replace door switch.

8. CHECK KEY SWITCH INPUT SIGNAL

With CONSULT-II

Check key switch ("KEY ON SW") in "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	
KEY ON SW	ON

When key is inserted to ignition key cylinder:

KEY ON SW ON

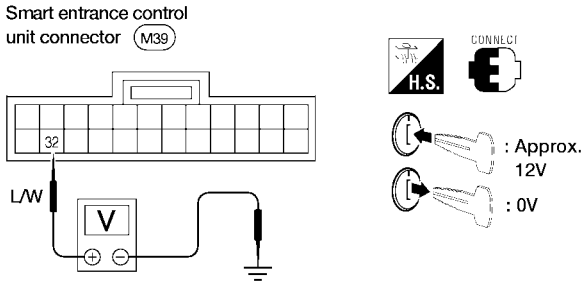
When key is removed from ignition key cylinder:

KEY ON SW OFF

SEL315W

Without CONSULT-II

Check voltage between smart entrance control unit harness connector terminal 32 and ground.



Voltage [V]:
Condition of key switch: Key is inserted.
Approx. 12
Condition of key switch: Key is removed.
0

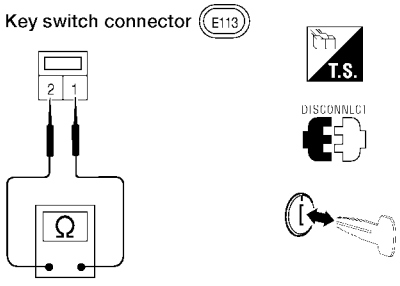
LEL454

OK or NG

OK >> Replace smart entrance control unit.
NG >> GO TO 9.

9. CHECK KEY SWITCH

Check continuity between terminals 1 and 2.



Continuity:
Condition of key switch: Key is inserted.
Yes
Condition of key switch: Key is removed.
No

LEL449

OK or NG

OK >> Check the following.
- 10A fuse [No. 12, located in fuse block (J/B)]
- Harness for open or short between key switch and fuse
- Harness for open or short between smart entrance control unit and key switch

NG >> Replace key switch.

BULB SPECIFICATIONS

PFP:26297

Bulb Specifications

EKS006AI

HEADLAMP

Item	Wattage (W)	Bulb No.*
High/Low	65/55	9008 (H13)

*Always check with the Parts Department for the latest parts information.

EXTERIOR LAMP

Item		Wattage (W)	Bulb No.*
Front parking and turn signal lamp		8/27	3157AK
Fog light		55	H11
Rear combination lamp	Turn signal	27	1156A
	Stop/Tail	27/8	1157
Back-up		18	921
License plate lamp		5	194
High-mounted stop lamp (parcel shelf mount)		18	921
High-mounted stop lamp (rear air spoiler mount)		*	*

*Always check with the Parts Department for the latest parts information.

INTERIOR LAMP

Item	Wattage (W)	Bulb No.*
Interior lamp	8	*
Map lamp	8	*
Trunk lamp	3.4	158

*Always check with the Parts Department for the latest parts information.

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DRIVER INFORMATION SYSTEM

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PRECAUTION

PFP:00011

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EKS00BNX

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Wiring Diagrams and Trouble Diagnosis

EKS008XP

When you read wiring diagrams, refer to the following:

- Refer to GI-13, "How to Read Wiring Diagrams" .
- Refer to PG-3, "POWER SUPPLY ROUTING" for power distribution circuit.

When you perform trouble diagnosis, refer to the following:

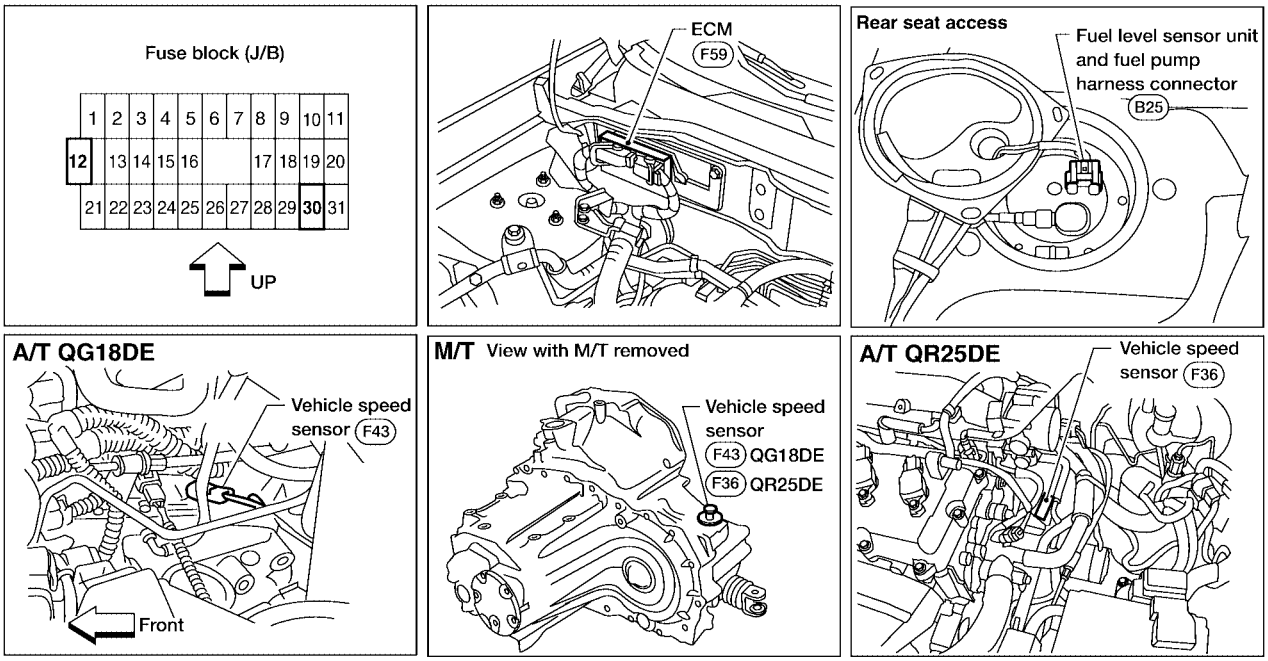
- Refer to GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES" .
- Refer to GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident" .

METERS AND GAUGES

PFP:24814

Component Parts and Harness Connector Location

EKS00399



WKIA1094E

System Description

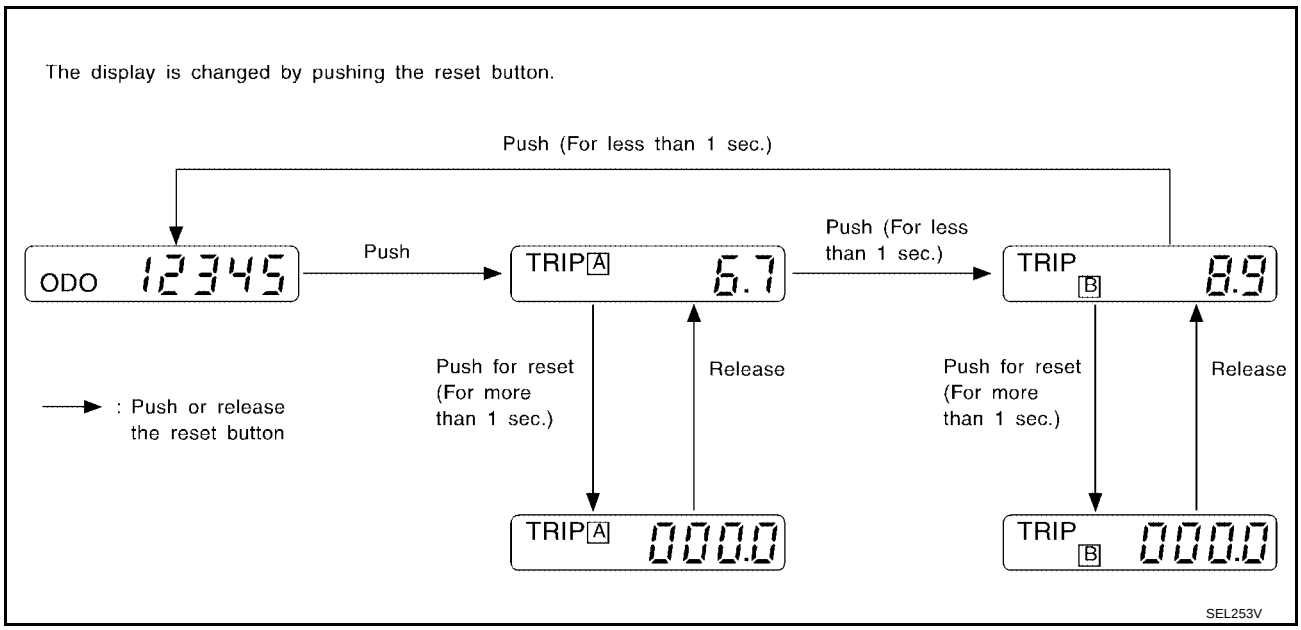
EKS0039A

UNIFIED CONTROL METER

- Speedometer, odo/trip meter, tachometer (if equipped), fuel gauge and water temperature gauge are controlled by the unified meter control unit built-in combination meter.
- Digital meter is adopted for odo/trip meter.*
  *The record of the odometer is kept even if the battery cable is disconnected. The record of the trip meter is erased when the battery cable is disconnected.
- Odo/trip meter segment can be checked in diagnosis mode.
- Meter/gauge can be checked in diagnosis mode.

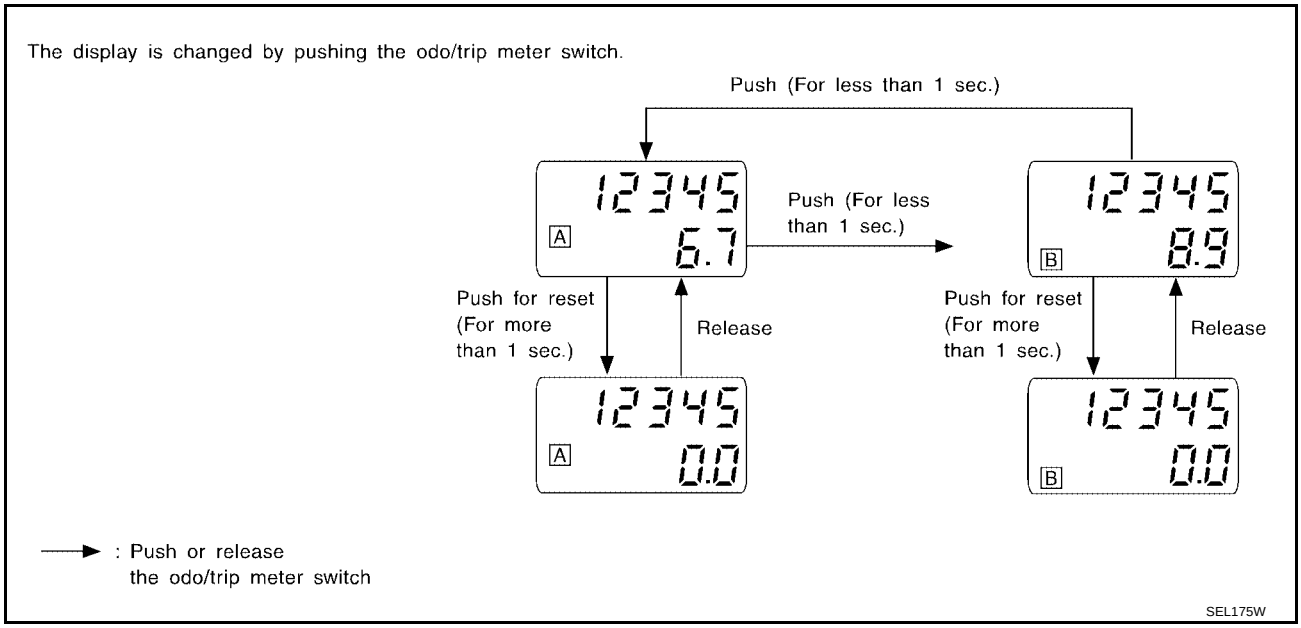
HOW TO CHANGE THE DISPLAY FOR ODO/TRIP METER (WITHOUT TRIP COMPUTER)

NOTE:
Turn ignition switch to the ON position to operate odo/trip meter.



HOW TO CHANGE THE DISPLAY FOR ODO/TRIP METER (WITH TRIP COMPUTER)

NOTE:
Turn ignition switch to the ON position to operate odo/trip meter.



POWER SUPPLY AND GROUND CIRCUIT

Power is supplied at all times:

- through 10A fuse [No. 12, located in the fuse block (J/B)]
- to combination meter terminal 25 (without tachometer), or 42 (QG18DE with tachometer), or 13 (QR25DE).

With the ignition switch in the ON or START position, power is supplied:

- through 10A fuse [No. 30, located in the fuse block (J/B)]
- to combination meter terminal 26 and 20 (without tachometer), or 41 and 6 (QG18DE with tachometer), or 14 and 7 (QR25DE).

Ground is supplied:

- to combination meter terminal 27 (without tachometer), or 48 (QG18DE with tachometer), or 12 (QR25DE)
- through body grounds M28 and M54.
- to combination meter terminal 31 (without tachometer), or 45 (QG18DE with tachometer), or 8 (QR25DE)
- through body grounds B19 and B13.

WATER TEMPERATURE GAUGE

The water temperature gauge indicates the engine coolant temperature.
ECM provides a water temperature signal to combination meter for water temperature gauge with CAN communication line.

TACHOMETER

The tachometer indicates engine speed in revolutions per minute (rpm).
ECM provides an engine speed signal to combination meter for tachometer with CAN communication line.

FUEL GAUGE

The fuel gauge indicates the approximate fuel level in the fuel tank.
The fuel gauge is regulated by a variable ground signal supplied:

- to combination meter terminal 30 (without tachometer), or 44 (QG18DE with tachometer), or 21 (QR25DE) for the fuel gauge
- from terminal 2 of the fuel level sensor unit and fuel pump
- through terminal 5 of the fuel level sensor unit and fuel pump, and
- through body grounds B19 and B13.

SPEEDOMETER

The combination meter receives a voltage signal from the vehicle speed sensor for the speedometer.
The voltage is supplied:

- to combination meter terminal 29 (without tachometer), or 47 (QG18DE with tachometer), or 17 (QR25DE) for the speedometer
- from terminal 1 (with QG18DE), or terminal + (with QR25DE) of the vehicle speed sensor.

The speedometer converts the voltage into the vehicle speed displayed.

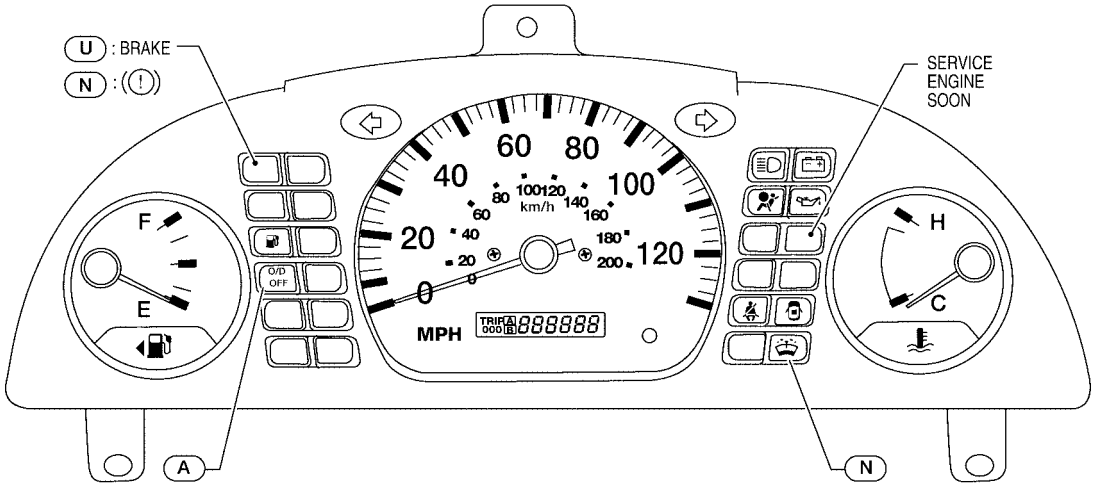
CAN Communication System Description

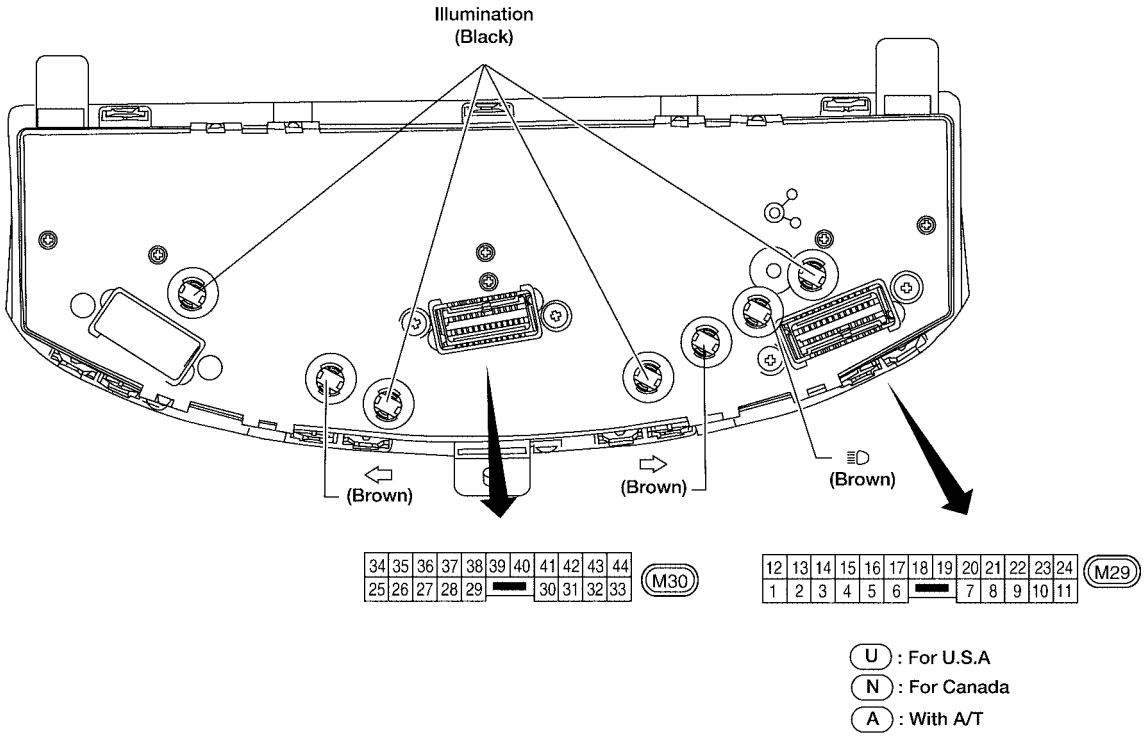
EKS003LD

Refer to LAN-4, "CAN COMMUNICATION" .

Combination Meter
WITHOUT TACHOMETER

EKS0039B



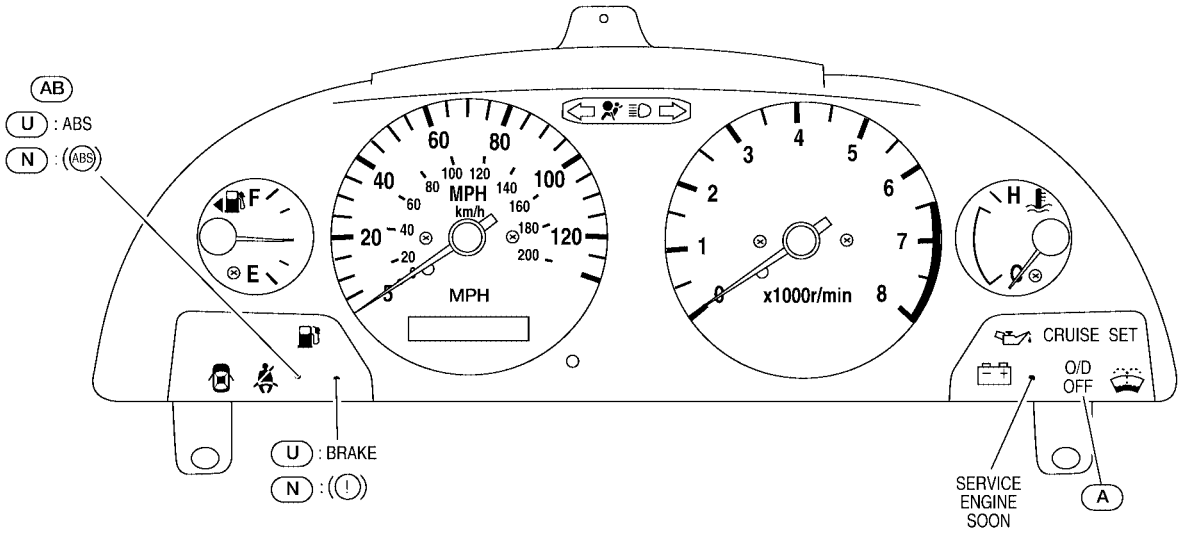


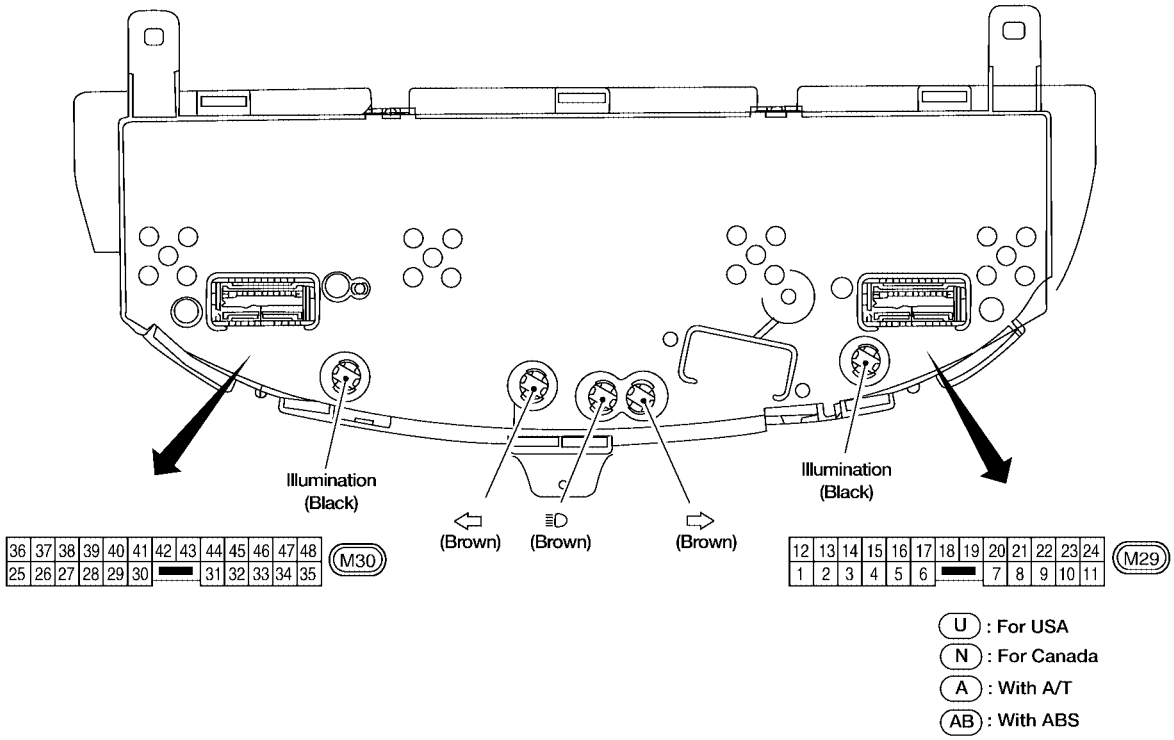
Bulb socket color	Bulb wattage
Brown	1.4W
Black	3.0W

( ): Bulb socket color

WKIA0289E

WITH TACHOMETER (QG18DE MODELS)



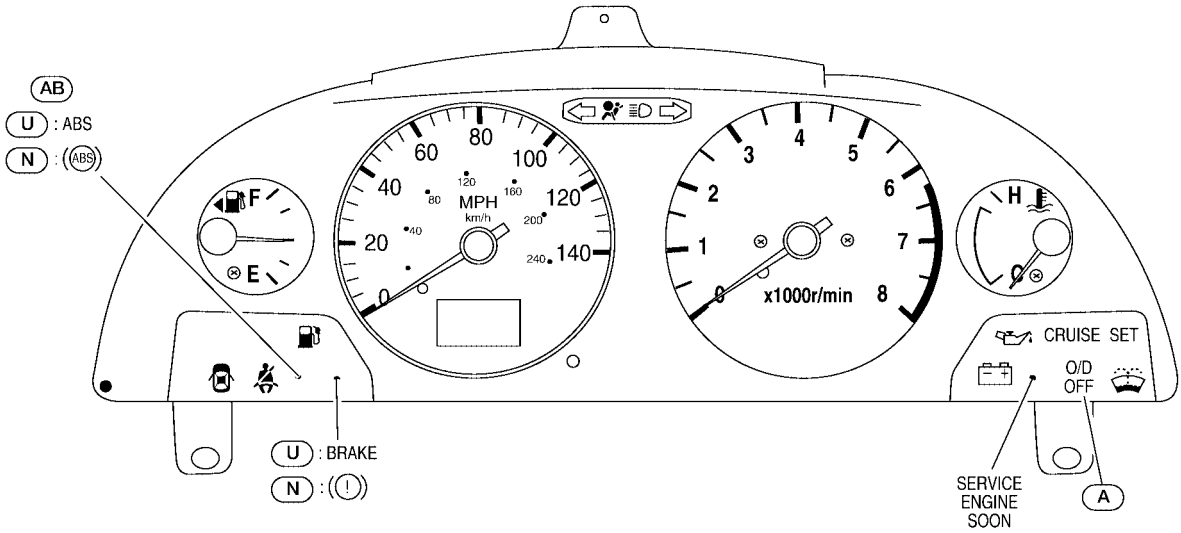


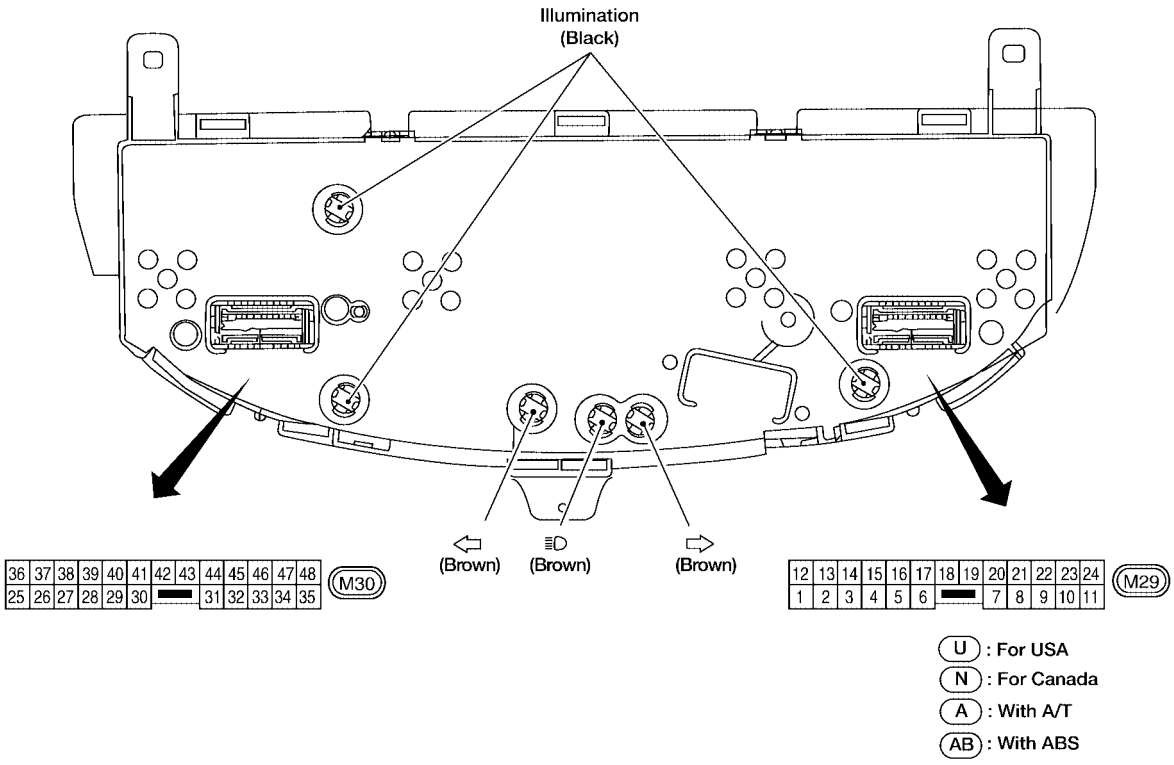
Bulb socket color	Bulb wattage
Brown	1.4W
Black	3.0W

( ): Bulb socket color

WKIA1095E

QR25DE





U : For USA
N : For Canada
A : With A/T
AB : With ABS

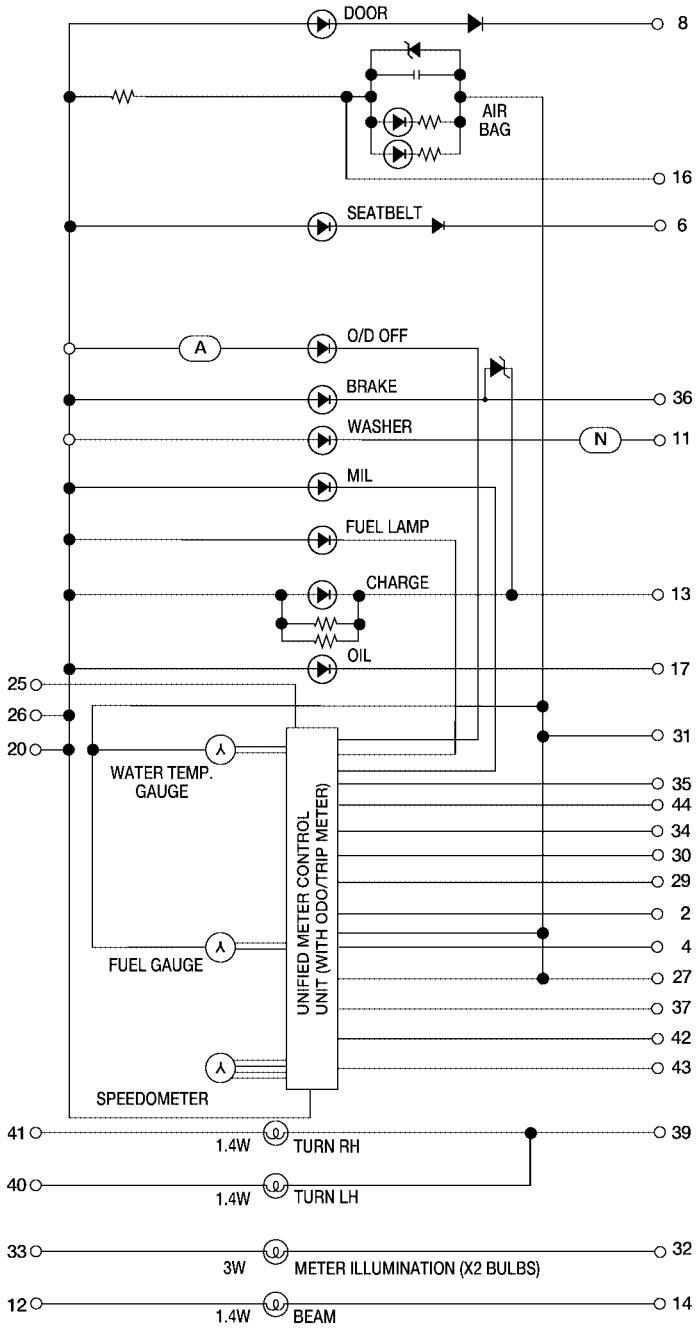
Bulb socket color	Bulb wattage
Brown	1.4W
Black	3.0W

( ): Bulb socket color

WKIA1096E

Schematic
WITHOUT TACHOMETER

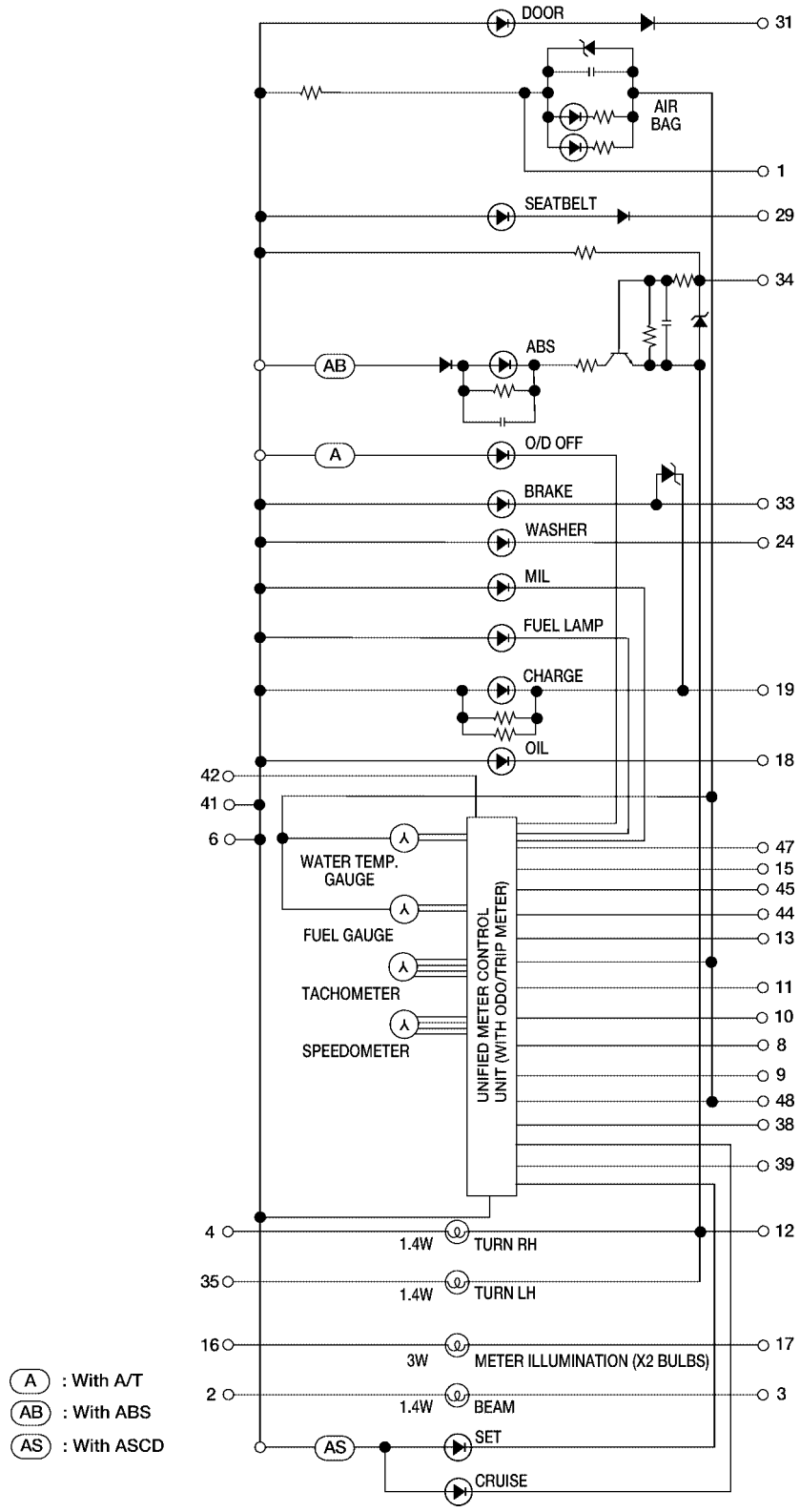
EKS0039C



A : With A/T
N : CANADA

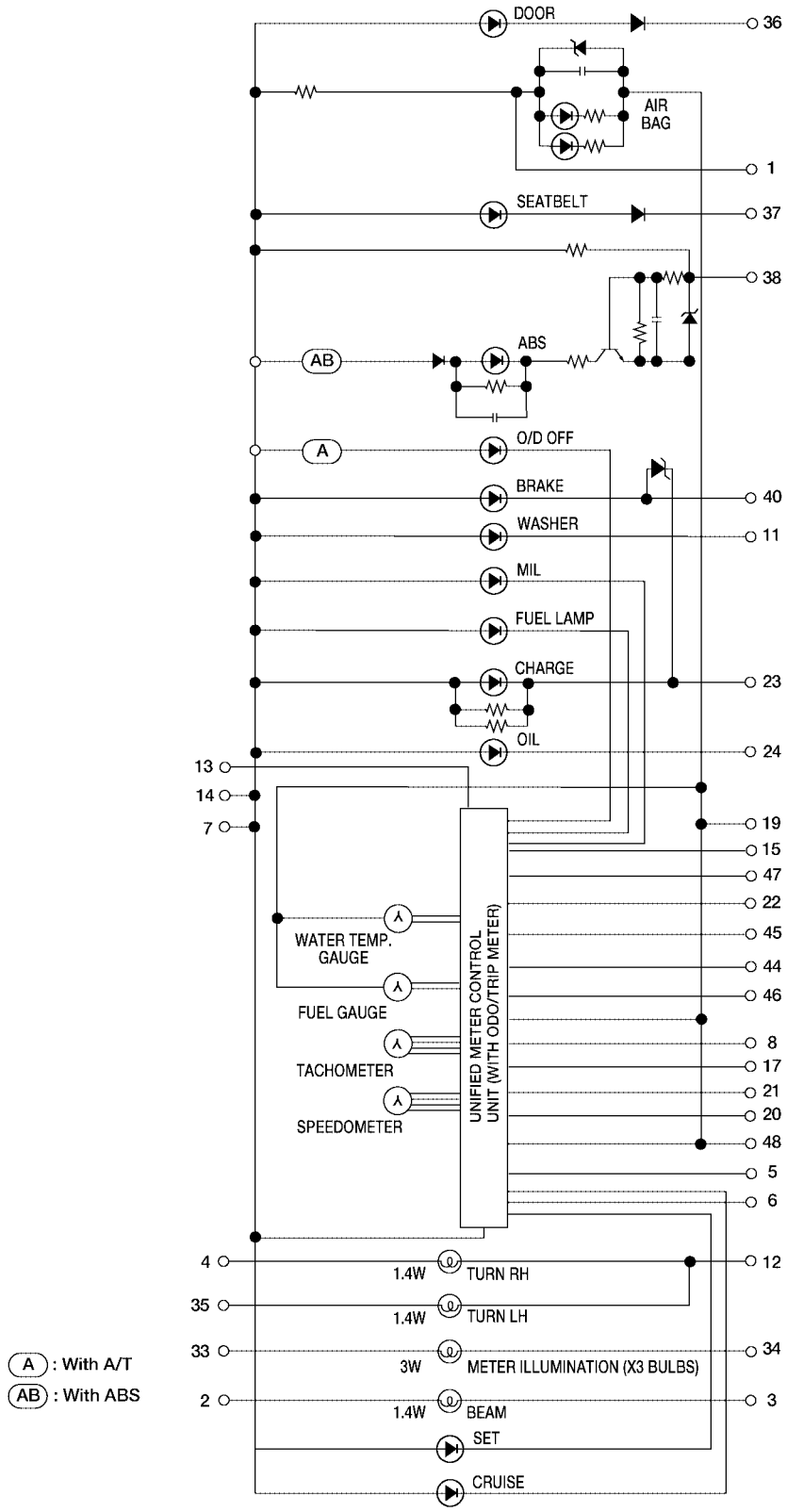
WKWA0607E

WITH TACHOMETER (QG18DE MODELS)



WKWA1611E

WITH TACHOMETER (QR25DE MODELS)

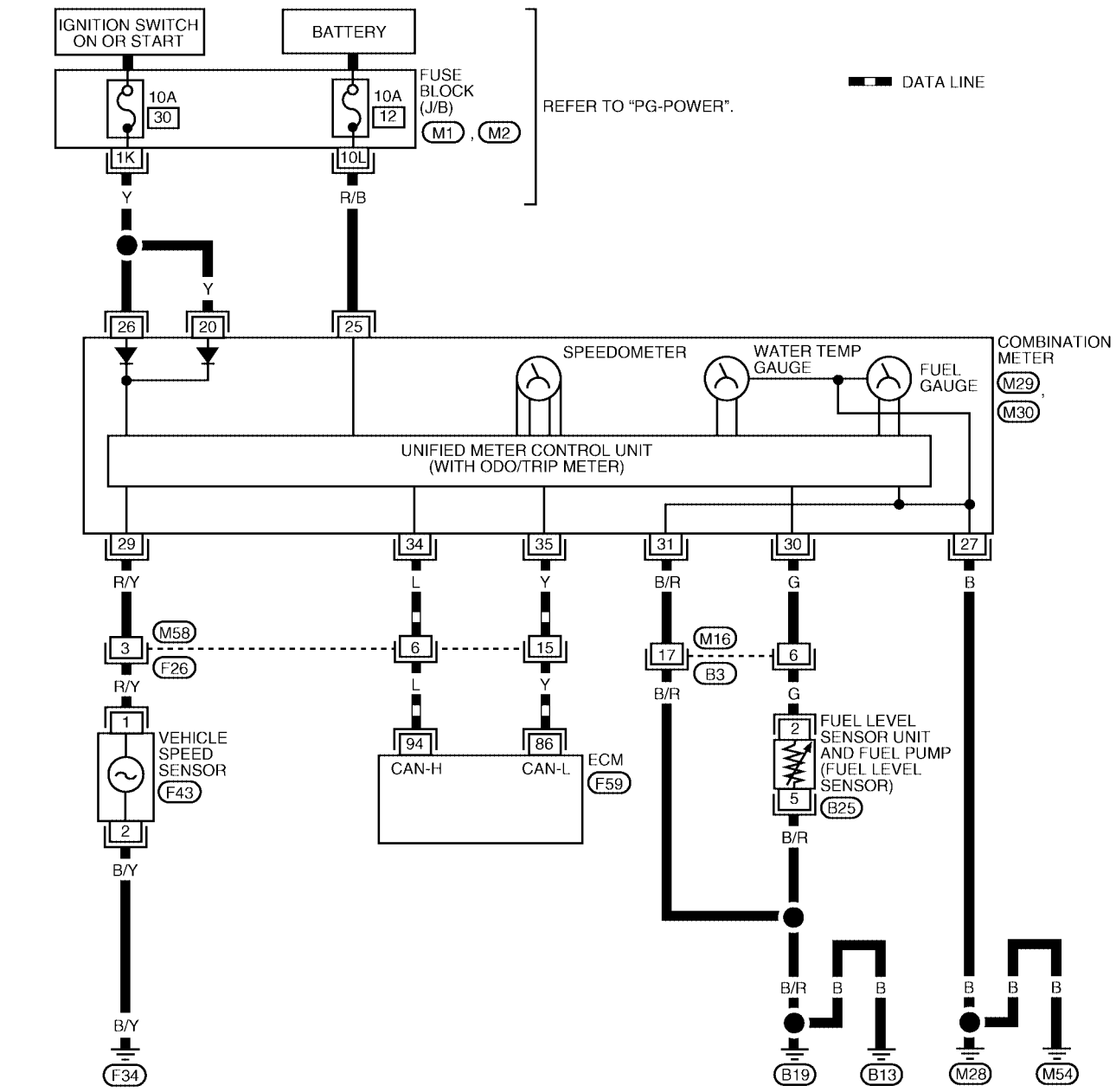


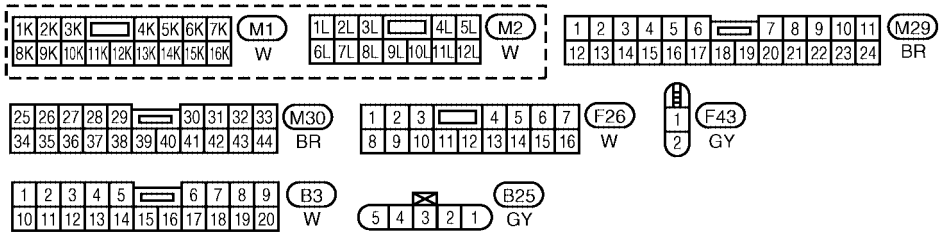
WKWA1612E

Wiring Diagram — METER —
WITHOUT TACHOMETER

EKS0039D

DI-METER-01

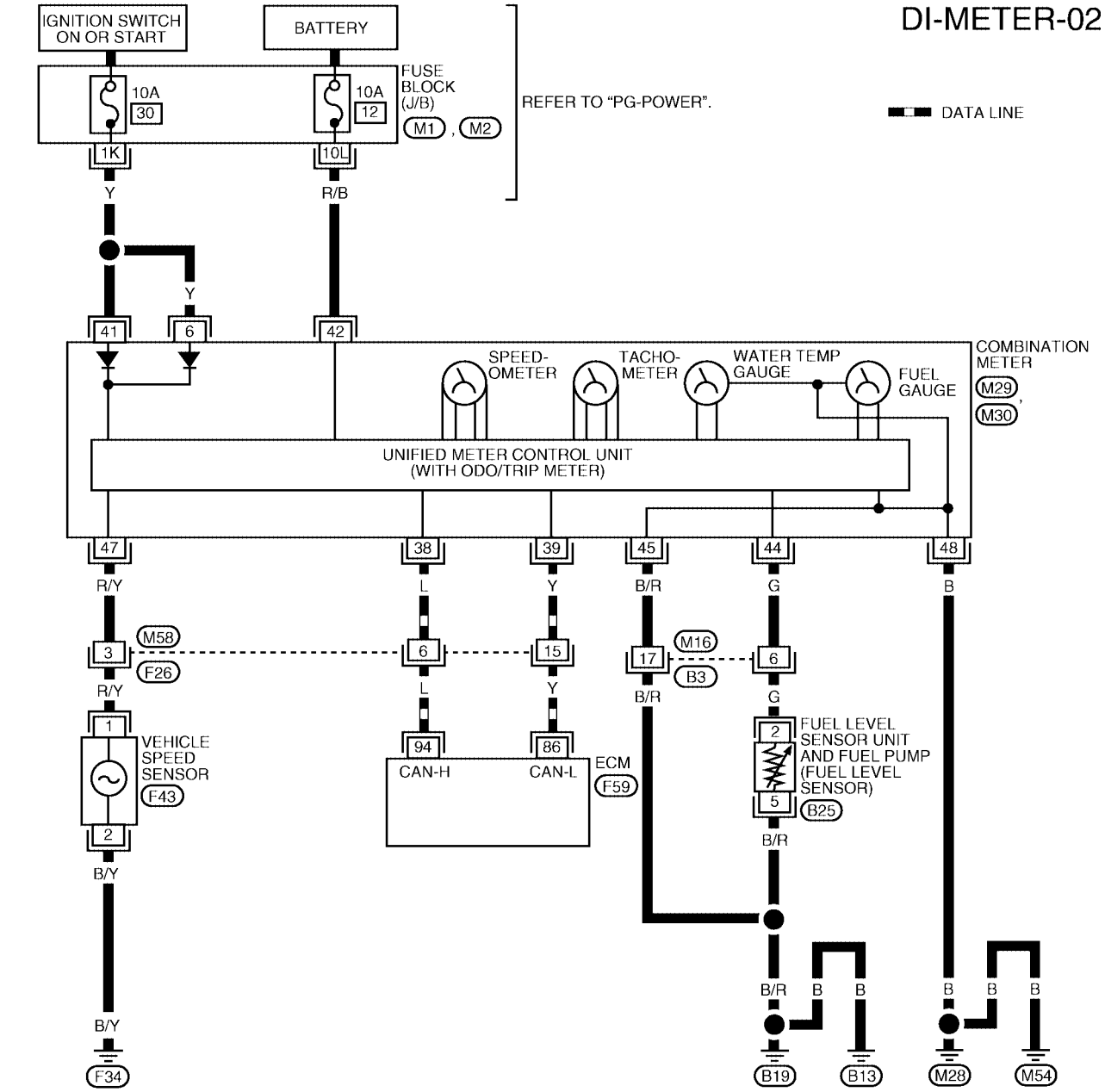


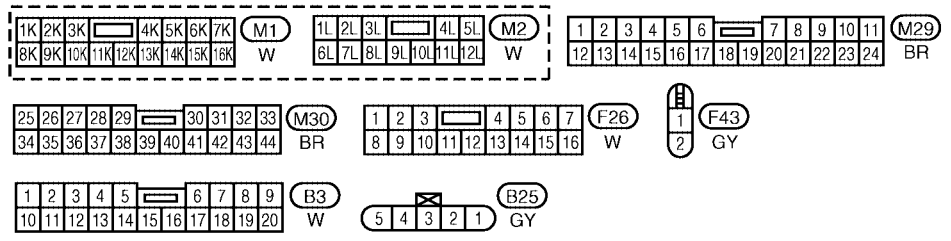


REFER TO THE FOLLOWING.
F59 - ELECTRICAL UNITS

WKWA1613E

WITH TACHOMETER (QG18DE MODELS)

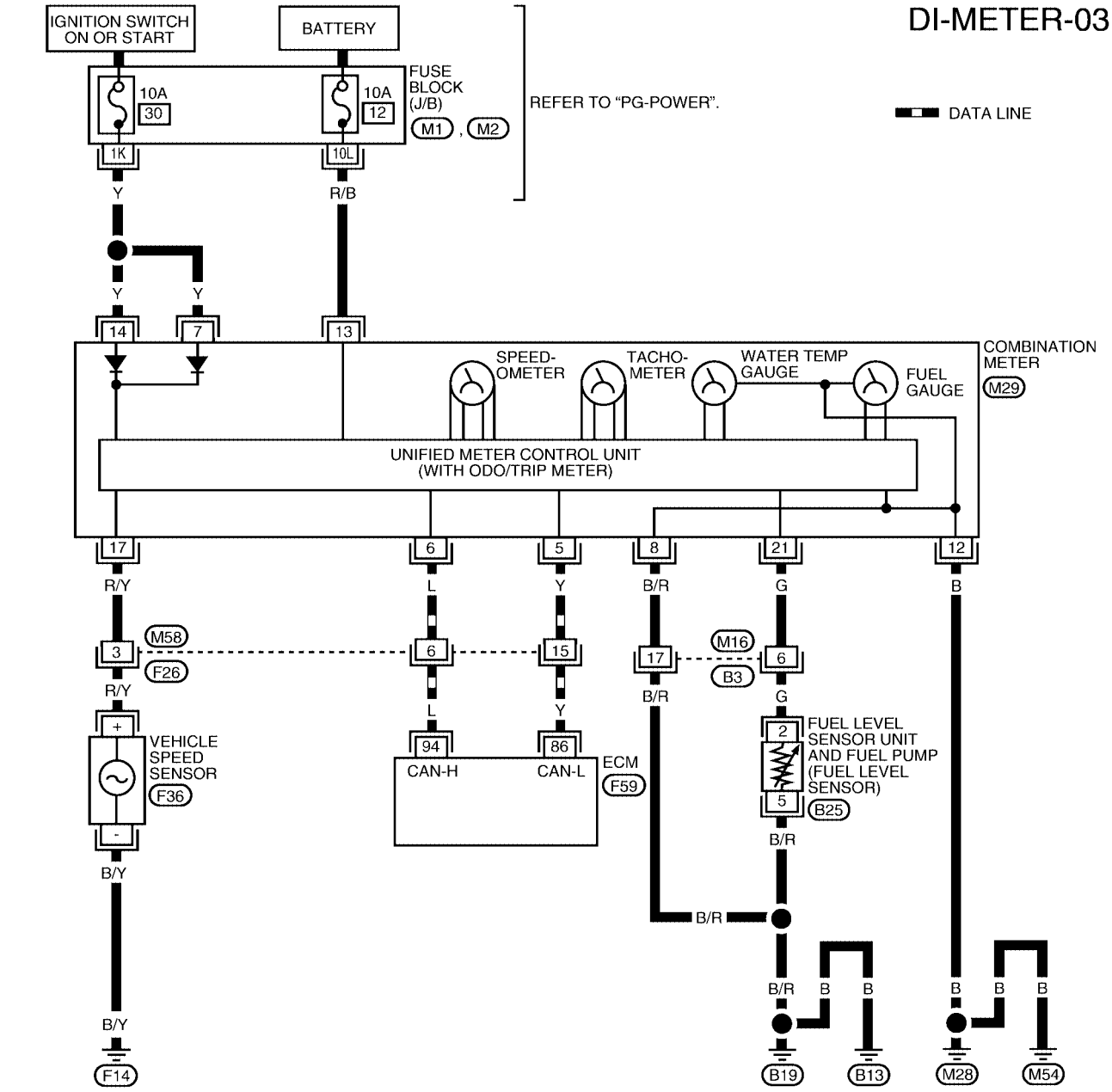


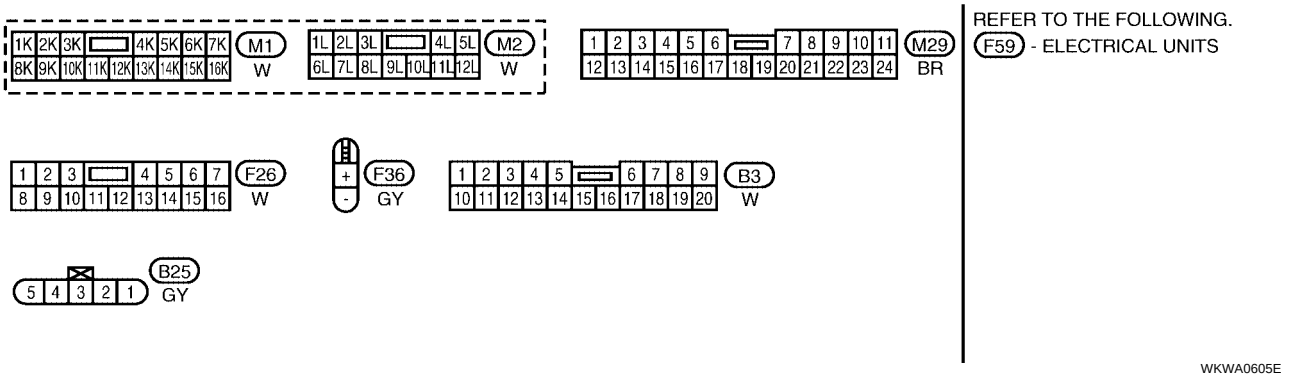


REFER TO THE FOLLOWING.
F59 - ELECTRICAL UNITS

WKWA1614E

WITH TACHOMETER (QR25DE MODELS)





Meter/Gauge Operation and Odo/Trip Meter Segment Check in Diagnosis Mode

EKS0039E

SELF-DIAGNOSIS FUNCTION

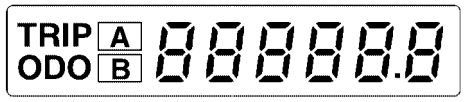
- Odo/trip meter segment can be checked in diagnosis mode.
- Meters/gauges can be checked in diagnosis mode.

HOW TO ALTERNATE DIAGNOSIS MODE

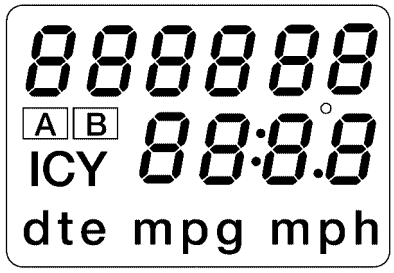
1. Turn ignition switch to ON and change odo/trip meter to “TRIP A” or “TRIP B”.
2. Turn ignition switch to OFF.
3. Turn ignition switch to ON when pushing odo/trip meter switch.
4. Release odo/trip meter switch 1 second after ignition switch is turned ON.
5. Push odo/trip meter switch three times within 7 seconds.
6. All odo/trip meter segments should be turned on.

   NOTE:
   If some segments are not turned on, combination meter should be replaced.
   At this point, the unified meter control unit is turned to diagnosis mode.

QG18DE



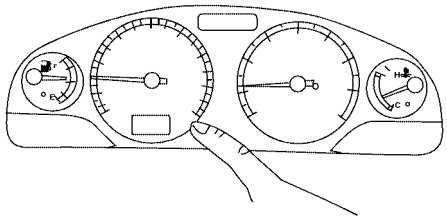
QR25DE



WKIA1120E

7. Push odo/trip meter switch. Indication of each meter/gauge should be as shown in figure while pushing odo/trip meter switch.

   NOTE:
   It takes a few seconds for indication of fuel gauge and water temperature gauge to become stable.
8. Turn ignition switch to OFF or start engine to cancel diagnosis mode.

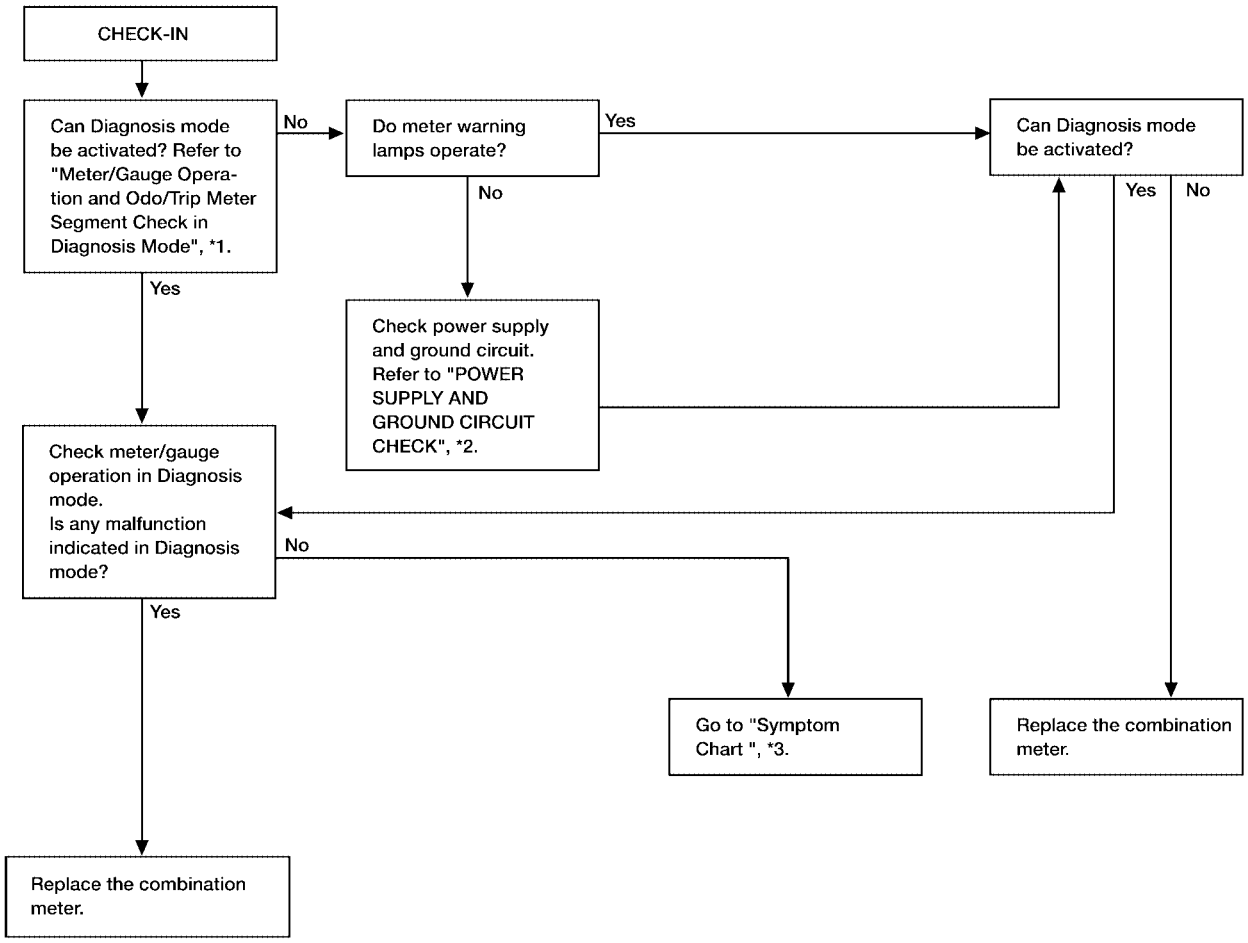


WEL128

Trouble Diagnoses

PRELIMINARY CHECK

EKS0039F



WKIA0159E

*1: DI-16 *2: DI-18 *3: DI-18

SYMPTOM CHART

Symptom	Possible causes	Repair order
One meter/gauge (speedometer/tachometer/fuel gauge/water temp. gauge) is malfunctioning.	1. Sensor signal - Vehicle speed signal - Engine revolution signal - Fuel gauge - Water temp. gauge 2. Unified meter control unit	1. Check the sensor for malfunctioning meter/gauge. DI-21, "INSPECTION/VEHICLE SPEED SENSOR" DI-22, "INSPECTION/ENGINE REVOLUTION SIGNAL" DI-23, "INSPECTION/FUEL LEVEL SENSOR UNIT AND FUEL PUMP" DI-25, "INSPECTION/WATER TEMPERATURE GAUGE" 2. Replace combination meter assembly.
Multiple meters/gauges (except odo/trip meter) are malfunctioning.		

Before starting trouble diagnoses below, perform “PRELIMINARY CHECK”, DI-17, "PRELIMINARY CHECK" .

POWER SUPPLY AND GROUND CIRCUIT CHECK

1. CHECK FUSE

Check for blown combination meter fuses.

Unit	Power source	Fuse No.
Combination meter	Battery	12
	Ignition switch ON or START	30

OK or NG

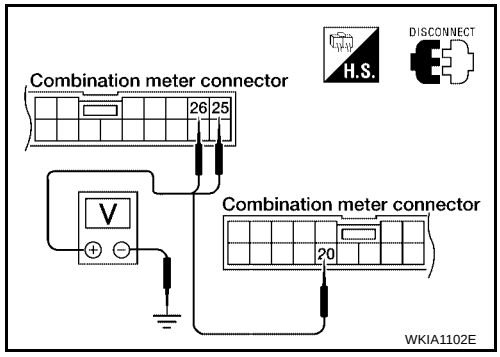
OK >> GO TO 2.
NG >> If fuse is blown, be sure to eliminate cause of malfunction before installing new fuse. Refer to PG-3, "POWER SUPPLY ROUTING" .

2. CHECK POWER SUPPLY CIRCUIT

1. Disconnect combination meter connector M29 (QR25DE) or M29 and M30 for (QG18DE).
2. Check voltage between combination meter harness connector terminals and ground.

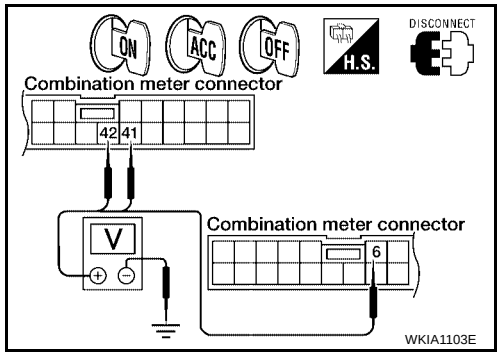
(QG18DE WITHOUT TACHOMETER)

Terminals			Ignition switch position		
(+)		(–)	OFF	ACC	ON
Connector	Terminal (Wire color)				
M30	25 (R/B)	Ground	Battery voltage	Battery voltage	Battery voltage
	26 (Y)		0V	0V	Battery voltage
M29	20 (Y)		0V	0V	Battery voltage



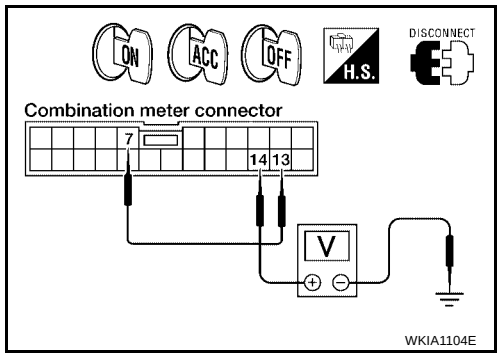
(QG18DE WITH TACHOMETER)

Terminals			Ignition switch position		
(+)		(–)	OFF	ACC	ON
Connector	Terminal (Wire color)				
M30	42 (R/B)	Ground	Battery voltage	Battery voltage	Battery voltage
	41 (Y)		0V	0V	Battery voltage
M29	6 (Y)		0V	0V	Battery voltage



(QR25DE)

Terminals			Ignition switch position		
(+)		(–)	OFF	ACC	ON
Connector	Terminal (Wire color)				
M29	13 (R/B)	Ground	Battery voltage	Battery voltage	Battery voltage
	14 (Y)		0V	0V	Battery voltage
	7 (Y)		0V	0V	Battery voltage



OK or NG

OK >> GO TO 3.

NG >> Check the following.

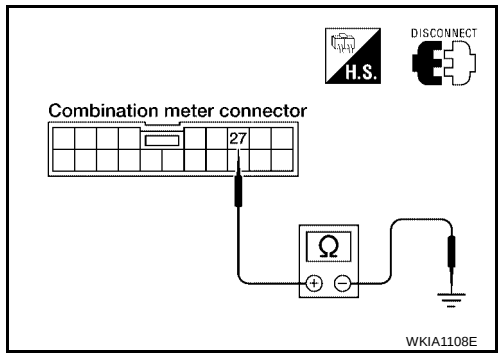
- Harness for open between combination meter and fuse

3. CHECK GROUND CIRCUIT

Check continuity between combination meter harness connector terminals and ground.

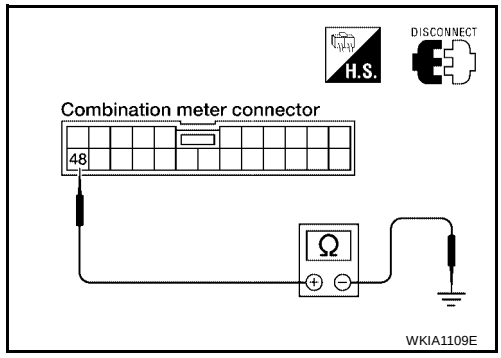
(QG18DE WITHOUT TACHOMETER)

Terminals			Continuity
(+)		(-)	
Connector	Terminal (Wire color)		
M30	27 (B)	Ground	Yes



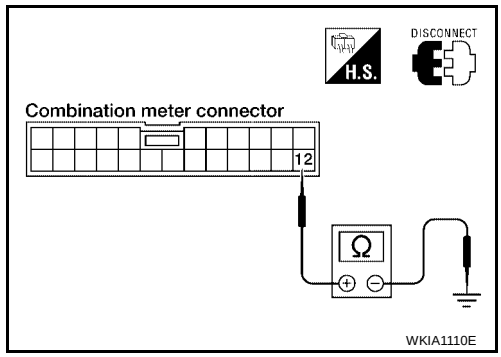
(QG18DE WITH TACHOMETER)

Terminals			Continuity
(+)		(-)	
Connector	Terminal (Wire color)		
M30	48 (B)	Ground	Yes



(QR25DE)

Terminals			Continuity
(+)		(-)	
Connector	Terminal (Wire color)		
M29	12 (B)	Ground	Yes



OK or NG

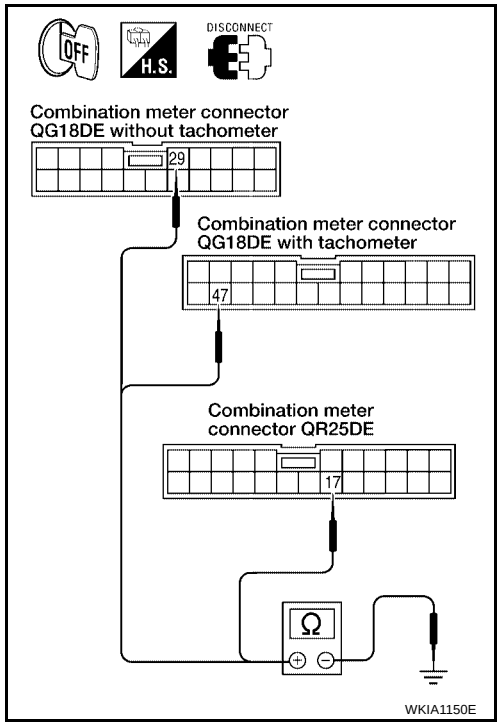
OK >> Inspection End.
NG >> Repair harness or connector.

INSPECTION/VEHICLE SPEED SENSOR

1. CHECK VEHICLE SPEED SENSOR OUTPUT

1. Remove vehicle speed sensor from transmission.
2. Check voltage between the combination meter terminal and ground while quickly turning speed sensor pinion.

Terminals			Voltage
(+)		(-)	
Connector	Terminal (Wire color)		
QG18DE (WITHOUT TACHOMETER)			
M30	29 (R/Y)	Ground	Approx. 0.5V
QG18DE (WITH TACHOMETER)			
M30	47 (R/Y)	Ground	Approx. 0.5V
QR25DE			
M29	17 (R/Y)	Ground	Approx. 0.5V



OK or NG

OK >> Vehicle speed sensor is OK.
NG >> GO TO 2.

2. CHECK VEHICLE SPEED SENSOR

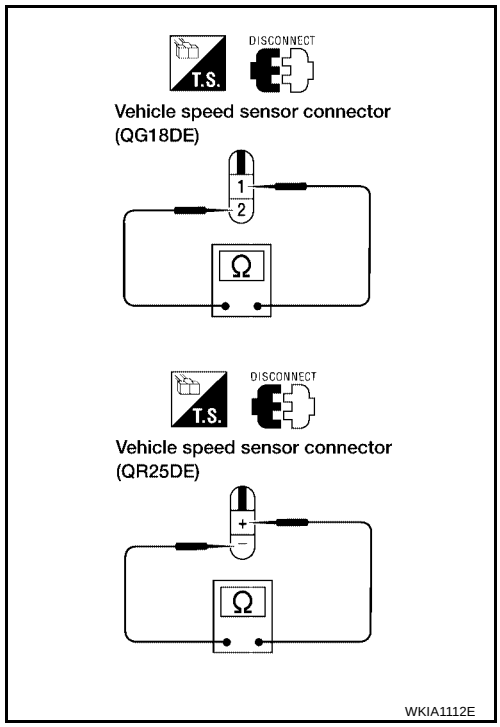
Check resistance between vehicle speed sensor connector F43 terminals 1 and 2 (with QG18DE), or connector F36 terminals + and - (with QR25DE).

Resistance Approx. 250Ω

OK or NG

OK >> Check the following.
- Harness between combination meter and vehicle speed sensor.
- Vehicle speed sensor ground circuit.

NG >> Replace vehicle speed sensor.



INSPECTION/ENGINE REVOLUTION SIGNAL

1. CHECK ECM SELF-DIAGNOSIS

Perform ECM self diagnosis. Refer to EC-137, "SELF-DIAG RESULTS MODE" (QG18DE models) or EC-794, "SELF-DIAG RESULTS MODE" (QR25DE models).

OK or NG

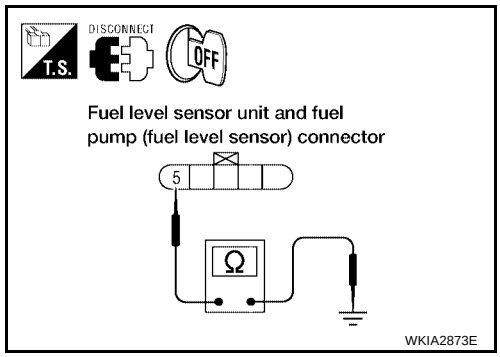
OK >> Replace combination meter.
NG >> Go to ECM trouble diagnosis. Refer to EC-96, "TROUBLE DIAGNOSIS" (QG18DE models) or EC-754, "TROUBLE DIAGNOSIS" (QR25DE models).

INSPECTION/FUEL LEVEL SENSOR UNIT AND FUEL PUMP

1. CHECK GROUND CIRCUIT FOR FUEL LEVEL SENSOR UNIT

Check harness continuity between fuel level sensor unit and fuel pump connector terminal 5 and ground.

Continuity should exist.



OK or NG

OK >> GO TO 2.
NG >> Repair harness or connector.

2. CHECK FUEL LEVEL SENSOR UNIT

Refer to DI-26, "FUEL LEVEL SENSOR UNIT CHECK" .

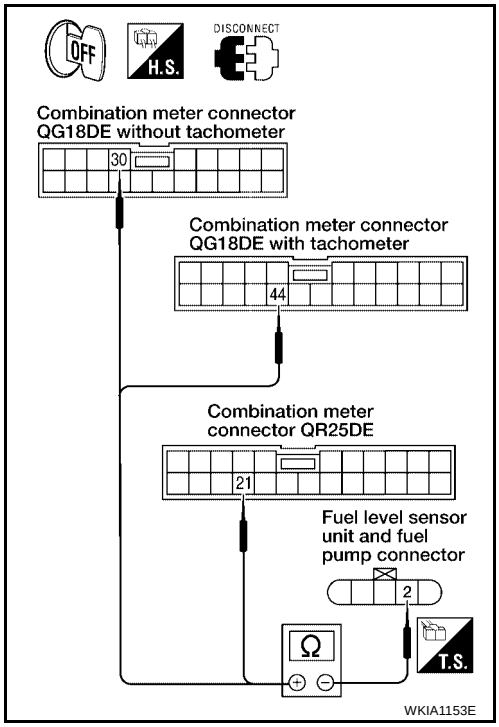
OK or NG

OK >> GO TO 3.
NG >> Replace fuel level sensor unit. Refer to FL-3, "Removal and Installation" .

3. CHECK HARNESS FOR OPEN OR SHORT

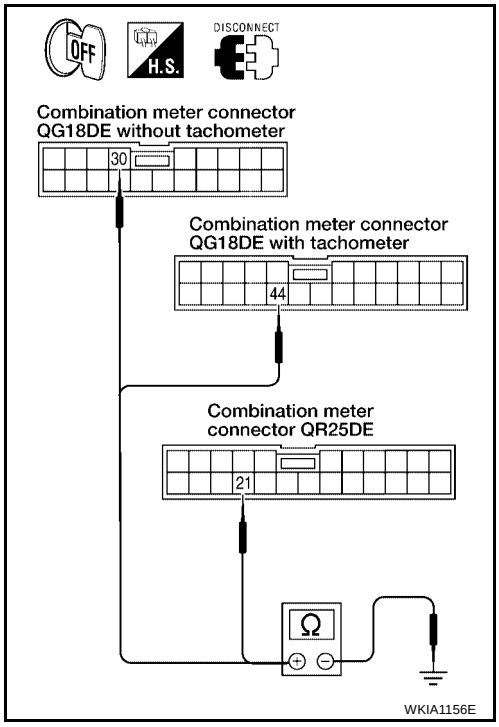
1. Disconnect combination meter connector and fuel level sensor unit and fuel pump connector.
2. Check continuity between combination meter terminal and fuel level sensor unit and fuel pump connector terminal.

Terminals				Continuity
(+)		(-)		
Connector	Terminal (Wire color)	Connector	Terminal (Wire color)	
QG18DE (WITHOUT TACHOMETER)				
M30	30 (G)	B25	2 (G)	Yes
QG18DE (WITH TACHOMETER)				
M30	44 (G)	B25	2 (G)	Yes
QR25DE				
M29	21 (G)	B25	2 (G)	Yes



3. Check continuity between combination meter terminal and ground.

Terminals			Continuity
(+)		(-)	
Connector	Terminal (Wire color)		
QG18DE (WITHOUT TACHOMETER)			
M30	30 (G)	Ground	No
QG18DE (WITH TACHOMETER)			
M30	44 (G)	Ground	No
QR25DE			
M29	21 (G)	Ground	No



OK or NG

OK >> Fuel level sensor unit is OK.
NG >> Repair harness or connector.

INSPECTION/WATER TEMPERATURE GAUGE

1. CHECK ECM SELF-DIAGNOSIS

Perform ECM self diagnosis. Refer to EC-137, "SELF-DIAG RESULTS MODE" (QG18DE models) or EC-794, "SELF-DIAG RESULTS MODE" (QR25DE models).

OK or NG

OK >> Replace combination meter.

NG >> Go to ECM trouble diagnosis. Refer to EC-96, "TROUBLE DIAGNOSIS" (QG18DE models) or EC-754, "TROUBLE DIAGNOSIS" (QR25DE models).

Electrical Components Inspection

EKS0039G

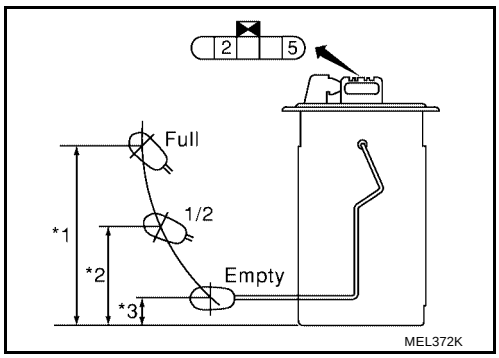
FUEL LEVEL SENSOR UNIT CHECK

- For removal, refer to FL-3, "Removal and Installation" .

Check the resistance between terminals 2 and 5.

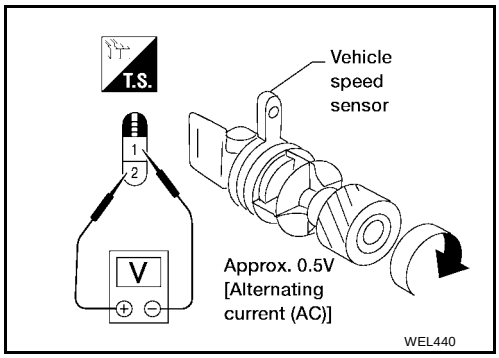
Ohmmeter		Float position mm (in)			Resistance (Approximate)
(+)	(–)				
2	5	*1	Full	136.1 (5.358)	4.5 - 5.5 Ω
		*2	1/2	89.8 (3.535)	31.5 - 33.5 Ω
		*3	Empty	31.3 (1.232)	80 - 83 Ω

*1 and *3: When float rod is in contact with stopper.



VEHICLE SPEED SENSOR SIGNAL CHECK

1. Remove vehicle speed sensor from transmission.
2. Turn vehicle speed sensor pinion quickly and measure voltage across terminals 1 and 2 (with QG18DE), or terminals + and - (with QR25DE).



Removal and Installation of Combination Meter

EKS008XR

For removal and installation procedure, refer to IP-10, "Removal and Installation" .

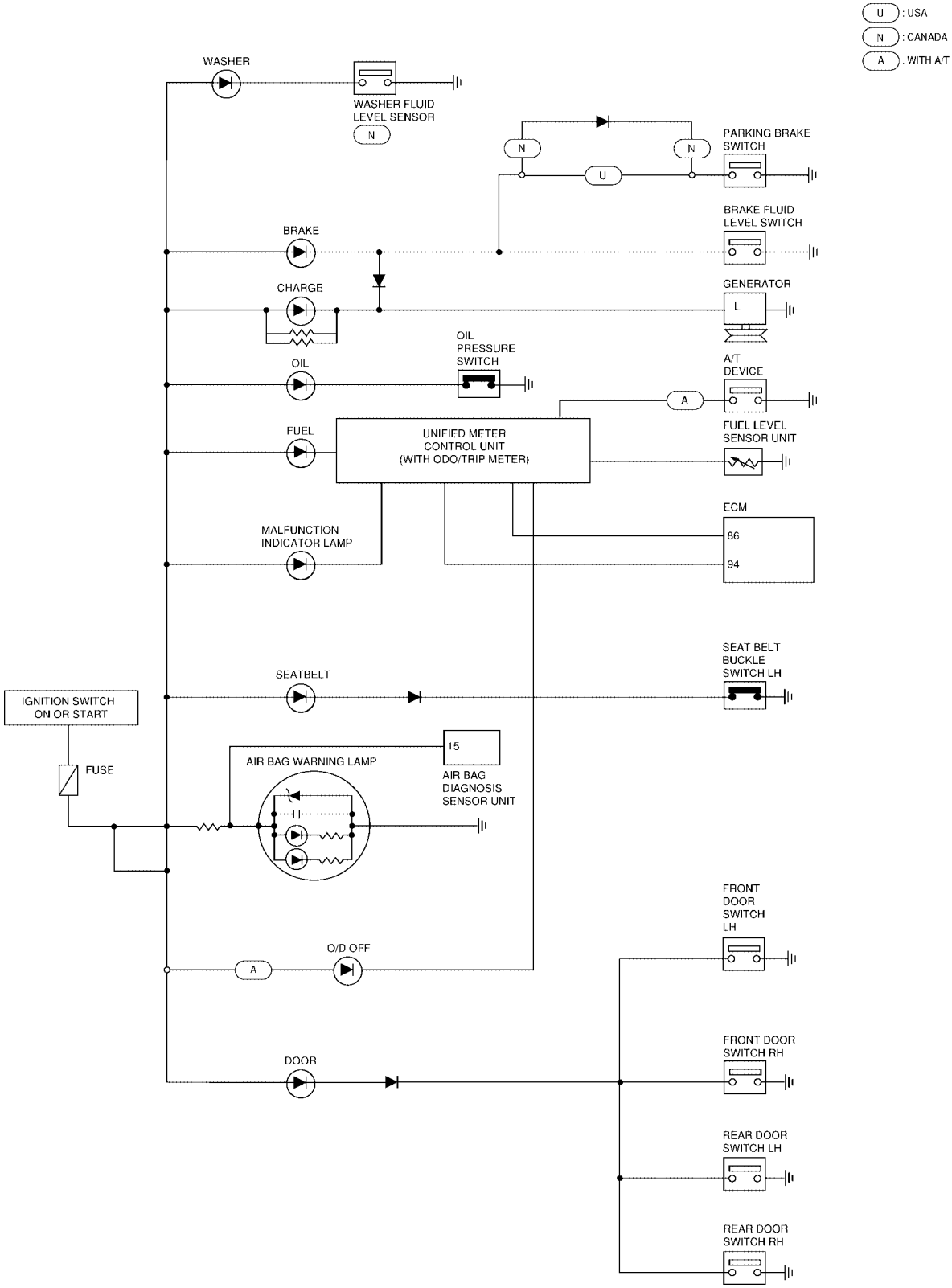
WARNING LAMPS

PFP:24814

Schematic

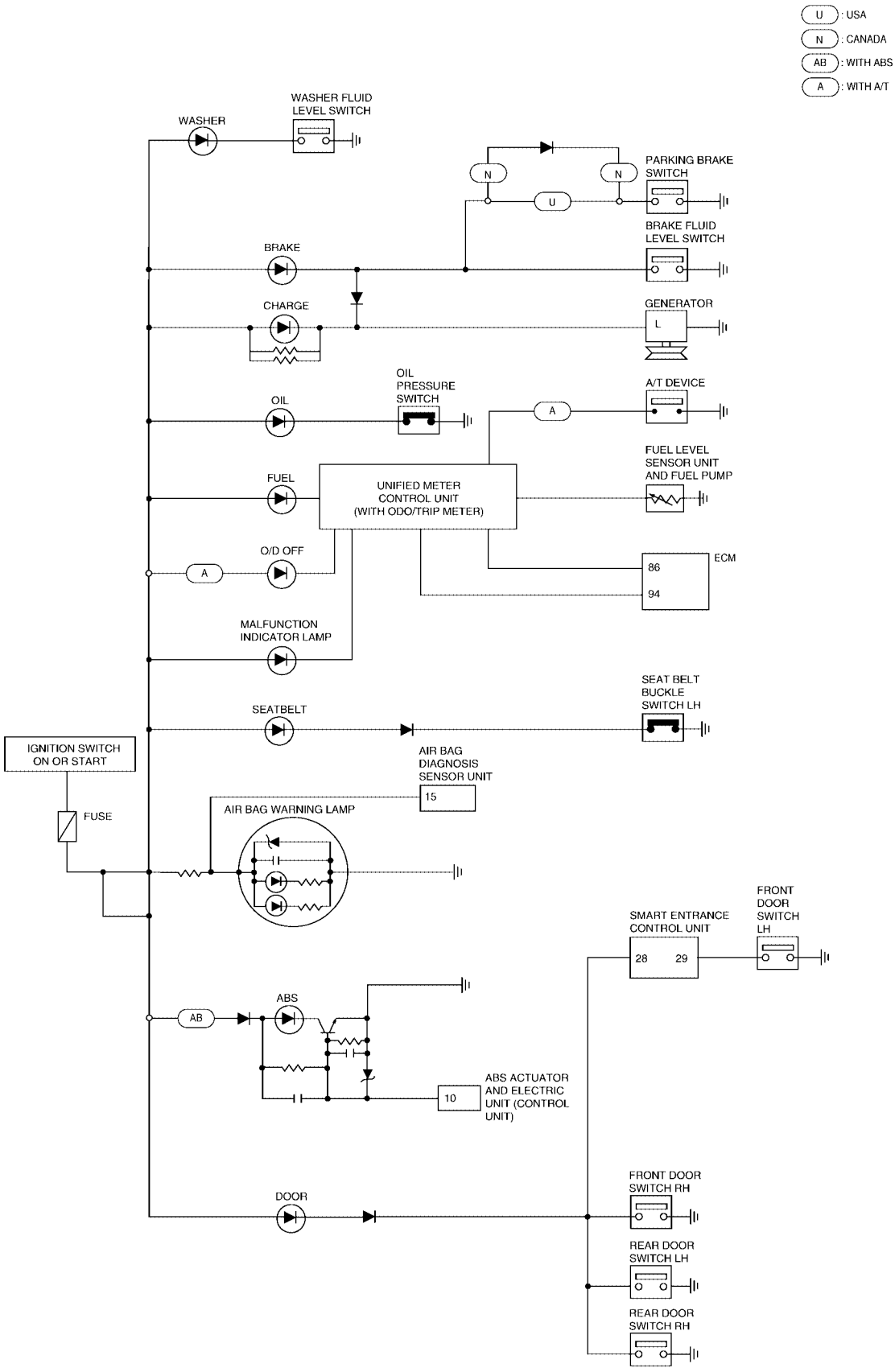
EKS0039H

WITHOUT TACHOMETER



WKWA1615E

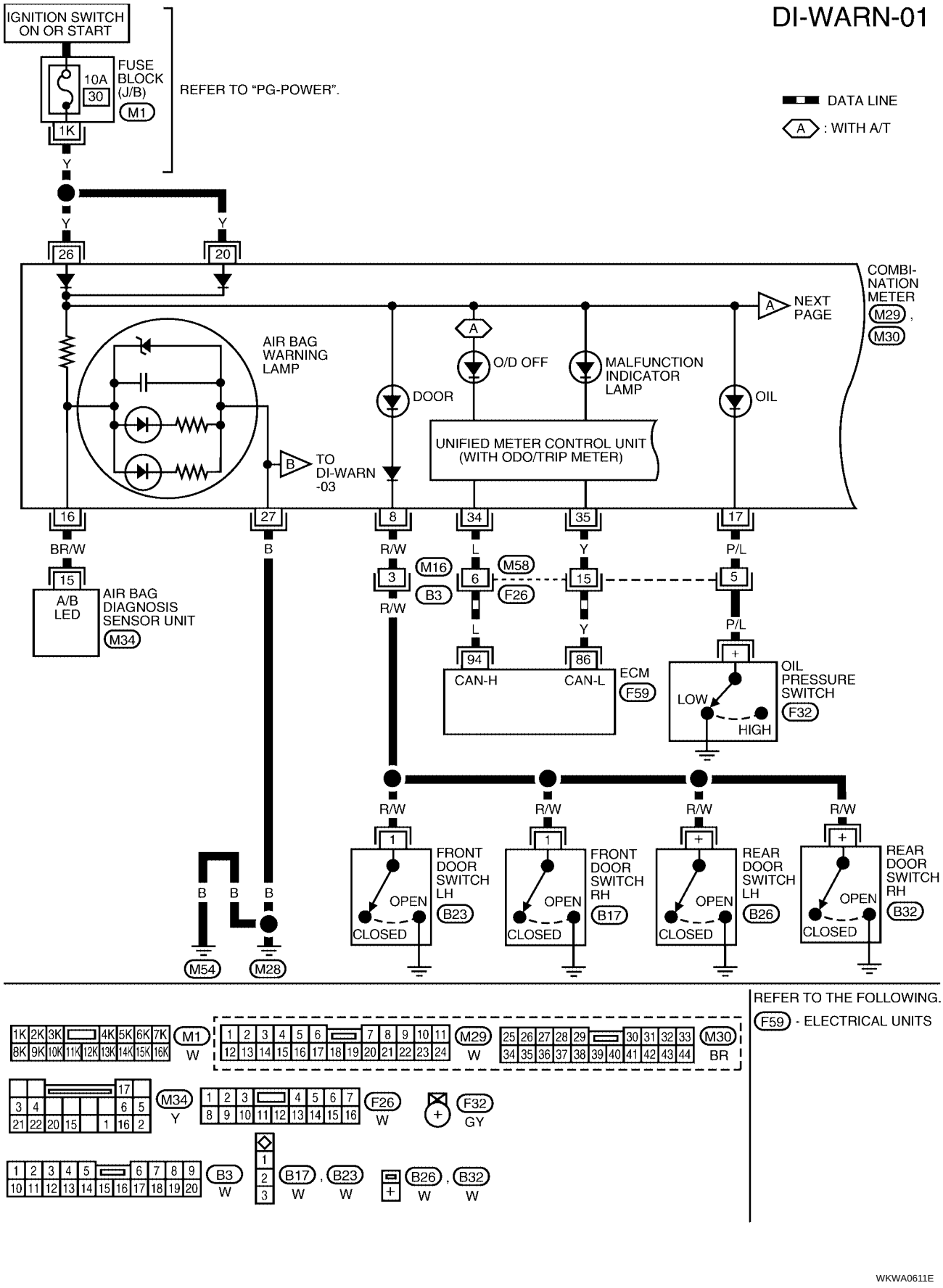
WITH TACHOMETER



Wiring Diagram — WARN —

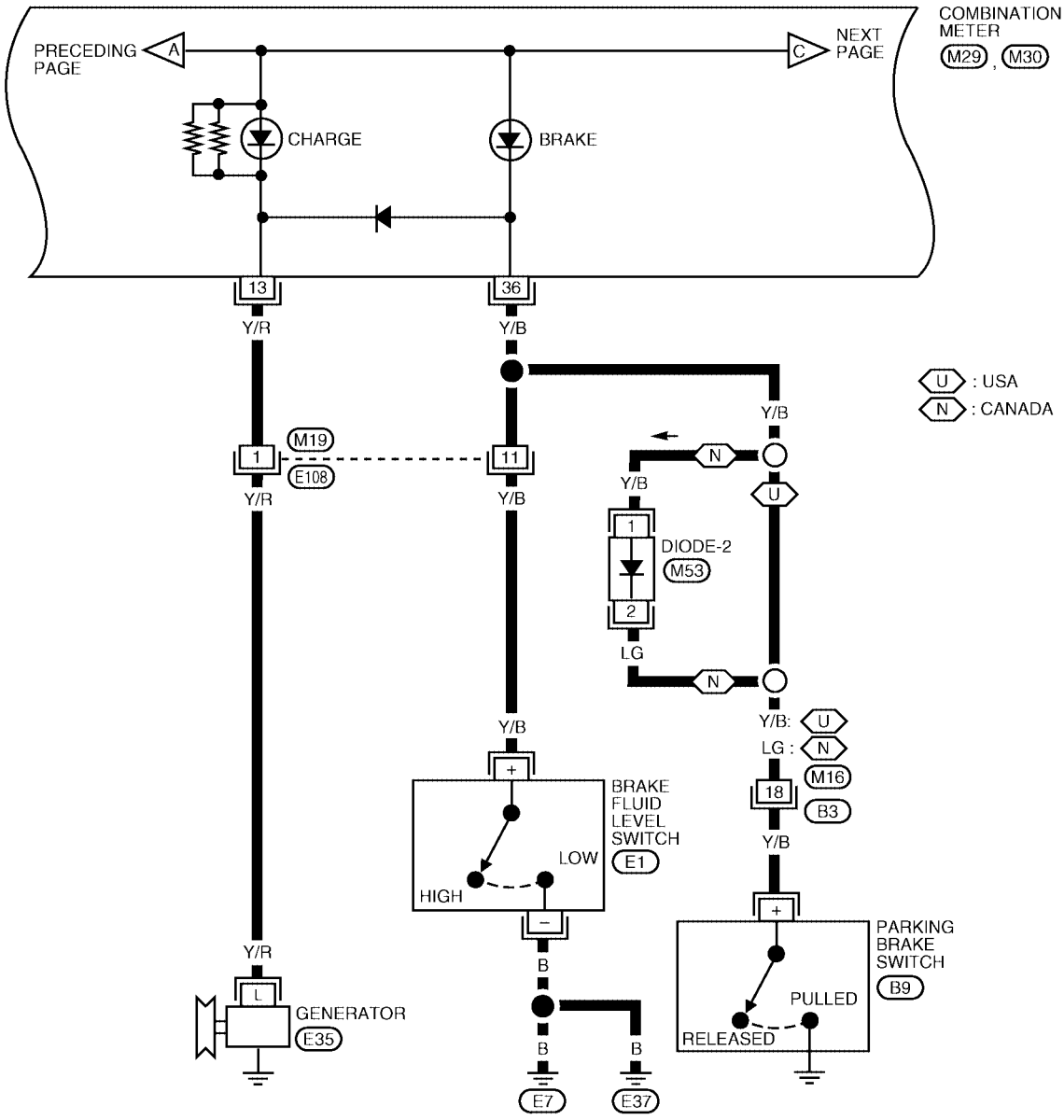
EKS0039I

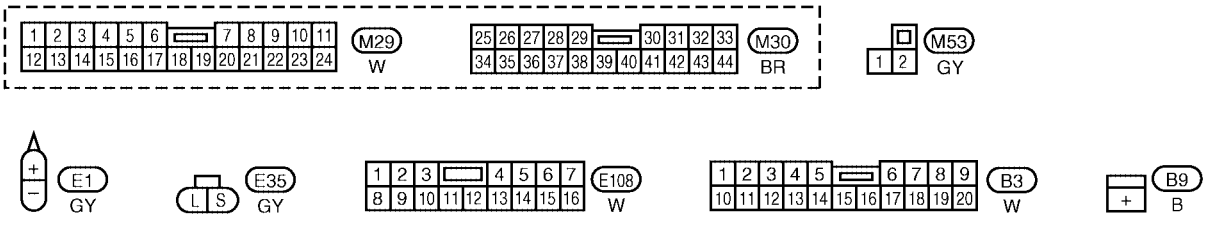
WITHOUT TACHOMETER



WKWA0611E

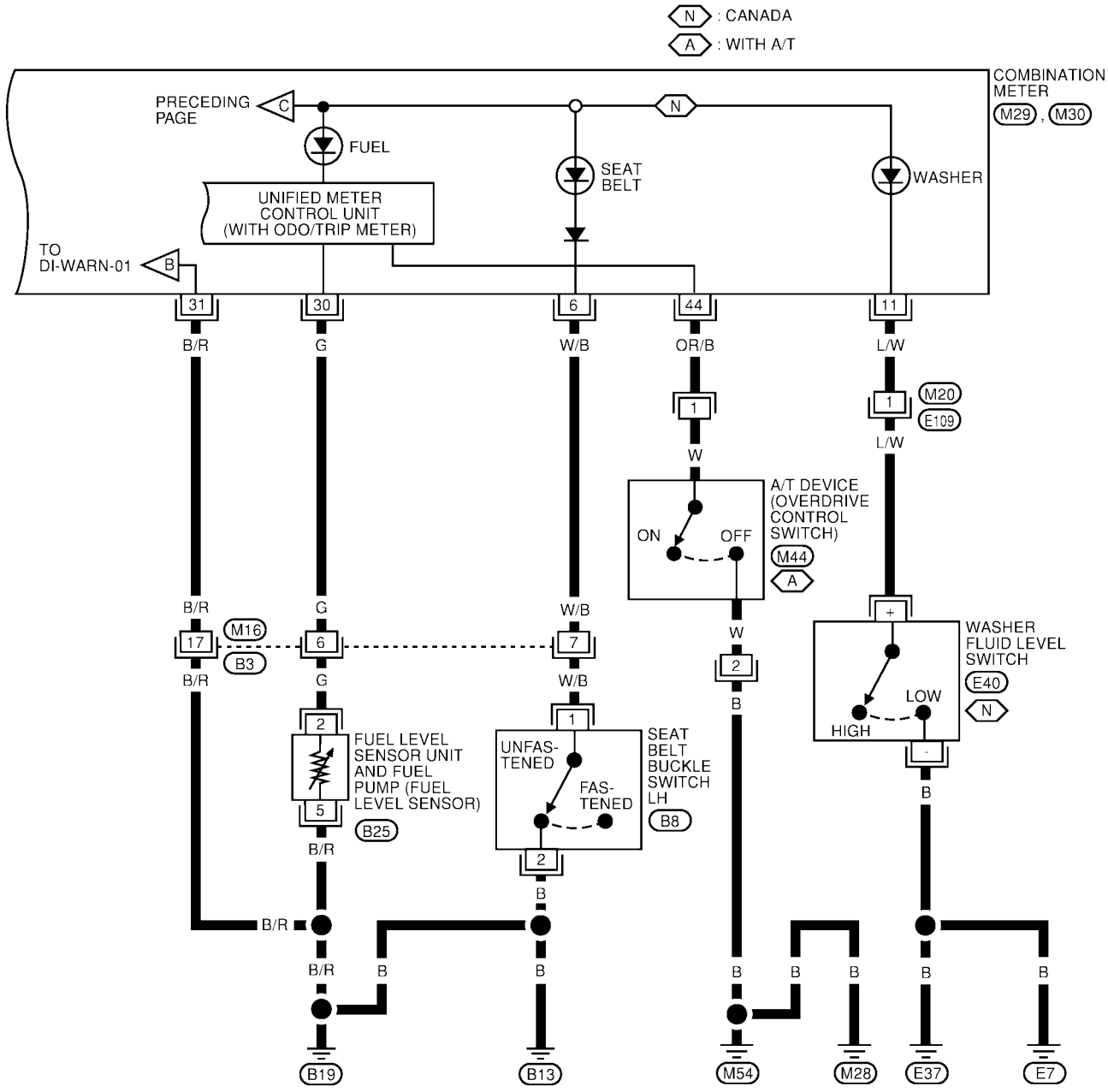
DI-WARN-02

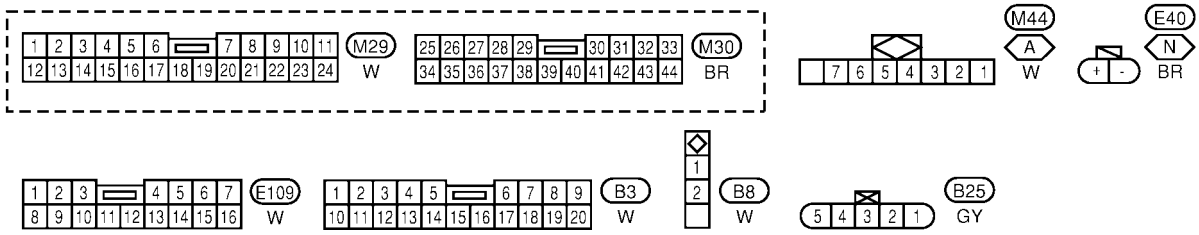




WKWA1616E

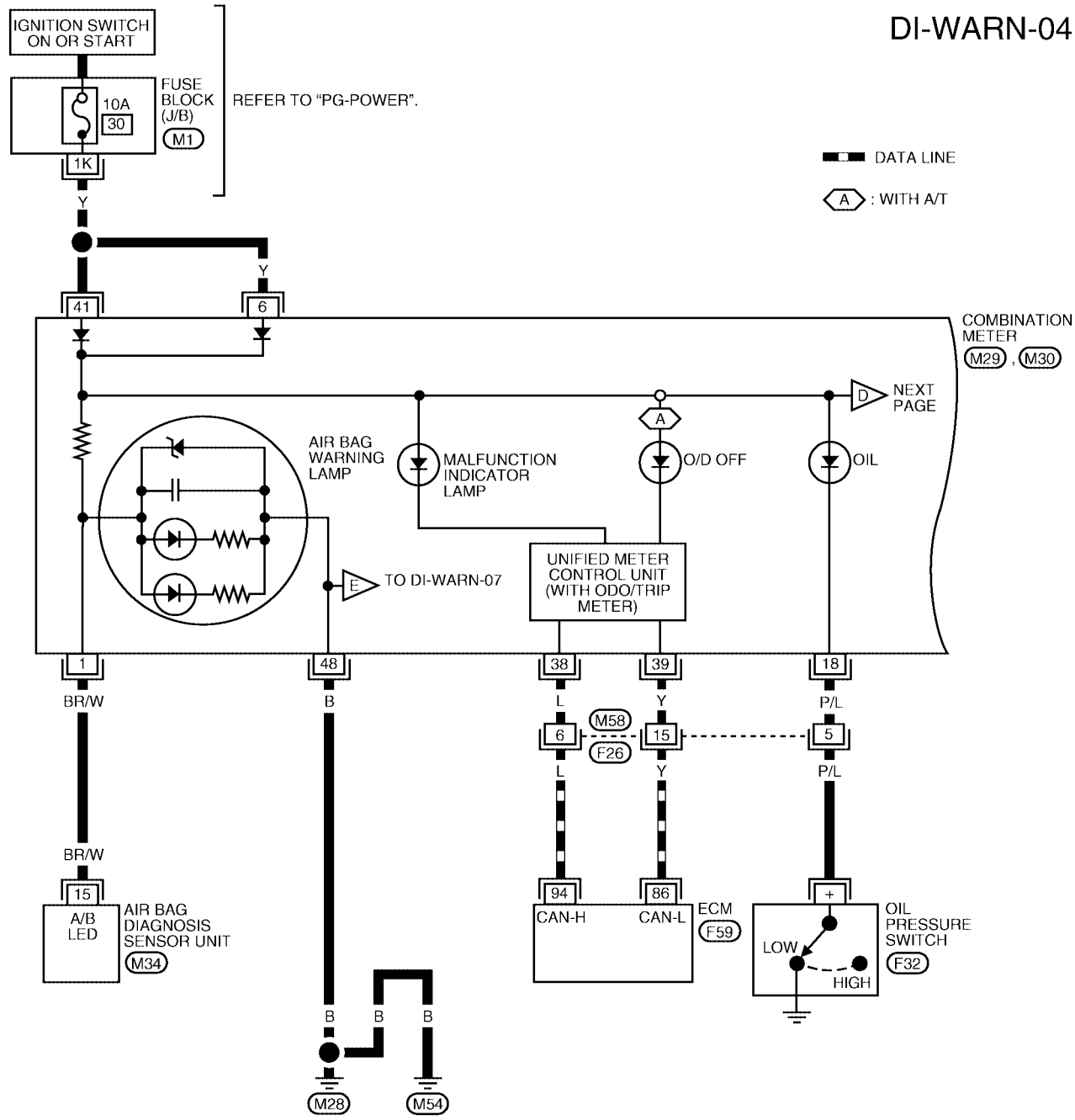
DI-WARN-03

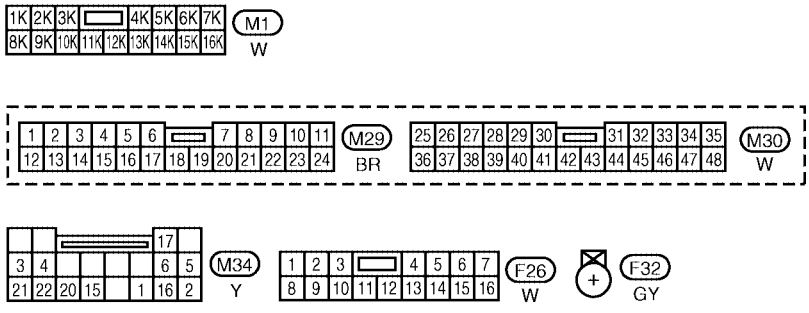




WKWA1617E

WITH TACHOMETER (QG18DE MODELS)

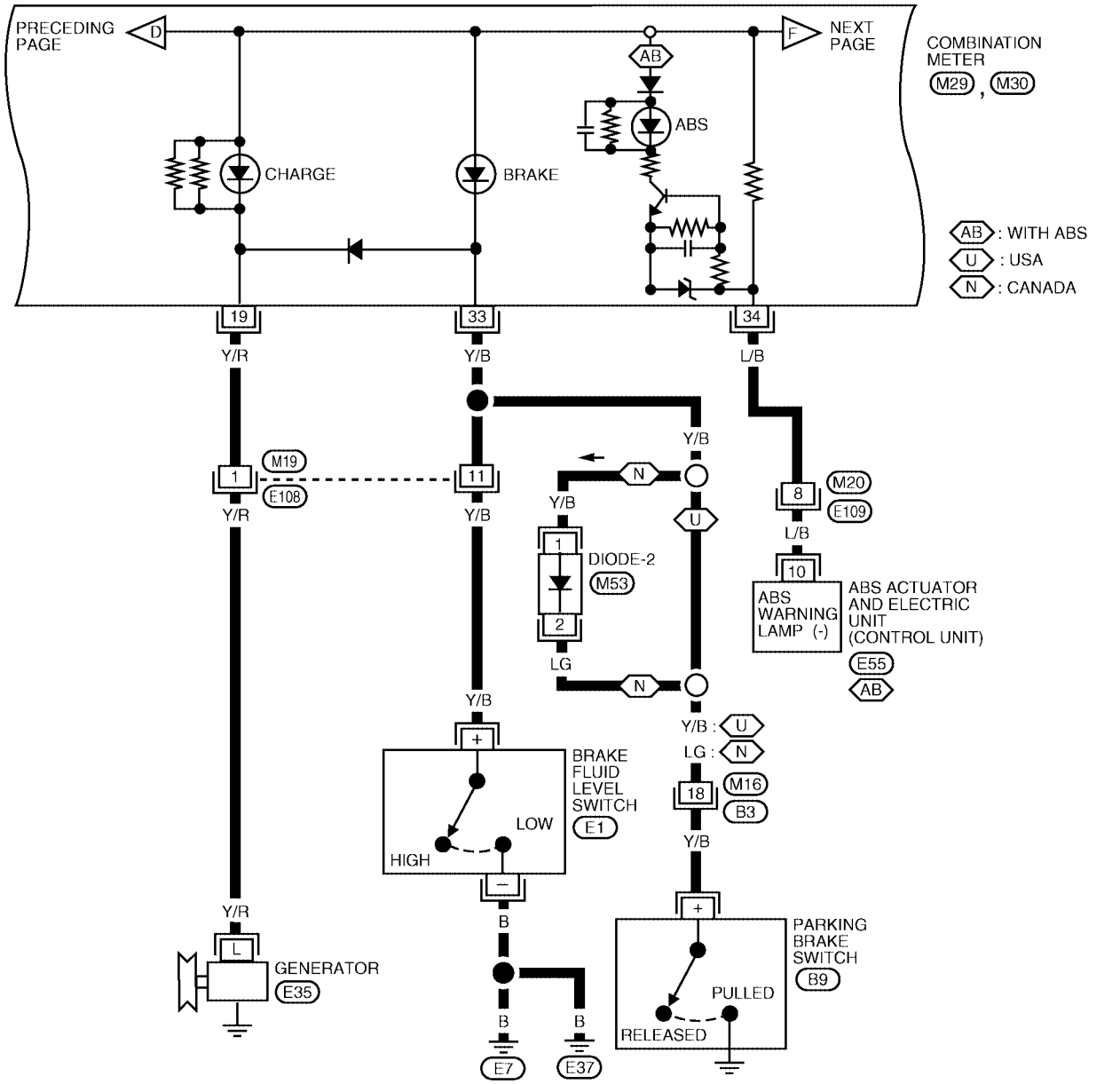


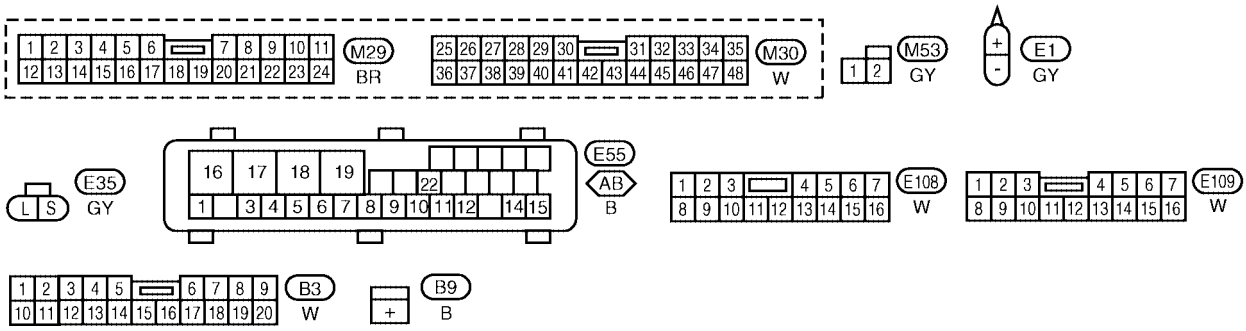


REFER TO THE FOLLOWING.
F59 - ELECTRICAL UNITS

WKWA1618E

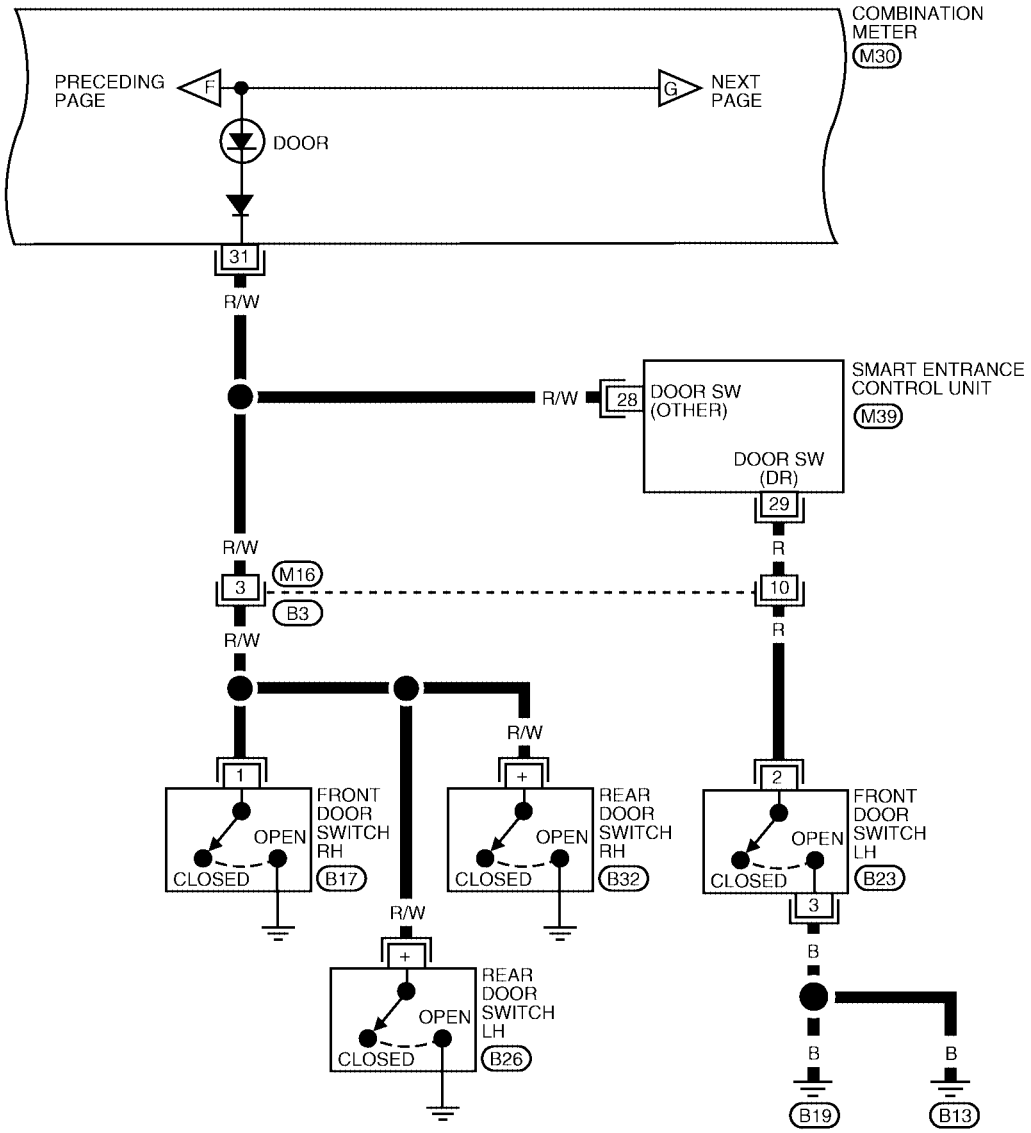
DI-WARN-05

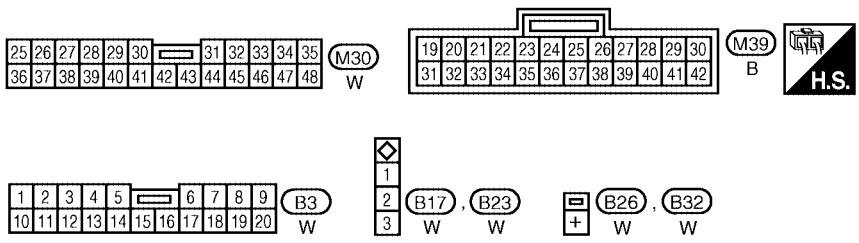




WKWA1619E

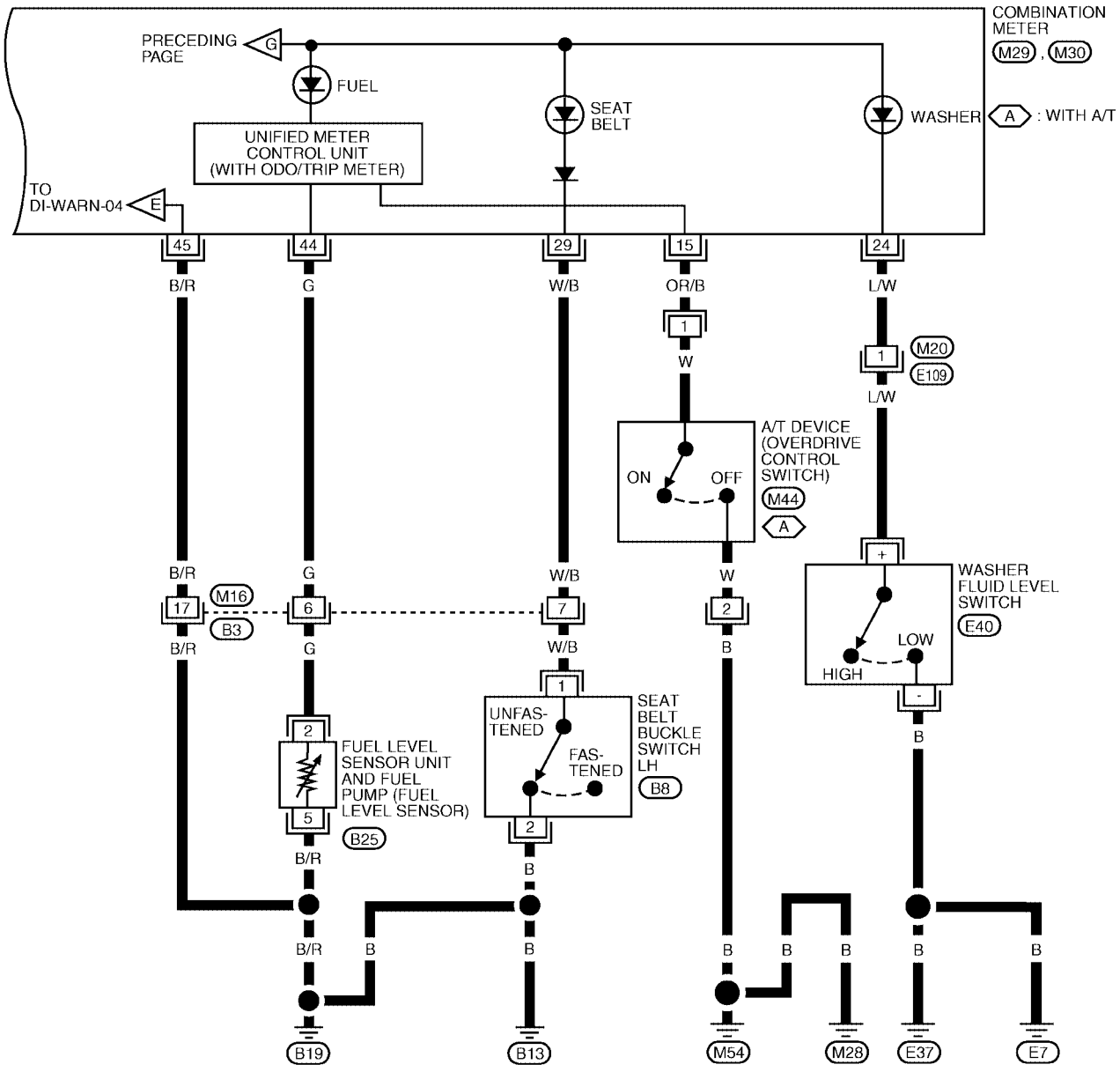
DI-WARN-06

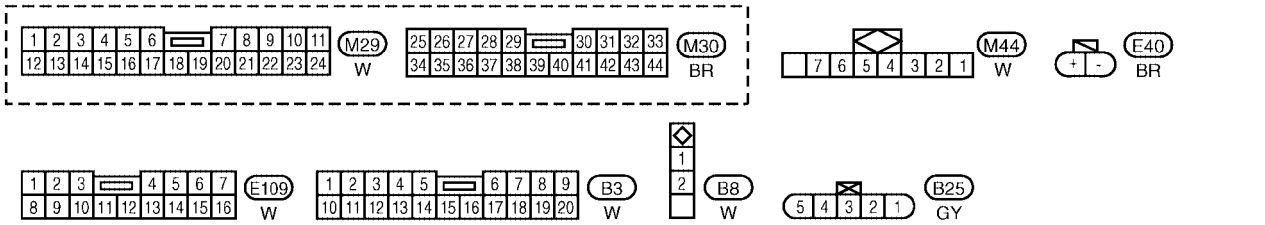




WKWA1620E

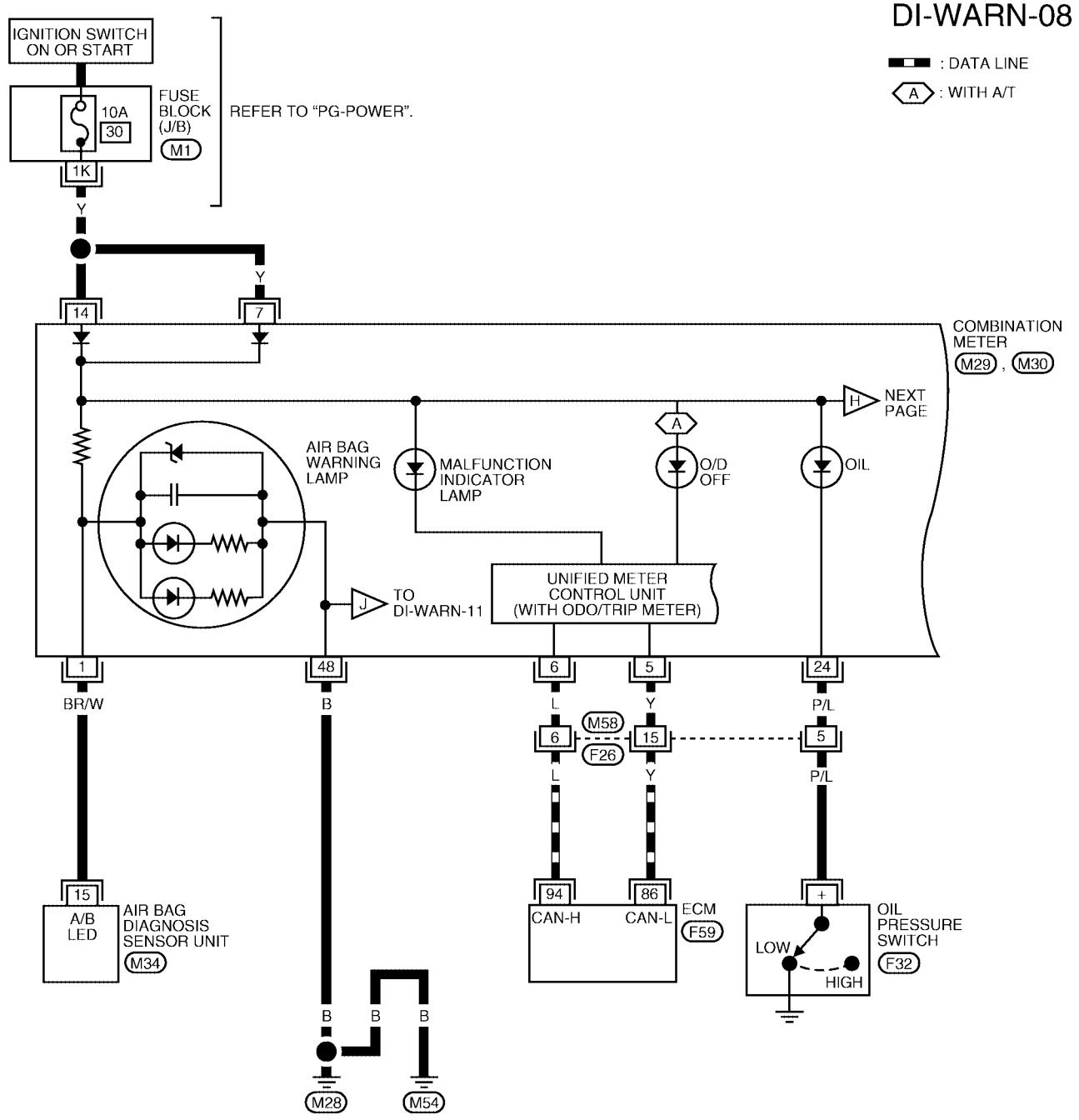
DI-WARN-07

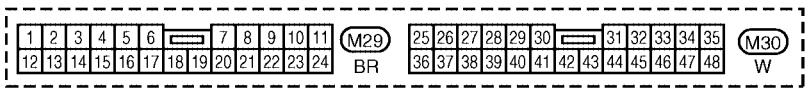


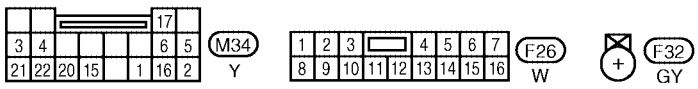


WKWA1621E

WITH TACHOMETER (QR25DE MODELS)



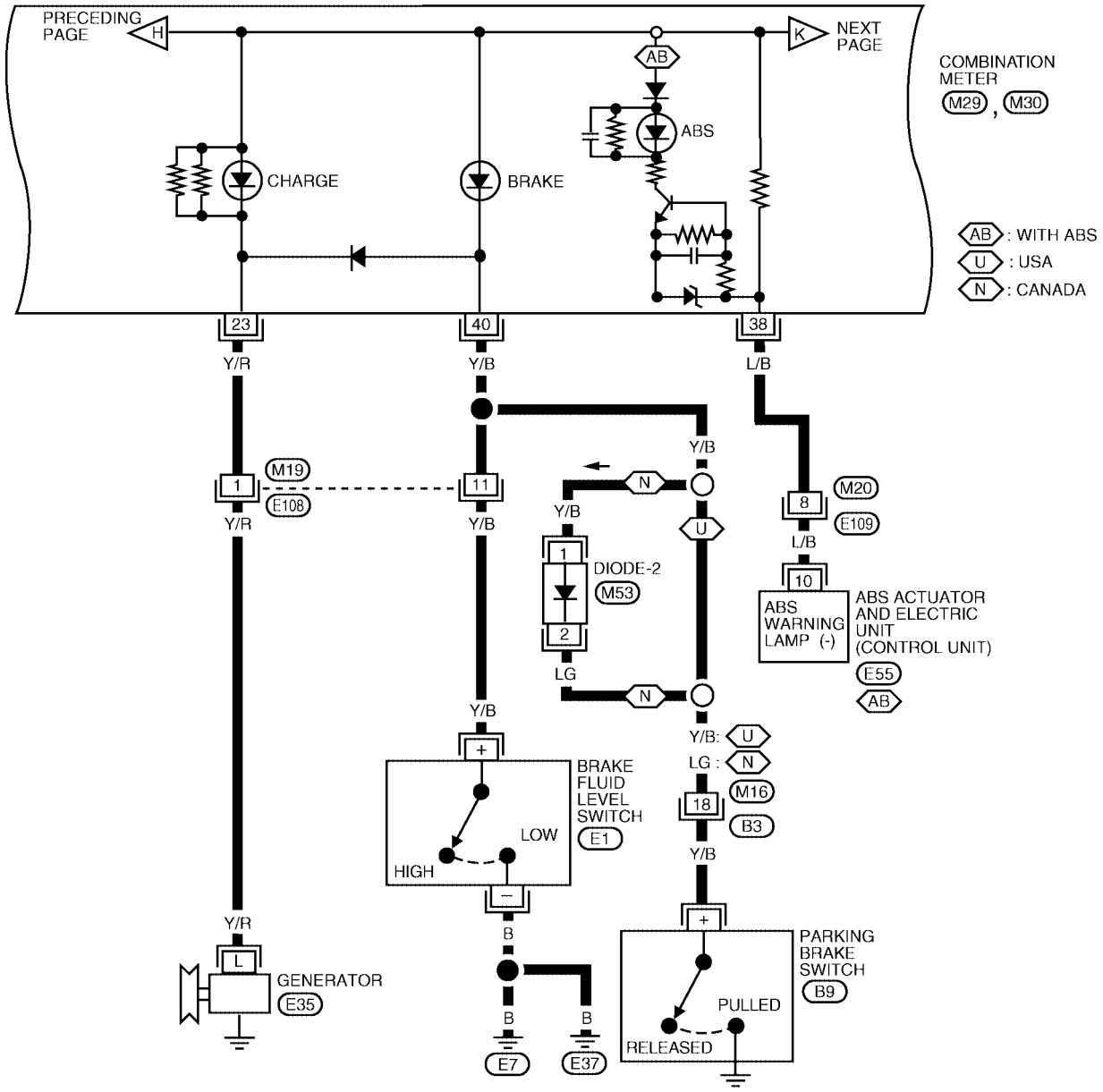


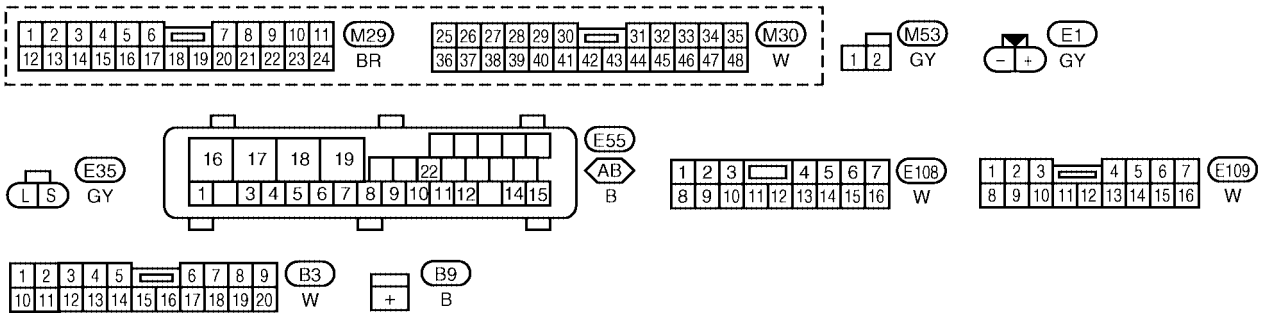


REFER TO THE FOLLOWING.
F59 - ELECTRICAL UNITS

WKWA1622E

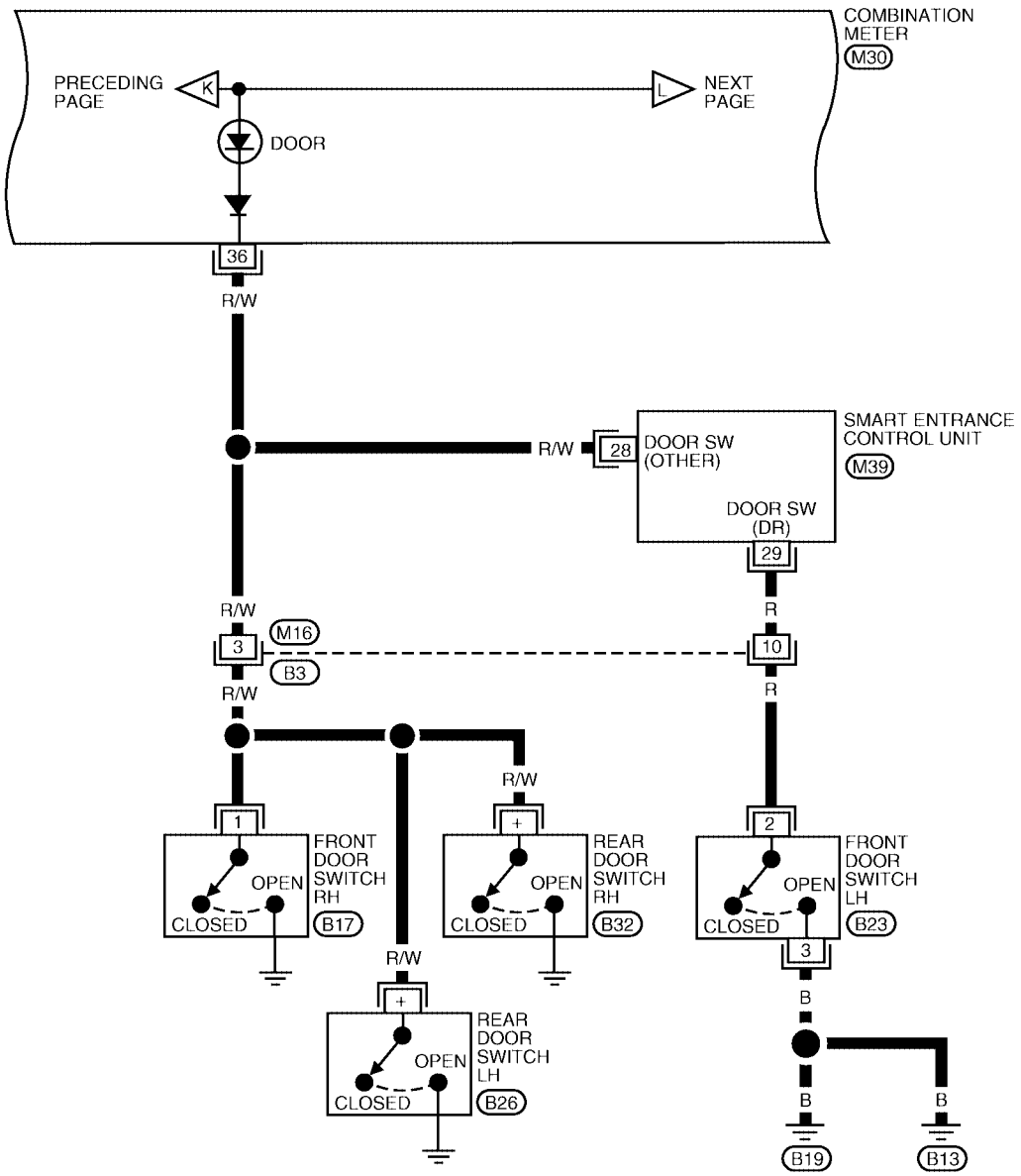
DI-WARN-09

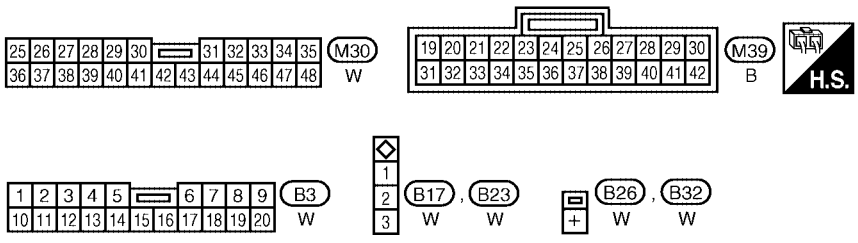




WKWA1623E

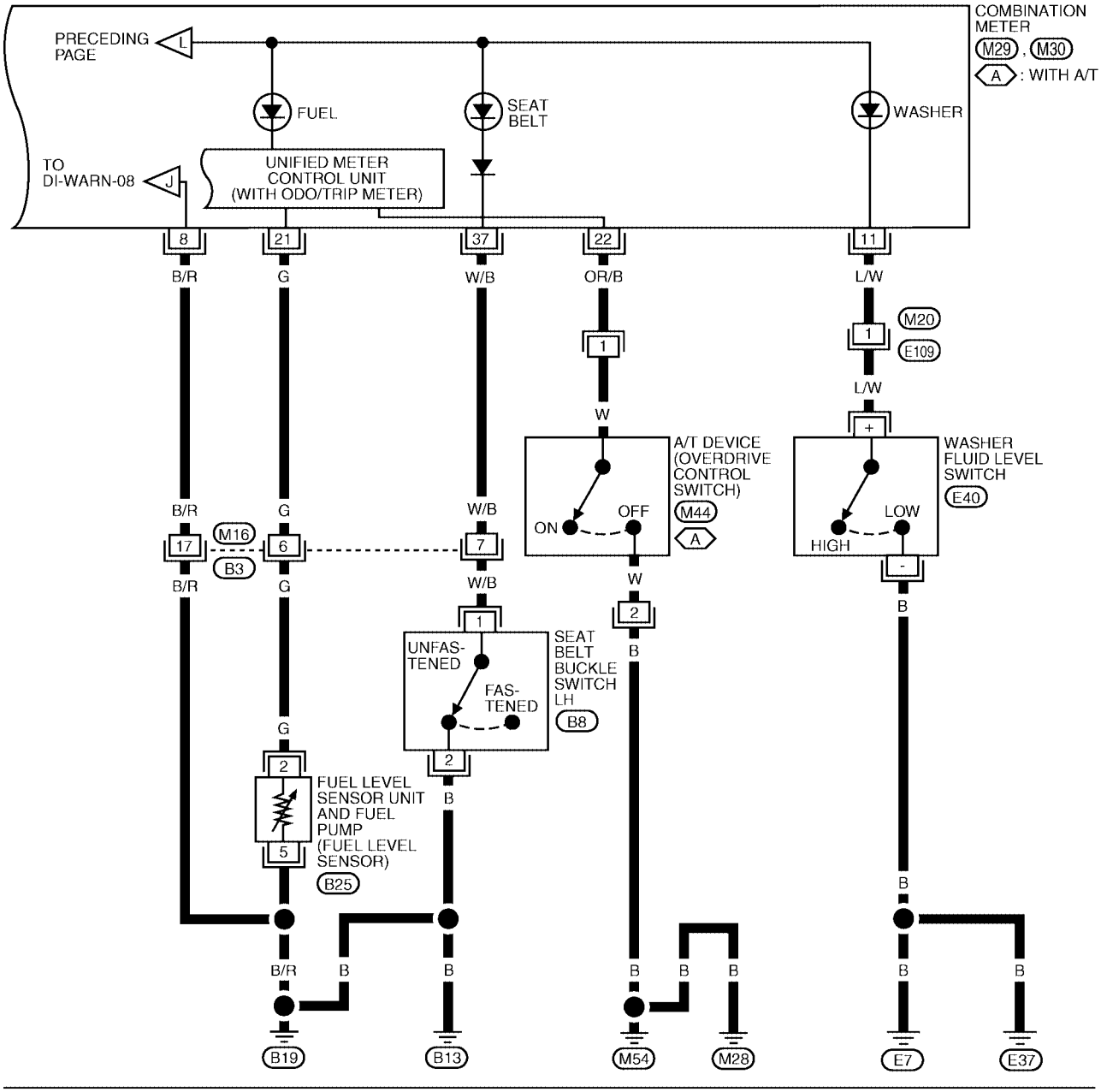
DI-WARN-10

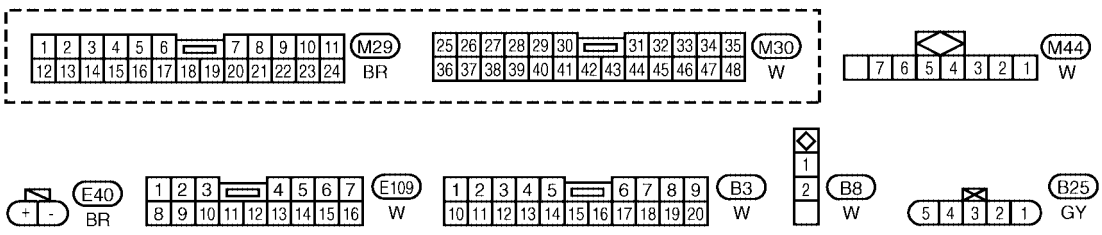




WKWA1624E

DI-WARN-11





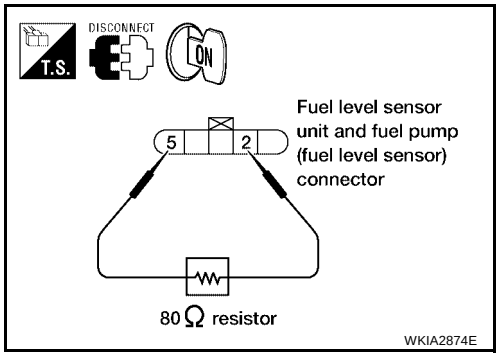
WKWA1625E

Electrical Components Inspection

EKS0039J

FUEL WARNING LAMP OPERATION CHECK

1. Turn ignition switch OFF.
2. Disconnect fuel level sensor unit and fuel pump harness connector B25.
3. Connect a resistor (80Ω) between fuel level sensor unit and fuel pump harness connector terminals 2 and 5.
4. Turn ignition switch ON.



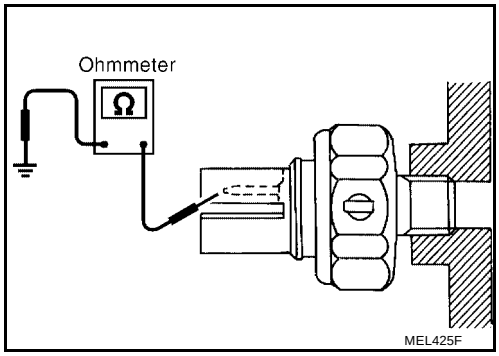
The fuel warning lamp should come on.

NOTE:
ECM might store the 1st trip DTC P0180 and the 1st trip DTC P0464 during this inspection.
If the DTC is stored in ECM memory, erase the DTC after reconnecting fuel level sensor unit and fuel pump harness connector.
Refer to EC-64, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" (QG18DE), EC-711, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" (QR25DE).

OIL PRESSURE SWITCH CHECK

Check the continuity between the terminals of oil pressure switch and body ground.

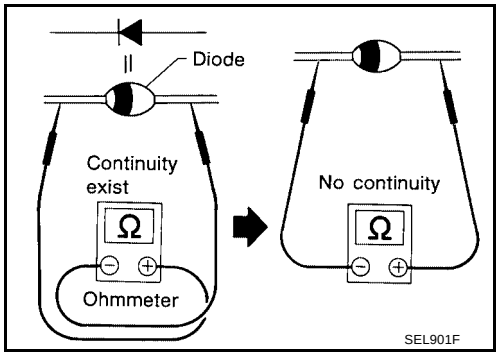
Condition	Oil pressure kPa (kg/cm^2 , psi)	Continuity
Engine running	More than 10 - 20 (0.1 - 0.2, 1 - 3)	No
Engine not running	Less than 10 - 20 (0.1 - 0.2, 1 - 3)	Yes



DIODE CHECK

- Check continuity using an ohmmeter.
- Diode is functioning properly if test results are as shown in the figure.
- Check diodes at the combination meter harness connector instead of on the combination meter assembly. Refer toDI-29, "Wiring Diagram — WARN —" .

  NOTE:
  Specification may vary depending on the type of tester. Before performing this inspection, be sure to refer to the instruction manual for the tester to be used.

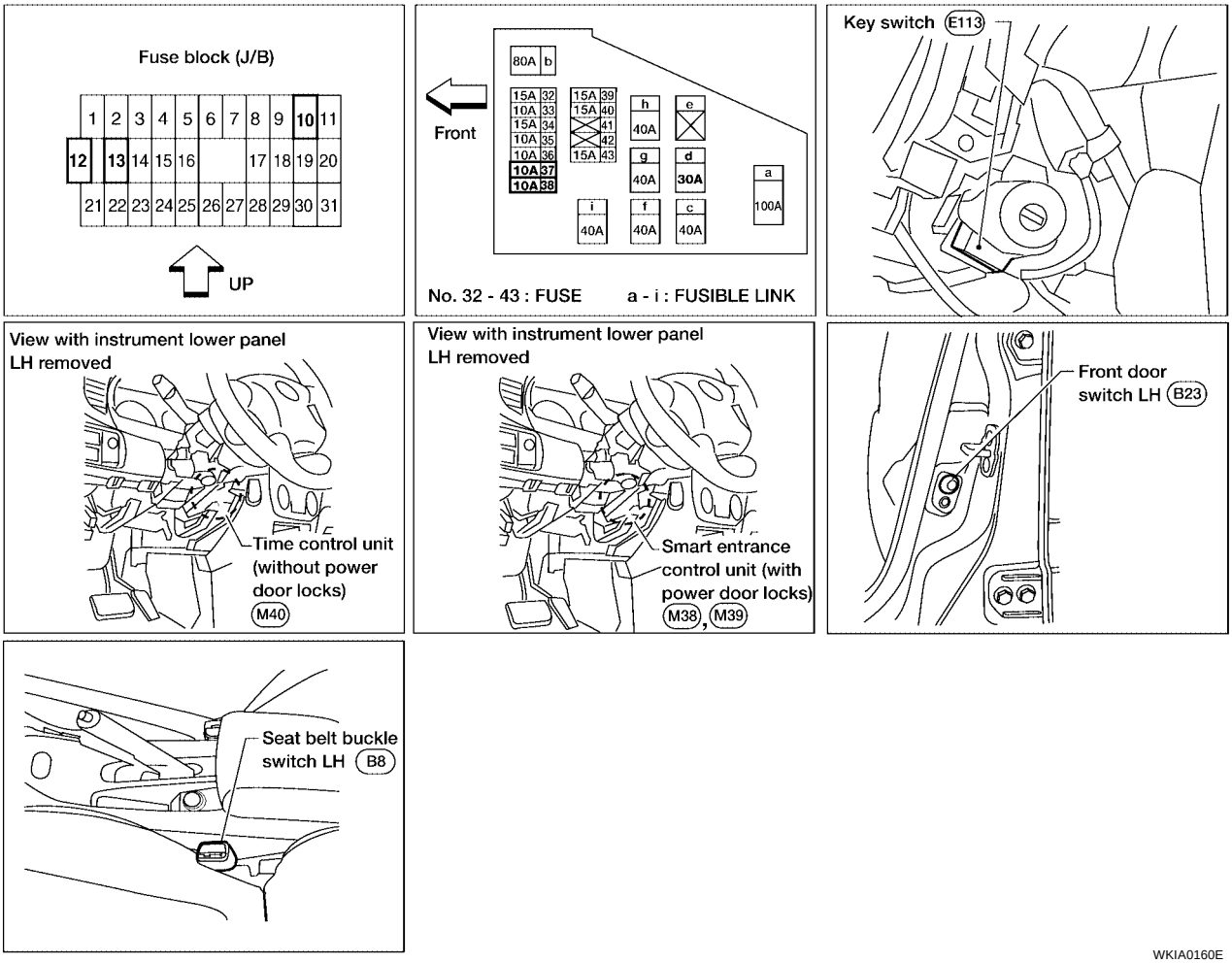


WARNING CHIME

PFP:24814

Component Parts and Harness Connector Location

EKS0039K



WKIA0160E

System Description

EKS0039L

WITHOUT POWER DOOR LOCKS

The warning chime is controlled by the time control unit.
The warning chime is located in the time control unit.
Power is supplied at all times:

- through 10A fuse [No. 13, located in fuse block (J/B)]
- to time control unit terminal 7
- through 10A fuse [No. 12, located in the fuse block (J/B)]
- to key switch terminal 2, and
- through 10A fuse (No. 38, located in the fuse and fusible link box)
- to combination switch (lighting switch) terminal 11.

With the ignition switch in the ON or START position, power is supplied:

- through 10A fuse [No. 10, located in the fuse block (J/B)]
- to time control unit terminal 9.

Ground is supplied to time control unit terminal 8 through body grounds M28 and M54.
When a signal, or combination of signals, is received by the time control unit, the warning chime will sound.

Ignition Key Warning Chime

With the key in the ignition switch, the ignition switch in the OFF position, and the driver door open, the warning chime will sound.
Power is supplied:

- from key switch terminal 1
- to time control unit terminal 4.

Ground is supplied:

- from front door switch LH terminal 2
- to time control unit terminal 2.

Front door switch LH terminal 3 is grounded through body grounds B13 and B19.

Light Warning Chime

With ignition switch OFF, driver door open, and combination switch (lighting switch) in parking lamp (1ST) or ON (2ND) position, warning chime will sound.
Power is supplied:

- from combination switch (lighting switch) terminal 12
- to time control unit terminal 5.

Ground is supplied:

- from front door switch LH terminal 2
- to time control unit terminal 2.

Front door switch LH terminal 3 is grounded through body grounds B13 and B19.

Seat Belt Warning Chime

With ignition switch turned ON and seat belt unfastened (seat belt buckle switch LH ON), warning chime will sound for approximately 6 seconds.
Ground is supplied:

- from seat belt buckle switch LH terminal 1
- to time control unit terminal 1.

Seat belt buckle switch LH terminal 2 is grounded through body grounds B13 and B19.

WITH POWER DOOR LOCKS

The warning chime is controlled by the smart entrance control unit.
The warning chime is located in the smart entrance control unit.
Power is supplied at all times:

- through 10A fuse (No. 37, located in fuse and fusible link box)
- to smart entrance control unit terminal 10,
- through 10A fuse [No. 12, located in the fuse block (J/B)]

- to key switch terminal 2, and
- through 10A fuse (No. 38, located in the fuse and fusible link box)
- to combination switch (lighting switch) terminal 11.

With the ignition switch in the ON or START position, power is supplied:

- through 10A fuse [No. 10, located in the fuse block (J/B)]
- to smart entrance control unit terminal 33.

Ground is supplied to smart entrance control unit terminal 16 through body grounds M28 and M54.
When a signal, or combination of signals, is received by the smart entrance control unit, the warning chime will sound.

Ignition Key Warning Chime

With the key in the ignition switch, the ignition switch in the OFF position, and the driver door open, the warning chime will sound.
Power is supplied:

- from key switch terminal 1
- to smart entrance control unit terminal 32.

Ground is supplied:

- from front door switch LH terminal 2
- to smart entrance control unit terminal 29.

Front door switch LH terminal 3 is grounded through body grounds B13 and B19.

Light Warning Chime

With ignition switch OFF, driver door open, and combination switch (lighting switch) in parking lamp (1ST) or ON (2ND) position, warning chime will sound.
Power is supplied:

- from combination switch (lighting switch) terminal 12
- to smart entrance control unit terminal 34.

Ground is supplied:

- from front door switch LH terminal 2
- to smart entrance control unit terminal 29.

Front door switch LH terminal 3 is grounded through body grounds B13 and B19.

Seat Belt Warning Chime

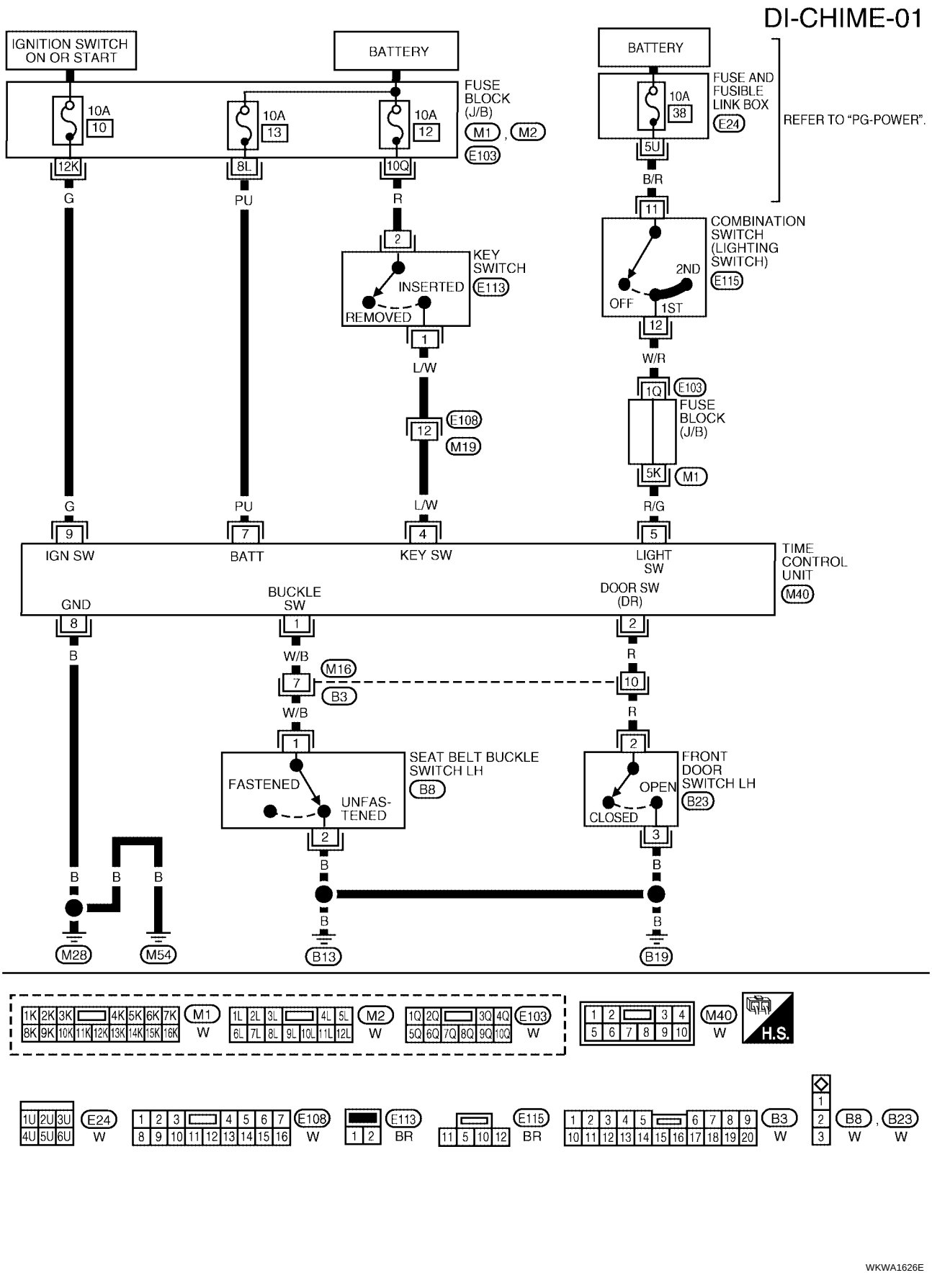
With ignition switch turned ON and seat belt unfastened (seat belt switch ON), warning chime will sound for approximately 6 seconds.
Ground is supplied:

- from seat belt buckle switch LH terminal 1
- to smart entrance control unit terminal 22.

Seat belt buckle switch LH terminal 2 is grounded through body grounds B13 and B19.

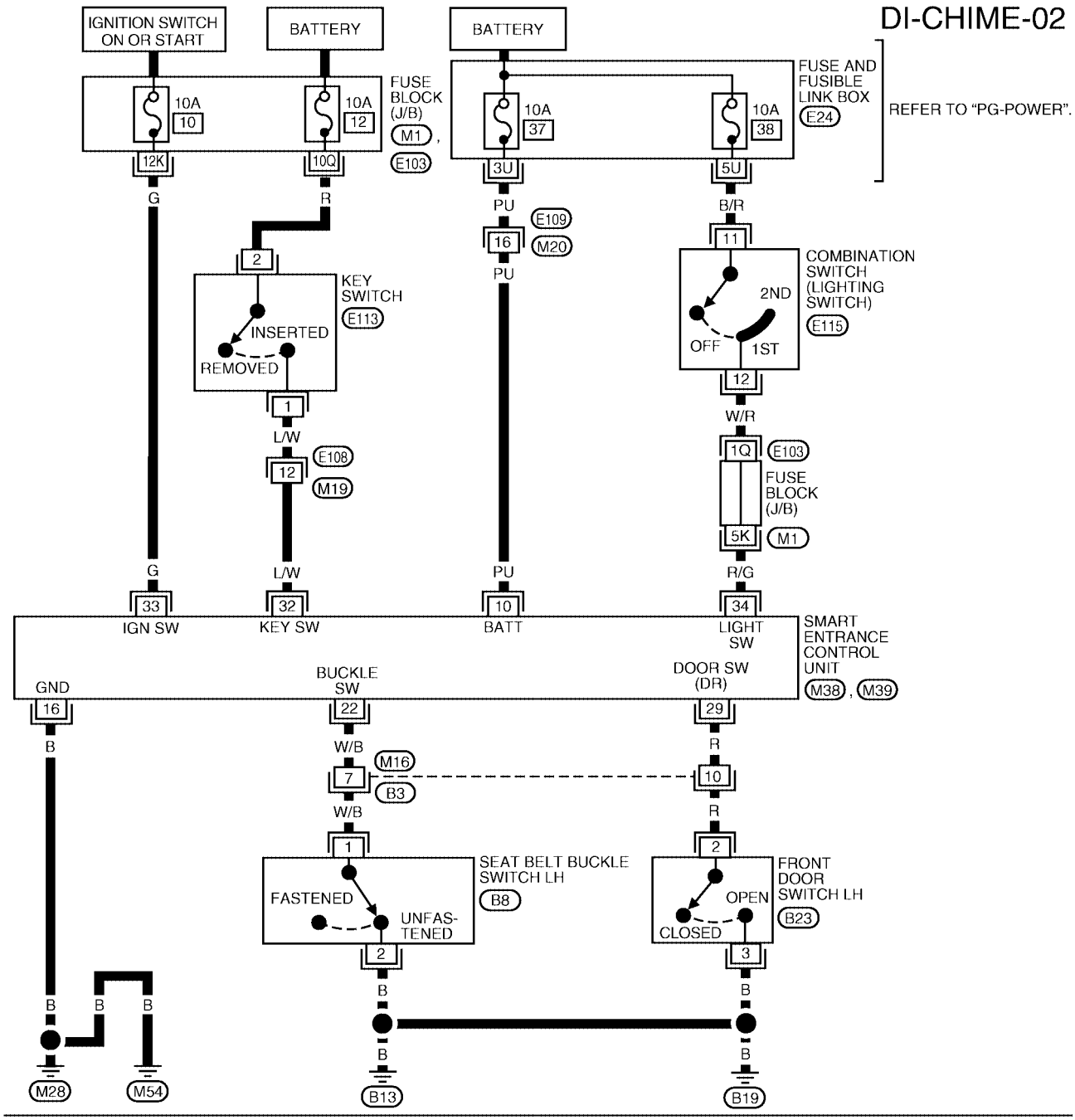
Wiring Diagram — CHIME —
WITHOUT POWER DOOR LOCKS

EKS0039M



WKWA1626E

WITH POWER DOOR LOCKS



CONSULT-II Function (BCM)

EKS0039N

CONSULT-II can display each diagnostic item using the diagnostic test modes shown following.

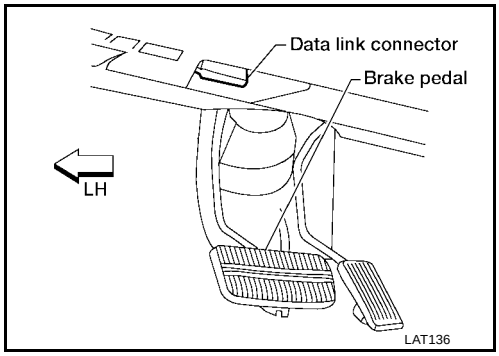
BCM diagnostic test item	Diagnostic mode	Description
Inspection by part	WORK SUPPORT	Supports inspections and adjustments. Commands are transmitted to the BCM for setting the status suitable for required operation, input/output signals are received from the BCM and received data is displayed.
	DATA MONITOR	Displays BCM input/output data in real time.
	ACTIVE TEST	Operation of electrical loads can be checked by sending drive signal to them.
	SELF-DIAG RESULTS	Displays BCM self-diagnosis results.
	CAN DIAG SUPPORT MNTR	The result of transmit/receive diagnosis of CAN communication can be read.
	ECU PART NUMBER	BCM part number can be read.
	CONFIGURATION	Performs BCM configuration read/write functions.

CONSULT-II BASIC OPERATION PROCEDURE (WITH POWER DOOR LOCKS)

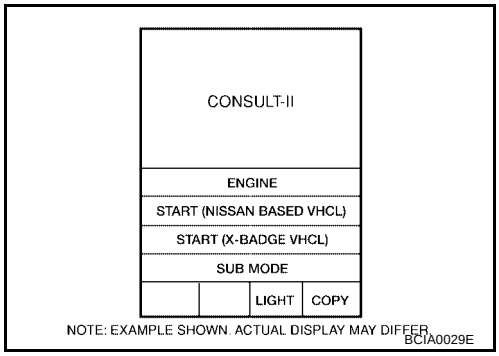
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carries out CAN communication.

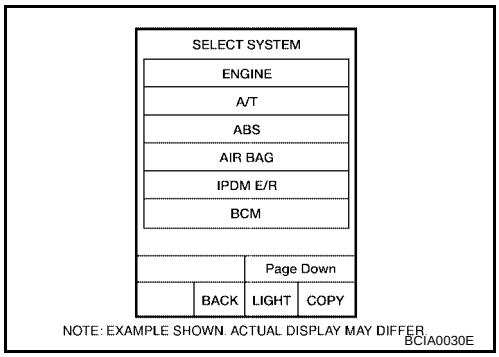
1. With the ignition switch OFF, connect CONSULT-II and CONSULT-II CONVERTER to the data link connector, then turn ignition switch ON.



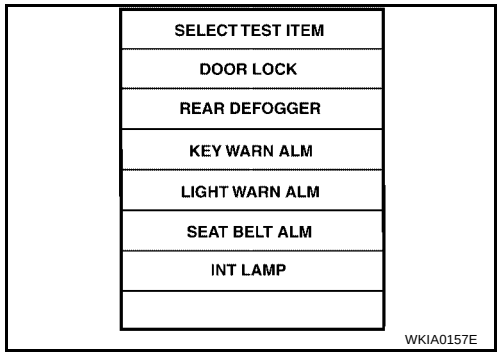
2. Touch “START (NISSAN BASED VHCL)”.



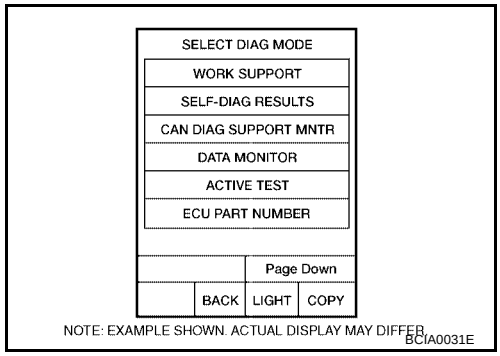
3. Touch “SMART ENTRANCE”.



4. Touch “KEY WARN ALM”, “LIGHT WARN ALM” or “SEAT BELT ALM”.



5. Select diagnosis mode.
“DATA MONITOR” and “ACTIVE TEST” are available for the warning chime.



CONSULT-II Application Items (With Power Door Locks)

EKS0039O

“KEY WARN ALARM”

Data Monitor

Monitored Item	Description
IGN ON SW	Indicates [ON/OFF] condition of ignition switch.
KEY ON SW	Indicates [ON/OFF] condition of key switch.
DOOR SW-DR	Indicates [ON/OFF] condition of front door switch LH.

Active Test

Test Item	Description
CHIME	This test is able to check key warning chime operation. Key warning chime sounds after touching “ON” on CONSULT-II screen.

“LIGHT WARN ALM”

Data Monitor

Monitored Item	Description
IGN ON SW	Indicates [ON/OFF] condition of ignition switch.
HD/LMP 1ST SW	Indicates [ON/OFF] condition of lighting switch.
DOOR SW-DR	Indicates [ON/OFF] condition of front door switch LH.

Active Test

Test Item	Description
CHIME	This test is able to check light warning chime operation. Light warning chime sounds after touching “ON” on CONSULT-II screen.

“SEAT BELT ALM”

Data Monitor

Monitored Item	Description
IGN ON SW	Indicates [ON/OFF] condition of ignition switch.
SEAT BELT SW	Indicates [ON/OFF] condition of seat belt buckle switch LH.

Active Test

Test Item	Description
CHIME	This test is able to check seat belt warning chime operation. Seat belt warning chime sounds after touching “ON” on CONSULT-II screen.

Trouble Diagnoses (Without Power Door Locks)

EKS0039P

SYMPTOM CHART

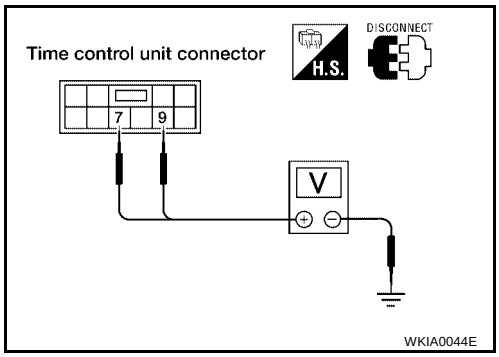
REFERENCE PAGE	DI-48	DI-49	DI-49	DI-50	DI-51
SYMPTOM	POWER SUPPLY AND GROUND CIRCUIT CHECK	DIAGNOSTIC PROCEDURE 1 (LIGHTING SWITCH INPUT SIGNAL CHECK)	DIAGNOSTIC PROCEDURE 2 (KEY SWITCH INSERTSIGNAL CHECK)	DIAGNOSTIC PROCEDURE 3 (SEAT BELT BUCKLE SWITCH LH CHECK)	DIAGNOSTIC PROCEDURE 4
Light warning chime does not activate.	X	X			X
Ignition key warning chime does not activate.	X		X		X
Seat belt warning chime does not activate.	X			X	X
All warning chimes do not activate.	X				X

X: Applicable

POWER SUPPLY AND GROUND CIRCUIT CHECK

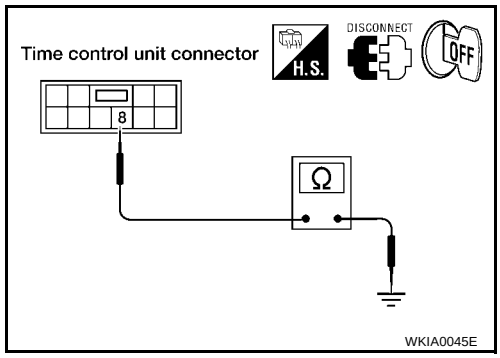
Power Supply Circuit Check

Terminals			Ignition switch position		
(+)		(-)	OFF	ACC	ON
Connector	Terminal (Wire color)				
M40	7 (PU)	Ground	Battery voltage	Battery voltage	Battery voltage
M40	9 (G)	Ground	0V	0V	Battery voltage



Ground Circuit Check

Terminals			Continuity
(+)		(-)	
Connector	Terminal (Wire color)		
M40	8 (B)	Ground	Yes

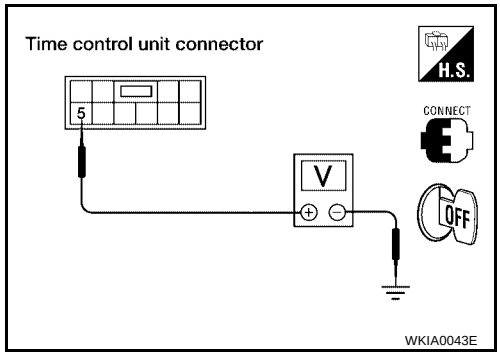


DIAGNOSTIC PROCEDURE 1 (LIGHTING SWITCH INPUT SIGNAL CHECK)

1. CHECK LIGHTING SWITCH INPUT SIGNAL

Check voltage between time control unit terminal 5 and ground.

Terminals			Condition of lighting switch		
(+)		(-)	1st position	2nd position	OFF
Connector	Terminal (Wire color)				
M40	5 (R/G)	Ground	Battery voltage	Battery voltage	0V



OK or NG

OK >> Combination switch (lighting switch) is OK.
NG >> Check the following.

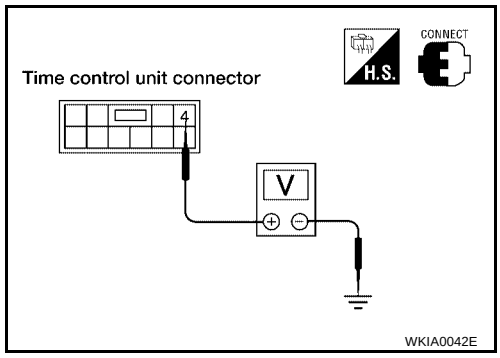
- 10A fuse (No. 38, located in the fuse and fusible link box)
- Harness for open or short between control unit and combination switch (lighting switch)

DIAGNOSTIC PROCEDURE 2 (KEY SWITCH INSERT SIGNAL CHECK)

1. CHECK KEY SWITCH INPUT SIGNAL

Check voltage between time control unit terminal 4 and ground.

Terminals			Condition of key switch	
(+)		(-)	Key inserted	Key removed
Connector	Terminal (Wire color)			
M40	4 (L/W)	Ground	Battery voltage	0V

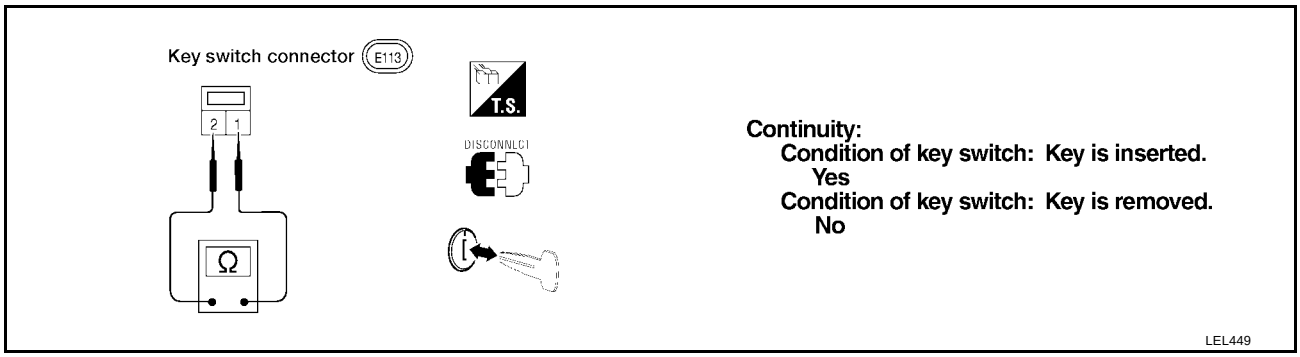


OK or NG

OK >> Key switch is OK.
NG >> GO TO 2.

2. CHECK KEY SWITCH

Check continuity between terminals 1 and 2.



OK or NG

OK >> Check the following.
- 10A fuse [No. 12, located in fuse block (J/B)]
- Harness for open or short between key switch and fuse
- Harness for open or short between time control unit and key switch

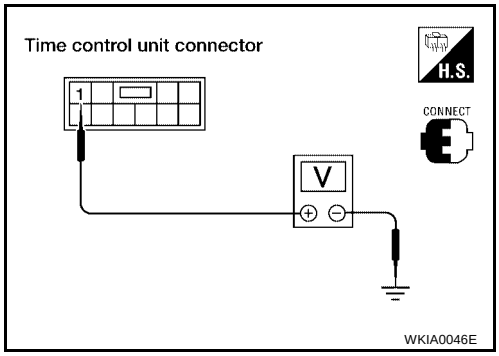
NG >> Replace key switch.

DIAGNOSTIC PROCEDURE 3 (SEAT BELT BUCKLE SWITCH LH CHECK)

1. CHECK SEAT BELT BUCKLE SWITCH LH INPUT SIGNAL

1. Turn ignition switch ON.
2. Check voltage between time control unit terminal 1 and ground.

Terminals			Condition of seat belt buckle switch LH	
(+)		(-)	Fastened	Unfastened
Connector	Terminal (Wire color)			
M40	1 (W/B)	Ground	Approx. 5V	0V

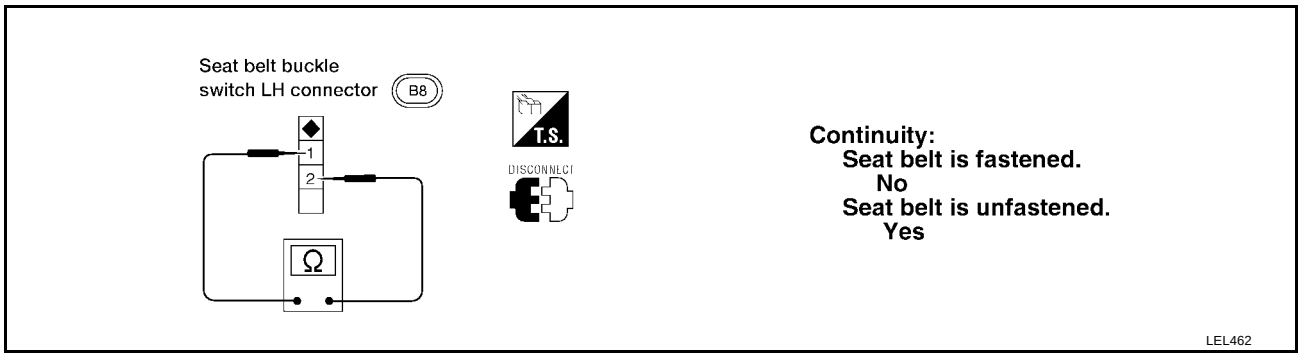


OK or NG

OK >> Seat belt buckle switch LH is OK.
NG >> GO TO 2.

2. CHECK SEAT BELT BUCKLE SWITCH LH

Check continuity between terminals 1 and 2 when seat belt is fastened and unfastened.



OK or NG

OK >> Check the following.
- Seat belt buckle switch LH ground circuit
- Harness for open between time control unit and seat belt buckle switch LH

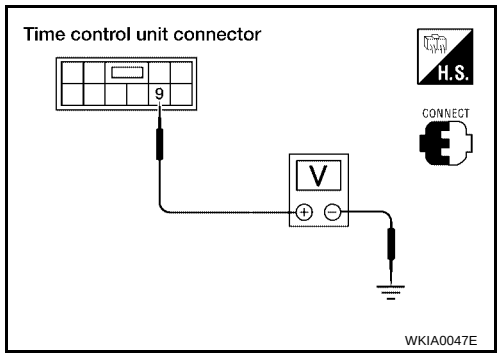
NG >> Replace seat belt buckle switch LH.

DIAGNOSTIC PROCEDURE 4

1. CHECK IGNITION ON SIGNAL

Check voltage between time control unit terminal 9 and ground.

Terminals		Ignition switch position		
(+)	(-)	OFF	ACC	ON
9 (G)	Ground	0V	0V	Battery voltage



OK or NG

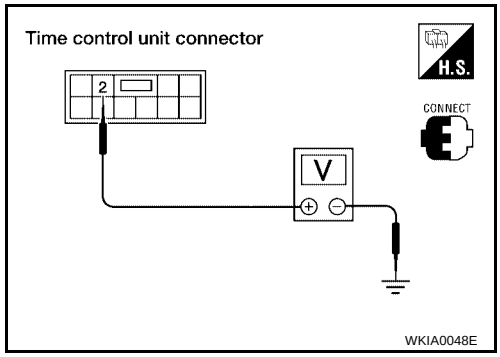
OK >> GO TO 2.

NG >> Check the following.
- 10A fuse [No. 10, located in fuse block (J/B)]
- Harness for open or short between time control unit and fuse

2. CHECK FRONT DOOR SWITCH LH INPUT SIGNAL

With ignition switch OFF, check voltage between time control unit terminal 2 and ground.

Terminals			Condition of driver's door	
(+)		(-)	Closed	Open
Connector	Terminal (Wire color)			
M40	2 (R)	Ground	Approx. 5V	0V



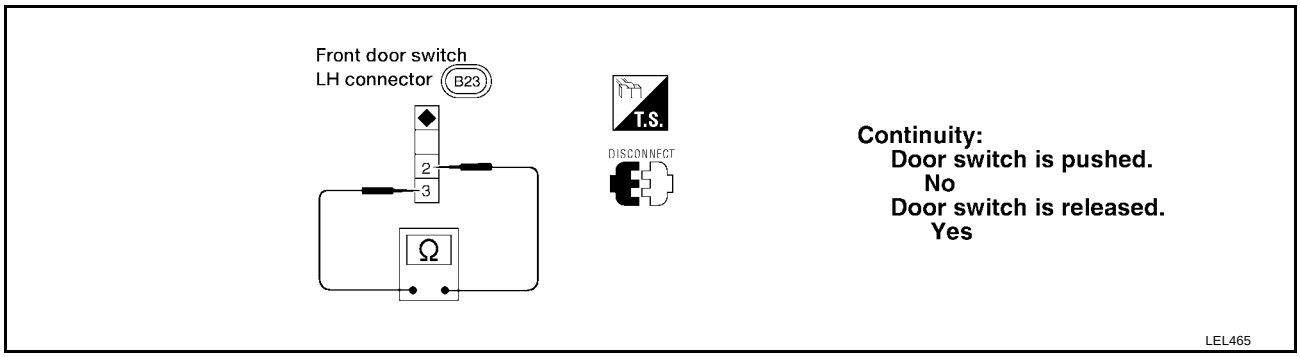
OK or NG

OK >> System is OK.

NG >> GO TO 3.

3. CHECK FRONT DOOR SWITCH LH

Check continuity between terminals 2 and 3.



OK or NG

OK >> Check the following.

- Front door switch LH ground circuit and condition
- Harness for open or short between time control unit and front door switch LH

NG >> Replace front door switch LH.

Trouble Diagnoses (With Power Door Locks)

EKS0039Q

SYMPTOM CHART

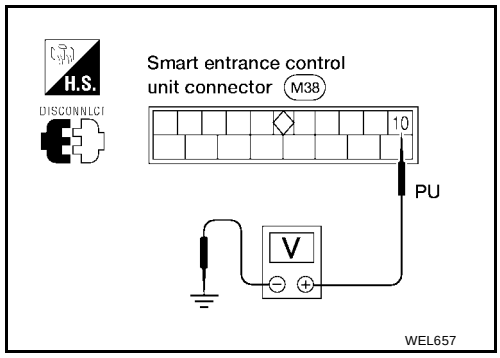
REFERENCE PAGE	DI-53	DI-54	DI-55	DI-56	DI-57
SYMPTOM	POWER SUPPLY AND GROUND CIRCUIT CHECK	DIAGNOSTIC PROCEDURE 1 (LIGHTING SWITCH INPUT SIGNAL CHECK)	DIAGNOSTIC PROCEDURE 2 (KEY SWITCH INSERTSIGNAL CHECK)	DIAGNOSTIC PROCEDURE 3 (SEAT BELT BUCKLE SWITCH LH CHECK)	DIAGNOSTIC PROCEDURE 4
Light warning chime does not activate.	X	X			X
Ignition key warning chime does not activate.	X		X		X
Seat belt warning chime does not activate.	X			X	X
All warning chimes do not activate.	X				X

X: Applicable

POWER SUPPLY AND GROUND CIRCUIT CHECK

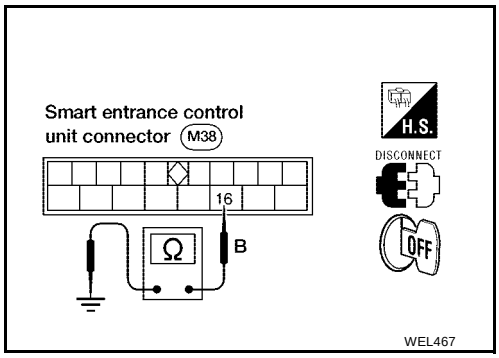
Power Supply Circuit Check

Terminals		Ignition switch position		
(+)	(-)	OFF	ACC	ON
10	Ground	Battery voltage	Battery voltage	Battery voltage



Ground Circuit Check

Terminals			Continuity
(+)		(-)	
Connector	Terminal (Wire color)		
M38	16 (B)	Ground	Yes

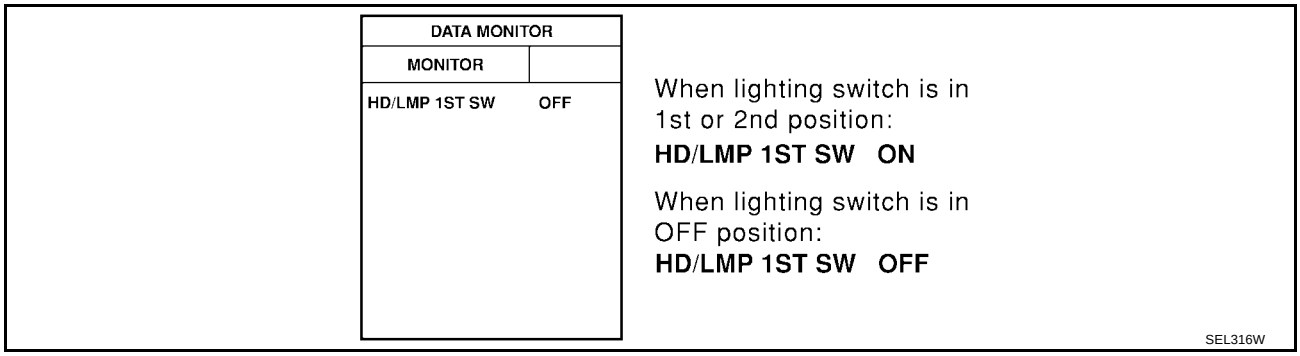


DIAGNOSTIC PROCEDURE 1 (LIGHTING SWITCH INPUT SIGNAL CHECK)

1. CHECK LIGHTING SWITCH INPUT SIGNAL

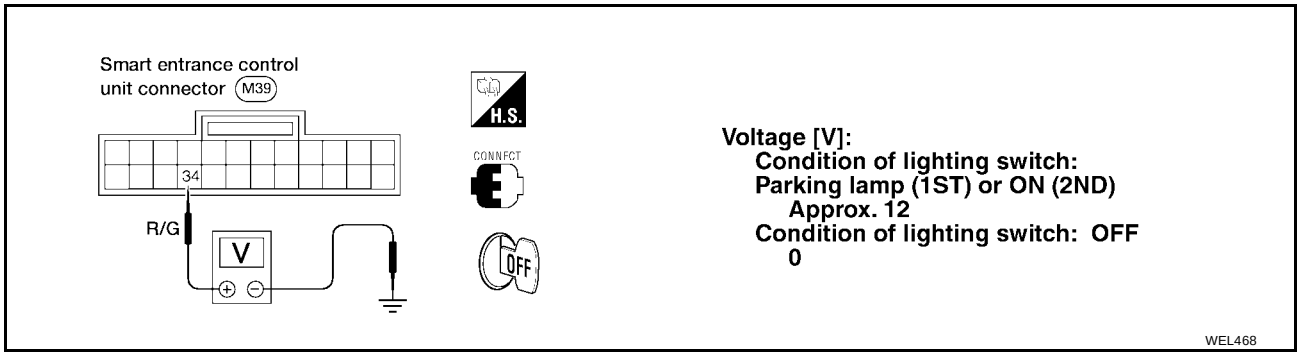
With CONSULT-II

Check combination switch (lighting switch) (“HD/LMP 1ST SW”) in “DATA MONITOR” mode with CONSULT-II.



Without CONSULT-II

Check voltage between smart entrance control unit terminal 34 and ground.



OK or NG

OK >> Combination switch (lighting switch) is OK.

NG >> Check the following.

- 10A fuse (No. 38, located in the fuse and fusible link box)
- Harness for open or short between smart entrance control unit and combination switch (lighting switch)

DIAGNOSTIC PROCEDURE 2 (KEY SWITCH INSERT SIGNAL CHECK)

1. CHECK KEY SWITCH INPUT SIGNAL

With CONSULT-II

Check key switch ("KEY ON SW") in "DATA MONITOR" mode with CONSULT-II.

DATA MONITOR	
MONITOR	
KEY ON SW	ON

When key is inserted to ignition key cylinder:

KEY ON SW ON

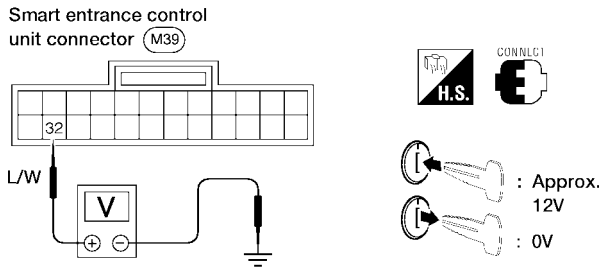
When key is removed from ignition key cylinder:

KEY ON SW OFF

SEL315W

Without CONSULT-II

Check voltage between smart entrance control unit terminal 32 and ground.



Voltage [V]:
Condition of key switch: Key is inserted.
Approx. 12
Condition of key switch: Key is removed.
0

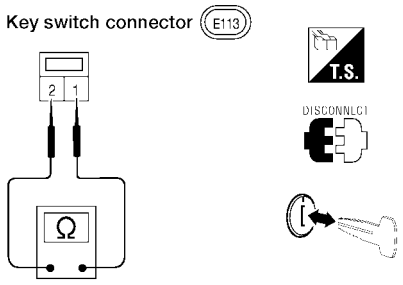
WEL469

OK or NG

OK >> Key switch is OK.
NG >> GO TO 2.

2. CHECK KEY SWITCH

Check continuity between terminals 1 and 2.



Continuity:
Condition of key switch: Key is inserted.
Yes
Condition of key switch: Key is removed.
No

LEL449

OK or NG

OK >> Check the following.
- 10A fuse [No. 12, located in fuse block (J/B)]
- Harness for open or short between key switch and fuse
- Harness for open or short between smart entrance control unit and key switch

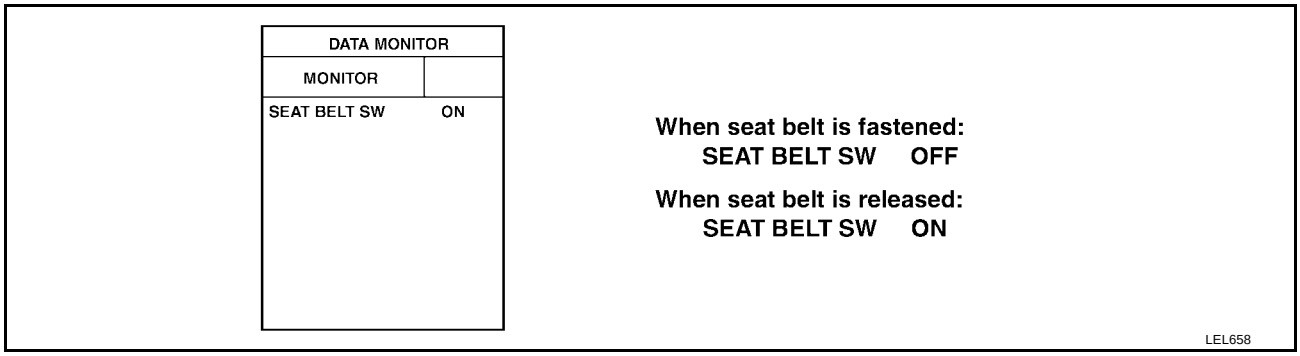
NG >> Replace key switch.

DIAGNOSTIC PROCEDURE 3 (SEAT BELT BUCKLE SWITCH LH CHECK)

1. CHECK SEAT BELT BUCKLE SWITCH LH INPUT SIGNAL

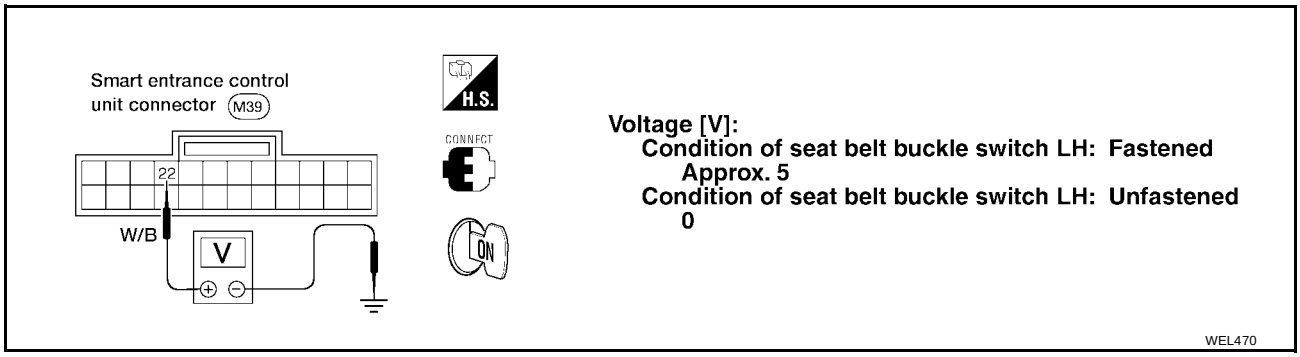
With CONSULT-II

Check seat belt buckle switch LH (“SEAT BELT SW”) in “DATA MONITOR” mode with CONSULT-II.



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between smart entrance control unit terminal 22 and ground.

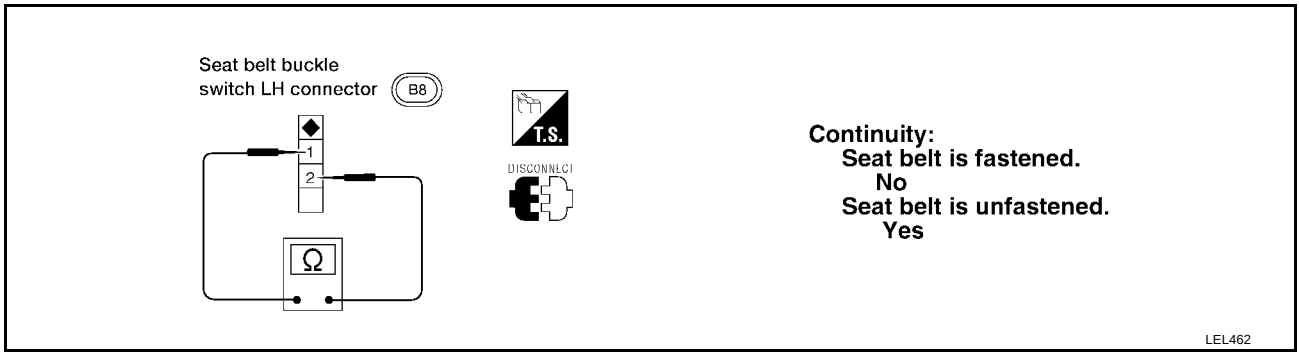


OK or NG

OK >> Seat belt buckle switch LH is OK.
NG >> GO TO 2.

2. CHECK SEAT BELT BUCKLE SWITCH LH

Check continuity between terminals 1 and 2 when seat belt is fastened and unfastened.



OK or NG

OK >> Check the following.
- Seat belt buckle switch LH ground circuit
- Harness for open between smart entrance control unit and seat belt buckle switch LH

NG >> Replace seat belt buckle switch LH.

DIAGNOSTIC PROCEDURE 4

1. CHECK IGNITION ON SIGNAL

With CONSULT-II

Check ignition switch ON signal (“IGN ON SW”) in “DATA MONITOR” mode with CONSULT-II.

DATA MONITOR	
MONITOR	
IGN ON SW	ON

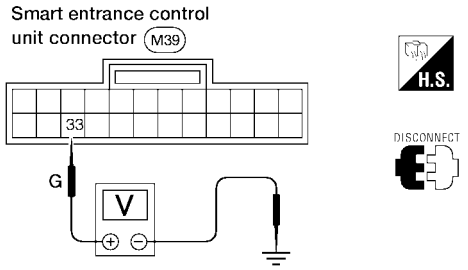
When ignition switch is ON:
IGN ON SW ON

When ignition switch is OFF:
IGN ON SW OFF

SEL318W

Without CONSULT-II

Check voltage between smart entrance control unit terminal 33 and ground.



Terminals		Ignition switch position		
(+)	(–)	OFF	ACC	ON
33	Ground	0V	0V	Battery voltage

WEL471

OK or NG

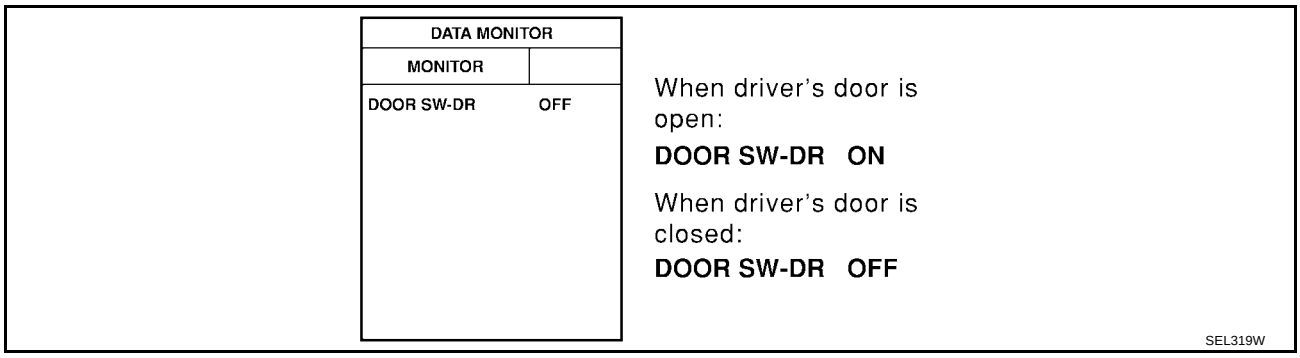
OK >> GO TO 2.
NG >> Check the following.

- 10A fuse [No. 10, located in fuse block (J/B)]
- Harness for open or short between smart entrance control unit and fuse

2. CHECK FRONT DOOR SWITCH LH INPUT SIGNAL

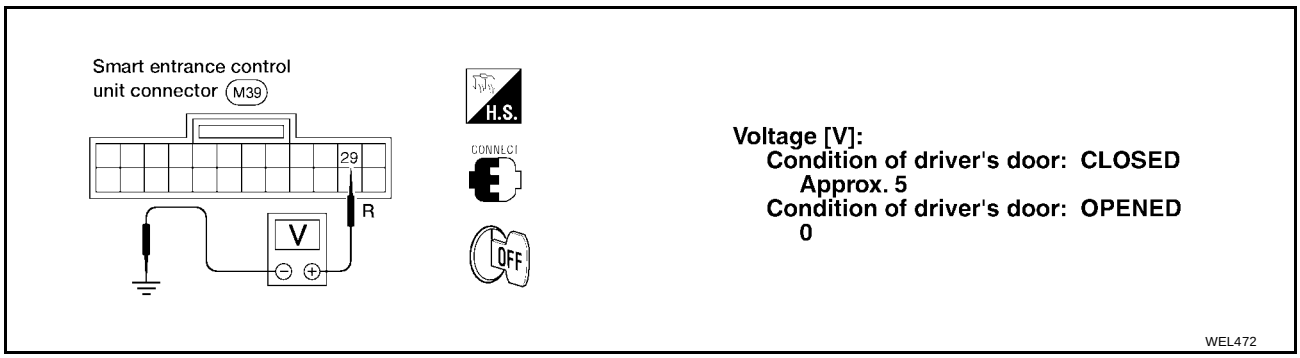
With CONSULT-II

Check front door switch LH signal (“DOOR SW-DR”) in “DATA MONITOR” mode with CONSULT-II.



Without CONSULT-II

Check voltage between smart entrance control unit terminal 29 and ground.

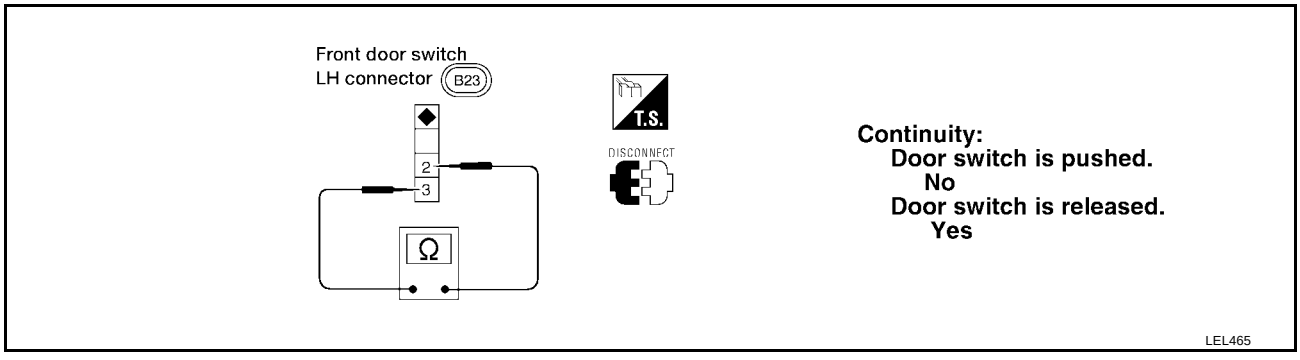


OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. CHECK FRONT DOOR SWITCH LH

Check continuity between terminals 2 and 3.



OK or NG

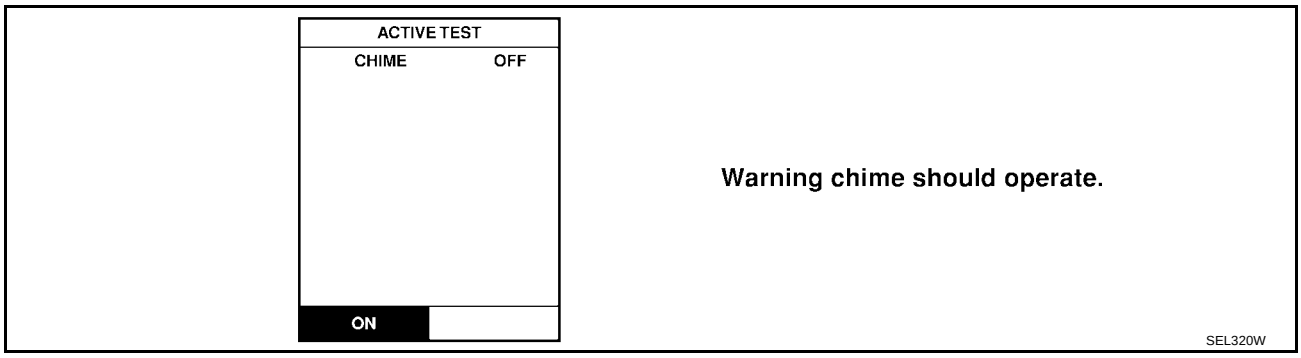
OK >> Check the following.
- Front door switch LH ground circuit and condition
- Harness for open between smart entrance control unit and front door switch LH

NG >> Replace front door switch LH.

4. CHECK WARNING CHIME

With CONSULT-II

Perform “CHIME” in “ACTIVE TEST” mode with CONSULT-II.



OK or NG

OK >> System is OK.
NG >> Replace smart entrance control unit.

BOARD COMPUTER

PFP:24810

System Description

EKS00653

FUNCTION

The board computer can indicate the following items.

- Outside air temperature
- DTE (distance to empty)
- Trip distance
- Trip time
- Average fuel consumption
- Average vehicle speed

OUTSIDE AIR TEMPERATURE INDICATION

The outside air temperature indication is displayed while the ignition switch is in the ON position.
Signal is supplied

- through ambient sensor terminal 1
- to combination meter (board computer) terminal 20.

Indication range is between -30 and 55°C (-22 and 131°F). When outside temperature is less than 3°C (37°F), display shows ICY. In this case, the display will change to the outside air temperature mode even though the display is showing a different mode. When outside temperature is more than 55°C (131°F), indication will be blank. The indicated temperature is not affected by engine heat. It changes only when one of the following conditions exists.

- When vehicle speed is more than 20 km/h (12 MPH).
- The ignition switch has been turned OFF for more than 3.5 hours.
- When outside air temperature is less than the indicated temperature.

DTE (DISTANCE TO EMPTY) INDICATION

The range indication provides the driver with an estimation of the distance that can be driven before refueling. The range is calculated by signals from the fuel level sensor unit (fuel remaining), ECM (fuel consumption) and vehicle speed sensor. The indication will be refreshed every 30 seconds. When fuel remaining is less than approximately 10 ℓ (10 5/8 US quarts), the indication will blink as a warning. If the fuel remaining is less than approximately 8 ℓ (8 1/2 US quarts), the indication will show "---". In this case, the display will change to the DTE mode even though the display is showing a different mode. When the battery is disconnected and reconnected, DTE mode will display "---" until the vehicle is driven 500 miles (804.5 km).

TRIP DISTANCE

Trip distance is calculated by signal from the vehicle speed sensor. If trip distance is reset, trip time will be reset at the same time.

TRIP TIME

Trip time displays cumulative ignition switch ON time. If trip time is reset, trip distance will be reset at the same time.

AVERAGE FUEL CONSUMPTION

Average fuel consumption indication is calculated by signals from the vehicle speed sensor and the ECM (fuel consumption). The indication will be refreshed every 30 seconds.

AVERAGE VEHICLE SPEED

Average vehicle speed indication is calculated by running distance and running time. The indication will be refreshed every 30 seconds. If average vehicle speed is reset, average fuel consumption will be reset at the same time. After resetting, the display will show "---" for 30 seconds.

HOW TO CHANGE/RESET INDICATION

Indication can be changed in the following order by momentarily depressing the board computer switch.
Outside air temperature → DTE → Trip distance → Trip time → Average fuel consumption → Average vehicle speed.
Holding the switch for more than 0.8 second will reset the indication of the currently displayed mode (trip distance, trip time, average vehicle speed or average fuel consumption).

NOTE:
After the display changes automatically, the indication can be changed to the last mode by pushing the board computer switch.

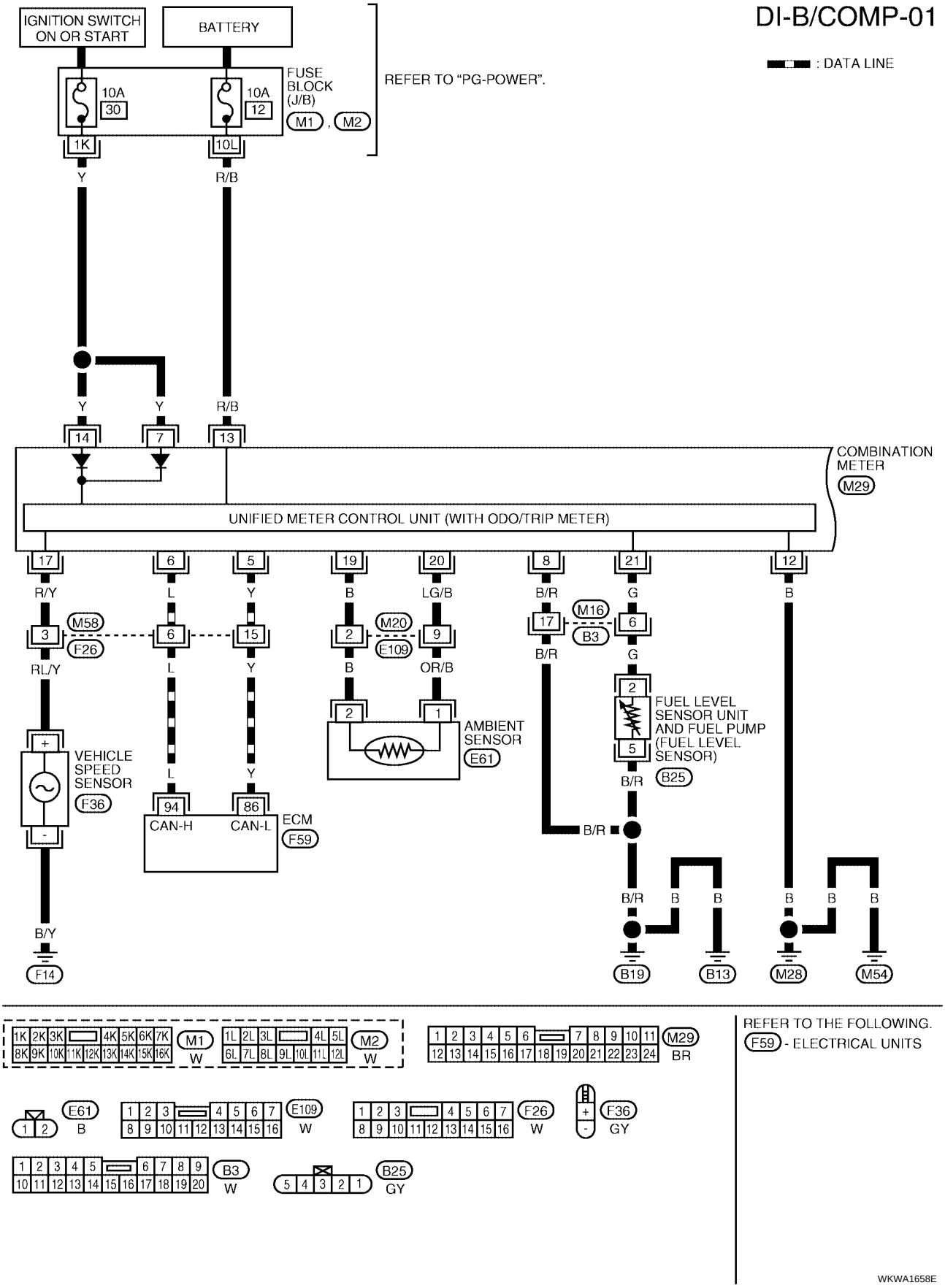
CAN Communication System Description

EKS00654

Refer to LAN-4, "CAN COMMUNICATION" .

Wiring Diagram — B/COMP —

EKS00655



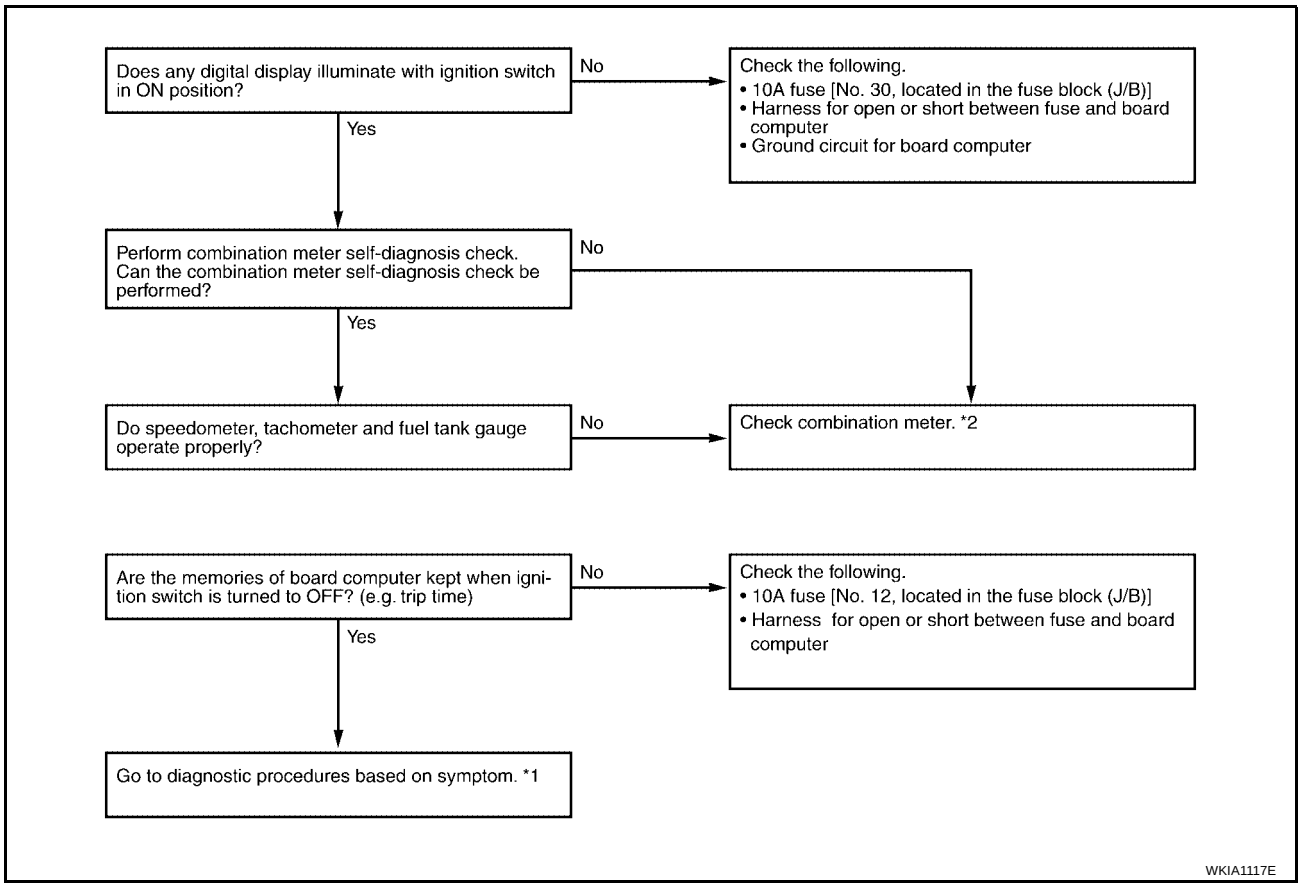
Trouble Diagnoses

EKS00656

SEGMENT CHECK

The board computer segment display can be checked by entering combination meter self-diagnostic mode. Refer to DI-16, "SELF-DIAGNOSIS FUNCTION" .

PRELIMINARY CHECK



*1 DI-63, "DIAGNOSIS PROCEDURE" *2 DI-17, "PRELIMINARY CHECK"

DIAGNOSIS PROCEDURE

Symptom	Possible cause	Repair order
Outside air temperature display is not displayed properly. (It may take a short time to steady the indication after ignition switch is turned ON.) **NOTE:** If the meter is powered up with the ambient sensor disconnected, outside air temperature display will show "---" even if the sensor is reconnected. In this case, with the sensor connected, disconnect and reconnect the battery, then the correct temperature will be displayed.	1. Ambient sensor 2. Ambient sensor circuit 3. Vehicle speed sensor signal	1. Check ambient sensor. 2. Check harness for open or short between ambient sensor and board computer. 3. Check harness for open or short between combination meter terminal 17 and vehicle speed sensor.
DTE (distance to empty) is not displayed properly.)	1. Average fuel consumption display 2. Fuel tank gauge signal circuit.	1. Make sure fuel consumption is displayed properly. If NG, check fuel consumption display. 2. Make sure fuel gauge operates properly. If NG, check fuel gauge.
Trip distance is not indicated properly.	1. Vehicle speed sensor signal circuit	1. Check harness for open or short between combination meter terminal 17 and vehicle speed sensor.

Symptom	Possible cause	Repair order
Trip time is not indicated properly.	1. Fuse	1. 10A fuse [No. 12 (located in fuse block (J/B)]. Verify battery voltage is present at combination meter terminal 13.
Average fuel consumption is not displayed properly.	1. Trip distance display 2. Fuel consumption signal	1. Check harness for open or short between combination meter terminal 17 and vehicle speed sensor. 2. Check CAN lines for open or short between ECM and combination meter.
Average vehicle speed is not indicated properly.	1. Trip distance display 2. Trip time display	1. Check harness for open or short between combination meter terminal 17 and vehicle speed sensor. 2. Make sure trip time is displayed properly. If NG, check trip time display.

Electrical Components Inspection

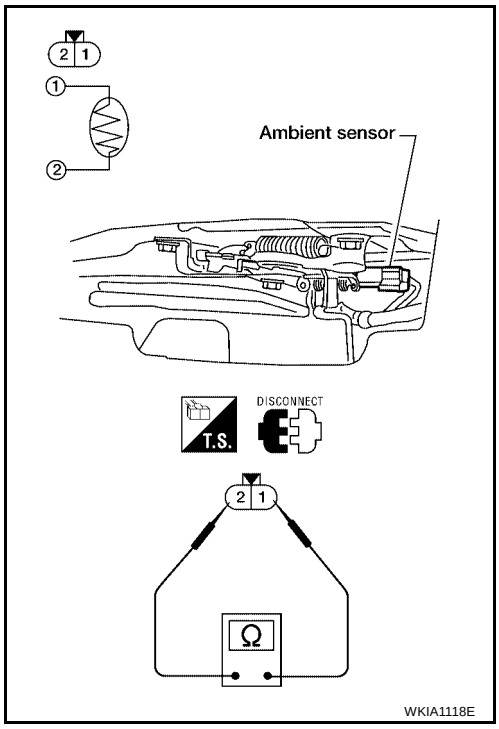
EKS00657

AMBIENT SENSOR

After disconnecting ambient sensor harness connector, measure resistance between terminals 2 and 1 at sensor harness side, using the table below.

Temperature °C (°F)	Resistance kΩ
-15 (5)	12.73
-10 (14)	9.92
-5 (23)	7.80
0 (32)	6.19
5 (41)	4.95
10 (50)	3.99
15 (59)	3.24
20 (68)	2.65
25 (77)	2.19
30 (86)	1.81
35 (95)	1.51
40 (104)	1.27
45 (113)	1.07

If NG, replace ambient sensor.



SECTION WW
WIPER, WASHER & HORN

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Wiring Diagrams and Trouble Diagnosis 2
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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EKS0039R

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**

Wiring Diagrams and Trouble Diagnosis

EKS0039S

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams", and
- PG-3, "POWER SUPPLY ROUTING" for power distribution circuit.

When you perform trouble diagnosis, refer to the following:

- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES", and
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident".

Check for any Service bulletins before servicing the vehicle.

FRONT WIPER AND WASHER

PFP:28810

System Description

EKS0039T

WIPER OPERATION

The wiper switch is controlled by a lever built into the combination switch.
There are three wiper switch positions:

- LO speed
- HI speed
- INT (with intermittent operation)

With the ignition switch in the ON or START position, power is supplied:

- through 20A fuse [No. 25, located in the fuse block (J/B)]
- to wiper motor terminal B, and
- to front wiper switch terminal 15 (with intermittent operation).

Low and High Speed Wiper Operation

Ground is supplied to wiper switch terminal 17 through body grounds E7 and E37.
When the wiper switch is placed in the LO position, ground is supplied:

- through terminal 14 of the wiper switch
- to wiper motor terminal L.

With power and ground supplied, the wiper motor operates at low speed.
When the wiper switch is placed in the HI position, ground is supplied:

- through terminal 16 of the wiper switch
- to wiper motor terminal H.

With power and ground supplied, the wiper motor operates at high speed.

Auto Stop Operation

With the wiper switch turned OFF, the wiper motor will continue to operate until wiper arms reach windshield base.
When wiper arms are not located at base of windshield with wiper switch OFF, ground is provided:

- from terminal 14 of the wiper switch
- to wiper motor terminal L, in order to continue wiper motor operation at low speed.

Ground is also supplied:

- through terminal 13 of the wiper switch
- to wiper motor terminal P
- through terminal E of the wiper motor, and
- through body grounds E7 and E37.

When wiper arms reach base of windshield, wiper motor terminals P and B are connected instead of terminals P and E. Wiper motor will then stop wiper arms at the STOP position.

Intermittent Operation

The wiper motor operates the wiper arms one time at low speed at a set interval of approximately 3 to 13 seconds. This feature is controlled by the wiper amplifier (INT SW) combined with wiper switch.
When the wiper switch is placed in the INT position, ground is supplied to wiper amplifier.
The desired interval time is input to wiper amplifier (INT VR) from wiper volume switch combined with wiper switch.
Then intermittent ground is supplied:

- to wiper motor terminal L
- from terminal 14 of wiper switch
- through wiper amplifier (OUTPUT).

The wiper motor operates at low speed at the desired interval.

WASHER OPERATION

With the ignition switch in the ON or START position, power is supplied:

- through 20A fuse [No. 25, located in the fuse block (J/B)]
- to front washer motor terminal +.

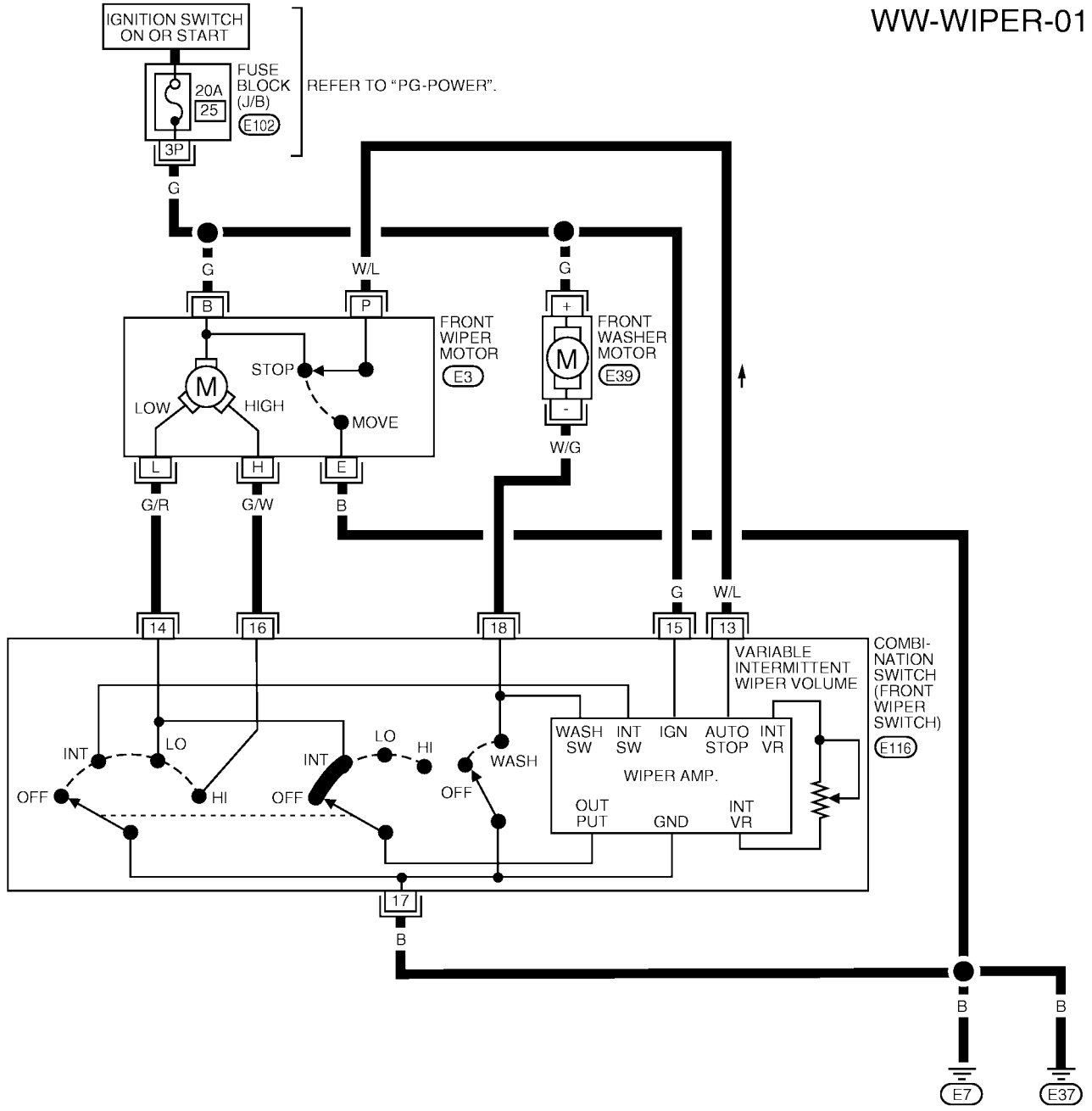
When the lever is pulled to the WASH position, ground is supplied:

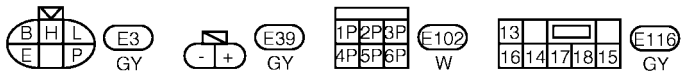
- to front washer motor terminal -
- from terminal 18 of the wiper switch
- through terminal 17 of the wiper switch, and
- through body grounds E7 and E37.

With power and ground supplied, the washer motor operates.
Without intermittent operation, the wiper motor operates while the lever is pulled to the WASH position.
With intermittent operation, when the lever is pulled to the WASH position for one second or more, the wiper motor operates at low speed for approximately 3 seconds to clean windshield. This feature is controlled by the wiper amplifier in the same manner as intermittent operation.

Wiring Diagram — WIPER —
WITH INTERMITTENT WIPERS

EKS0039U

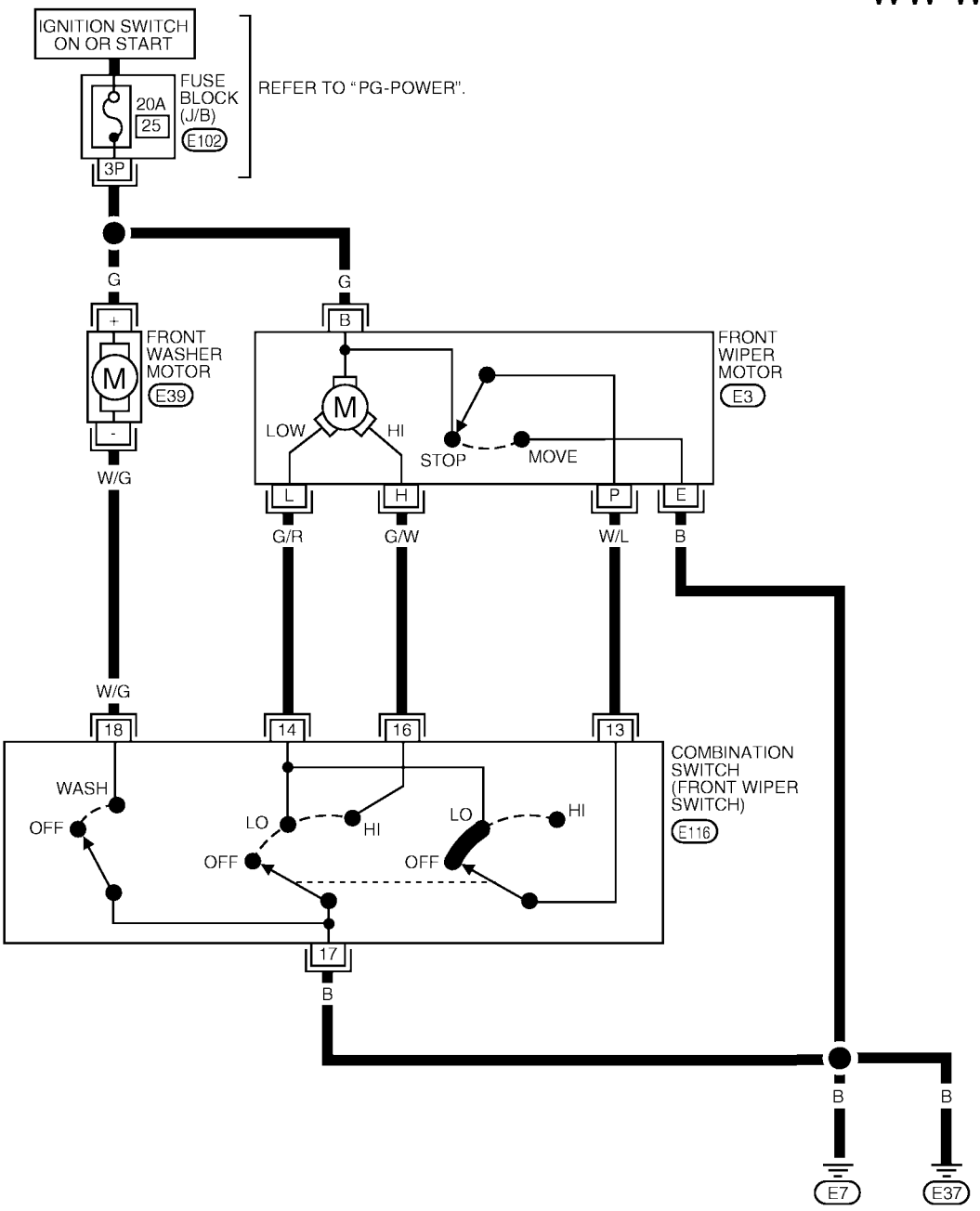


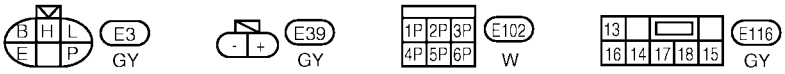


WKWA0050E

WITHOUT INTERMITTENT WIPERS

WW-WIPER-02





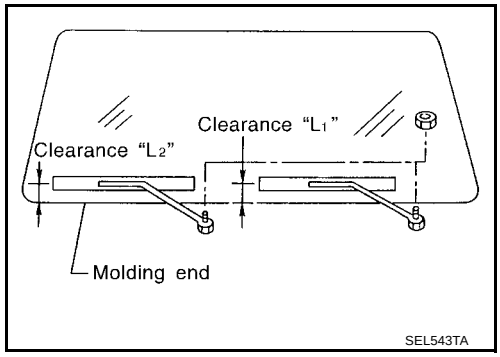
WKWA0051E

Removal and Installation

EKS0039V

WIPER ARMS

1. Prior to wiper arm installation, turn on wiper switch to operate wiper motor and then turn it “OFF” (Auto Stop).
2. Lift the blade up approximately 100 mm (3.94 in) and then set it down onto glass surface to set the blade center to clearance “L_1 ” & “L_2 ” immediately before tightening nut.
3. Eject washer fluid. Turn on wiper switch to operate wiper motor and then turn it “OFF”.
4. Ensure that wiper blades stop within clearance “L_1 ” & “L_2 ”.



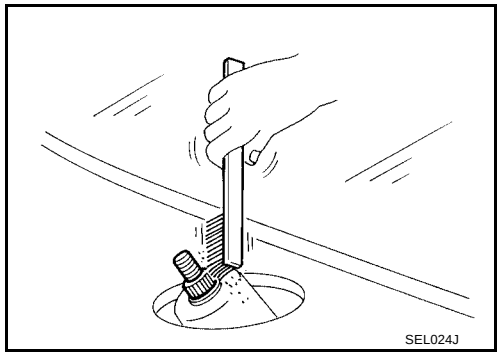
Clearance “L_1 ” : 27.5 - 42.5 mm (1.08 - 1.67 in)

Clearance “L_2 ” : 34.5 - 49.5 mm (1.36 - 1.95 in)

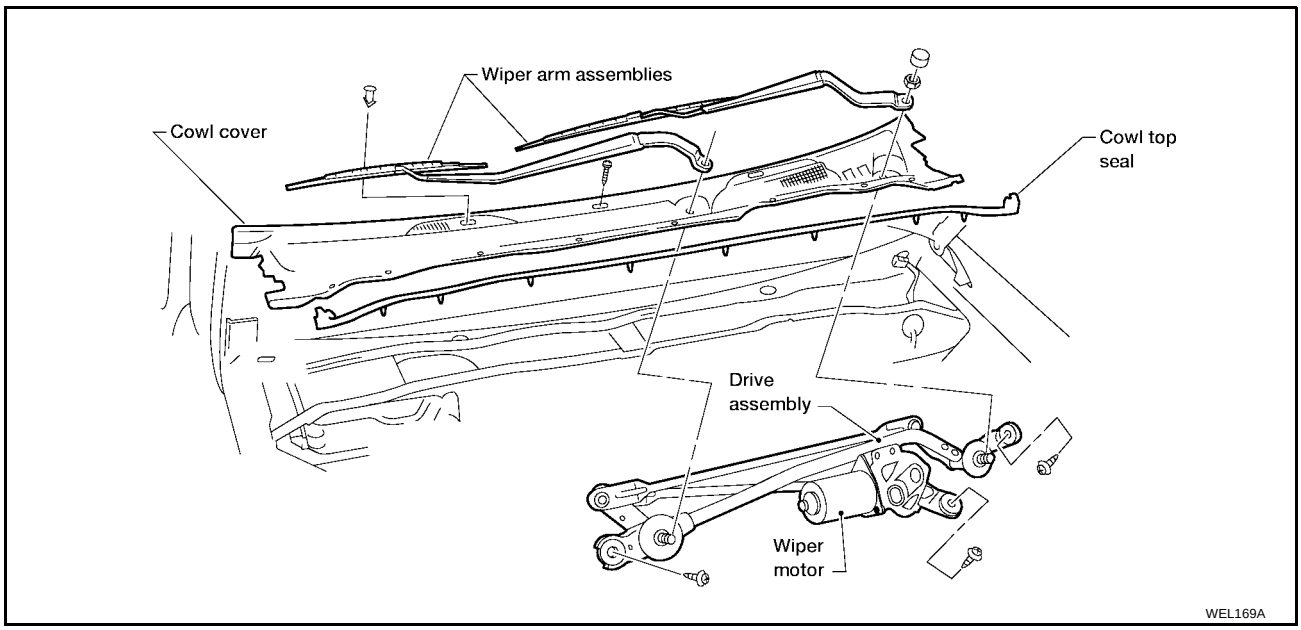
- Tighten wiper arm nuts to specified torque.

Front wiper : 21 - 26 N-m (2.1 - 2.7 kg-m, 16 - 19 ft-lb)

- **Before reinstalling wiper arm, clean the pivot area as illustrated. This will reduce possibility of wiper arm looseness.**



WIPER LINKAGE



Removal

1. Remove 4 bolts that secure wiper motor.
2. Detach wiper motor from wiper linkage at ball joint.
3. Remove wiper linkage.

Be careful not to break ball joint rubber boot.

Installation

- Grease ball joint portion before installation.

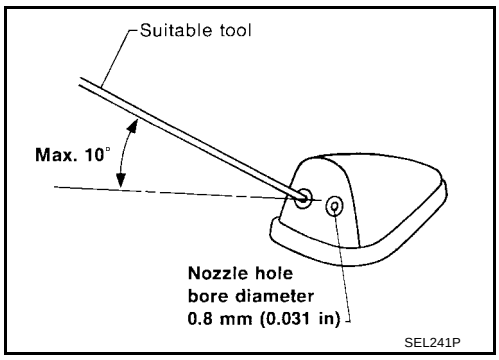
1. Installation is the reverse order of removal.

Washer Nozzle Adjustment

EKS0039W

- Adjust washer nozzle with suitable tool as shown in the figure at left.

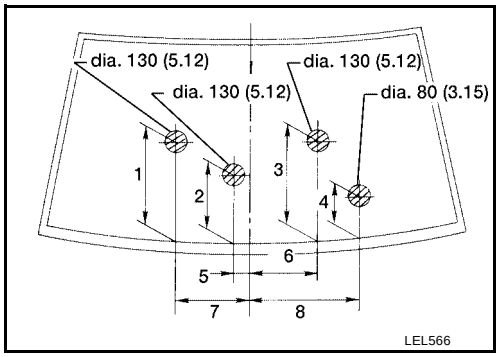
Adjustable range : ±10°



Unit: mm (in)

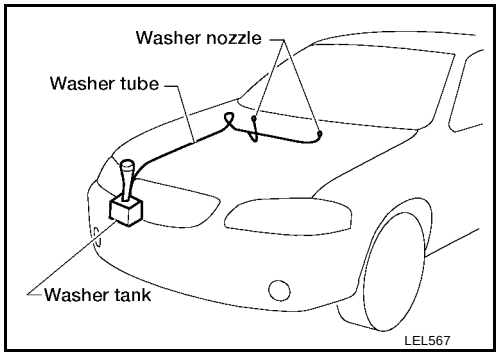
1	400 (15.75)	5	151 (5.94)
2	325 (12.80)	6	155 (6.10)
3	425 (16.73)	7	250 (9.84)
4	226 (8.90)	8	380 (14.96)

*: The diameters of these circles are less than 80 mm (3.15 in).



Washer Tube Layout

EKS0039X

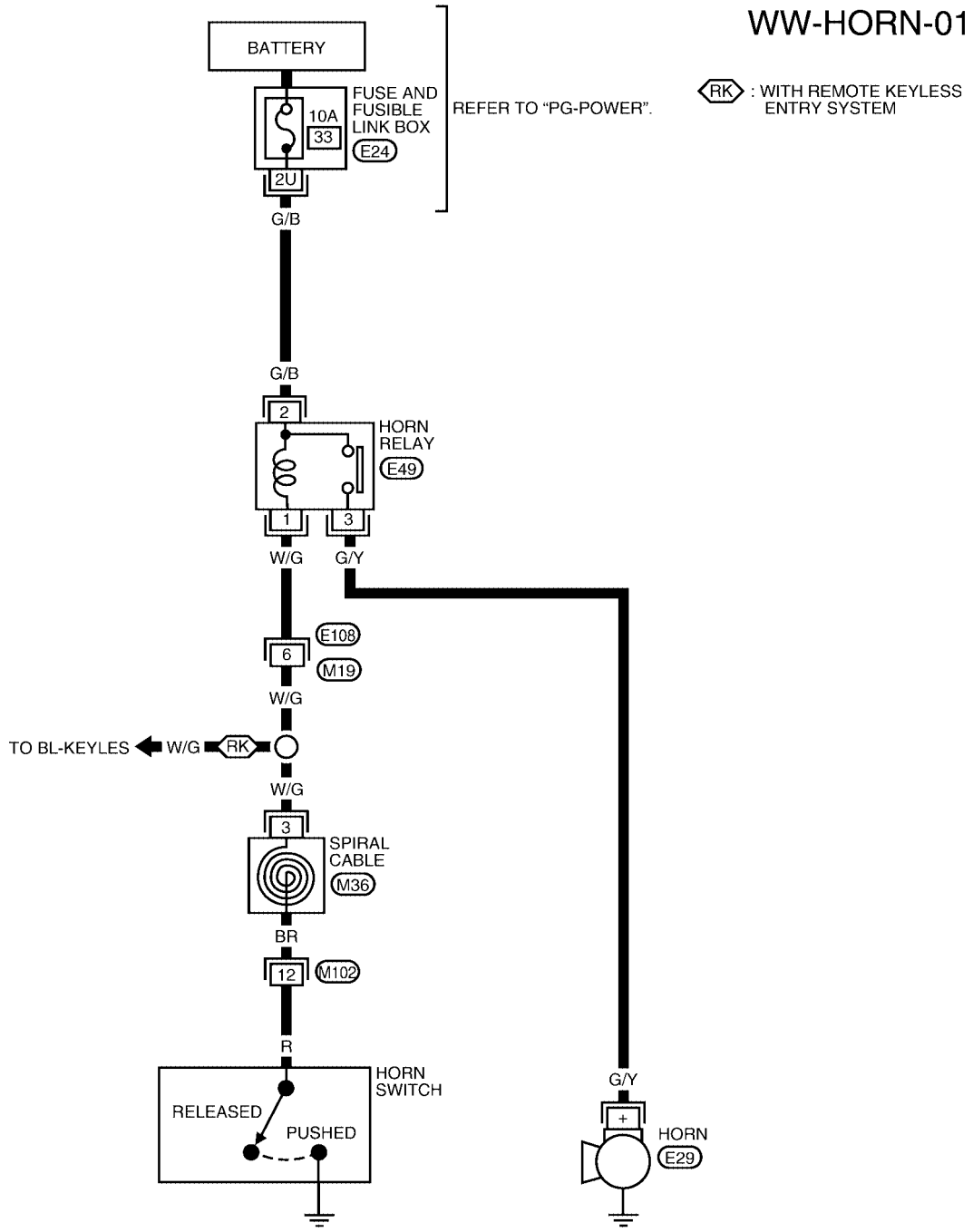


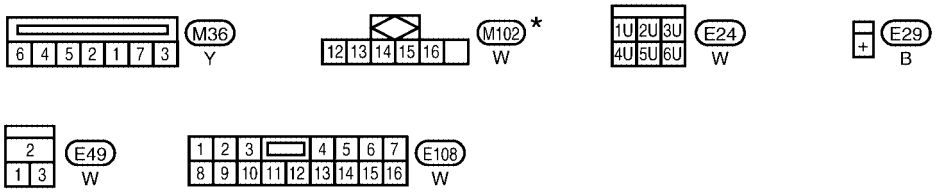
HORN

PFP:25610

Wiring Diagram — HORN —

EKS0039Y





* : THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT" OF PG SECTION.

WKWA0200E

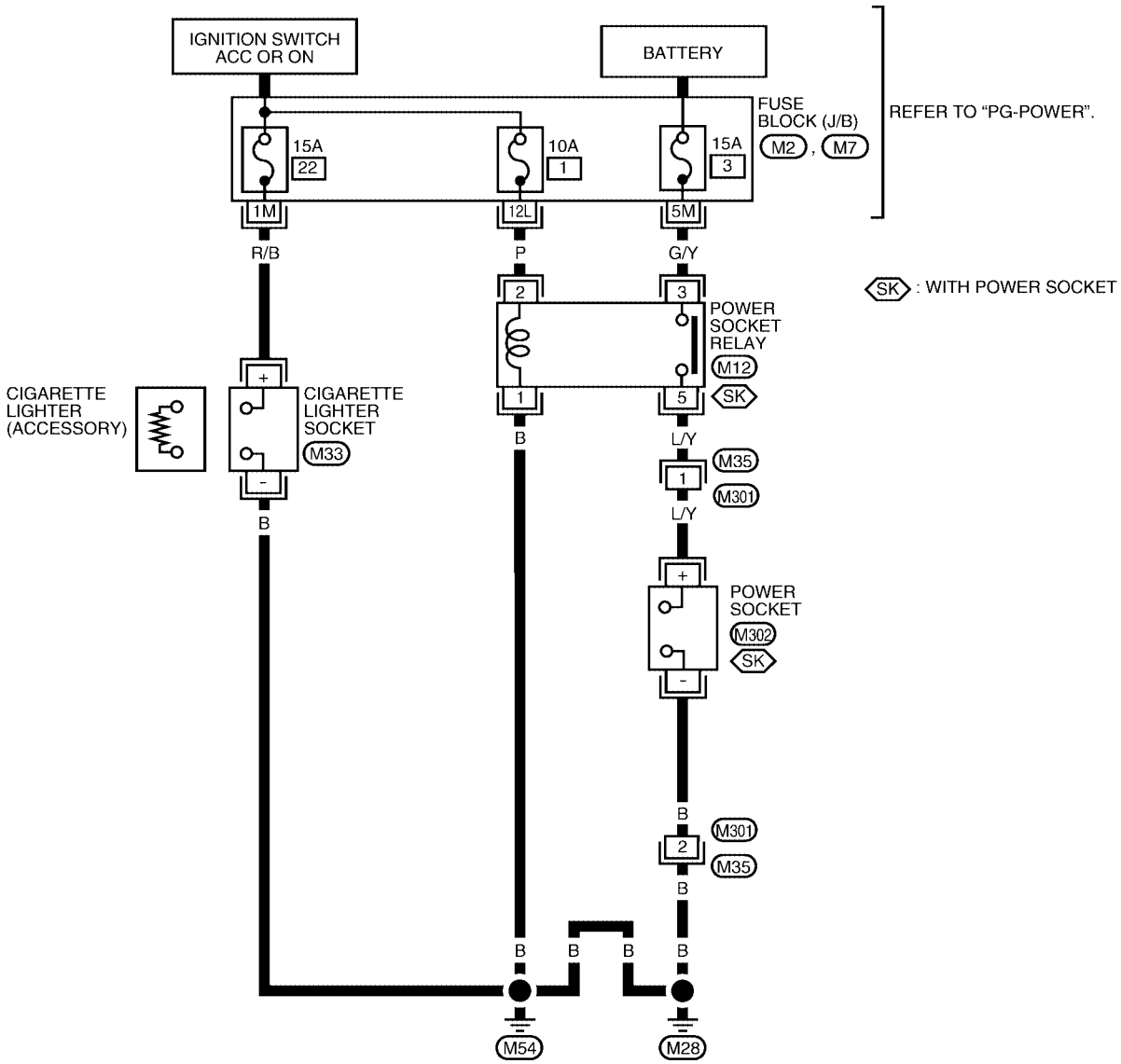
CIGARETTE LIGHTER

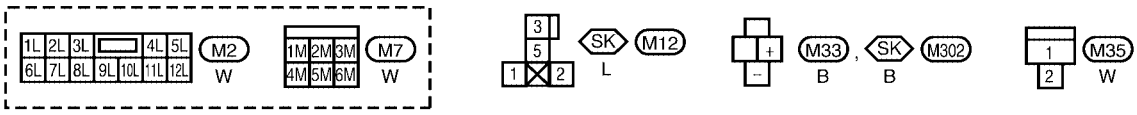
PFP:35330

Wiring Diagram — CIGAR —

EKS0039Z

WW-CIGAR-01





WKWA0201E

SECTION BCS
BODY CONTROL SYSTEM

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EKS003A0

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**

Wiring Diagrams and Trouble Diagnosis

EKS003A1

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams", and
- PG-3, "POWER SUPPLY ROUTING".

When you perform trouble diagnosis, refer to the following:

- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES", and
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident".

Check for any Service bulletins before servicing the vehicle.

SMART ENTRANCE CONTROL UNIT

PFP:28596

Description

EKS003A2

OUTLINE

The smart entrance control unit totally controls the following body electrical system operations.

- Warning chime
- Rear window defogger and door mirror defogger
- Power door locks
- Remote keyless entry system
- Vehicle security system
- Interior lamp
- Battery saver control

BATTERY SAVER CONTROL

Interior Lamp/Map Lamp/Vanity Lamps

The lamps turn off automatically when the interior lamp, map lamp or/and vanity lamps are illuminated with the ignition key in the OFF position, if the lamp remains lit by the door switch open signal or if the lamp switch is in the ON position for approximately 10 minutes.
After lamps are turned off by the battery saver system, the lamps illuminate again when:

- Driver's door is locked or unlocked,
- Door is opened or closed,
- Key is inserted into or removed from the ignition key cylinder.

Rear Window Defogger/Door Mirror Defogger

Rear window defogger and door mirror defogger are turned off approximately 15 minutes after the rear window defogger switch is turned on.

INPUT/OUTPUT

System	Input	Output
Power door lock	Door lock and unlock switch LH and RH Key switch (Insert) Door switches Door key cylinder switch	Door lock actuator
Remote keyless entry	Key switch (Insert) Ignition switch (ACC) Door switches Front door unlock sensor LH Keyfob signal	Vehicle security lamp relay Vehicle security horn relay Interior lamp Remote keyless entry relay Door lock actuator Trunk lid opener actuator
Warning chime	Key switch (Insert) Ignition switch (ON) Lighting switch (1st or 2nd) Seat belt buckle switch LH Front door switch LH	Warning chime (located in smart entrance control unit)
Rear window defogger and door mirror defogger	Ignition switch (ON) Rear window defogger switch	Rear window defogger relay
Vehicle security	Ignition switch (ACC, ON) Door switches Door lock/unlock switches Door key cylinder switch (lock/unlock) Trunk lid key cylinder switch (unlock) Door unlock sensors	Vehicle security lamp relay Horn relay Security indicator lamp

System	Input	Output
Interior lamp	Door switches Front door unlock sensor LH Ignition switch (ON) Key switch (Insert)	Interior lamp
Battery saver control for interior lamp/map lamp/vanity lamps	Ignition switch (ON) Door switches Lamp switches Main power window and door lock/unlock switch	Interior lamp Map lamp Vanity lamps

CONSULT-II

EKS003A3

DIAGNOSTIC ITEMS APPLICATION

Item (CONSULT-II screen terms)	Diagnosed system	DATA MONITOR	ACTIVE TEST	WORK SUPPORT
DOOR LOCK	Power door lock	X	X	
REAR DEFOGGER	Rear window defogger	X	X	
KEY WARN ALM	Warning chime	X	X	
LIGHT WARN ALM	Warning chime	X	X	
SEAT BELT ALM	Warning chime	X	X	
INT LAMP	Interior lamps	X	X	
BATTERY SAVER	Battery saver control for interior lamp	X	X	
THEFT WAR ALM	Vehicle security system	X	X	X
MULTI REMOTE ENT	Remote keyless entry system	X	X	X

X: Applicable

For diagnostic item in each control system, refer to the relevant pages for each system.

DIAGNOSTIC ITEM DESCRIPTION

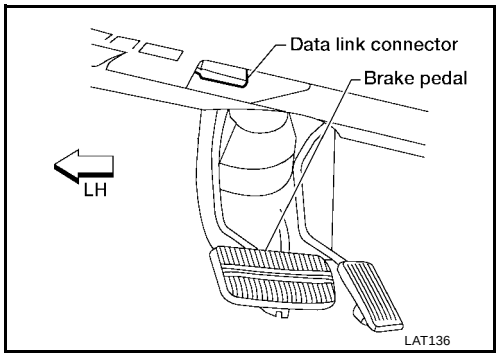
MODE	Description
DATA MONITOR	Input/output data in the smart entrance control unit can be read.
ACTIVE TEST	Diagnostic Test Mode in which CONSULT-II drives some systems apart from the smart entrance control unit.
WORK SUPPORT for THEFT WAR ALM	The recorded trigger signal when vehicle security system was activated can be checked.
WORK SUPPORT for MULTI REMOTE ENT	ID code of keyfob can be registered and erased.

CONSULT-II INSPECTION PROCEDURE

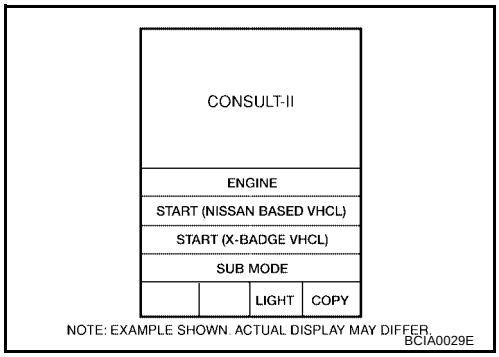
CAUTION:

If CONSULT-II is used with no connection of CONSULT-II CONVERTER, malfunctions might be detected in self-diagnosis depending on control unit which carry out CAN communication.

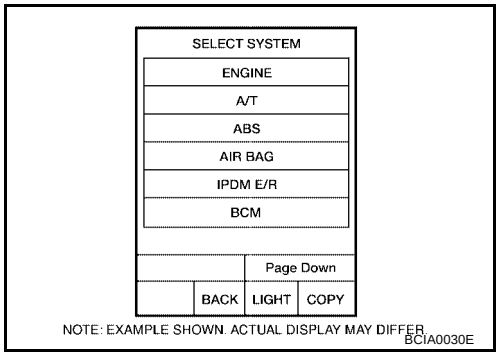
1. Turn the ignition switch “OFF”.
2. Connect “CONSULT-II” to the data link connector.



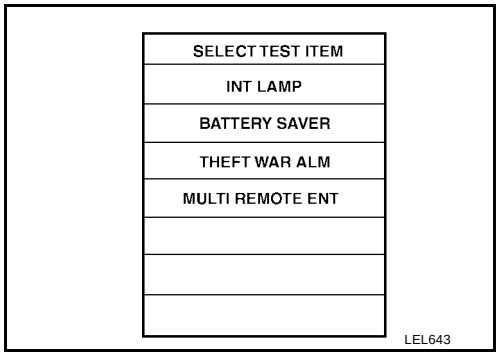
3. Turn ignition switch “ON”.
4. Touch “START (NISSAN BASED VHCL)”.



5. Touch “SMART ENTRANCE”.

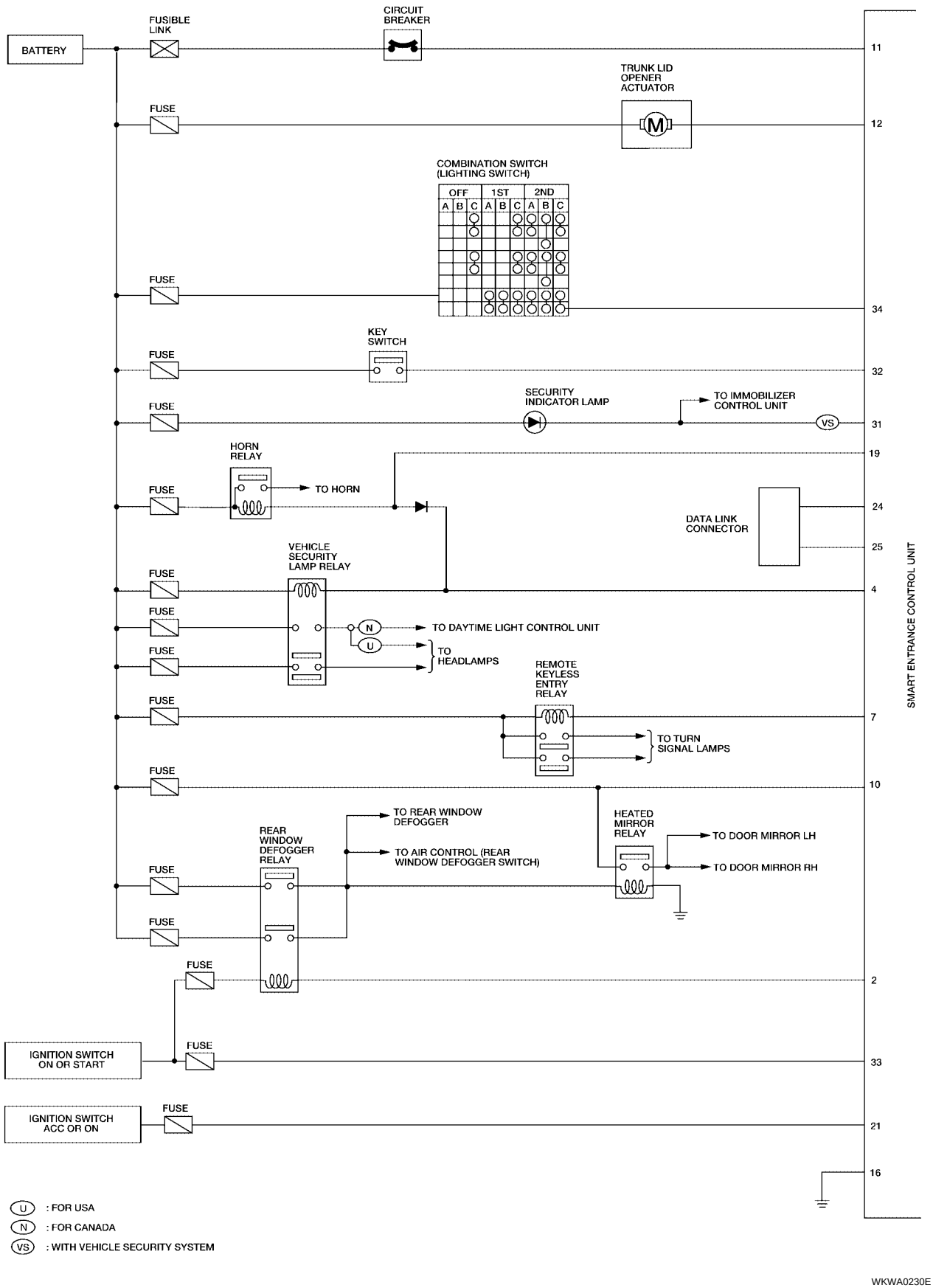


6. Perform each diagnostic item according to “DIAGNOSTIC ITEMS APPLICATION”. Refer to BCS-5, "DIAGNOSTIC ITEMS APPLICATION" .



Schematic

EKS003A4



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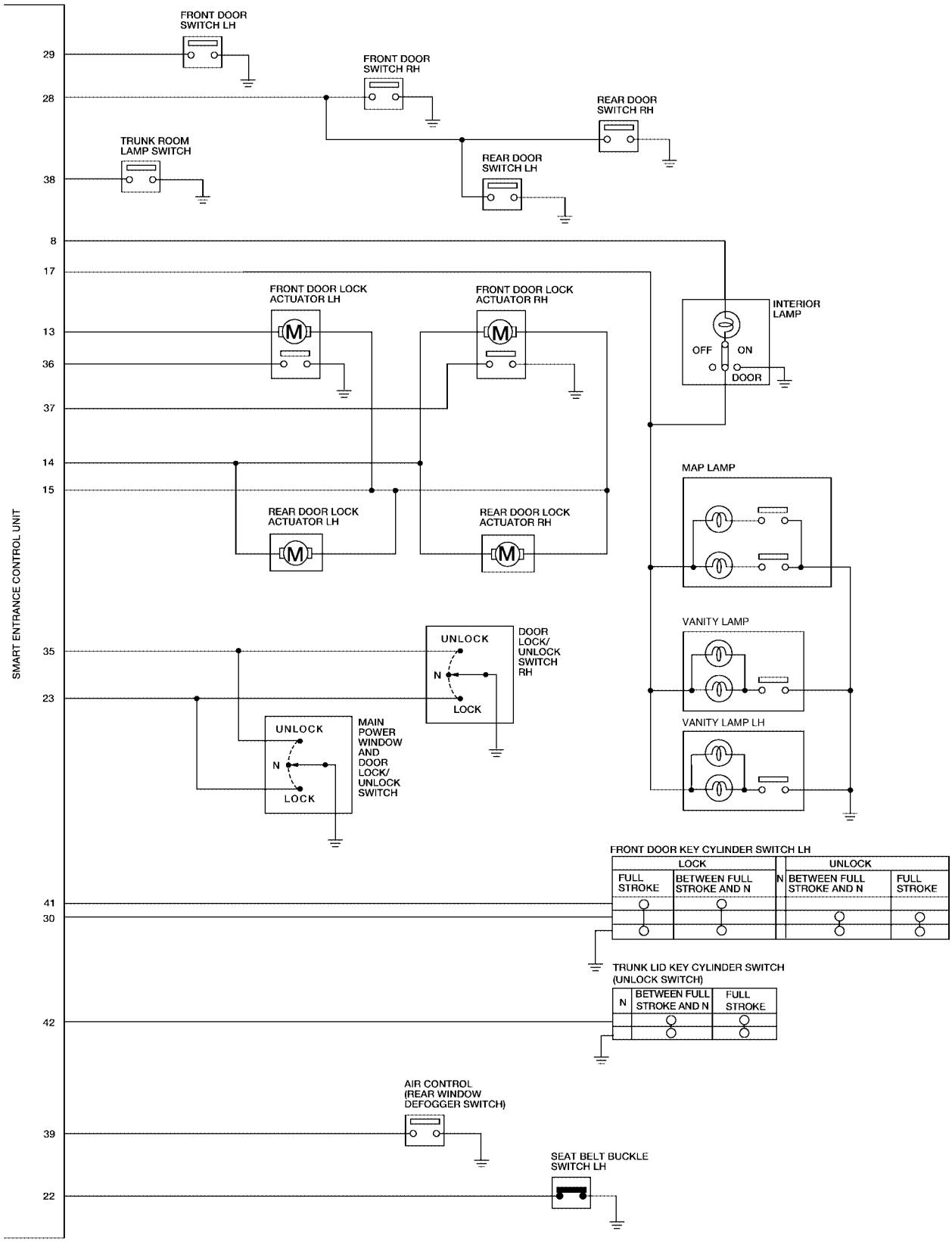

SMART ENTRANCE CONTROL UNIT
FRONT DOOR SWITCH LH
FRONT DOOR SWITCH RH
REAR DOOR SWITCH RH
TRUNK ROOM LAMP SWITCH
REAR DOOR SWITCH LH
FRONT DOOR LOCK ACTUATOR LH
FRONT DOOR LOCK ACTUATOR RH
INTERIOR LAMP
OFF
ON
DOOR
MAP LAMP
REAR DOOR LOCK ACTUATOR LH
REAR DOOR LOCK ACTUATOR RH
VANITY LAMP
VANITY LAMP LH
UNLOCK
N
LOCK
DOOR LOCK/ UNLOCK SWITCH RH
MAIN POWER WINDOW AND DOOR LOCK/ UNLOCK SWITCH
FRONT DOOR KEY CYLINDER SWITCH LH
LOCK
UNLOCK
FULL STROKE
BETWEEN FULL STROKE AND N
TRUNK LID KEY CYLINDER SWITCH (UNLOCK SWITCH)
AIR CONTROL (REAR WINDOW DEFOGGER SWITCH)
SEAT BELT BUCKLE SWITCH LH
29
28
38
8
17
13
36
37
14
15
35
23
41
30
42
39
22

WKWA0649E

Smart Entrance Control Unit Inspection Table

EKS003A5

Terminal No.	Wire color	Connections	Operated condition		Voltage (Approx.)
2	G/R	Rear window defogger relay	OFF → ON (Ignition key is in “ON” position)		0V → 12V
4	SB	Horn relay and vehicle security lamp relay	When panic alarm is operated using Keyfob or when alarm is activated		12V → 0V
7	OR/B	Remote keyless entry relay	When doors are locked using Keyfob		12V → 0V
8	R/Y	Interior lamp	When interior lamp is operated using Keyfob (Lamp switch in “DOOR” position)		0V → 12V
10	PU	Power source (Fuse)	—		12V
11	W/L	Power source (C/B)	—		12V
12	P/B	Trunk lid opener actuator	ON (Open) → OFF (Closed)		0V → 12V
13	L/R	Driver door lock actuator	Door lock & unlock switch	Free	0V
14	W/R	Passenger and rear doors lock actuators		Unlocked	12V
15	R/B	Door lock actuators	Door lock & unlock switch	Free	0V
				Locked	12V
16	B	Ground	—		—
17	R/B	Battery saver (Interior lamp)	Battery saver does not operate → Operate		12V → 0V
19	W/G	Horn relay	When doors are locked using Keyfob with horn chirp mode		12V → 0V
21	P	Ignition switch (ACC, ON)	“ACC” or “ON” position		12V
22	W/B	Seat belt buckle switch LH	Unfasten → Fasten (Ignition key is in “ON” position)		0V → 5V
23	GY	Door lock & unlock switches	Neutral → Locks		5V → 0V
24	G/B	Data link connector	—		—
25	GY/L	Data link connector	—		—
28	R/W	Other door switches	OFF (Closed) → ON (Open)		5V → 0V
29	R	Front door switch LH	OFF (Closed) → ON (Open)		5V → 0V
30	W/L	Door key cylinder unlock switch	OFF (Neutral) → ON (Unlocked)		5V → 0V
31	GY/R	Vehicle security indicator	Goes off → Illuminates		12V → 0V
32	L/W	Ignition key switch (Insert)	Key inserted → Key removed from IGN key cylinder		12V → 0V
33	G	Ignition switch (ON,START)	Ignition key is in “ON” or "START" position		12V
34	R/G	Combination switch (Lighting switch)	1ST, 2ND positions: ON → OFF		12V → 0V
35	PU/R	Door lock & unlock switches	Neutral → Unlocks		5V → 0V
36	Y/G	Door unlock sensor LH	Driver door: Locked → Unlocked		5V → 0V
37	Y	Door unlock sensor RH	Passenger door: Locked → Unlocked		5V → 0V
38	R/B	Trunk room lamp switch	ON (Open) → OFF (Closed)		0V → 12V
39	G/B	Air control (Rear window defogger switch)	OFF → ON		5V → 0V
41	LG/R	Door key cylinder lock switch	OFF (Neutral) → ON (Locked)		5V → 0V
42	L/OR	Trunk lid key cylinder switch	OFF (Neutral) → ON (Unlock)		5V → 0V

TIME CONTROL UNIT

PFP:28491

Description (Without Power Door Locks)

EKS003A6

OUTLINE

The time control unit totally controls the following body electrical system operations.

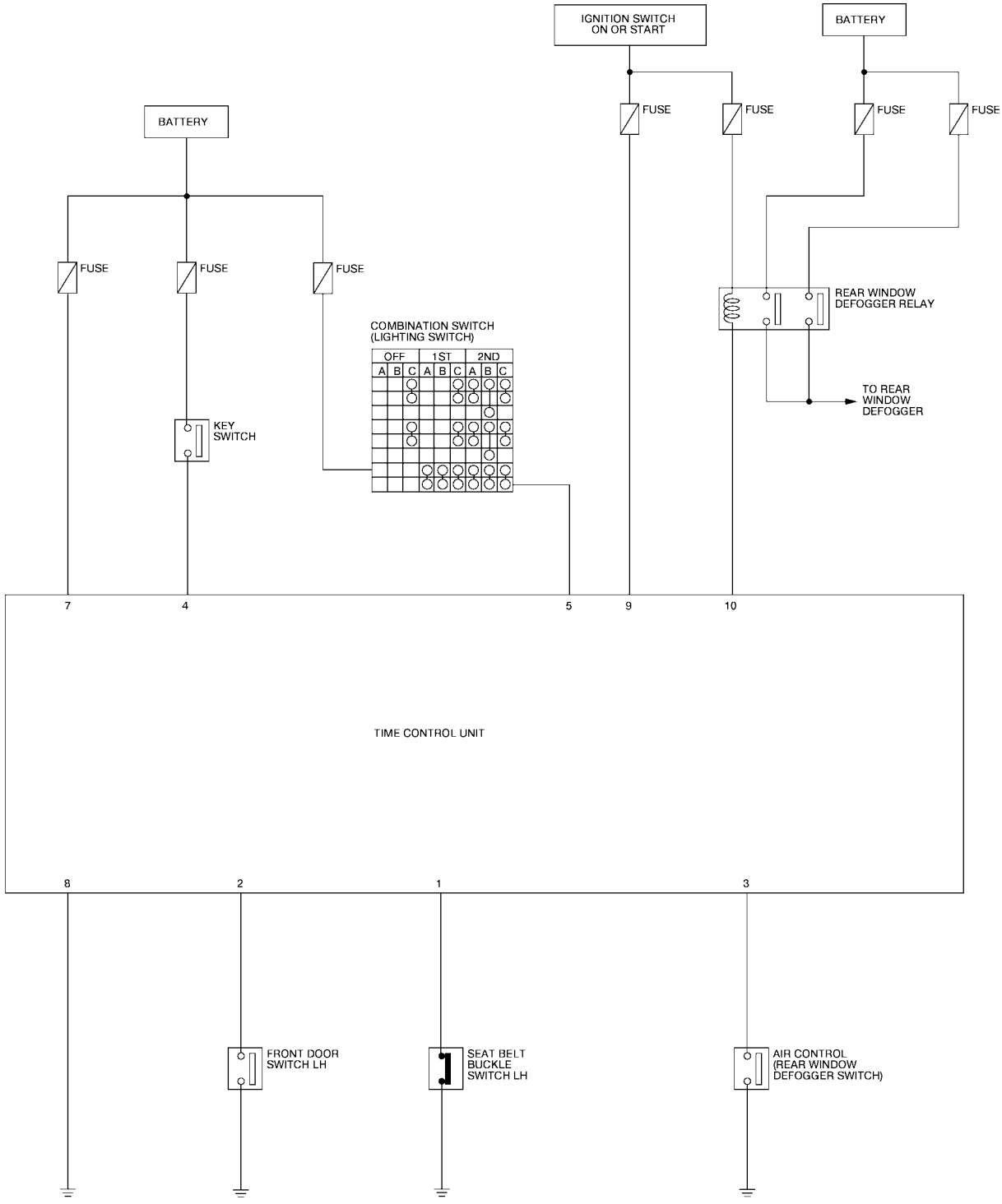
- Warning chime
- Rear window defogger

INPUT/OUTPUT

System	Input	Output
Warning chime	Key switch (Insert) Ignition switch (ON) Lighting switch (1st or 2nd) Seat belt buckle switch LH Front door switch LH	Warning chime (located in time control unit)
Rear window defogger	Ignition switch (ON) Rear window defogger switch	Rear window defogger relay

Schematic (Without Power Door Locks)

EKS003A7



LEL553

Time Control Unit Inspection Table (Without Power Door Locks)

EKS003A8

Terminal No.	Wire color	Connections	Operated condition	Voltage (Approx.)
1	W/B	Seat belt buckle switch LH	Unfasten → Fasten (Ignition key is in “ON” position)	0V → 5V
2	R	Front door switch LH	OFF (Closed) → ON (Open)	5V → 0V
3	G/B	Air control (Rear window defogger switch)	OFF → ON	5V → 0V
4	L/W	Ignition key switch (Insert)	Key inserted → Key removed from IGN key cylinder	12V → 0V
5	R/G	Combination switch (Lighting switch)	1ST, 2ND positions: ON → OFF	12V → 0V
7	PU	Power source (Fuse)	—	12V
8	B	Ground	—	—
9	G	Ignition switch (ON, START)	Ignition key is in “ON” or "START" position	12V
10	G/R	Rear window defogger relay	OFF → ON (Ignition key is in “ON” position)	0V → 12V

SECTION LAN

LAN SYSTEM

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

UKS0024Z

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

Precautions For Trouble Diagnosis

UKS00250

CAN SYSTEM

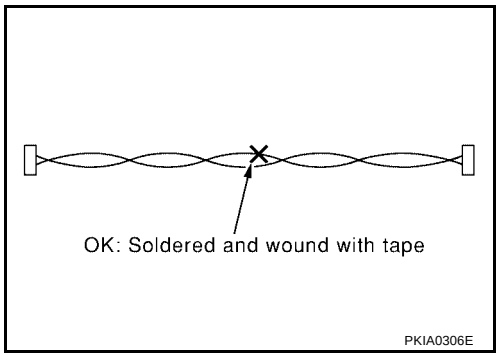
- Do not apply voltage of 7.0 V or higher to the measurement terminals.
- Use the tester with its open terminal voltage being 7.0 V or less.

Precautions For Harness Repair

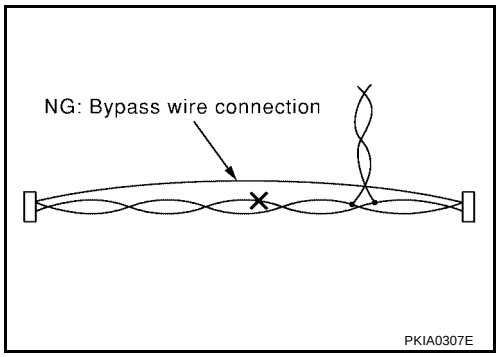
UKS00251

CAN SYSTEM

- Solder the repaired parts, and wrap with tape. [Frays of twisted line must be within 110 mm (4.33 in).]



- Do not perform bypass wire connections for the repair parts. (The spliced wire will become separated and the characteristics of twisted line will be lost.)



Wiring Diagrams and Trouble Diagnosis

UKS00252

When you read wiring diagrams, refer to the following:

- GI-13, "How to Read Wiring Diagrams"
- PG-3, "POWER SUPPLY ROUTING" for power distribution circuit

When you perform trouble diagnosis, refer to the following:

- GI-10, "HOW TO FOLLOW TEST GROUPS IN TROUBLE DIAGNOSES"
- GI-26, "How to Perform Efficient Diagnosis for an Electrical Incident"

Check for any Service bulletins before servicing the vehicle.

CAN COMMUNICATION

PFP:23710

System Description

UKS00253

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

CAN Communication Unit

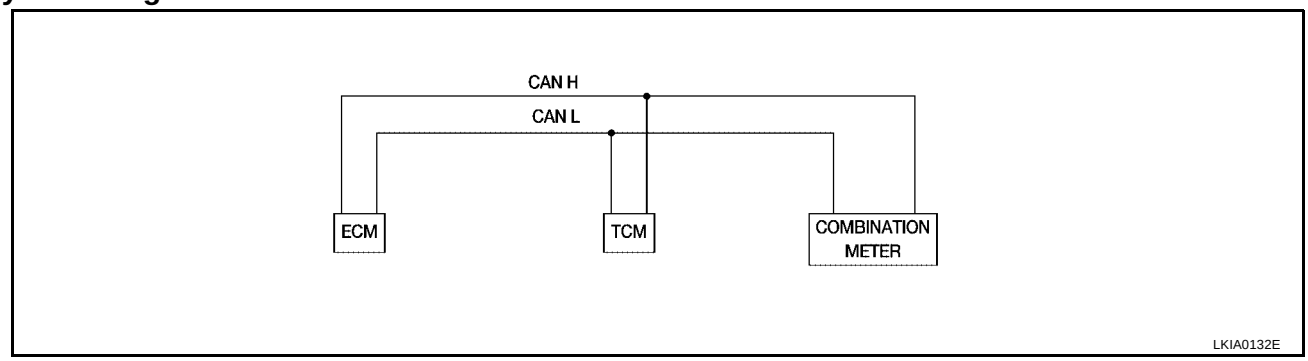
UKS00254

Go to CAN system, when selecting your CAN system type from the following table.

Body type	Sedan	
Axle	2WD	
Engine	QG18DE/QR25DE	
Transmission	A/T	M/T
CAN system type	1	2
CAN system trouble diagnosis	LAN-6, "CAN SYSTEM (TYPE 1)"	LAN-17, "CAN SYSTEM (TYPE 2)"

TYPE 1

System diagram



Input/output signal chart

T: Transmit R: Receive

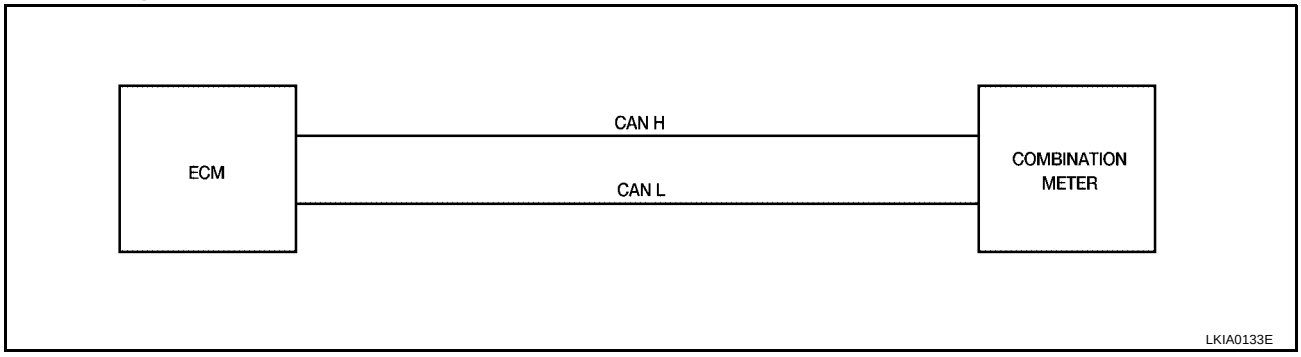
Signals	ECM	TCM	Combination Meter
Accelerator pedal position signal	T	R	
Output shaft revolution signal	R	T	
A/T self-diagnosis signal	R	T	
Closed throttle position signal	T	R	
Wide open throttle position signal	T	R	
Stop lamp switch signal		R	T
Overdrive control switch signal		R	T
O/D OFF indicator signal		T	R
Engine speed signal	T		R
Engine coolant temperature signal	T		R
Fuel consumption monitor signal*	T		R
Vehicle speed signal	R		T
Fuel level sensor signal	R		T
Malfunction indicator lamp signal	T		R
ASCD SET lamp signal	T		R
ASCD CRUISE lamp signal	T		R

Signals	ECM	TCM	Combination Meter
Engine and A/T integrated control signal	T	R	
	R	T	

*: For QR25DE models only

TYPE 2

System diagram



Input/output signal chart

T: Transmit R: Receive

Signals	ECM	Combination Meter
Engine speed signal	T	R
Engine coolant temperature signal	T	R
Fuel consumption monitor signal*	T	R
Vehicle speed signal	R	T
Fuel level sensor signal	R	T
Malfunction indicator lamp signal	T	R
ASCD SET lamp signal	T	R
ASCD CRUISE lamp signal	T	R

*: For QR25DE models

CAN SYSTEM (TYPE 1)

PFP:23710

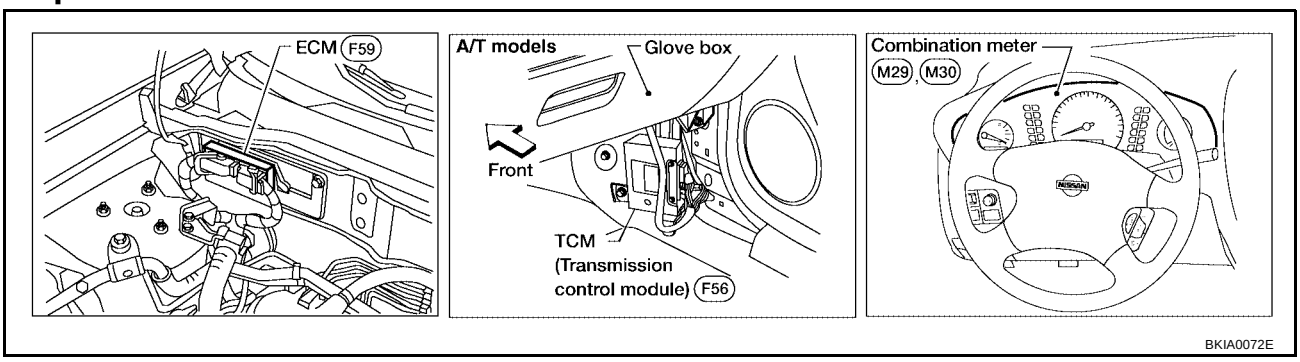
System Description

UKS00255

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

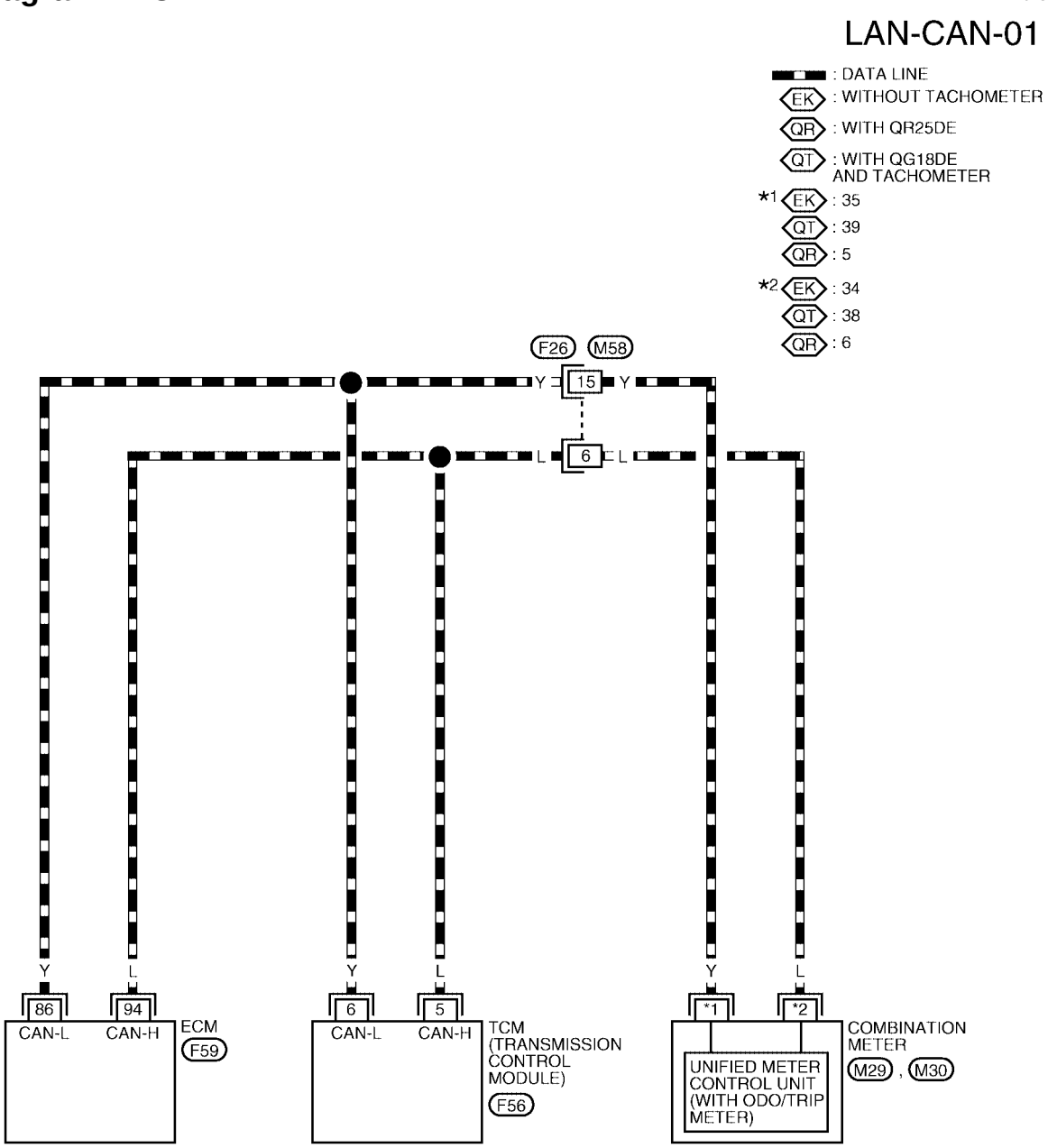
Component Parts and Harness Connector Location

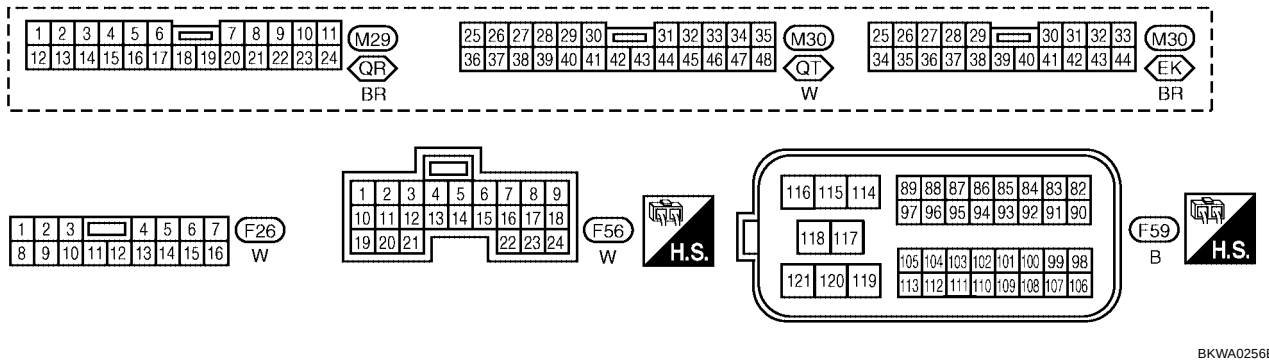
UKS00256



Wiring Diagram — CAN —

UKS00257



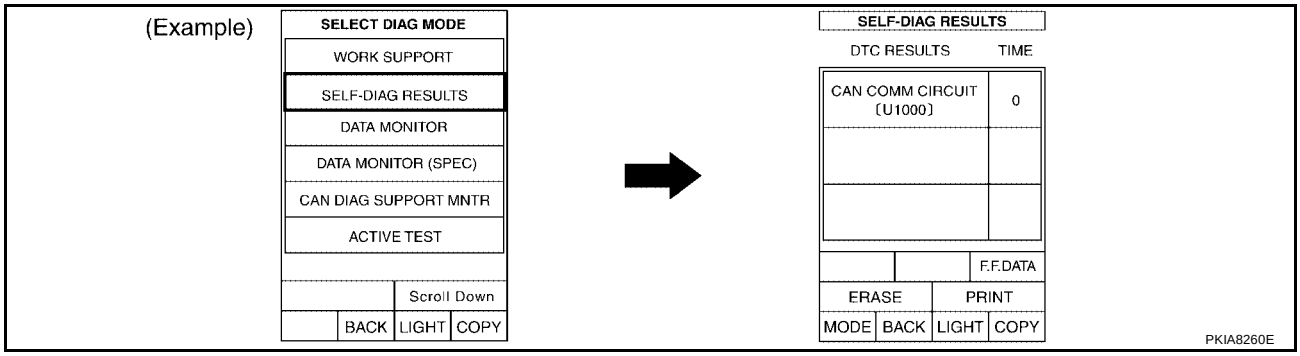


BKWA0256E

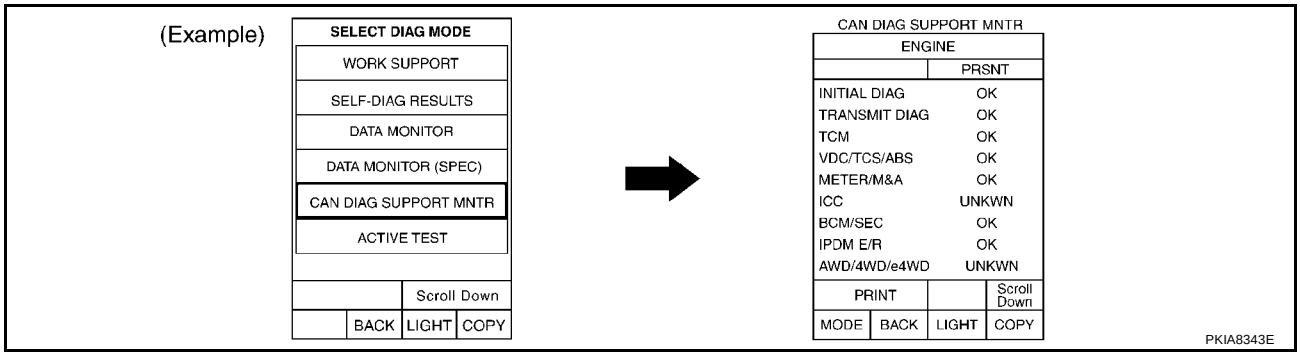
Work Flow

UKS00258

1. Print all the data of “SELF-DIAG RESULTS” for “ENGINE” and “A/T” displayed on CONSULT-II.



2. Print all the data of “CAN DIAG SUPPORT MNTR” for “ENGINE” and “A/T” displayed on CONSULT-II.



3. Attach the printed sheet of “SELF-DIAG RESULTS” and “CAN DIAG SUPPORT MNTR” onto the check sheet. Refer to LAN-9, "CHECK SHEET" .
4. Based on the “CAN DIAG SUPPORT MNTR” results, put check marks onto the items with “UNKWN” or “NG” in the check sheet table. Refer to LAN-9, "CHECK SHEET" .

   NOTE:
   If a check mark is put on “NG” on “INITIAL DIAG (Initial diagnosis)”, replace the control unit.
5. According to the check sheet results (example), start inspection. Refer to LAN-10, "CHECK SHEET RESULTS (EXAMPLE)" .

CHECK SHEET

NOTE:

If a check mark is put on “NG” on “INITIAL DIAG (Initial diagnosis)”, replace the control unit.

Check sheet table

SELECT SYSTEM screen	CAN DIAG SUPPORT MNTR				
	Initial diagnosis	Transmit diagnosis	Receive diagnosis		
			ECM	TCM	METER/ M&A
ENGINE	NG	UNKWN	-	UNKWN	UNKWN
A/T	NG	UNKWN	UNKWN	-	UNKWN

Symptoms:

Attach copy of ENGINE SELF-DIAG RESULTS

Attach copy of A/T SELF-DIAG RESULTS

Attach copy of ENGINE CAN DIAG SUPPORT MNTR

Attach copy of A/T CAN DIAG SUPPORT MNTR

WKIA2724E

CHECK SHEET RESULTS (EXAMPLE)

NOTE:

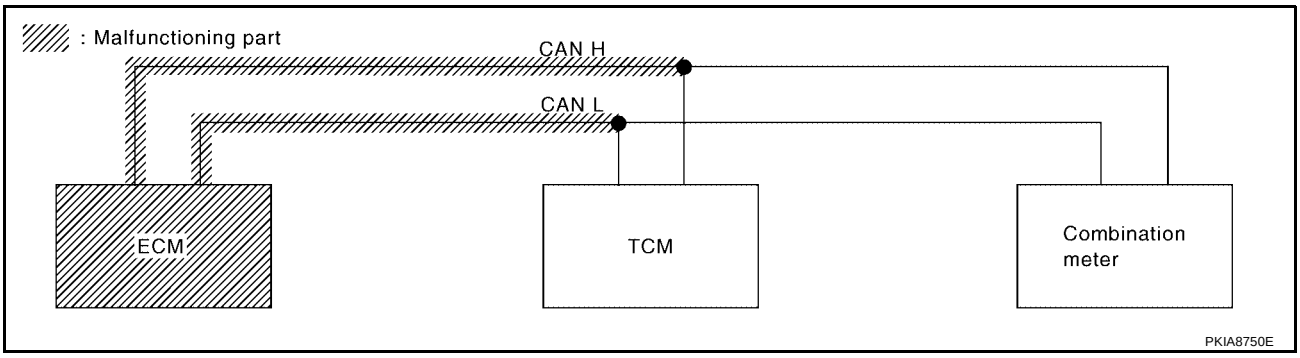
If a check mark is put on “NG” on “INITIAL DIAG (Initial diagnosis)”, replace the control unit.

Case 1

Check ECM circuit. Refer to LAN-12, "ECM Circuit Inspection" .

SELECT SYSTEM screen	CAN DIAG SUPPORT MNTR				
	Initial diagnosis	Transmit diagnosis	Receive diagnosis		
			ECM	TCM	METER/ M&A
ENGINE	NG	UNKWN ✓	-	UNKWN ✓	UNKWN ✓
A/T	NG	UNKWN	UNKWN ✓	-	UNKWN

WKIA2727E



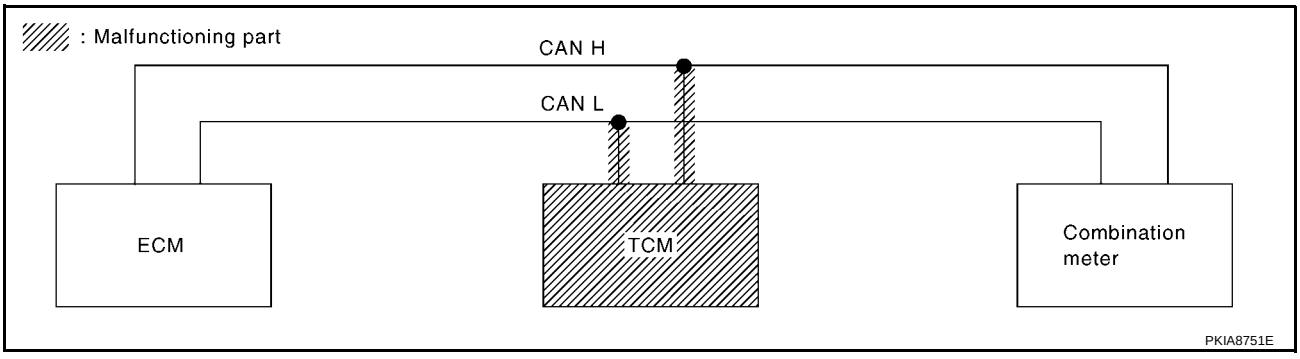
PKIA8750E

Case 2

Check TCM circuit. Refer to LAN-12, "TCM Circuit Inspection" .

SELECT SYSTEM screen	CAN DIAG SUPPORT MNTR				
	Initial diagnosis	Transmit diagnosis	Receive diagnosis		
			ECM	TCM	METER/ M&A
ENGINE	NG	UNKWN	-	UNKWN ✓	UNKWN
A/T	NG	UNKWN ✓	UNKWN ✓	-	UNKWN ✓

WKIA2728E



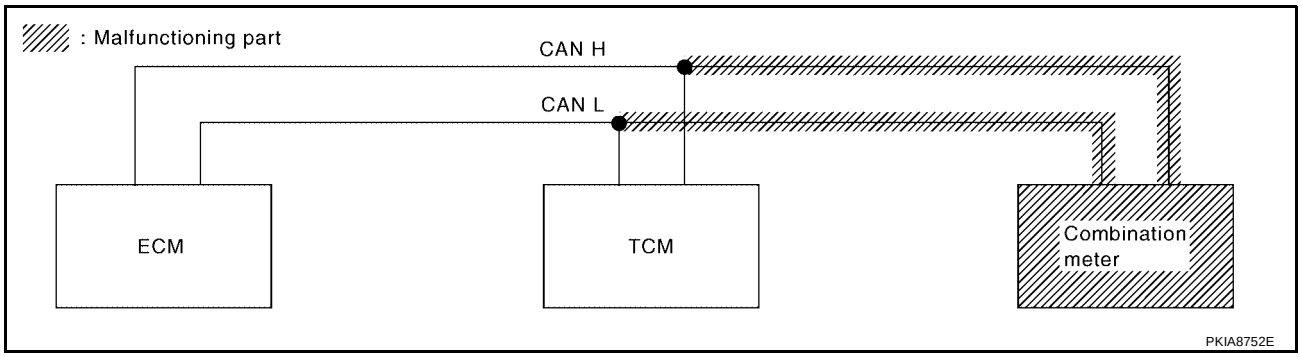
PKIA8751E

Case 3

Check combination meter circuit. Refer to LAN-13, "Combination Meter Circuit Inspection" .

SELECT SYSTEM screen	CAN DIAG SUPPORT MNTR				
	Initial diagnosis	Transmit diagnosis	Receive diagnosis		
			ECM	TCM	METER/ M&A
ENGINE	NG	UNKWN	-	UNKWN	UNKWN
A/T	NG	UNKWN	UNKWN	-	UNKWN

WKIA2729E



PKIA8752E

Case 4

Check CAN communication circuit. Refer to LAN-14, "CAN Communication Circuit Inspection" .

SELECT SYSTEM screen	CAN DIAG SUPPORT MNTR				
	Initial diagnosis	Transmit diagnosis	Receive diagnosis		
			ECM	TCM	METER/ M&A
ENGINE	NG	UNKWN	-	UNKWN	UNKWN
A/T	NG	UNKWN	UNKWN	-	UNKWN

WKIA2730E

ECM Circuit Inspection

UKS00259

1. CHECK CONNECTOR

1. Turn ignition switch OFF.
2. Check terminals and connectors of ECM for damage, bend and loose connection (control module side and harness side).

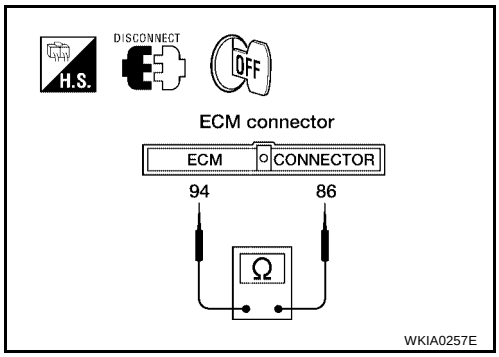
OK or NG

OK >> GO TO 2.
NG >> Repair terminal or connector.

2. CHECK HARNESS FOR OPEN CIRCUIT

1. Disconnect ECM connector.
2. Check resistance between ECM harness connector F59 terminals 94 (L) and 86 (Y).

94 (L) – 86 (Y) : Approx. 108 – 132 Ω



OK or NG

OK >> Replace ECM.
NG >> Repair harness between ECM and TCM.

TCM Circuit Inspection

UKS0025A

1. CHECK CONNECTOR

1. Turn ignition switch OFF.
2. Check terminals and connectors of TCM for damage, bend and loose connection (control module side and harness side).

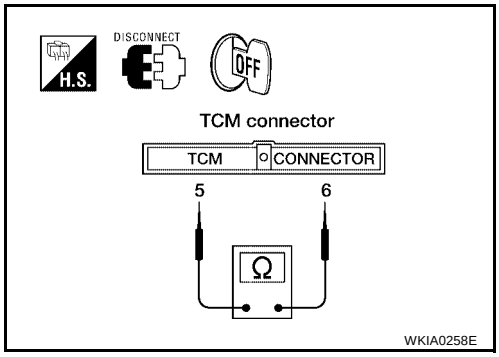
OK or NG

OK >> GO TO 2.
NG >> Repair terminal or connector.

2. CHECK HARNESS FOR OPEN CIRCUIT

1. Disconnect TCM connector.
2. Check resistance between TCM harness connector F56 terminals 5 (L) and 6 (Y).

5 (L) – 6 (Y) : Approx. 54 – 66 Ω



OK or NG

OK >> Replace TCM.
NG >> Repair harness between TCM and ECM.

Combination Meter Circuit Inspection

UKS0025B

1. CHECK CONNECTOR

1. Turn ignition switch OFF.
2. Check terminals and connectors of combination meter for damage, bend and loose connection (meter side and harness side).

OK or NG

OK >> GO TO 2.
NG >> Repair terminal or connector.

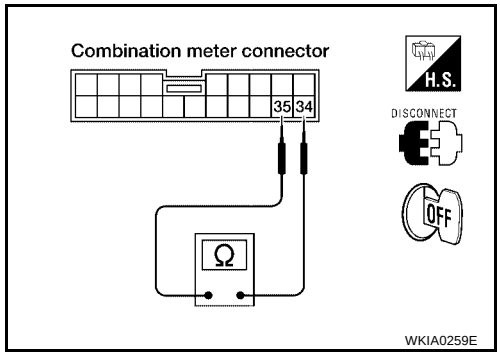
2. CHECK HARNESS FOR OPEN CIRCUIT

1. Disconnect combination meter connector.
2. Check the following.

Without tachometer

- Resistance between combination meter harness connector M30 terminals 34 (L) and 35 (Y).

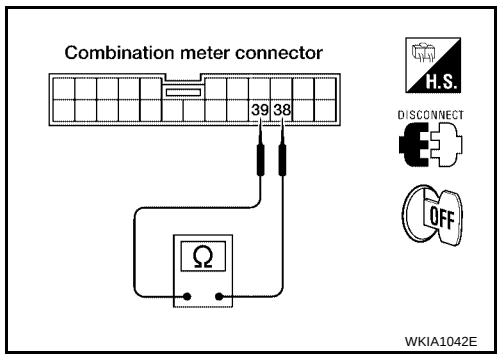
34 (L) – 35 (Y) : Approx. 108 – 132 Ω



With tachometer (QG18DE)

- Resistance between combination meter harness connector M30 terminals 38 (L) and 39 (Y).

38 (L) – 39 (Y) : Approx. 108 – 132 Ω



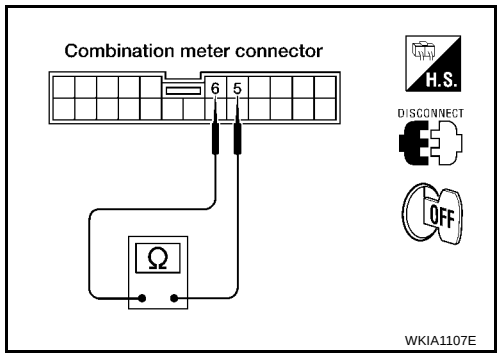
With tachometer (QR25DE)

- Resistance between combination meter harness connector M29 terminals 6 (L) and 5 (Y).

6 (L) – 5 (Y) : Approx. 108 – 132 Ω

OK or NG

OK >> Replace combination meter.
NG >> Repair harness between combination meter and TCM.



CAN Communication Circuit Inspection

UKS0025C

1. CHECK CONNECTOR

1. Turn ignition switch OFF.
2. Check following terminals and connectors for damage, bend and loose connection (meter side, control module side and harness side).

- Combination meter
- TCM
- ECM
- Between combination meter and ECM

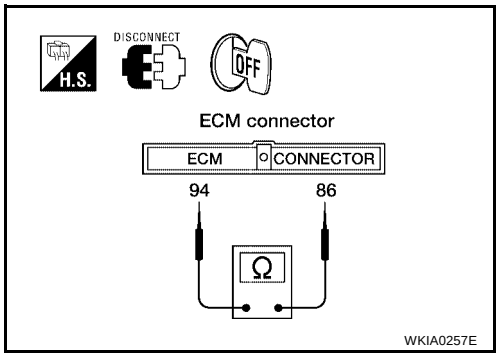
OK or NG

OK >> GO TO 2.
NG >> Repair terminal or connector.

2. CHECK HARNESS FOR SHORT CIRCUIT

1. Disconnect ECM connector, TCM connector and harness connector F26.
2. Check continuity between ECM harness connector F59 terminals 94 (L) and 86 (Y).

94 (L) – 86 (Y) : Continuity should not exist.



OK or NG

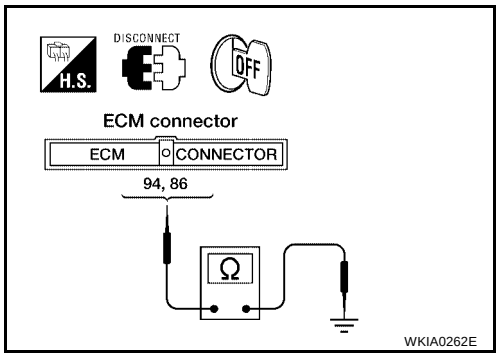
OK >> GO TO 3.
NG >> Check the following harnesses. If any harness is damaged, repair the harness.

- Repair harness between ECM and harness connector F26
- Repair harness between ECM and TCM

3. CHECK HARNESS FOR SHORT CIRCUIT

Check continuity between ECM harness connector F59 terminals 94 (L), 86 (Y) and ground.

94 (L) – Ground : Continuity should not exist.
86 (Y) – Ground : Continuity should not exist.



OK or NG

OK >> GO TO 4.
NG >> Check the following harnesses. If any harness is damaged, repair the harness.

- Repair harness between ECM and harness connector F26
- Repair harness between ECM and TCM

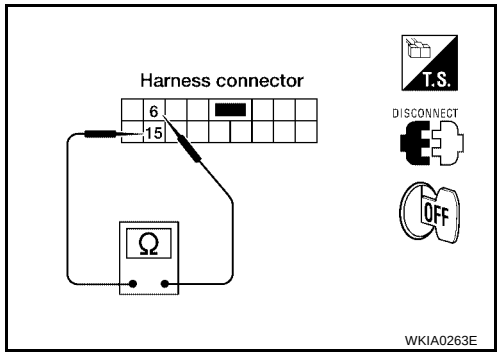
4. CHECK HARNESS FOR SHORT CIRCUIT

1. Disconnect combination meter connector.
2. Check continuity between harness connector M58 terminals 6 (L) and 15 (Y).

6 (L) – 15 (Y) : Continuity should not exist.

OK or NG

OK >> GO TO 5.
NG >> Repair harness between harness connector M58 and combination meter.



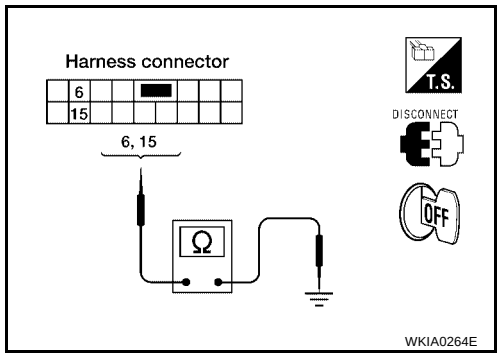
5. CHECK HARNESS FOR SHORT CIRCUIT

Check continuity between harness connector M58 terminals 6 (L), 15 (Y) and ground.

6 (L) – Ground : Continuity should not exist.
15 (Y) – Ground : Continuity should not exist.

OK or NG

OK >> GO TO 6.
NG >> Repair harness between harness connector M58 and combination meter.



6. CHECK ECM AND COMBINATION METER INTERNAL CIRCUIT

Check components inspection. Refer to LAN-15, "CHECK ECM AND COMBINATION METER INTERNAL CIRCUIT" .

OK or NG

OK >> Connect all the connectors and diagnose again. Refer to LAN-8, "Work Flow" .
NG >> Replace ECM and/or combination meter.

Component Inspection

UKS0025D

CHECK ECM AND COMBINATION METER INTERNAL CIRCUIT

1. Remove ECM and combination meter from vehicle.
2. Check resistance between ECM terminals 94 and 86.
3. Check the following.

Without tachometer

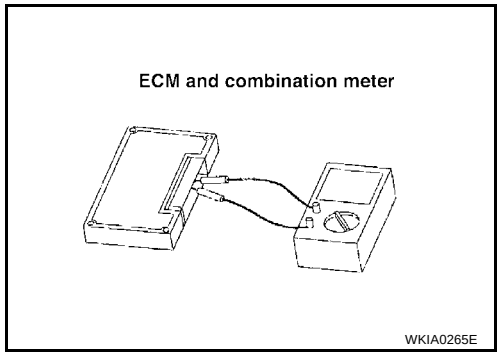
– Check resistance between combination meter terminals 34 and 35.

With tachometer (QG18DE)

– Check resistance between combination meter terminals 38 and 39.

With tachometer (QR25DE)

– Check resistance between combination meter terminals 5 and 6.



Unit	Terminal	Resistance (Ω) (Approx.)
ECM	94 – 86	108 – 132
Combination meter (Without tachometer)	34 – 35	
Combination meter (QG18DE with tachometer)	38 – 39	
Combination meter (QR25DE with tachometer)	5 – 6	

CAN SYSTEM (TYPE 2)

PFP:23710

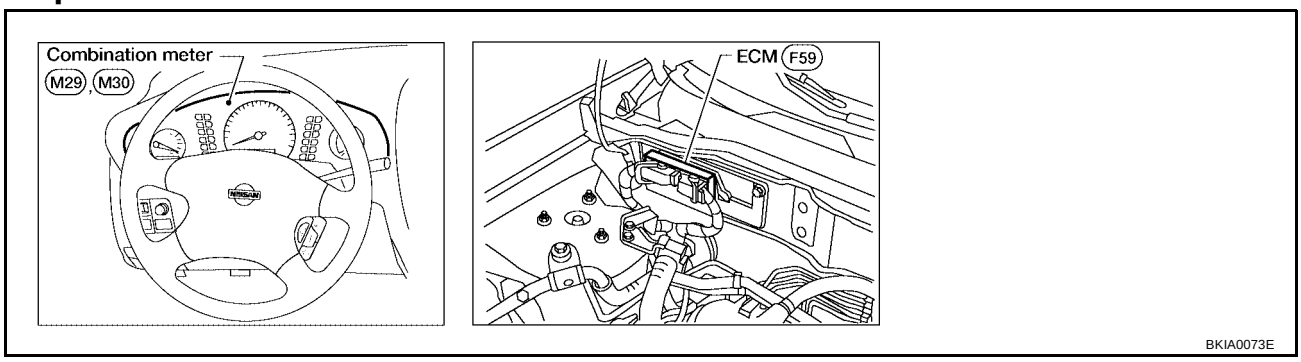
System Description

UKS0025E

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

Component Parts and Harness Connector Location

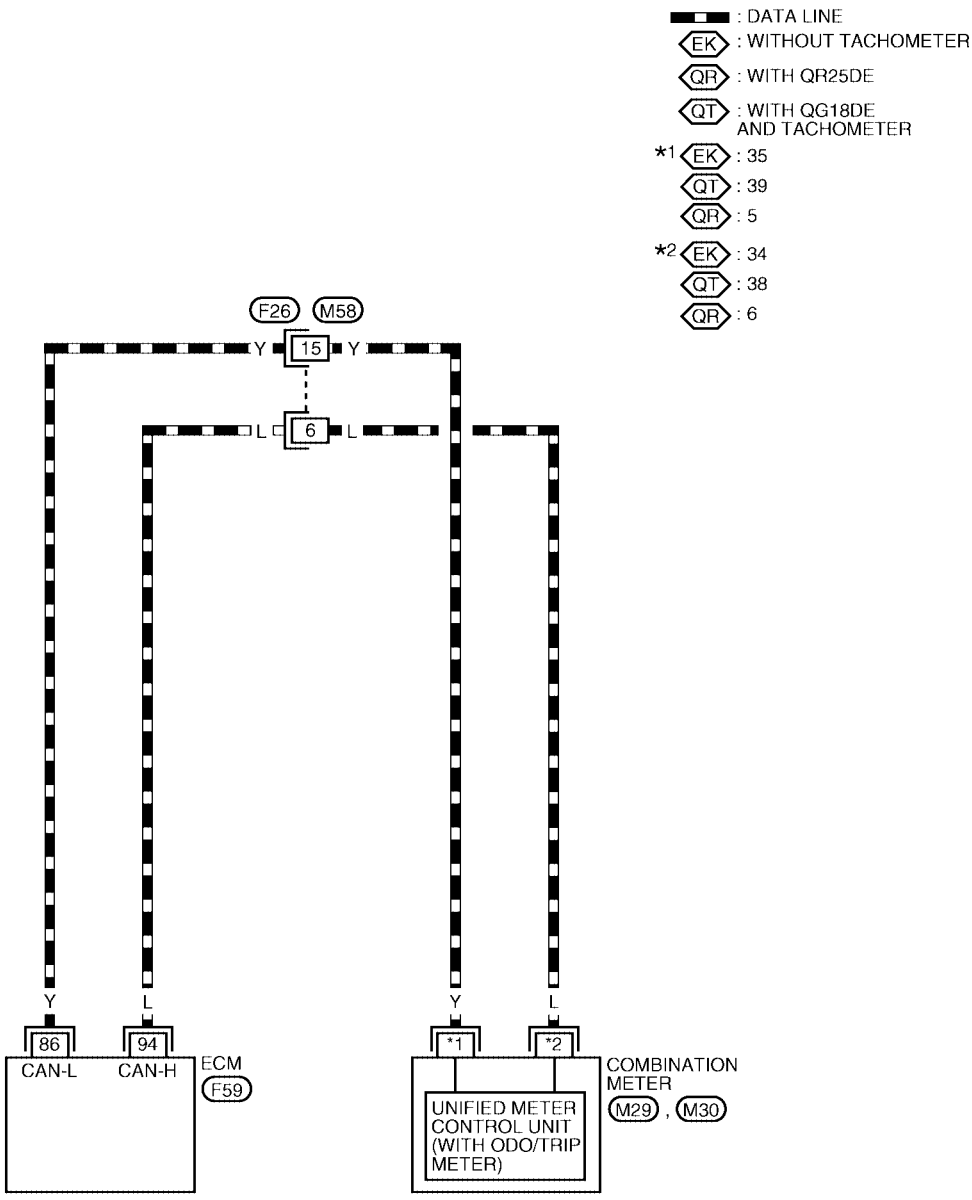
UKS0025F

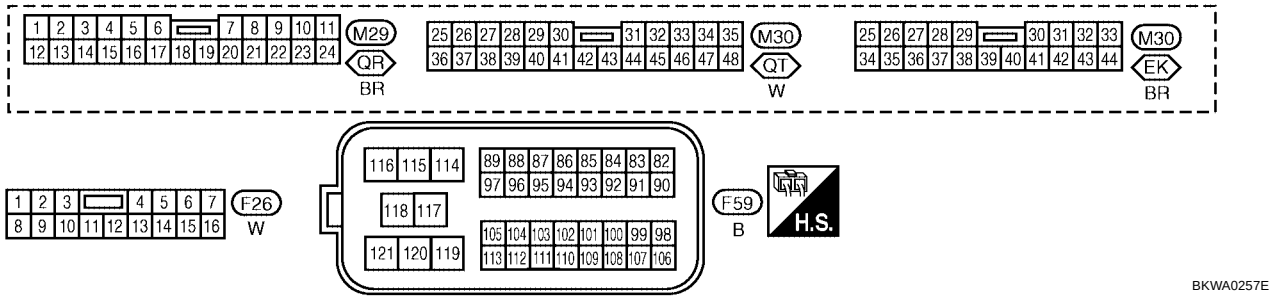


Wiring Diagram — CAN —

UKS0025G

LAN-CAN-02



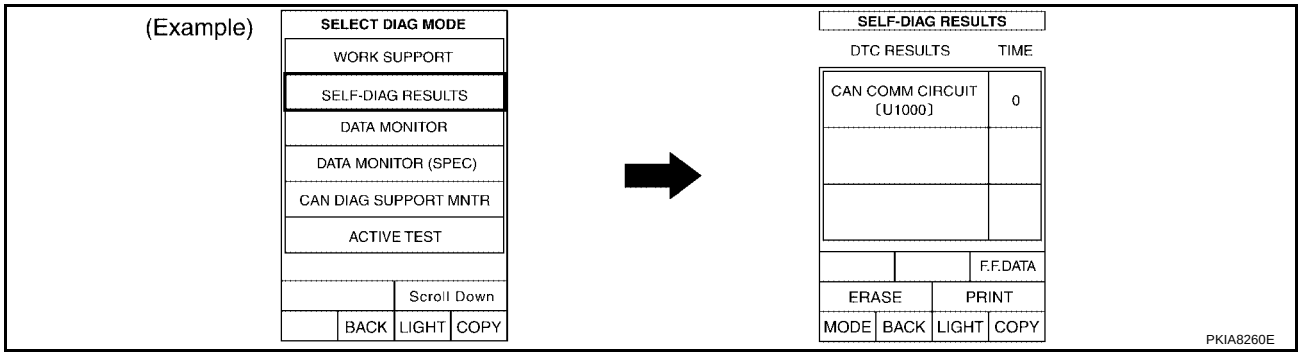


BKWA0257E

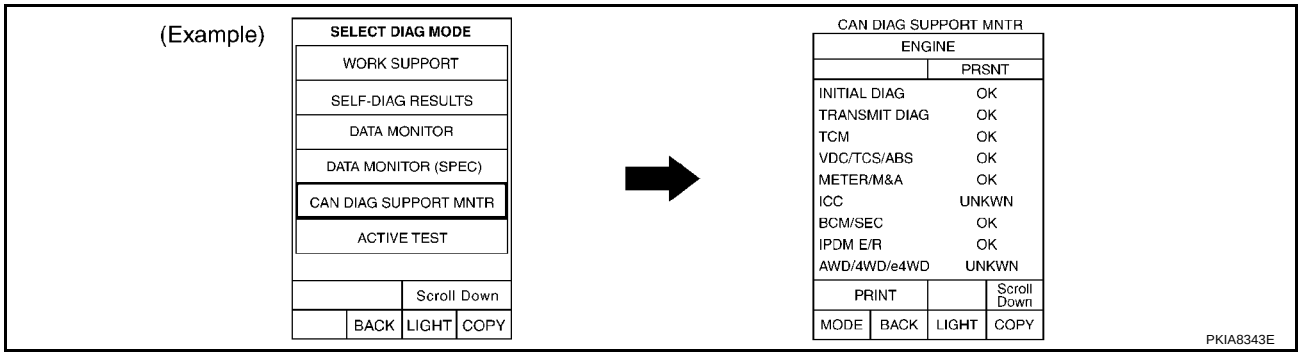
Work Flow

UKS0025H

1. Print all the data of “SELF-DIAG RESULTS” for “ENGINE” displayed on CONSULT-II.



2. Print all the data of “CAN DIAG SUPPORT MNTR” for “ENGINE” displayed on CONSULT-II.



3. Attach the printed sheet of “SELF-DIAG RESULTS” and “CAN DIAG SUPPORT MNTR” onto the check sheet. Refer to LAN-20, "CHECK SHEET" .
4. Based on the “CAN DIAG SUPPORT MNTR” results, put check marks onto the items with “UNKWN” or “NG” in the check sheet table. Refer to LAN-20, "CHECK SHEET" .

   NOTE:
   If a check mark is put on “NG” on “INITIAL DIAG (Initial diagnosis)”, replace the control unit.
5. According to the check sheet results (example), start inspection. Refer to LAN-21, "CHECK SHEET RESULTS (EXAMPLE)" .

CHECK SHEET

NOTE:

If a check mark is put on “NG” on “INITIAL DIAG (Initial diagnosis)”, replace the control unit.

SELECT SYSTEM screen	CAN DIAG SUPPORT MNTR			
	Initial diagnosis	Transmit diagnosis	Receive diagnosis	
			ECM	METER/ M&A
ENGINE	NG	UNKWN	-	UNKWN

Symptoms:

Attach copy of
ENGINE
SELF-DIAG RESULTS

Attach copy of
ENGINE
CAN DIAG SUPPORT
MNTR

WKIA2731E

CHECK SHEET RESULTS (EXAMPLE)

NOTE:

If a check mark is put on “NG” on “INITIAL DIAG (Initial diagnosis)”, replace the control unit.

Case 1

Check CAN communication circuit. Refer to LAN-22, "CAN Communication Circuit Inspection" .

SELECT SYSTEM screen	CAN DIAG SUPPORT MNTR			
	Initial diagnosis	Transmit diagnosis	Receive diagnosis	
			ECM	METER/ M&A
ENGINE	NG	UNKWN ✓	-	UNKWN ✓

WKIA2733E

CAN Communication Circuit Inspection

UKS0025I

1. CHECK CONNECTOR

1. Turn ignition switch OFF.
2. Check following terminals and connectors for damage, bend and loose connection (meter side, control module side and harness side).

- Combination meter
- ECM
- Between combination meter and ECM

OK or NG

OK >> GO TO 2.
NG >> Repair terminal or connector.

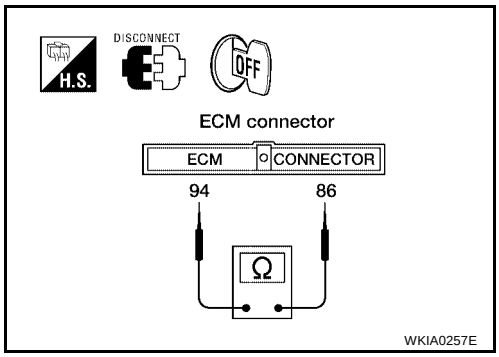
2. CHECK HARNESS FOR SHORT CIRCUIT

1. Disconnect ECM connector and harness connector F26.
2. Check continuity between ECM harness connector F59 terminals 94 (L) and 86 (Y).

94 (L) – 86 (Y) : Continuity should not exist.

OK or NG

OK >> GO TO 3.
NG >> Repair harness between ECM and harness connector F26.



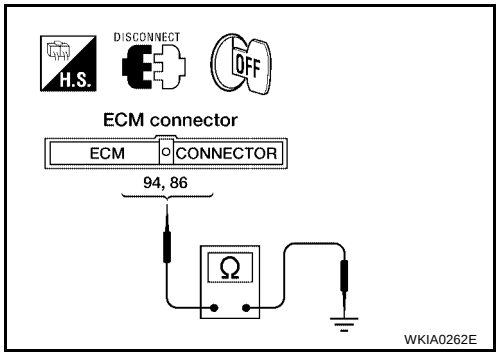
3. CHECK HARNESS FOR SHORT CIRCUIT

Check continuity between ECM harness connector F59 terminals 94 (L), 86 (Y) and ground.

94 (L) – Ground : Continuity should not exist.
86 (Y) – Ground : Continuity should not exist.

OK or NG

OK >> GO TO 4.
NG >> Repair harness between ECM and harness connector F26.



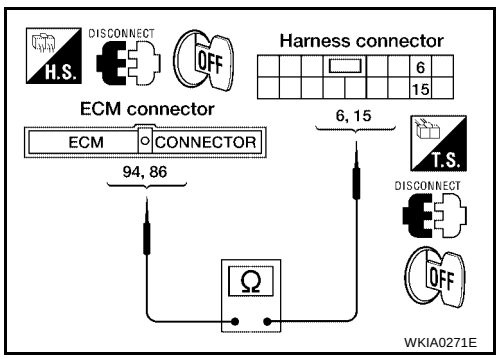
4. CHECK HARNESS FOR OPEN CIRCUIT

Check continuity between ECM harness connector F59 terminals 94 (L), 86 (Y) and harness connector F26 terminals 6 (L), 15 (Y).

94 (L) – 6 (L) : Continuity should exist.
86 (Y) – 15 (Y) : Continuity should exist.

OK or NG

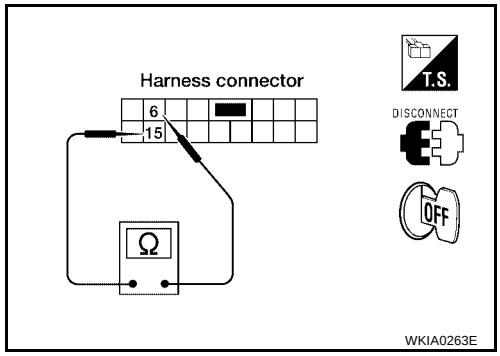
OK >> GO TO 5.
NG >> Repair harness.



5. CHECK HARNESS FOR SHORT CIRCUIT

1. Disconnect combination meter connector.
2. Check continuity between harness connector M58 terminals 6 (L) and 15 (Y).

6 (L) – 15 (Y) : Continuity should not exist.



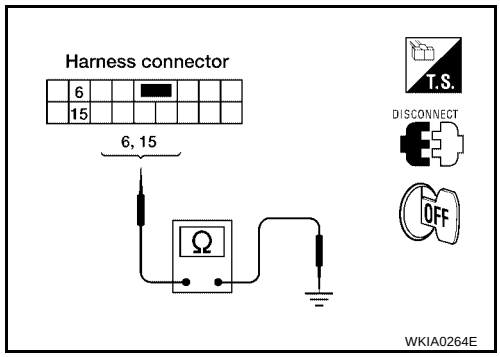
OK or NG

OK >> GO TO 6.
NG >> Repair harness between harness connector M58 and combination meter.

6. CHECK HARNESS FOR SHORT CIRCUIT

Check continuity between harness connector M58 terminals 6 (L), 15 (Y) and ground.

6 (L) – Ground : Continuity should not exist.
15 (Y) – Ground : Continuity should not exist.



OK or NG

OK >> GO TO 7.
NG >> Repair harness between harness connector M58 and combination meter.

7. CHECK HARNESS FOR OPEN CIRCUIT

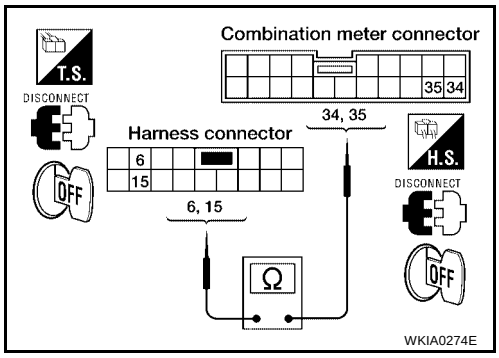
Check the following.

Without tachometer

- Continuity between harness connector M58 terminals 6 (L), 15 (Y) and combination meter harness connector M30 terminals 34 (L), 35 (Y).

6 (L) – 34 (L) : Continuity should exist.

15 (Y) – 35 (Y) : Continuity should exist.

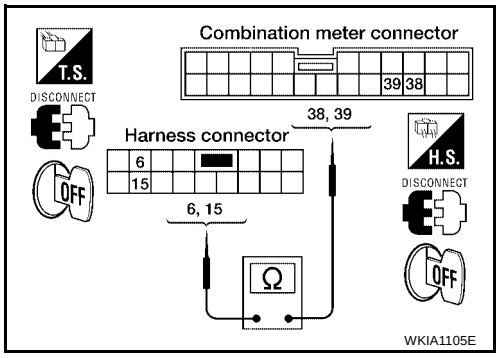


With tachometer (QG18DE)

- Continuity between harness connector M58 terminals 6 (L), 15 (Y) and combination meter harness connector M30 terminals 38 (L), 39 (Y).

6 (L) – 38 (L) : Continuity should exist.

15 (Y) – 39 (Y) : Continuity should exist.

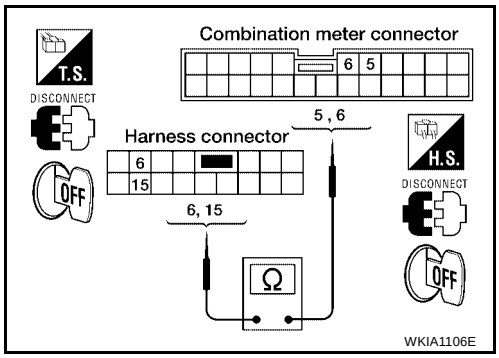


With tachometer (QR25DE)

- Continuity between harness connector M58 terminals 6 (L), 15 (Y) and combination meter harness connector M29 terminals 6 (L), 5 (Y).

6 (L) – 6 (L) : Continuity should exist.

15 (Y) – 5 (Y) : Continuity should exist.



OK or NG

OK >> GO TO 8.

NG >> Repair harness.

8. CHECK ECM AND COMBINATION METER INTERNAL CIRCUIT

Check components inspection. Refer to LAN-25, "CHECK ECM AND COMBINATION METER INTERNAL CIRCUIT" .

OK or NG

OK >> Connect all the connectors and diagnose again. Refer to LAN-19, "Work Flow" .

NG >> Replace ECM and/or combination meter.

Component Inspection

UKS0025J

CHECK ECM AND COMBINATION METER INTERNAL CIRCUIT

1. Remove ECM and combination meter from vehicle.
2. Check resistance between ECM terminals 94 and 86.
3. Check the following.

Without tachometer

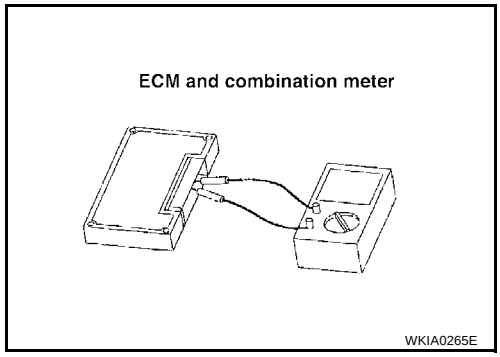
- Check resistance between combination meter terminals 34 and 35.

With tachometer (QG18DE)

- Check resistance between combination meter terminals 38 and 39.

With tachometer (QR25DE)

- Check resistance between combination meter terminals 5 and 6.



Unit	Terminal	Resistance (Ω) (Approx.)
ECM	94 – 86	108 – 132
Combination meter (Without tachometer)	34 – 35	
Combination meter (QG18DE with tachometer)	38 – 39	
Combination meter (QR25DE with tachometer)	5 – 6	

SECTION AV

AUDIO, VISUAL & TELEPHONE SYSTEM

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MID LEVEL SYSTEM 2
PREMIUM SYSTEM 2
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Antenna Removal and Installation 16

AUDIO

PFP:28111

System Description

EKS003AI

BASE SYSTEM

Refer to Owner's Manual for audio system operating instructions.
Power is supplied at all times:

- through 15A fuse (No. 32, located in the fuse and fusible link box)
- to audio unit terminal 6.

With the ignition switch in the ACC or ON position, power is supplied:

- through 10A fuse [No. 1, located in the fuse block (J/B)]
- to audio unit terminal 10.

Ground is supplied through the case of the audio unit.
Audio signals are supplied:

- through audio unit terminals 1, 2, 3, 4, 13, 14, 15 and 16
- to terminals + and - of front door speaker LH and RH
- to terminals + and - of rear speaker LH and RH.

MID LEVEL SYSTEM

Refer to Owner's Manual for audio system operating instructions.
Power is supplied at all times:

- through 15A fuse (No. 32, located in the fuse and fusible link box)
- to audio unit terminal 6.

With the ignition switch in the ACC or ON position, power is supplied:

- through 10A fuse [No. 1, located in the fuse block (J/B)]
- to audio unit terminal 10.

Ground is supplied through the case of the audio unit.
Ground is supplied to subwoofer amp. terminal 7 through body grounds B13 and B19.
Audio signals are supplied:

- through audio unit terminals 1, 2, 3, 4, 13, 14, 15 and 16
- to terminals + and - of front door speaker LH and RH
- to terminals + and - of rear speaker LH and RH
- to terminals + and - of pillar tweeter LH and RH and
- to terminals 1, 2, 3 and 4 of subwoofer amp.

PREMIUM SYSTEM

Refer to Owner's Manual for audio system operating instructions.
Power is supplied at all times:

- through 15A fuse (No. 32, located in the fuse and fusible link box)
- to audio unit terminal 6
- through 20A fuse (No. 42, located in the fuse and fusible link box)
- to audio amplifier terminals 1 and 2.

With the ignition switch in the ACC or ON position, power is supplied:

- through 10A fuse [No. 1, located in the fuse block (J/B)]
- to audio unit terminal 10.

Ground is supplied through the case of the audio unit.
Ground is supplied:

- to audio amplifier terminals 3 and 4
- through body grounds B13 and B19.

Audio signals are supplied:

- through audio unit terminals 1, 2, 3, 4, and 12
- to audio amplifier terminals 13, 14, 15, 16, 17, 18, 19, 20 and 24
- through audio unit terminals 13, 14, 15 and 16

- to terminals + and - of rear speaker LH and RH.

The audio signals are amplified by the audio amplifier and then supplied:

- through audio amplifier terminals 5, 6, 7, 8, 9, 10, 11, and 12.
- to terminals + and - of front door speaker LH and RH
- to terminals + and - of pillar tweeter LH and RH and
- to terminals 1, 2, 3 and 4 of subwoofer.

Satellite Radio Tuner (Pre-wiring)

The satellite radio tuner pre-wiring allows connection of a satellite radio tuner.
Power is supplied at all times:

- through 15A fuse [No. 32, located in the fuse and fusible link box]
- to satellite radio tuner pre-wiring terminal 18 (with CD autochanger) or 32 (without CD autochanger).

With the ignition switch in the ACC or ON position, power is supplied:

- through 10A fuse [No. 1, located in the fuse block (J/B)]
- to satellite radio tuner pre-wiring terminal 17 (with CD autochanger) or 36 (without CD autochanger).

Ground is supplied through the case of the satellite radio tuner.
Then audio signals are supplied:

- through satellite radio tuner pre-wiring terminals 22, 23, 31 and 32 (with CD autochanger) or 21, 22, 23 and 24 (without CD autochanger)
- to audio unit terminals 41, 42, 43 and 44.

CD Autochanger

Refer to Owner's Manual for CD autochanger operating instructions.
Power is supplied at all times:

- through 15A fuse [No. 32, located in the fuse and fusible link box]
- to CD autochanger terminal 4.

With the ignition switch in the ACC or ON position, power is supplied:

- through 10A fuse [No. 1, located in the fuse block (J/B)]
- to CD autochanger terminal 6.

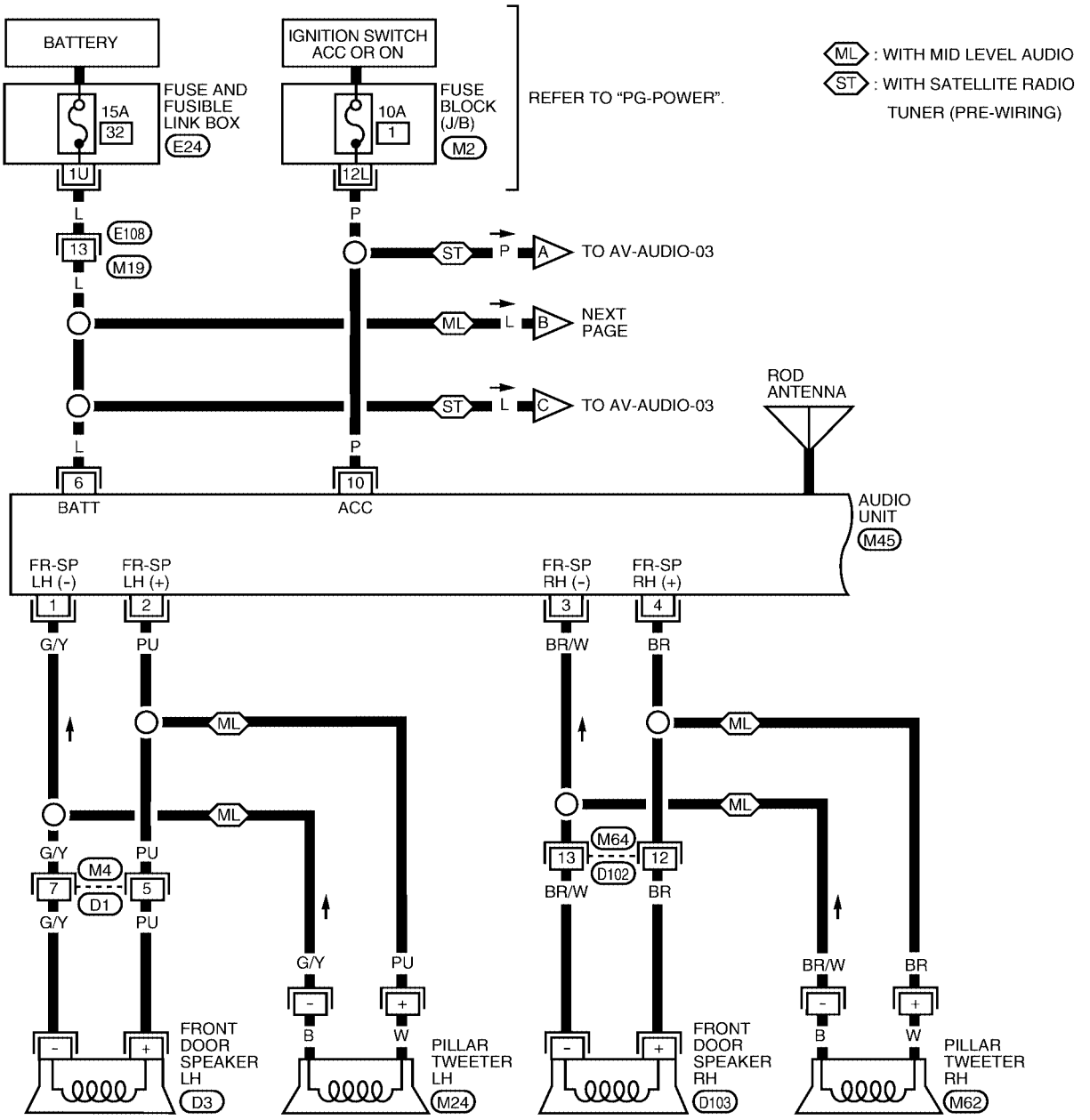
Ground is supplied through the case of the CD autochanger.
Audio signals are supplied:

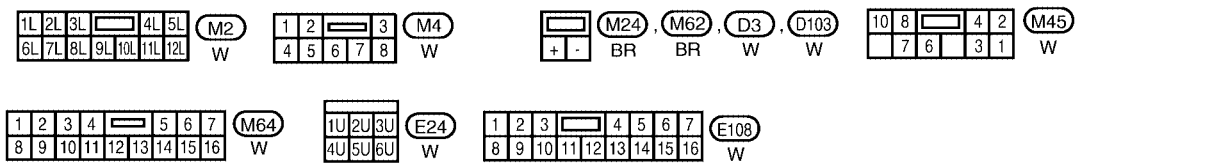
- through CD autochanger terminals 1, 2, 7 and 8
- to audio unit terminals 41, 42, 43 and 44.

Wiring Diagram — AUDIO — /Base and Mid Level System

EKS003AJ

AV-AUDIO-01

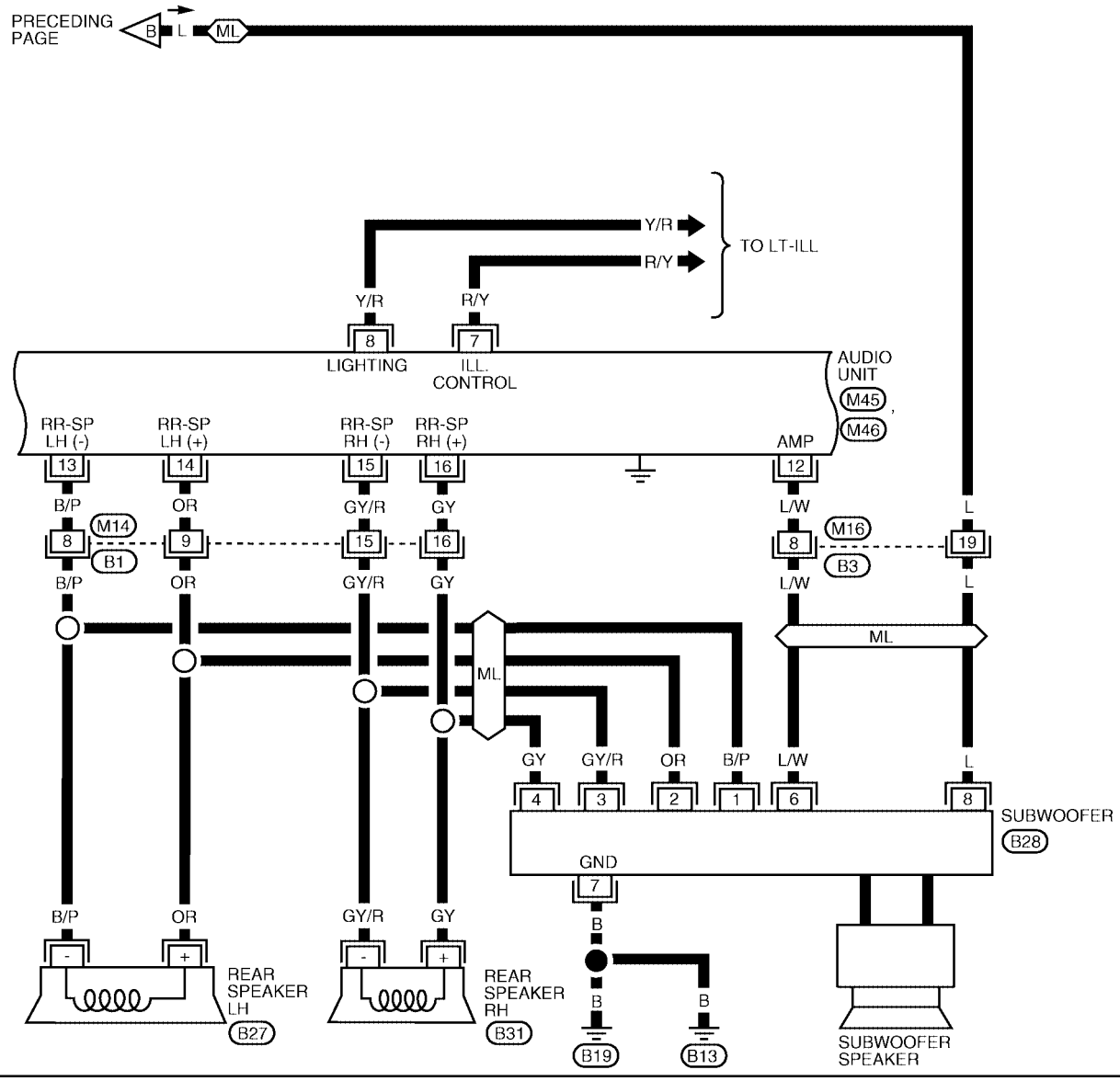


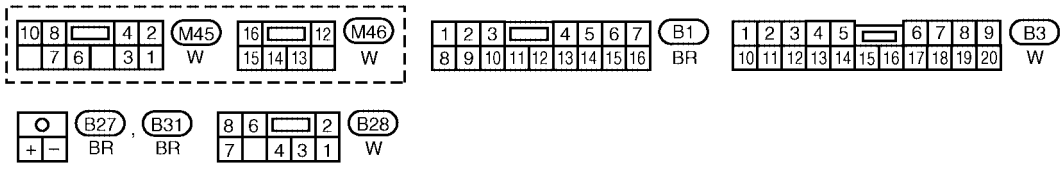


WKWA1830E

AV-AUDIO-02

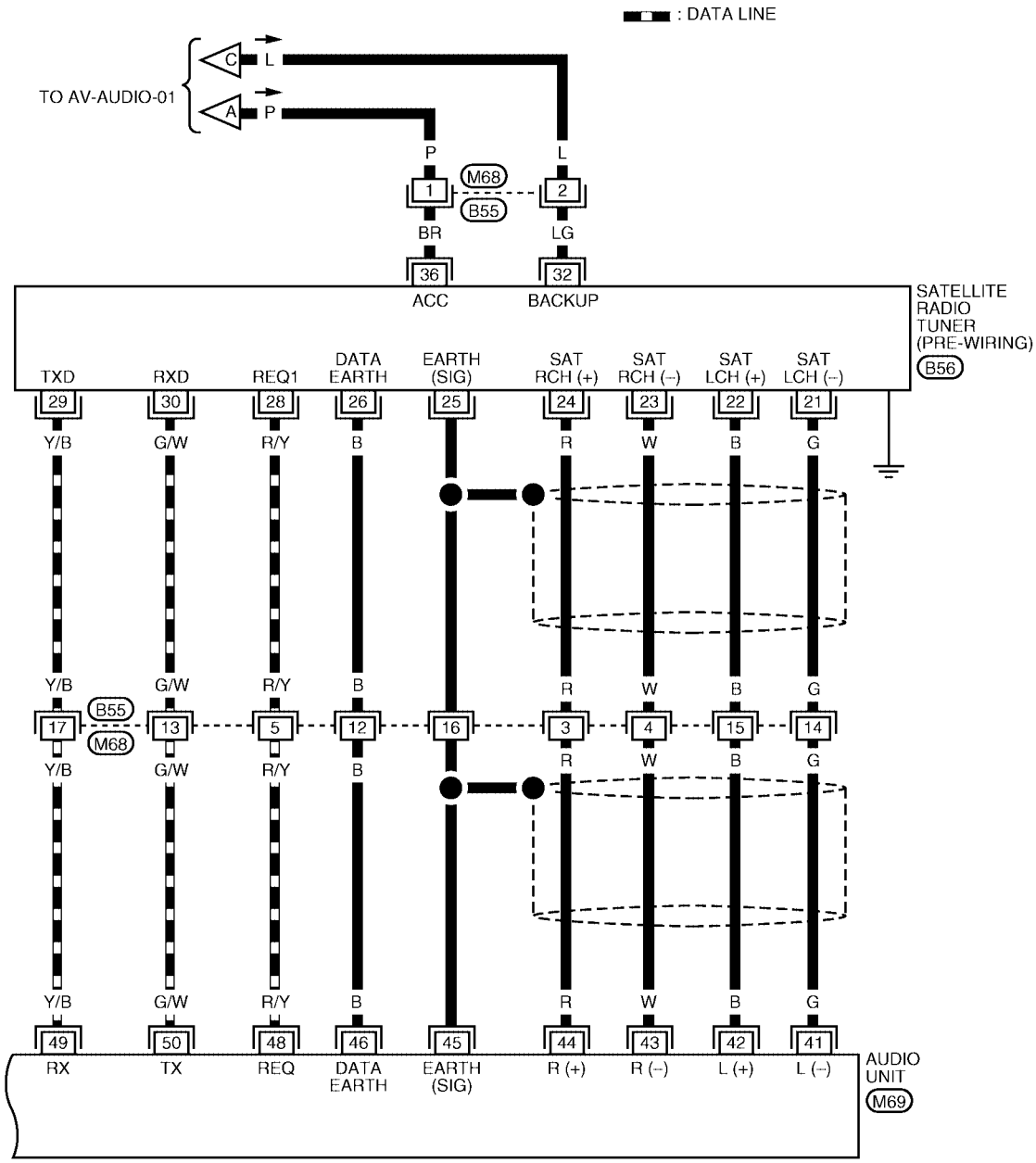
ML : WITH MID LEVEL AUDIO

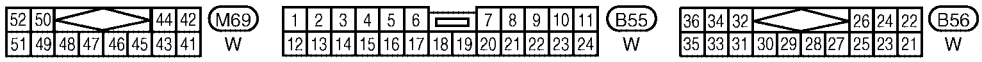




WKWA1842E

AV-AUDIO-03

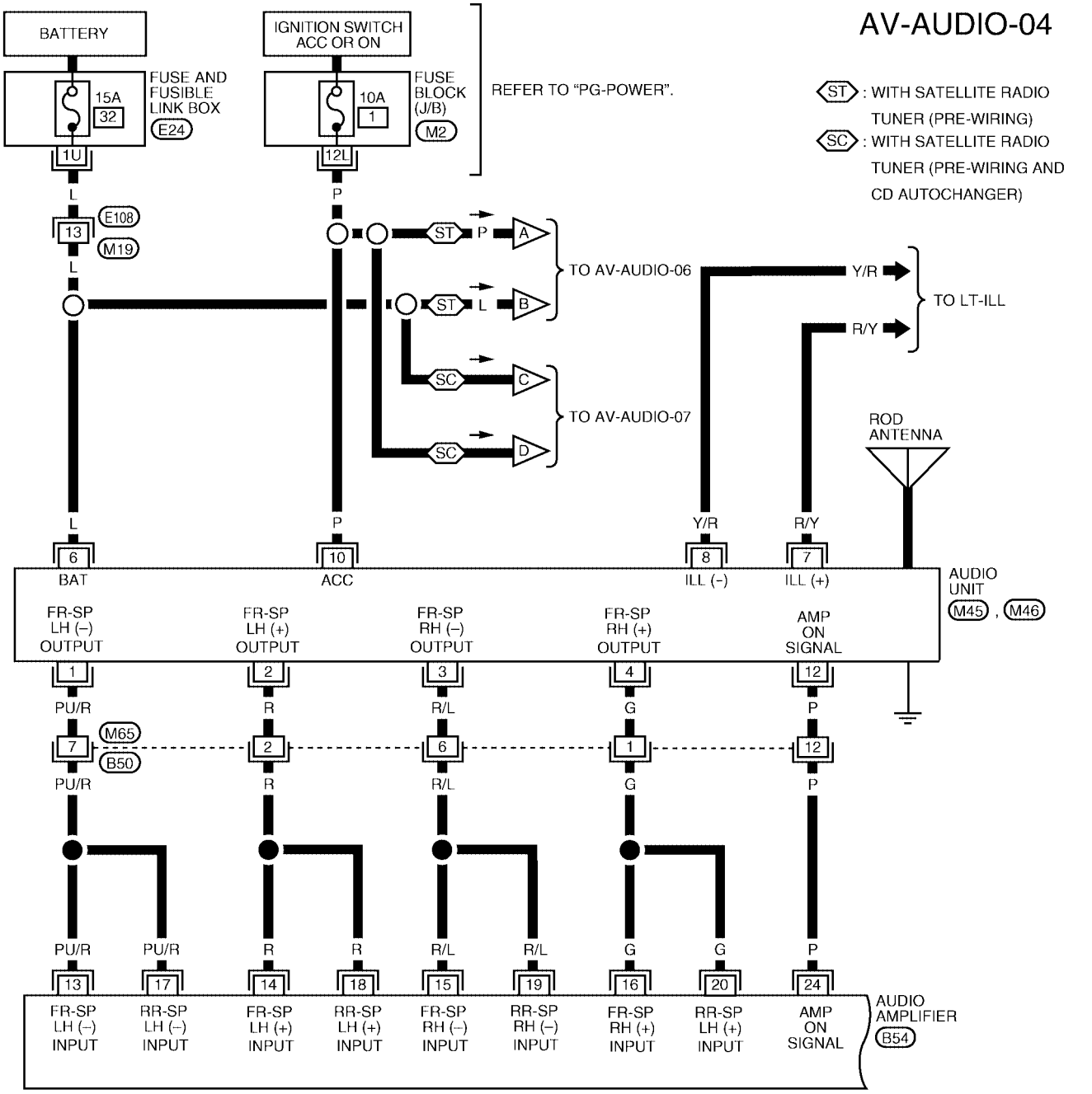


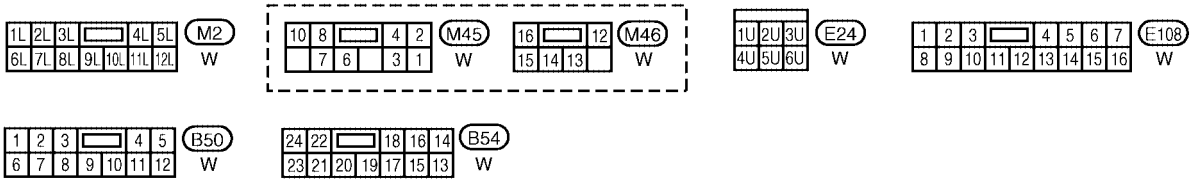


WKWA1831E

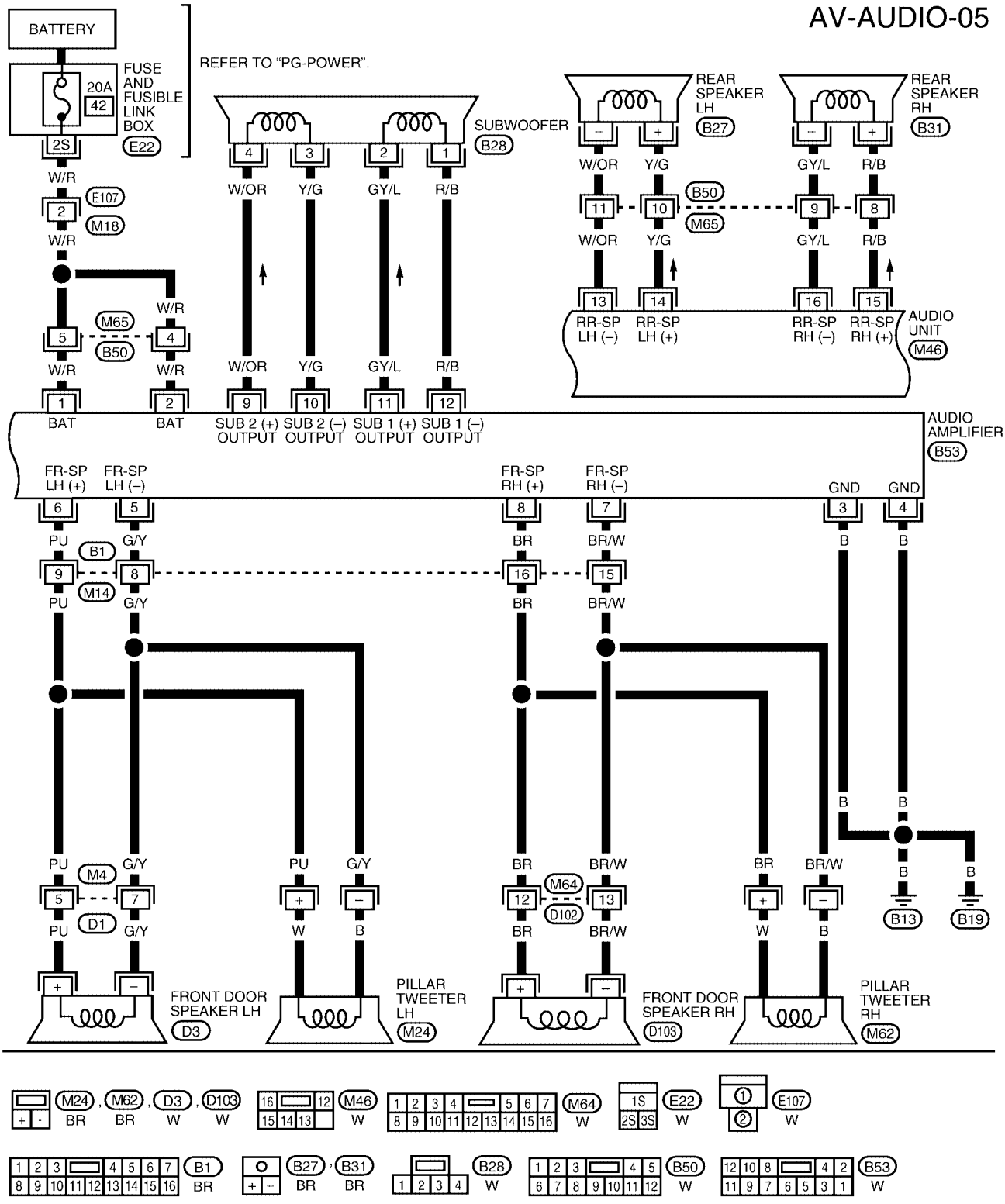
Wiring Diagram — AUDIO — /Premium System

EKS003AK





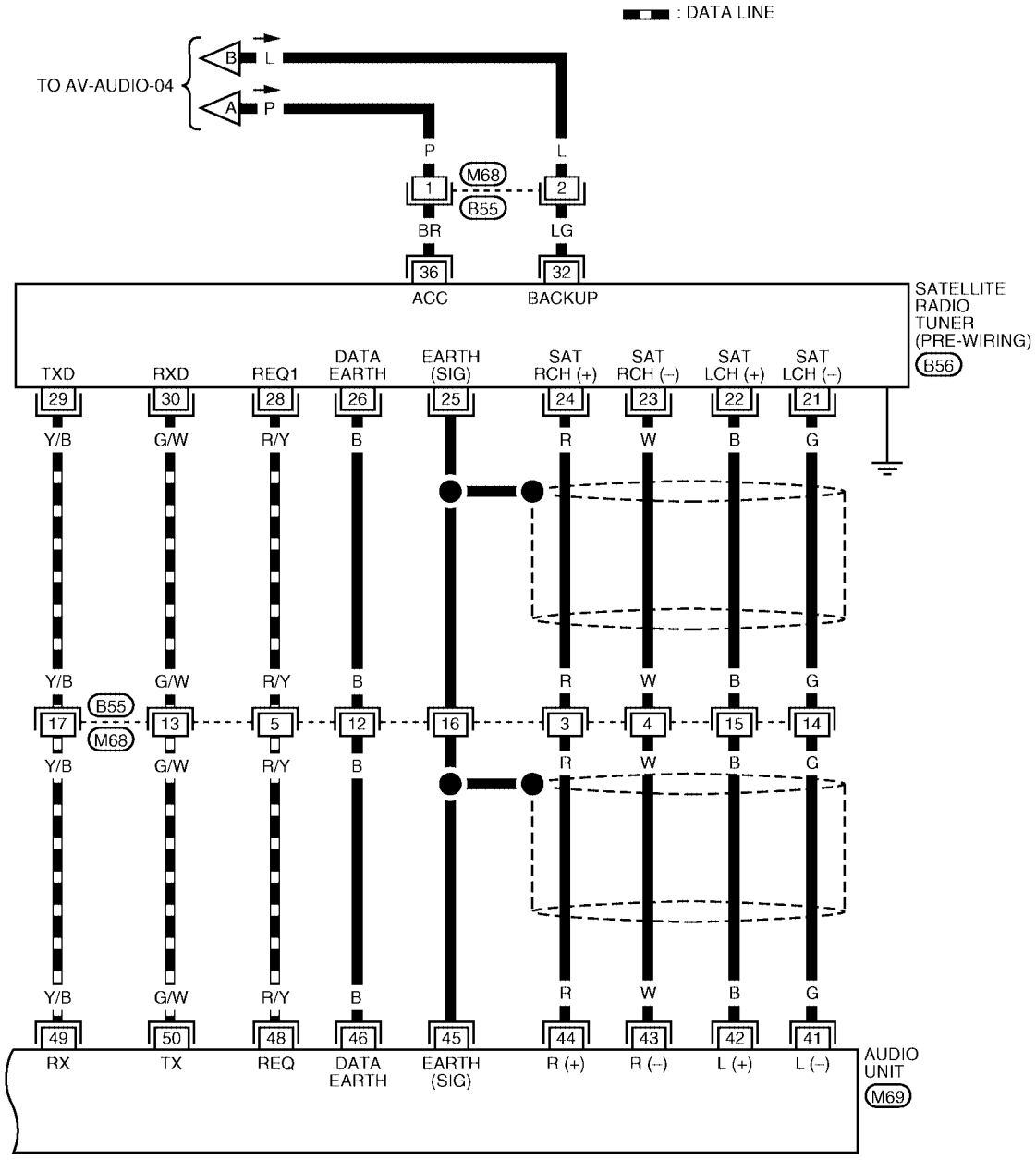
WKWA1832E

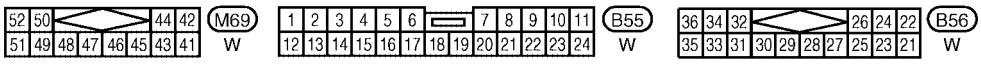

AV-AUDIO-05
BATTERY
FUSE AND FUSIBLE LINK BOX
E22
20A
42
2S
REFER TO "PG-POWER".
SUBWOOFER
B28
REAR SPEAKER LH
B27
REAR SPEAKER RH
B31
W/R
E107
M18
M65
B50
W/OR
Y/G
GY/L
R/B
RR-SP LH (–)
RR-SP LH (+)
RR-SP RH (–)
RR-SP RH (+)
AUDIO UNIT
M46
BAT
SUB 2 (+) OUTPUT
SUB 2 (–) OUTPUT
SUB 1 (+) OUTPUT
SUB 1 (–) OUTPUT
AUDIO AMPLIFIER
B53
FR-SP LH (+)
FR-SP LH (–)
FR-SP RH (+)
FR-SP RH (–)
GND
PU
G/Y
BR
BR/W
B1
M14
M4
D1
M64
D102
B13
B19
FRONT DOOR SPEAKER LH
D3
PILLAR TWEETER LH
M24
FRONT DOOR SPEAKER RH
D103
PILLAR TWEETER RH
M62
M24, M62, D3, D103
M46
M64
E22
E107
B1
B27, B31
B28
B50
B53

WKWA1833E

WITHOUT CD AUTOCHANGER

AV-AUDIO-06





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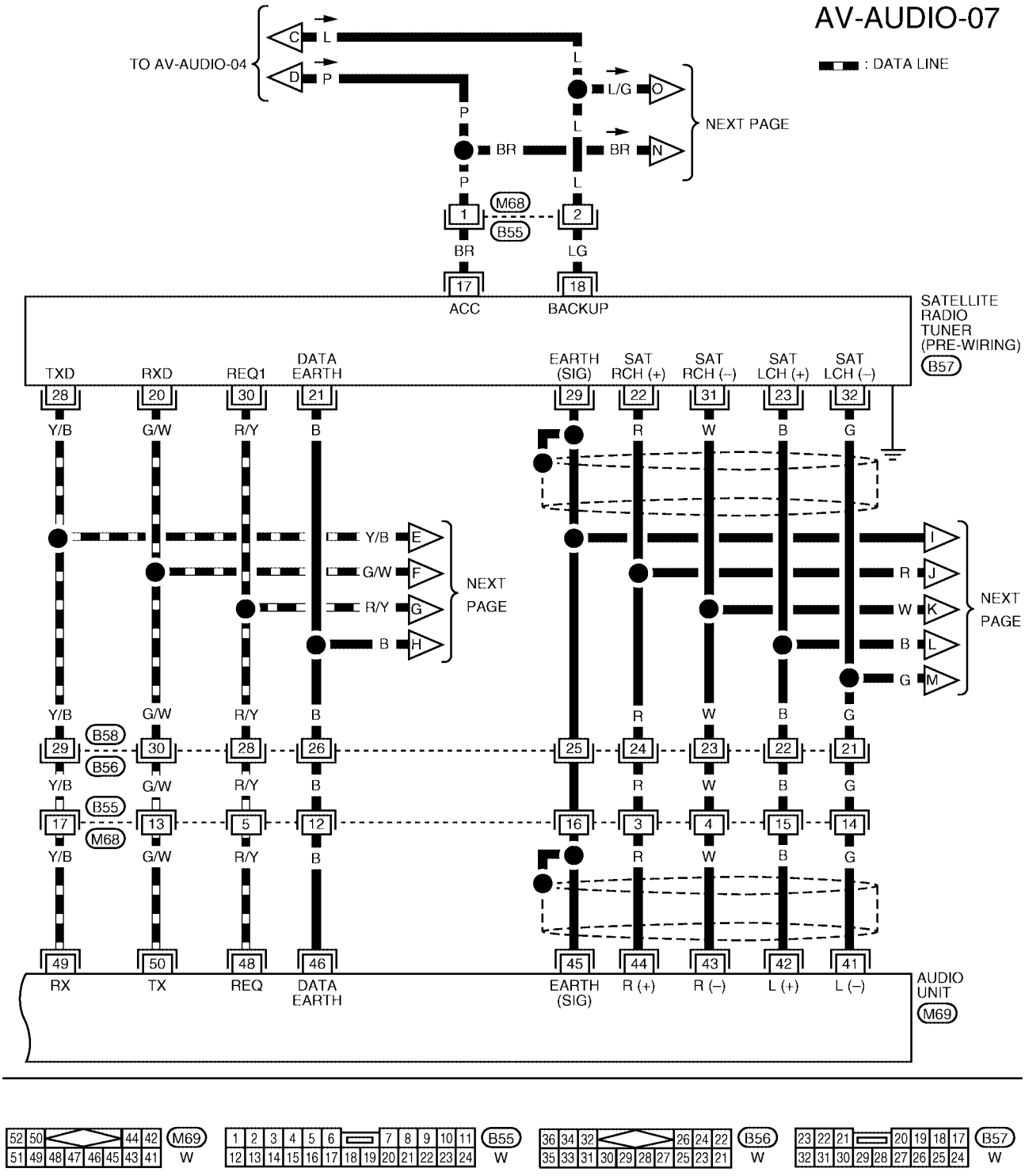
WITH CD AUTOCHANGER



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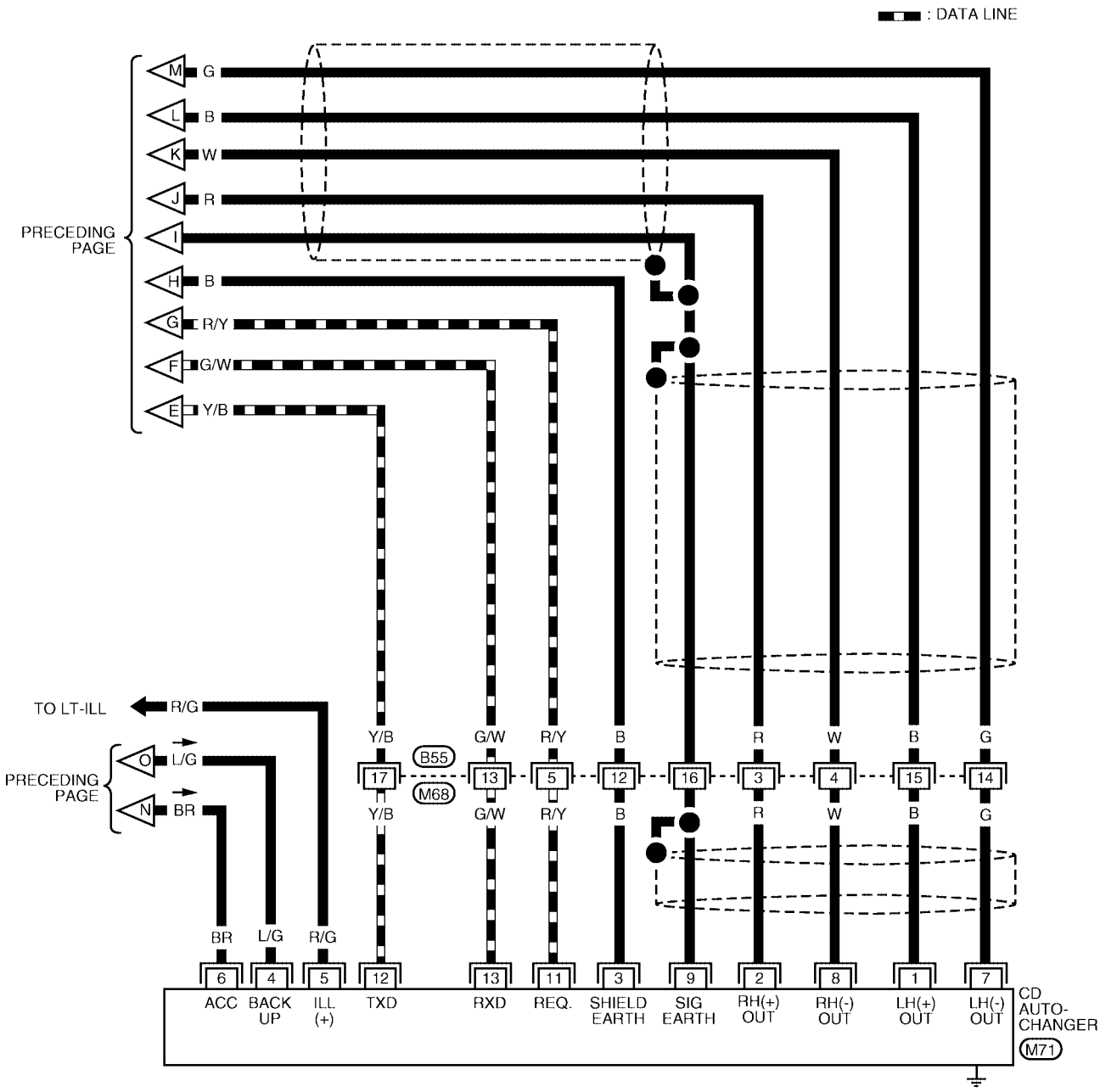
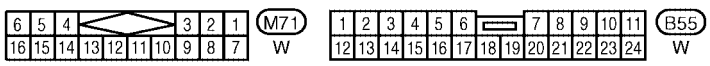




WKWA1836E

Trouble Diagnoses

EKS003AL

AUDIO UNIT

Symptom	Possible causes	Repair order
Audio unit inoperative (no digital display and no sound from speakers).	1. 10A fuse 2. Poor audio unit case ground 3. Audio unit	1. Check 10A fuse [No. 1, located in fuse block (J/B)]. Turn ignition switch ON and verify that battery positive voltage is present at terminal 10 of audio unit. 2. Check audio unit case ground. 3. Remove audio unit for repair.
Audio unit presets are lost when ignition switch is turned OFF.	1. 15A fuse 2. Audio unit	1. Check 15A fuse [No. 32, located in fuse and fusible link box] and verify that battery positive voltage is present at terminal 6 of audio unit. 2. Remove audio unit for repair.
AM/FM stations are weak or noisy.	1. Antenna 2. Poor audio unit case ground 3. Audio unit	1. Check antenna. 2. Check audio unit case ground. 3. Remove audio unit for repair.
Audio unit generates noise in AM and FM modes with engine running.	1. Poor audio unit case ground 2. Loose or missing ground bonding straps 3. Ignition condenser or rear window defogger noise suppressor condenser 4. Ignition coil(s) 5. Audio unit	1. Check audio unit case ground. 2. Check ground bonding straps. 3. Replace ignition condenser or rear window defogger noise suppressor condenser. 4. Check ignition coil(s). 5. Remove audio unit for repair.
Audio unit generates noise in AM and FM modes with accessories on (switch pops and motor noise).	1. Poor audio unit case ground 2. Antenna 3. Accessory ground 4. Faulty accessory	1. Check audio unit case ground. 2. Check antenna. 3. Check accessory ground. 4. Replace accessory.

BASE AND MID LEVEL SYSTEM

Symptom	Possible causes	Repair order
Individual speaker is noisy or inoperative.	1. Speaker 2. Audio unit output 3. Speaker circuit 4. Audio unit	1. Check speaker. 2. Check audio unit output voltages. 3. Check circuits for open or short between the audio unit and the speaker. 4. Remove audio unit for repair.
Audio unit controls are operational, but no sound is heard from any speaker.	1. Speaker 2. Speaker circuit 3. Audio unit	1. Check speaker. 2. Check circuits for open or short between the audio unit and the speaker. 3. Remove audio unit for repair.

PREMIUM SYSTEM

Symptom	Possible causes	Repair order
Audio unit controls are operational, but no sound is heard from any speaker.	1. 20A fuse 2. Amp. ON/OFF signal circuit 3. Audio amplifier ground 4. Audio unit 5. Audio amplifier	1. Check 20A fuse (No. 42, located in fuse and fusible link box). Verify that battery positive voltage is present at audio amplifier terminals 1 and 2. 2. Check harness continuity between audio unit terminal 12 and audio amplifier terminal 24. 3. Check harness continuity between audio amplifier terminals 3 and 4 and ground. 4. Remove audio unit for repair. 5. Remove audio amplifier for repair.
Individual speaker is noisy or inoperative.	1. Speaker 2. Output circuit to individual speaker 3. Audio unit 4. Audio amplifier	1. Check speaker. 2. Check the output circuits to individual speaker – between audio unit and audio amplifier. – between audio amplifier and speaker. 3. Remove audio unit for repair. 4. Remove audio amplifier for repair.
Subwoofer does not operate.	1. Output circuit to subwoofer 2. Subwoofer 3. Audio amplifier	1. Check circuits for open or short between the audio amplifier and the subwoofer. 2. Check subwoofer. 3. Remove audio amplifier for repair.

CD AUTOCHANGER

Symptom	Possible causes	Repair order
CD autochanger is inoperative.	1. 10A fuse 2. Poor CD autochanger case ground 3. CD autochanger	1. Check 10A fuse [No. 1, located in fuse block (J/B)]. Turn the ignition switch ON and verify that battery positive voltage is present at terminal 6 of the CD autochanger. 2. Check CD autochanger case ground. 3. Remove CD autochanger for repair.
CD autochanger controls are operational, but no sound is heard from any speaker.	1. Audio output circuits 2. CD autochanger	1. Check circuits for open or short between the CD autochanger and the audio unit. 2. Remove CD autochanger for repair.
The sound skips, stops suddenly, or is distorted.	1. Dirt, damage, or water on disc 2. CD autochanger	1. Inspect disc for dirt, damage, or water. 2. Remove CD autochanger for repair.

Inspection

EKS003AM

AUDIO UNIT

All voltage inspections are made with:

- Ignition switch ON or ACC
- Audio unit ON
- Audio unit connected (If audio unit is removed for inspection, supply a ground to the case using a jumper wire.)

ANTENNA

Using a jumper wire, clip an auxiliary ground between antenna and body.

- If reception improves, check antenna ground (at body surface).
- If reception does not improve, check main feeder cable for short circuit or open circuit.

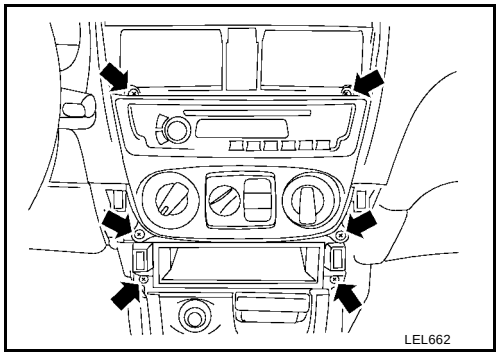
CD Autochanger (If Equipped) Removal and Installation

EKS003AN

CAUTION:

Prior to removing a malfunctioning CD autochanger to be shipped for repair, the changer mechanism MUST BE LOCKED to prevent the mechanism from being damaged during shipping. Refer to AV-14, "LOCKING CD AUTOCHANGER MECHANISM" .

1. Remove upper cluster lid C by firmly grasping and carefully pulling rearward from instrument panel.
2. Remove lower cluster lid C by firmly grasping and carefully pulling rearward from instrument panel. Refer to IP-10, "Removal and Installation" .
3. Remove six screws and remove audio unit and storage bin or CD autochanger (if equipped) as an assembly.



4. Disconnect audio unit connectors and CD autochanger connectors (if equipped).

   CAUTION:

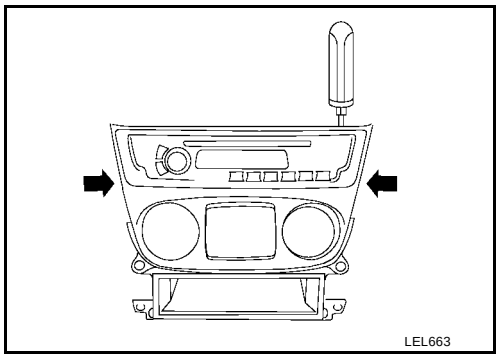
   Be sure to disconnect the harness connectors before disconnecting the antenna connector or damage may result to audio unit.
5. Release two tabs using a screwdriver and carefully remove heater A/C control bezel from audio unit face plate.

   CAUTION:

   Do not pry or forcibly remove heater A/C control bezel from audio unit face plate or audio unit damage could result.
6. Remove brackets from audio unit and CD autochanger (if equipped).
7. Install in reverse order of removal.

   CAUTION:

   Be sure to connect the antenna connector before connecting the harness connectors or damage may result to audio unit.



LOCKING CD AUTOCHANGER MECHANISM

CAUTION:

- **Prior to removing a malfunctioning CD autochanger to be shipped for repair, the changer mechanism MUST BE LOCKED to prevent the mechanism from being damaged during shipping.**
- **If a CD is jammed or unable to be removed from the CD autochanger, do NOT lock the changer mechanism. If the CD autochanger is to be shipped for repair, carefully package the CD autochanger to prevent vibration and shock.**

1. Eject and remove any CDs from the CD autochanger unit.
2. Turn ignition switch OFF. Wait until CD autochanger display is off and mechanism stops moving (mechanism sound stops).
3. Press any one of the disc selection buttons once. When a display shows on the CD autochanger unit, press the same disc selection button again within 5 seconds.
   - The changer mechanism will lock itself within 10 seconds.
4. After mechanism stops moving (mechanism sound stops), disconnect the CD autochanger connectors.
5. Remove the CD autochanger unit.

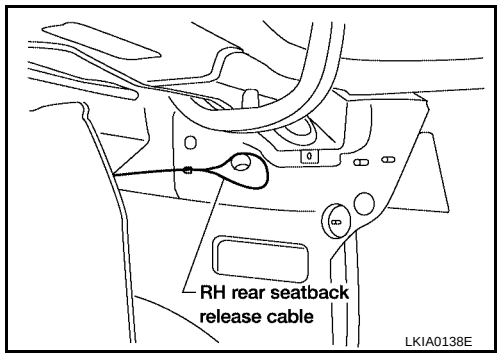
NOTE:

After installing a new or remanufactured CD autochanger unit, switching the CD autochanger ON will automatically unlock the mechanism. A special unlocking procedure is not required.

Subwoofer (With Premium Audio System) Removal and Installation

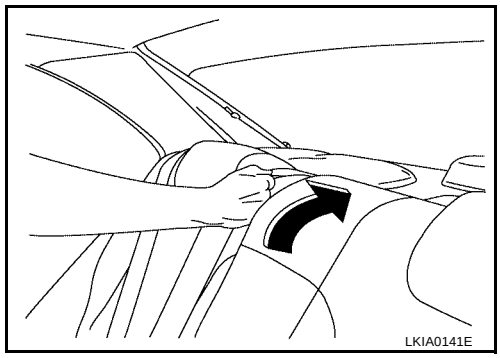
EKS003KW

1. Partially remove RH trunk room trim. Refer to EI-33, "Removal and Installation" .
2. Pull cable to release RH rear seat back.
3. Remove rear seat bottom. Refer to SE-5, "Removal and Installation" .

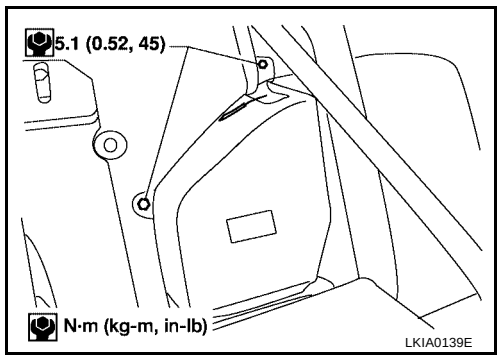


4. Fold RH rear seatback forward.

NOTE:
When using the fold down rear seatback, the rear center seat belt retractor may lock up and prevent folding down the seatback.
If the rear center seat belt retractor has inadvertently locked up, push the seat belt webbing toward the retractor as shown. This will unlock the seat belt retractor and allow the rear seatback to fold down.



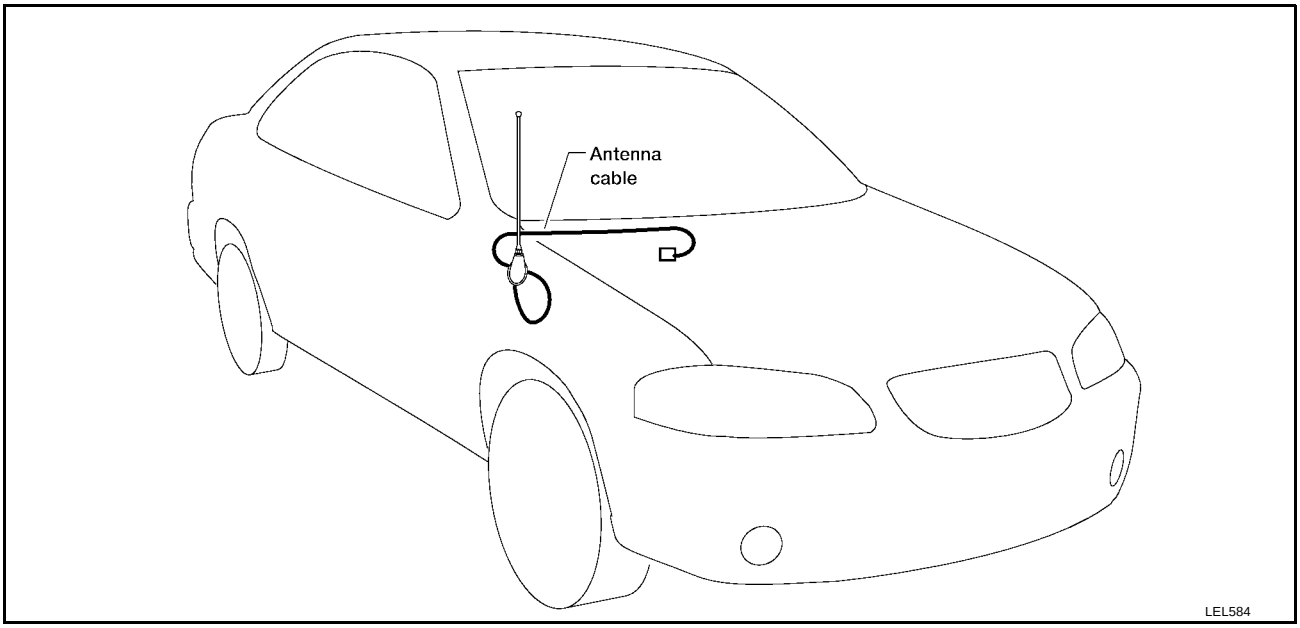
5. Remove 2 upper subwoofer bolts.
6. Disconnect subwoofer connector.



7. Remove 2 bolts from rear seatback center hinge. Refer to SE-5, "Removal and Installation" .
8. Remove subwoofer through trunk.
9. Install in reverse order of removal.

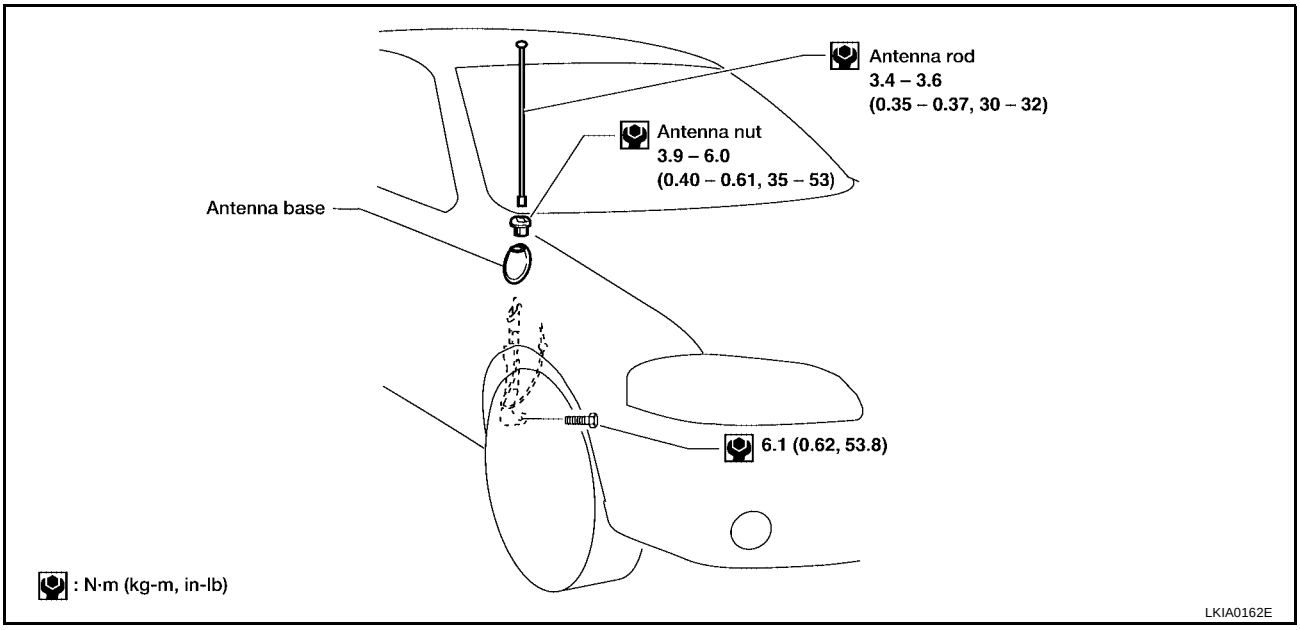
Location of Antenna

EKS003AO



Antenna Removal and Installation

EKS003KX



SECTION ACS
AUTO CRUISE CONTROL SYSTEM

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Description 2

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

PFP:18930

Description

UKS000DY

Regarding the information for ASCD system, refer to EC-33, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" (QG engine models), EC-677, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" (QR engine models).

SECTION PG

POWER SUPPLY, GROUND & CIRCUIT ELEMENTS

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

EKS00658

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

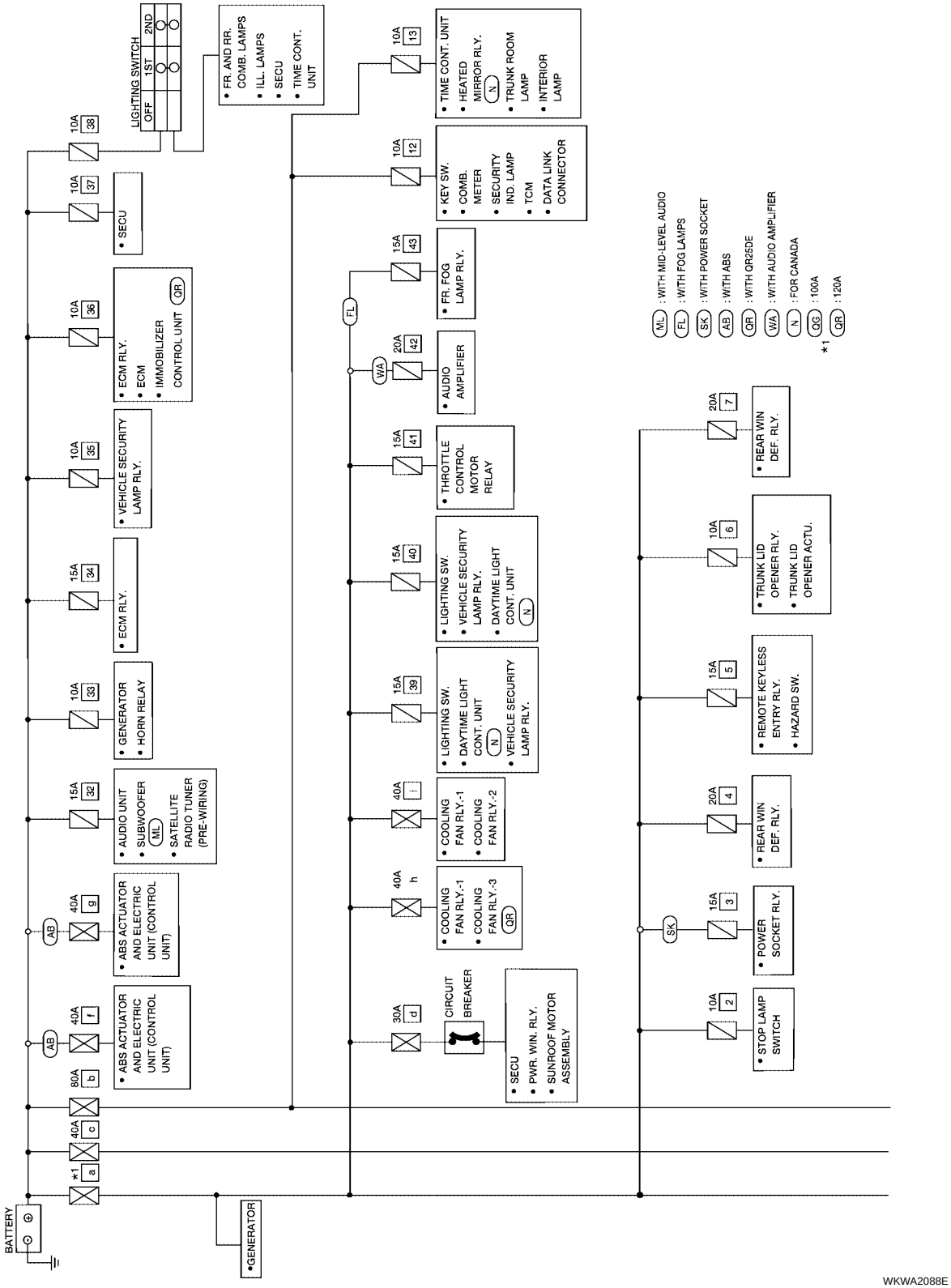
POWER SUPPLY ROUTING

PFP:24110

Schematic

EKS003AZ

For detailed ground distribution information, refer to PG-13, "Ground Distribution" .



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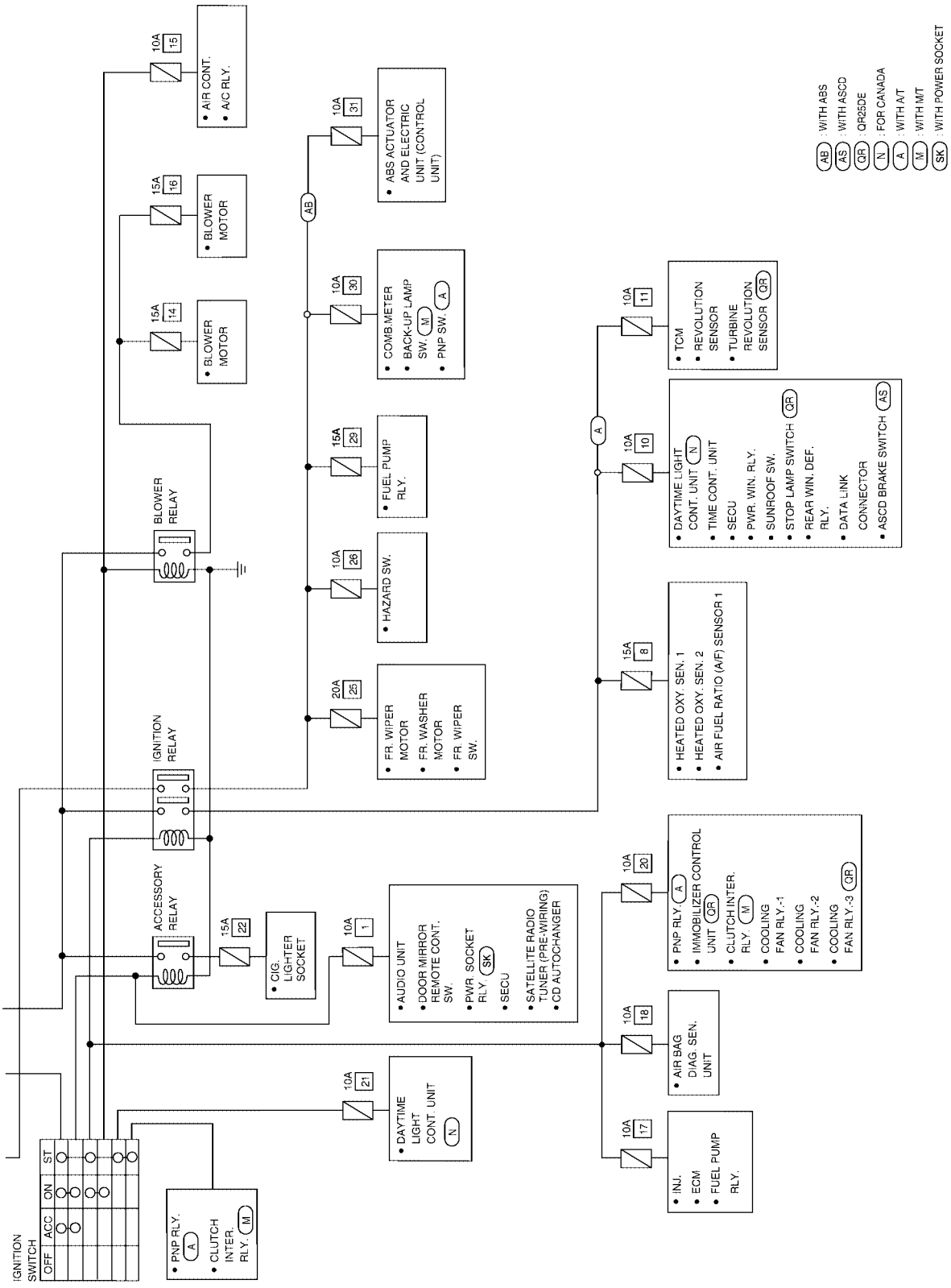
IGNITION SWITCH
OFF
ACC
ON
ST
BLOWER RELAY
IGNITION RELAY
ACCESSORY RELAY
10A 15
• AIR CONT.
• A/C RLY.
15A 16
• BLOWER MOTOR
15A 14
• BLOWER MOTOR
10A 31
• ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)
10A 30
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• BACK-UP LAMP SW. (M)
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• FR. WASHER MOTOR
• FR. WIPER SW.
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• DOOR MIRROR REMOTE CONT. SW.
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• SECU
• SATELLITE RADIO TUNER (PRE-WIRING)
• CD AUTOCHANGER
10A 21
• DAYTIME LIGHT CONT. UNIT (N)
• PNP RLY. (A)
• CLUTCH INTER. RLY. (M)
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• PNP RLY. (A)
• IMMOBILIZER CONTROL UNIT (QR)
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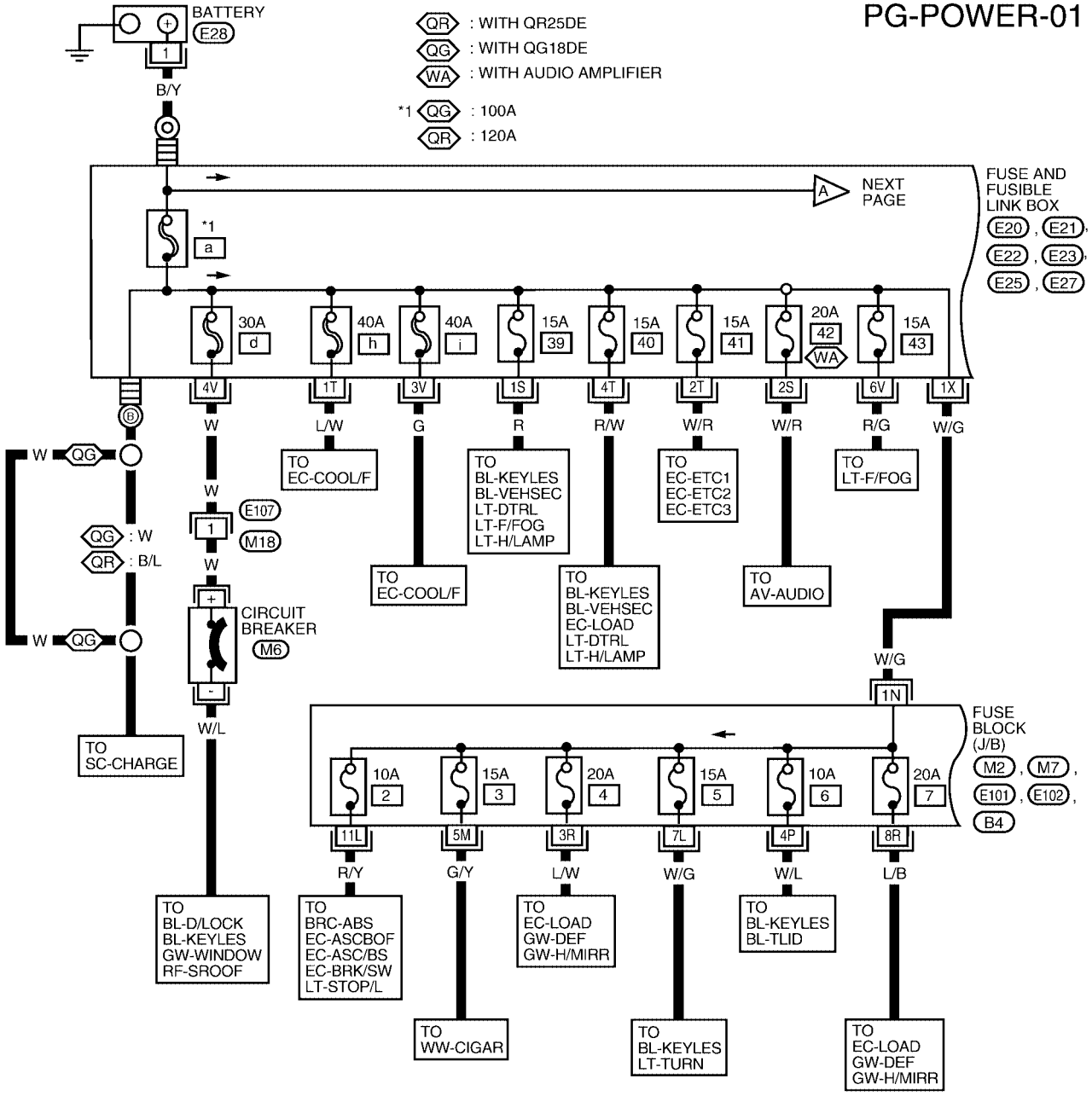
15A 8
• HEATED OXY. SEN. 1
• HEATED OXY. SEN. 2
• AIR FUEL RATIO (A/F) SENSOR 1
10A 10
• DAYTIME LIGHT CONT. UNIT (N)
• TIME CONT. UNIT
• SECU
• PWR. WIN. RLY.
• SUNROOF SW.
• STOP LAMP SWITCH (QR)
• REAR WIN. DEF. RLY.
• DATA LINK CONNECTOR
• ASCD BRAKE SWITCH (AS)
10A 11
• TCM
• REVOLUTION SENSOR
• TURBINE REVOLUTION SENSOR (QR)
(AB) : WITH ABS
(AS) : WITH ASCD
(QR) : QR25DE
(N) : FOR CANADA
(A) : WITH A/T
(M) : WITH M/T
(SK) : WITH POWER SOCKET

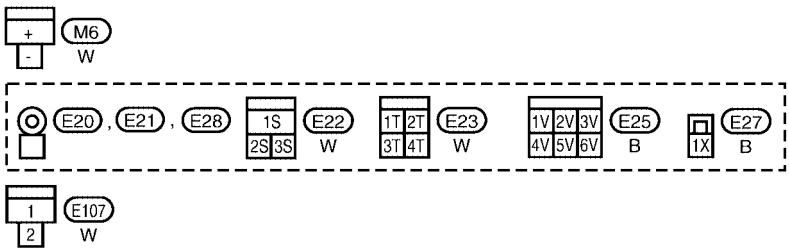
WKWA2089E

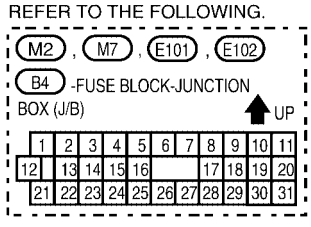
Wiring Diagram — POWER —

EKS003B0

BATTERY POWER SUPPLY — IGNITION SW. IN ANY POSITION







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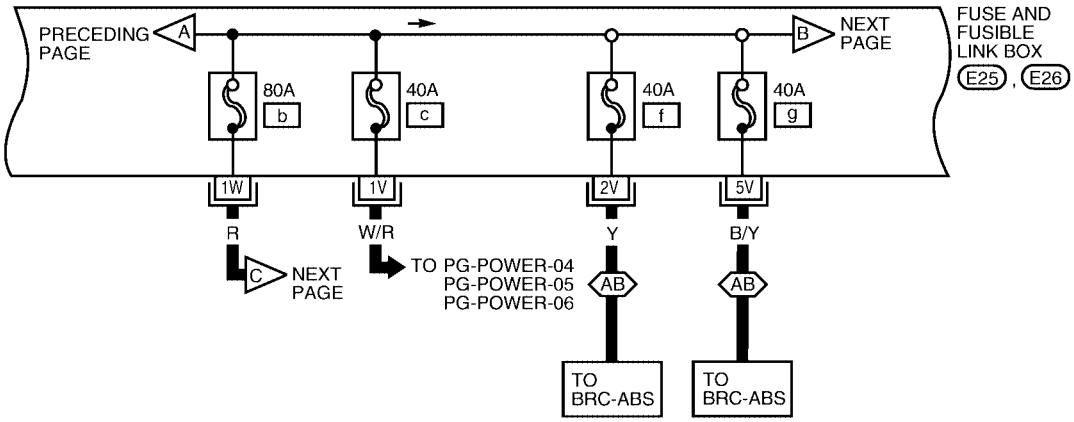
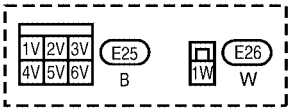
PG-POWER-02

AB : WITH ABS





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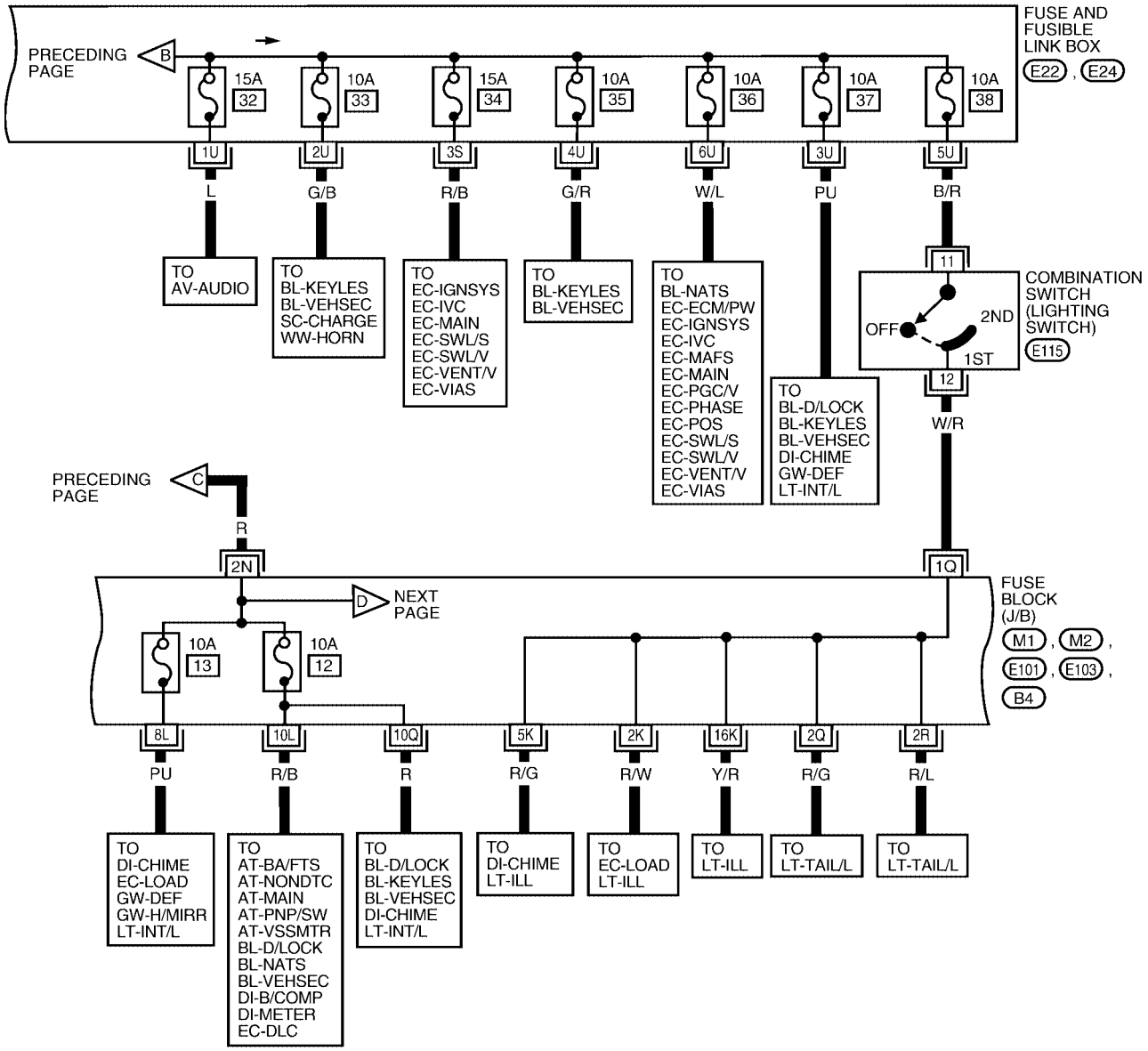
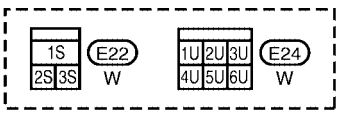
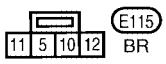
PG-POWER-03







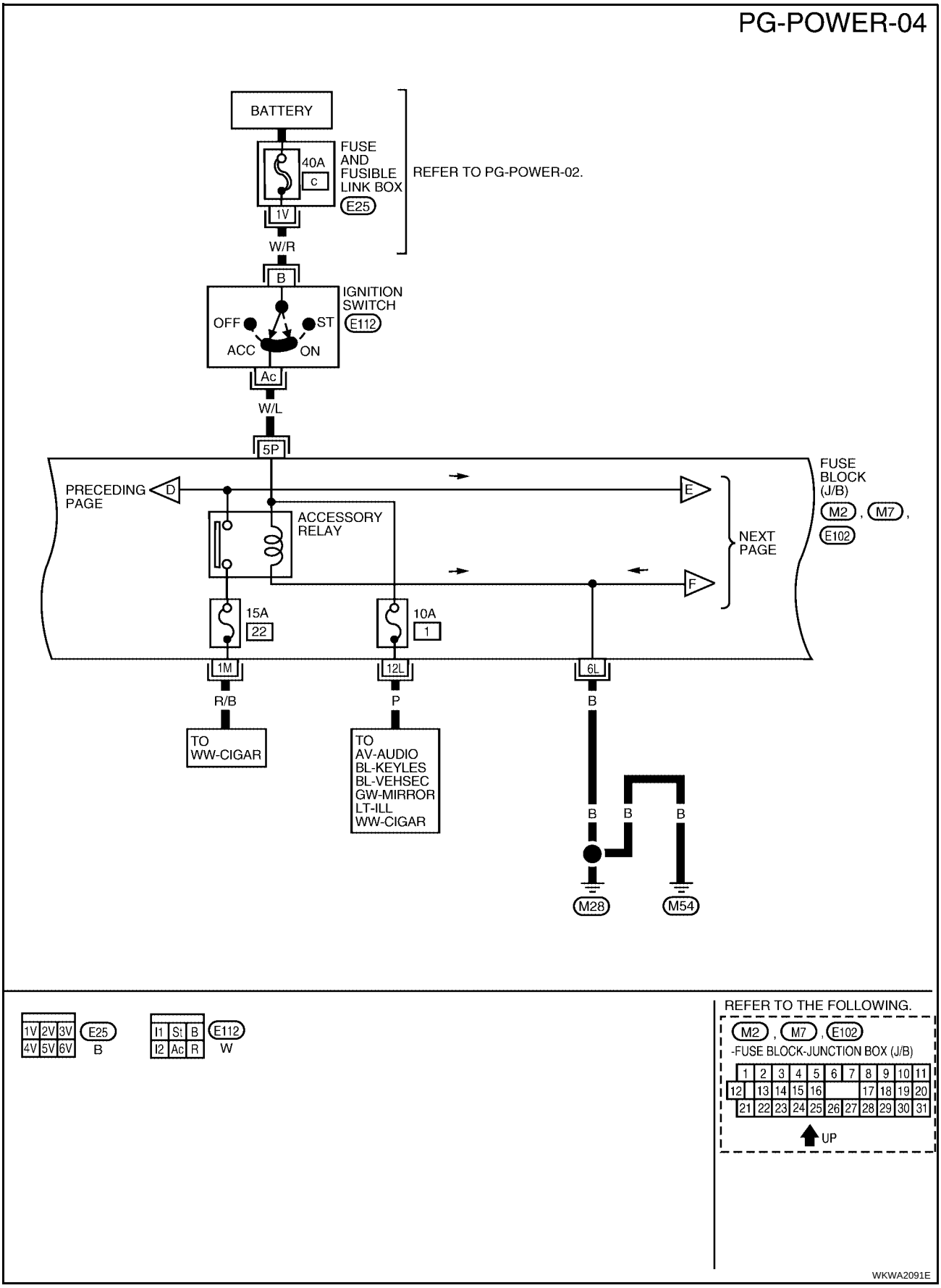
REFER TO THE FOLLOWING.

M1, M2, E101, E103, B4 -FUSE BLOCK-JUNCTION BOX (J/B)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16			17	18	19	20
21	22	23	24	25	26	27	28	29	30	31

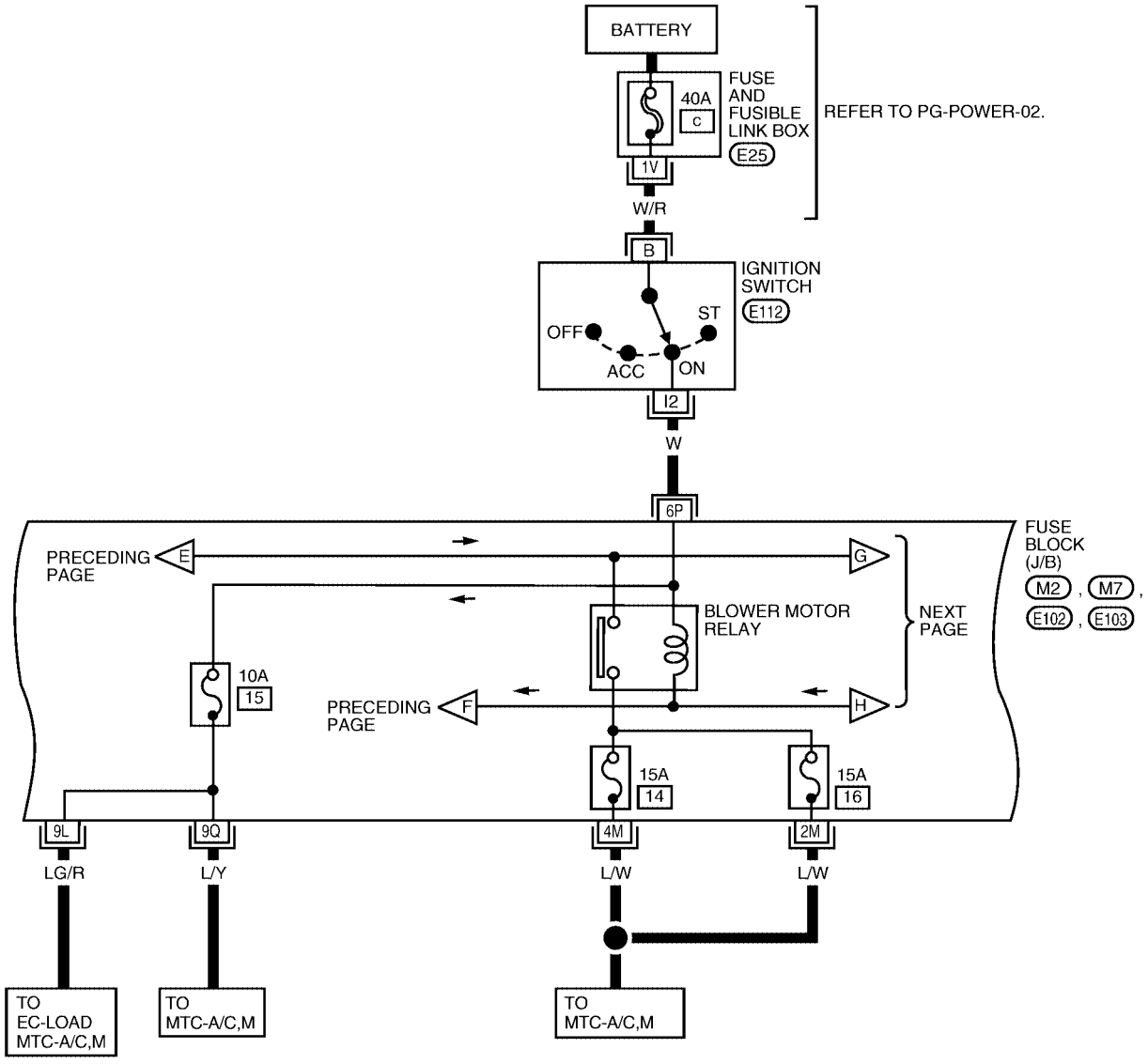
WKWA2090E

ACCESSORY POWER SUPPLY — IGNITION SW. IN “ACC” OR “ON”



IGNITION POWER SUPPLY — IGNITION SW. IN “ON”

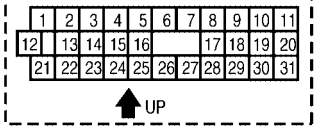
PG-POWER-05



REFER TO THE FOLLOWING.

M2 , M7 , E102 , E103

-FUSE BLOCK-JUNCTION BOX (J/B)



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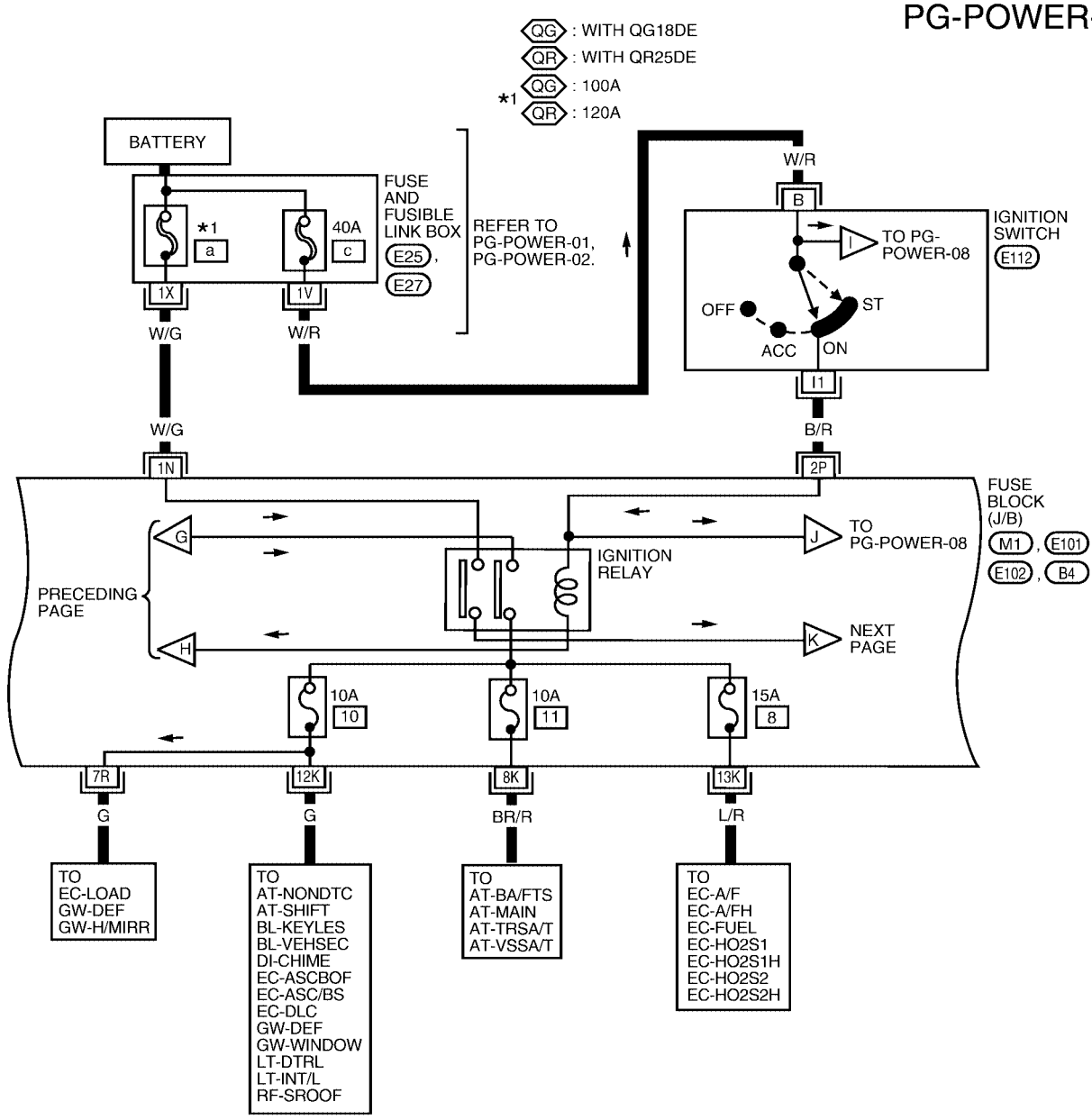
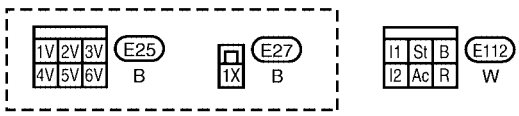
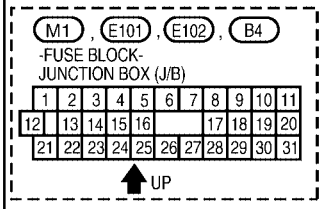
IGNITION POWER SUPPLY — IGNITION SW. IN “ON” AND/OR “START”

PG-POWER-06



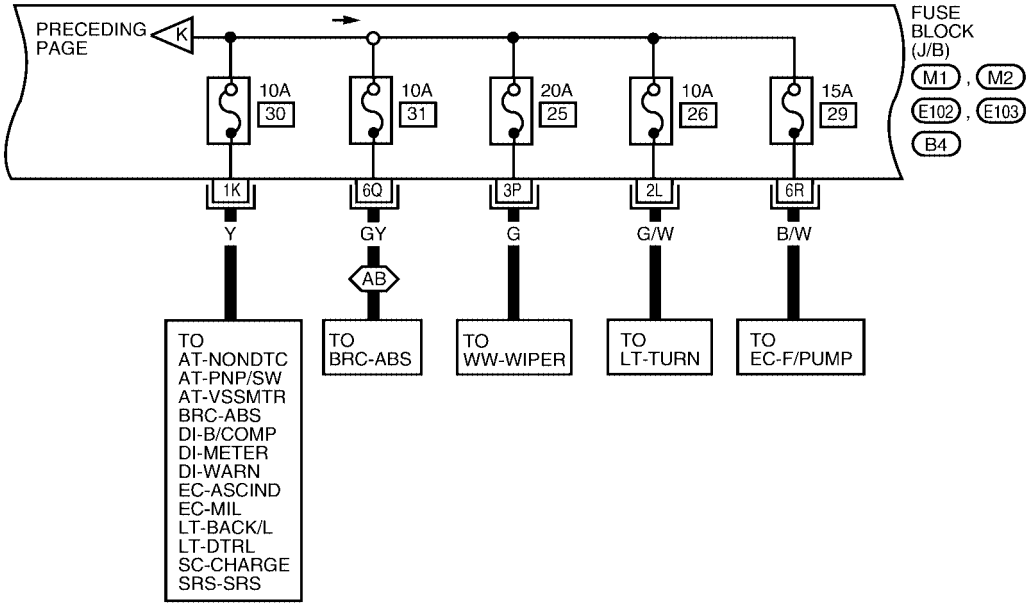


REFER TO THE FOLLOWING.



WKWA2093E

AB : With ABS



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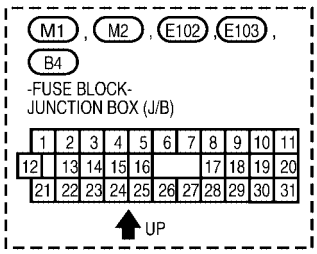
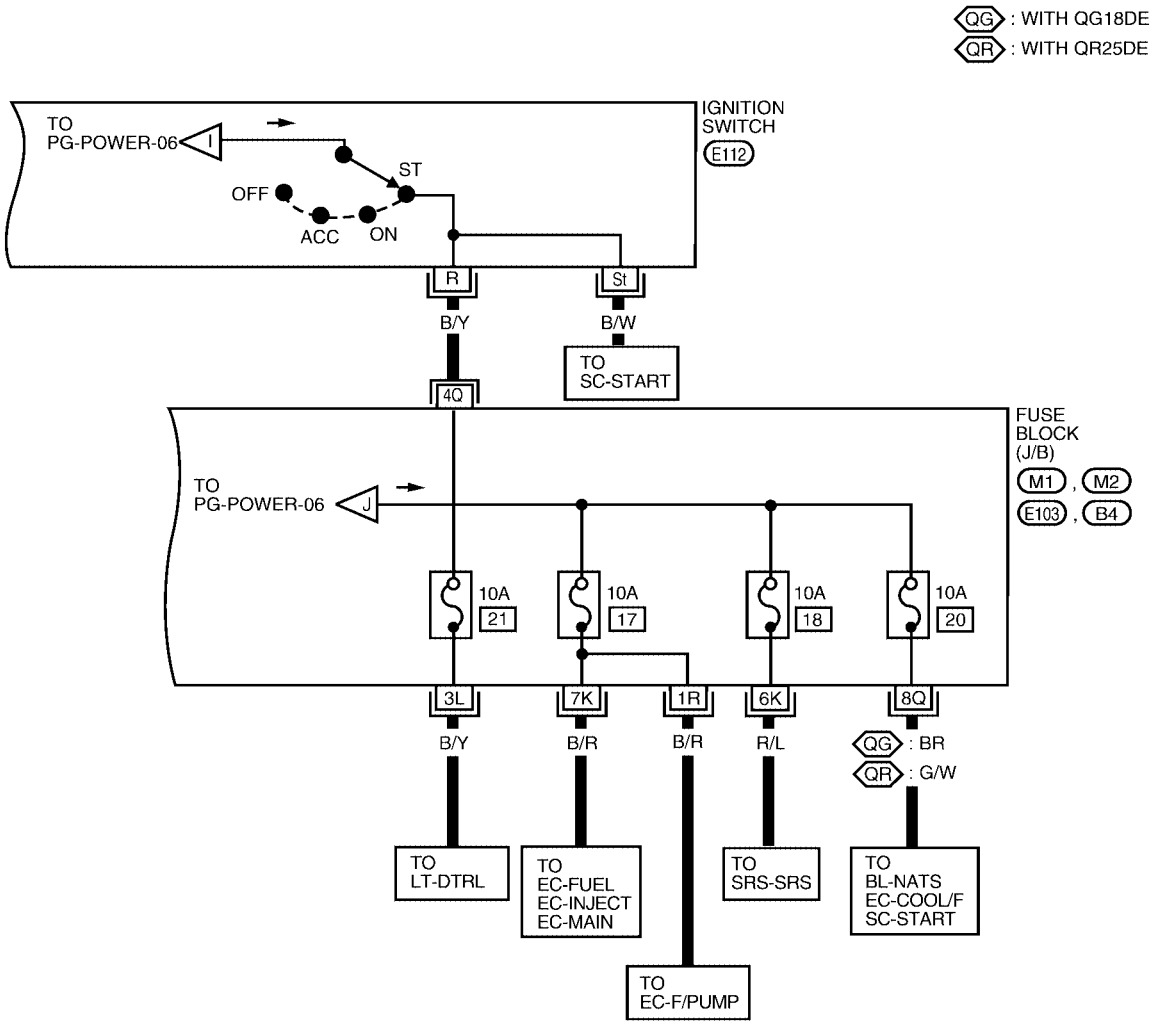
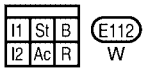


WKWA2094E

PG-POWER-08





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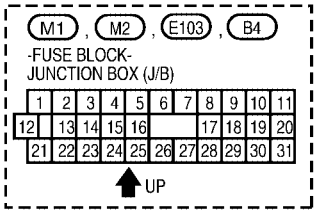

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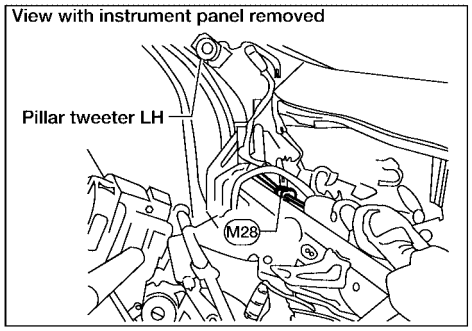
GROUND

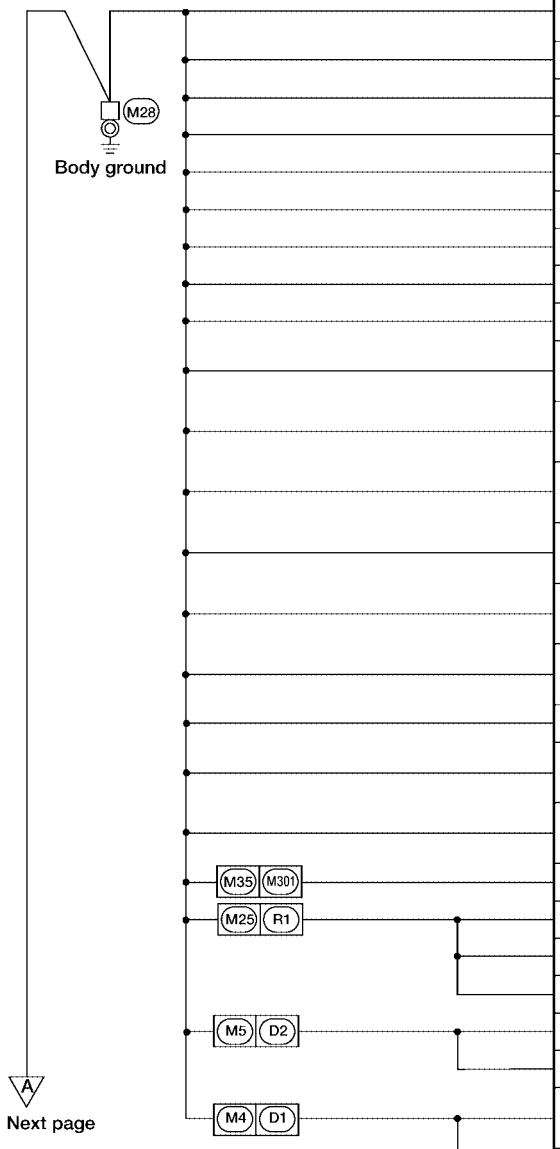
PFP:24080

Ground Distribution

EKS003B1

MAIN HARNESS





CONNECTOR NUMBER	CONNECT TO
M2	Fuse block (J/B) (Blower motor relay, ignition relay, accessory relay)
M3	Heated mirror relay
M8	Data link connector (Terminal No. 4)
M8	Data link connector (Terminal No. 5)
M9	Power window relay
M10	Trunk lid opener relay
M21	Trunk lid opener switch
M22	Illumination control switch
M23	Door mirror remote control switch
M29	Combination meter (Terminal No.3) (High beam indicator) (With tachometer)
M29	Combination meter (Terminal No.12) (Turn signal indicator lamps) (With tachometer)
M29	Combination meter (Terminal No.14) (High beam indicator) (Without tachometer)
M30	Combination meter (Terminal No. 27) (Without tachometer)
M30	Combination meter (Terminal No. 39) (Turn signal indicator lamps) (Without tachometer)
M30	Combination meter (Terminal No. 48) (QG18DE models with tachometer)
M31	Fan control switch
M38	Smart entrance control unit (With power door locks) (Terminal No. 16)
M40	Time control unit (Without power door locks) (Terminal No. 8)
M302	Power socket
R2	Vanity lamp LH
R3	Map lamp
R7	Vanity lamp RH
D4	Door mirror LH
D8	Front door key cylinder switch LH
D6	Main power window and door lock / unlock switch
D7	Front door lock actuator (door unlock sensor) LH

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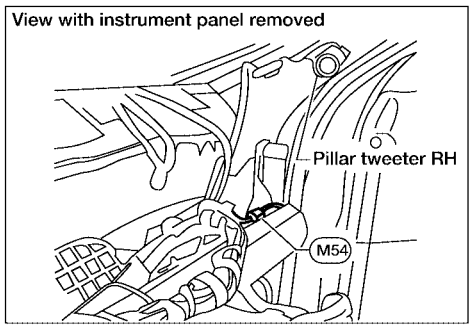
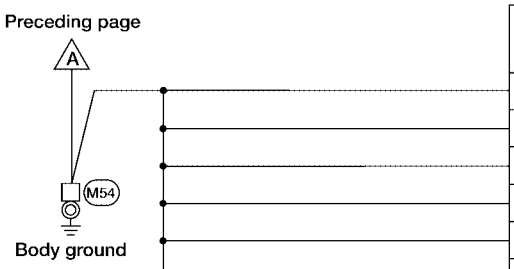
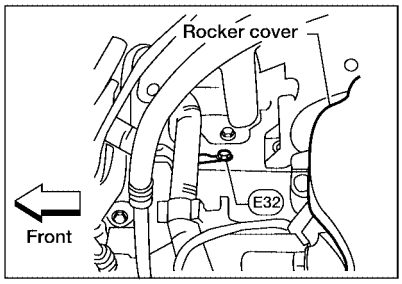


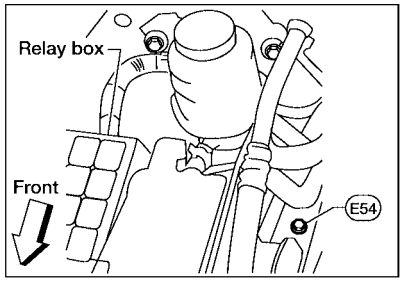


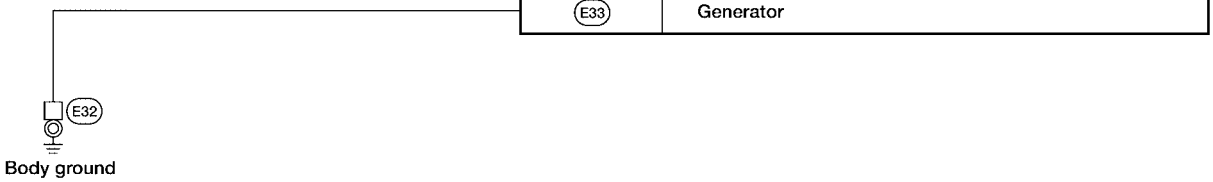
CONNECTOR NUMBER	CONNECT TO
M12	Power socket relay
M32	Air control
M33	Cigarette lighter socket
M34	Air bag diagnosis sensor unit (Terminal No. 2)
M42	Combination flasher unit
M44	A/T device (Terminal No. 2) (Overdrive control switch)
M44	A/T device (Terminal No. 6) (Shift lock)
M49	Intake sensor
M58 F26	Camshaft position sensor (PHASE) (QR25DE)
F11	Crankshaft position sensor (POS) (QR25DE)
F16	Camshaft position sensor (PHASE) (QG18DE)
F18	Knock sensor (Shield wire) (QR25DE)
F31	Knock sensor (Shield wire) (QG18DE)
F50	Electric throttle control actuator (Throttle position sensor) (Shield wire) (QR25DE)
F50	Electric throttle control actuator (Throttle control motor) (Shield wire) (QR25DE)
F52	Crankshaft position sensor (POS) (QG18DE)
F57	TCM (Terminal No. 25) (QG18DE)
F57	TCM (Terminal No. 48) (QG18DE)
F57	TCM (Terminal No. 25) (QR25DE)
F57	TCM (Terminal No. 48) (QR25DE)
F58	Electric throttle control actuator (Throttle control motor) (Shield wire) (QG18DE)
F58	Electric throttle control actuator (Throttle position sensor) (Shield wire) (QG18DE)
F59	ECM (Terminal No. 115)
F59	ECM (Terminal No. 116)
F60	ECM (Terminal No. 1)
F63	Swirl control valve position sensor (Shield wire) (QG18DE SULEV)
F47 E9	Immobilizer control unit (QR25DE)
M64 D102	Door lock / unlock switch RH
D107	Front door lock actuator RH (Door unlock sensor)
D109	Door mirror RH

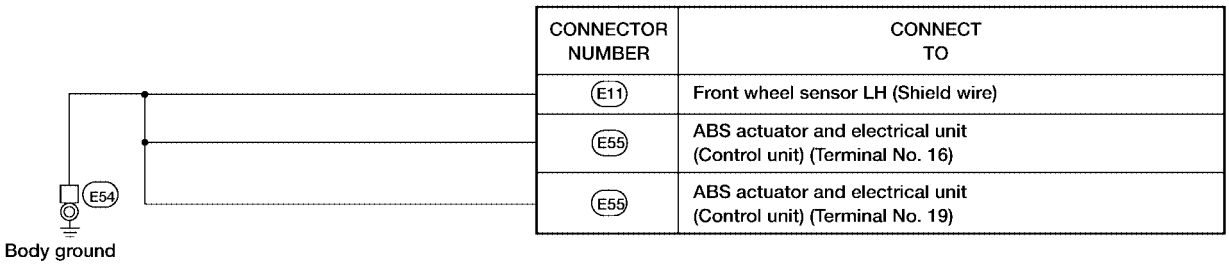
WKIA3330E

ENGINE ROOM HARNESS

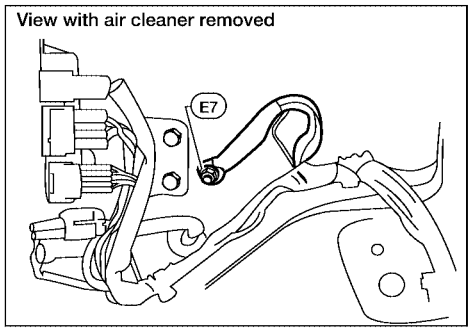


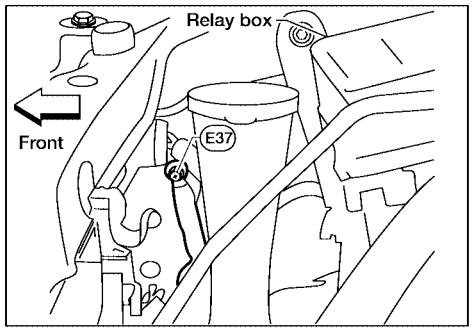


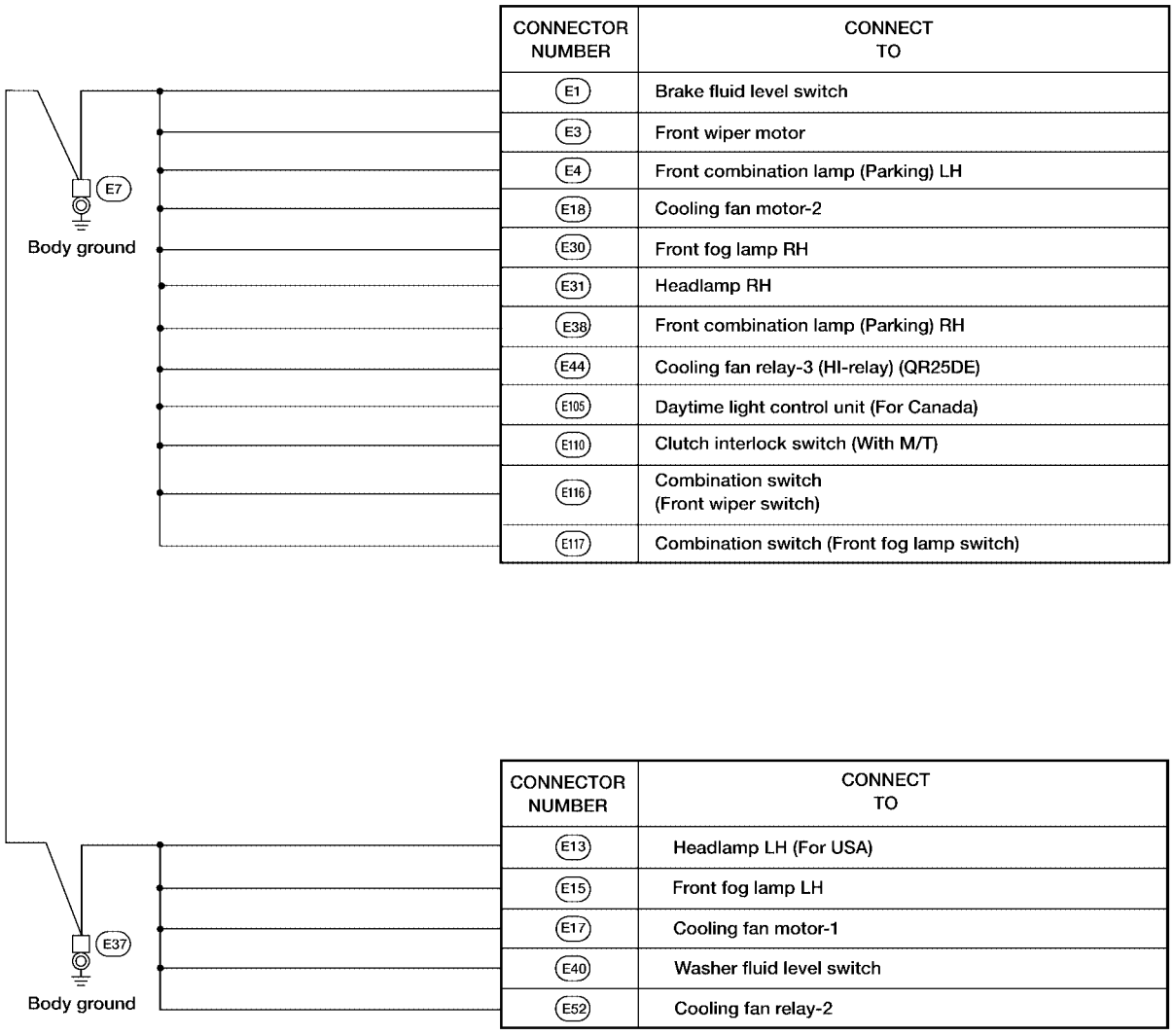




WKIA0215E







CONNECTOR NUMBER	CONNECT TO
E1	Brake fluid level switch
E3	Front wiper motor
E4	Front combination lamp (Parking) LH
E18	Cooling fan motor-2
E30	Front fog lamp RH
E31	Headlamp RH
E38	Front combination lamp (Parking) RH
E44	Cooling fan relay-3 (HI-relay) (QR25DE)
E105	Daytime light control unit (For Canada)
E110	Clutch interlock switch (With M/T)
E116	Combination switch (Front wiper switch)
E117	Combination switch (Front fog lamp switch)

CONNECTOR NUMBER	CONNECT TO
E13	Headlamp LH (For USA)
E15	Front fog lamp LH
E17	Cooling fan motor-1
E40	Washer fluid level switch
E52	Cooling fan relay-2

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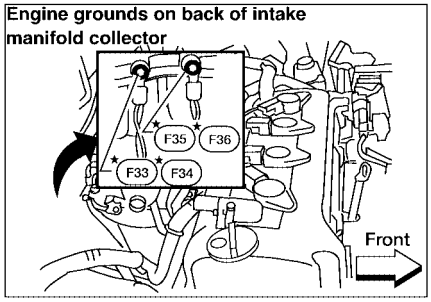
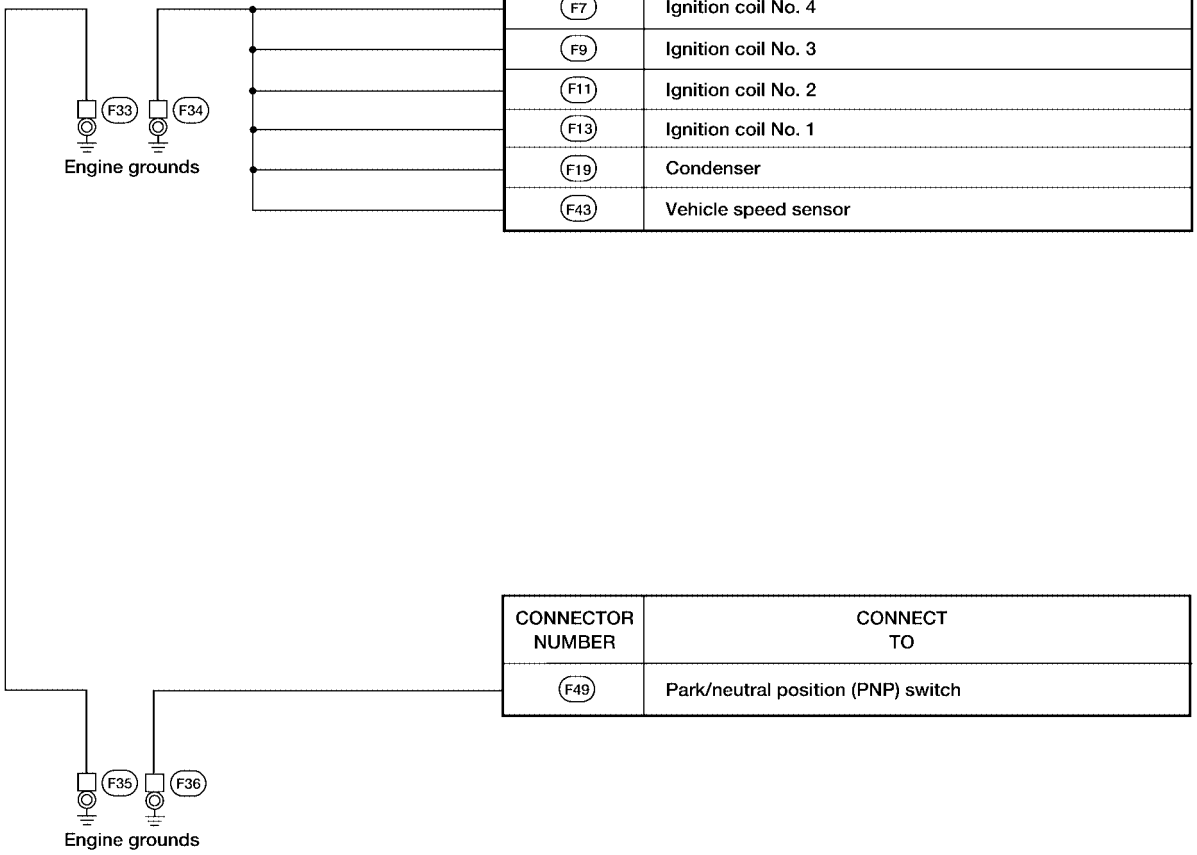
ENGINE CONTROL HARNESS
QG18DE



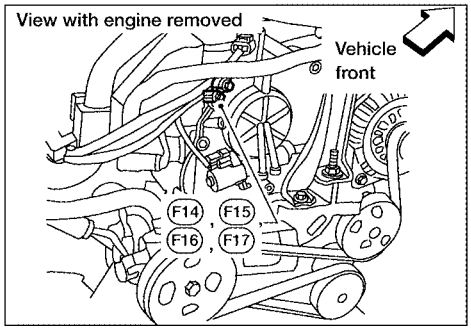


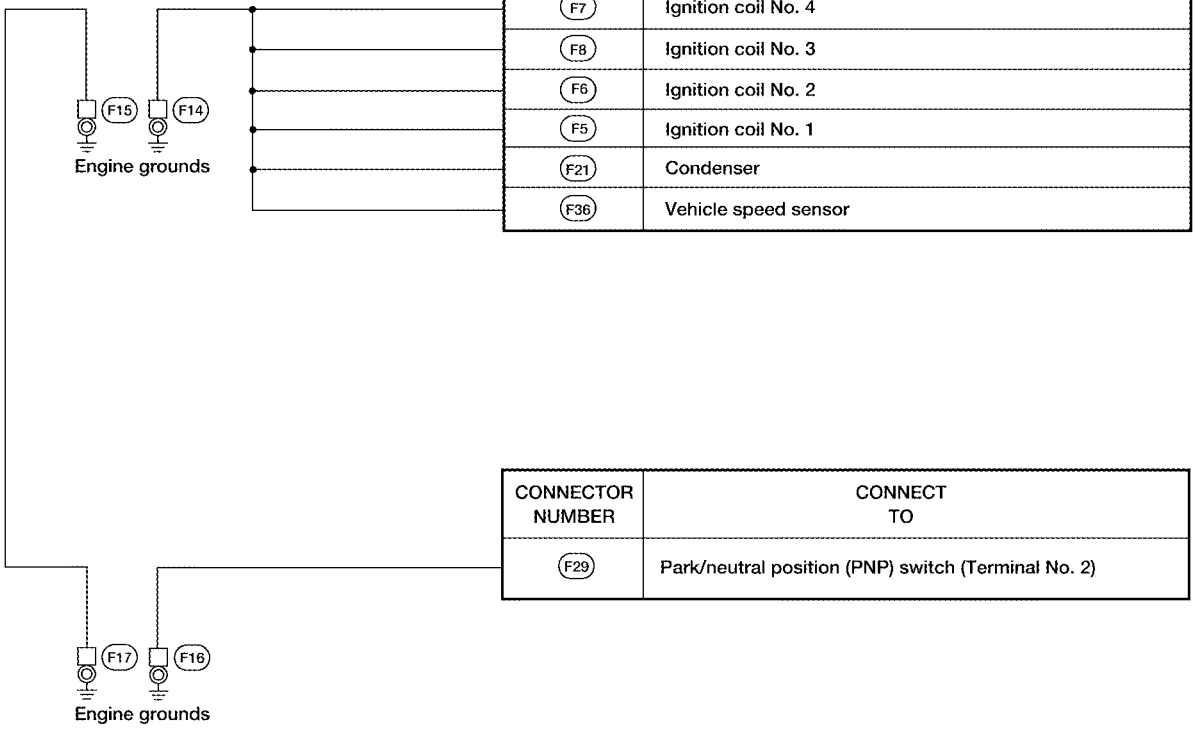
CONNECTOR NUMBER	CONNECT TO
F7	Ignition coil No. 4
F9	Ignition coil No. 3
F11	Ignition coil No. 2
F13	Ignition coil No. 1
F19	Condenser
F43	Vehicle speed sensor

CONNECTOR NUMBER	CONNECT TO
F49	Park/neutral position (PNP) switch

WKIA0217E

QR25DE





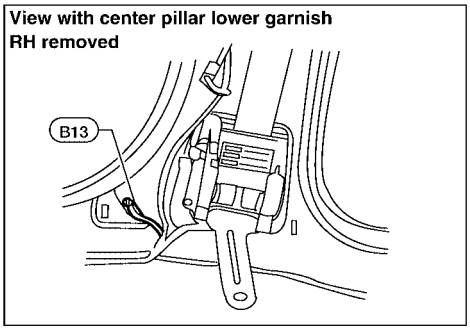
CONNECTOR NUMBER	CONNECT TO
F7	Ignition coil No. 4
F8	Ignition coil No. 3
F6	Ignition coil No. 2
F5	Ignition coil No. 1
F21	Condenser
F36	Vehicle speed sensor

CONNECTOR NUMBER	CONNECT TO
F29	Park/neutral position (PNP) switch (Terminal No. 2)

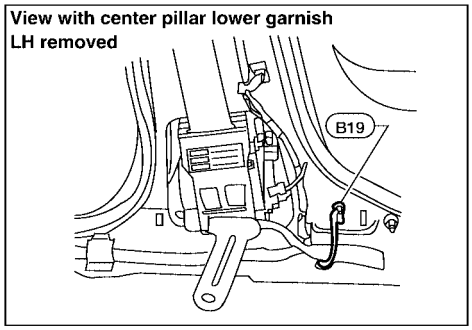
WKIA3331E

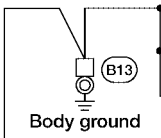
BODY HARNESS

View with center pillar lower garnish RH removed

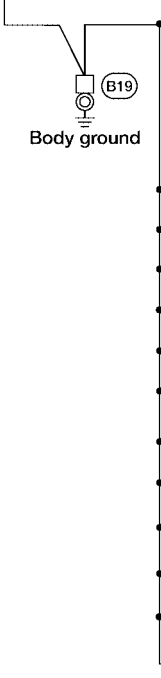


View with center pillar lower garnish LH removed





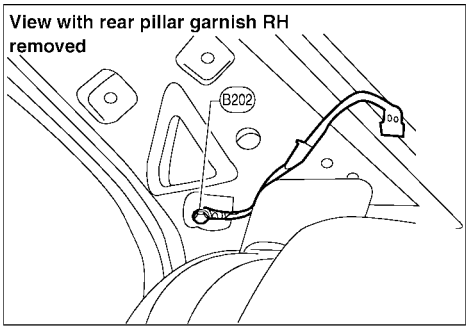
CONNECTOR NUMBER	CONNECT TO
B8	Seat belt buckle switch LH
B29	High-mounted stop lamp (Without rear air spoiler)
B53	Audio amplifier (With premium audio)

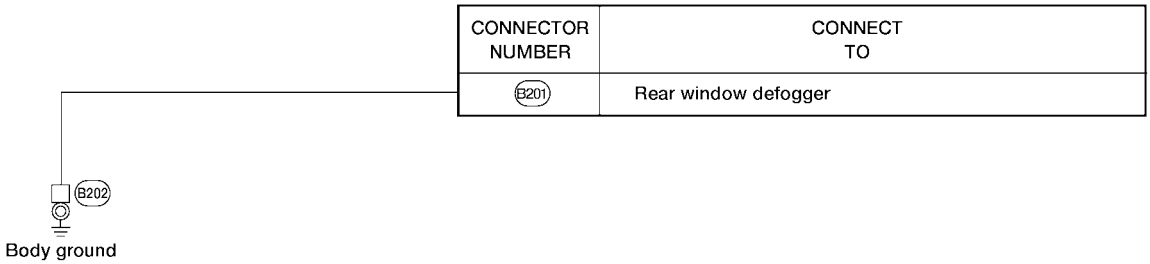


CONNECTOR NUMBER	CONNECT TO
M29	Combination meter (Terminal No. 8) (QR25DE)
M30	Combination meter (Terminal No. 31) (Without tachometer)
M30	Combination meter (Terminal No. 45) (QG18DE models with tachometer)
B23	Front door switch LH
B25	Fuel level sensor unit and fuel pump
B28	Subwoofer (With mid-level audio)
B38	Back-up lamp LH
B39	High-mounted stop lamp (With rear air spoiler)
B40	License plate lamp LH
B41	License plate lamp RH
B42	Back-up lamp RH
B43	Trunk lid key cylinder switch
B44	Rear combination lamp LH
B48	Trunk room lamp switch
B49	Rear combination lamp RH

WKIA0964E

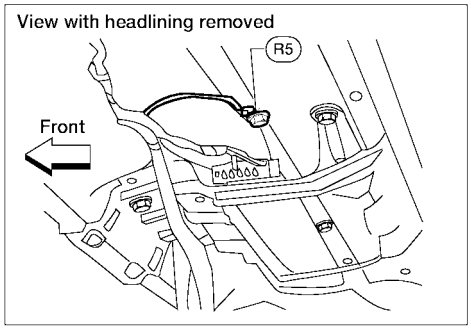
REAR WINDOW DEFOGGER GROUND HARNESS



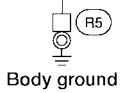


LEL434

ROOM HARNESS



CONNECTOR NUMBER	CONNECT TO
R4	Sunroof motor assembly



LEL433

HARNESS

PFP:24010

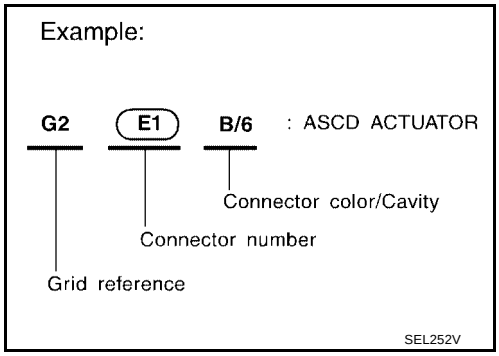
Harness Layout

EKS003B2

HOW TO READ HARNESS LAYOUT

The following Harness Layouts use a map style grid to help locate connectors on the drawings:

- Main Harness
- Engine Room Harness
- Engine Control Harness
- Body Harness



TO USE THE GRID REFERENCE

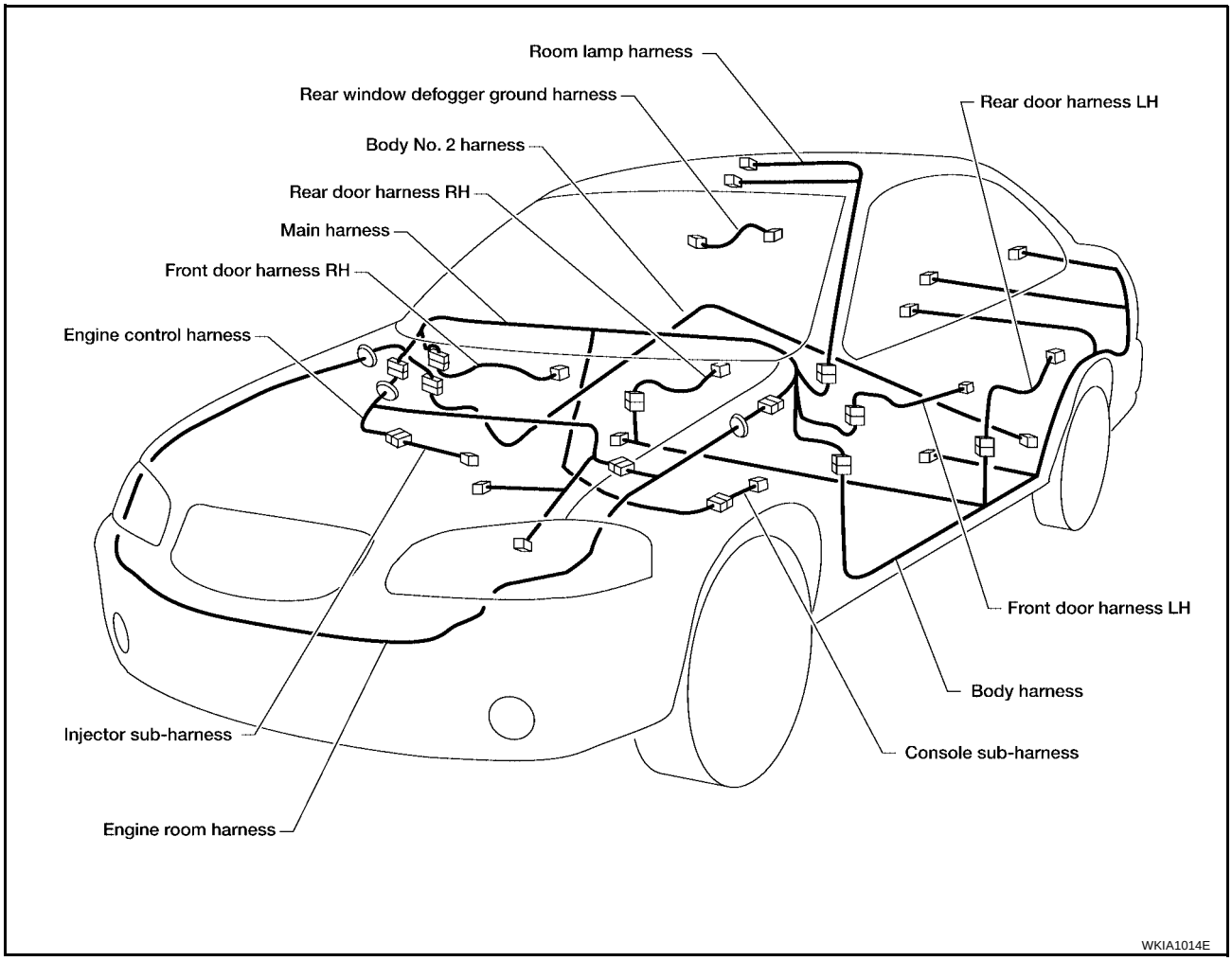
1. Find the desired connector number on the connector list.
2. Find the grid reference.
3. On the drawing, find the crossing of the grid reference letter column and number row.
4. Find the connector number in the crossing zone.
5. Follow the line (if used) to the connector.

CONNECTOR SYMBOL

Main symbols of connector (in Harness Layout) are indicated in the below.

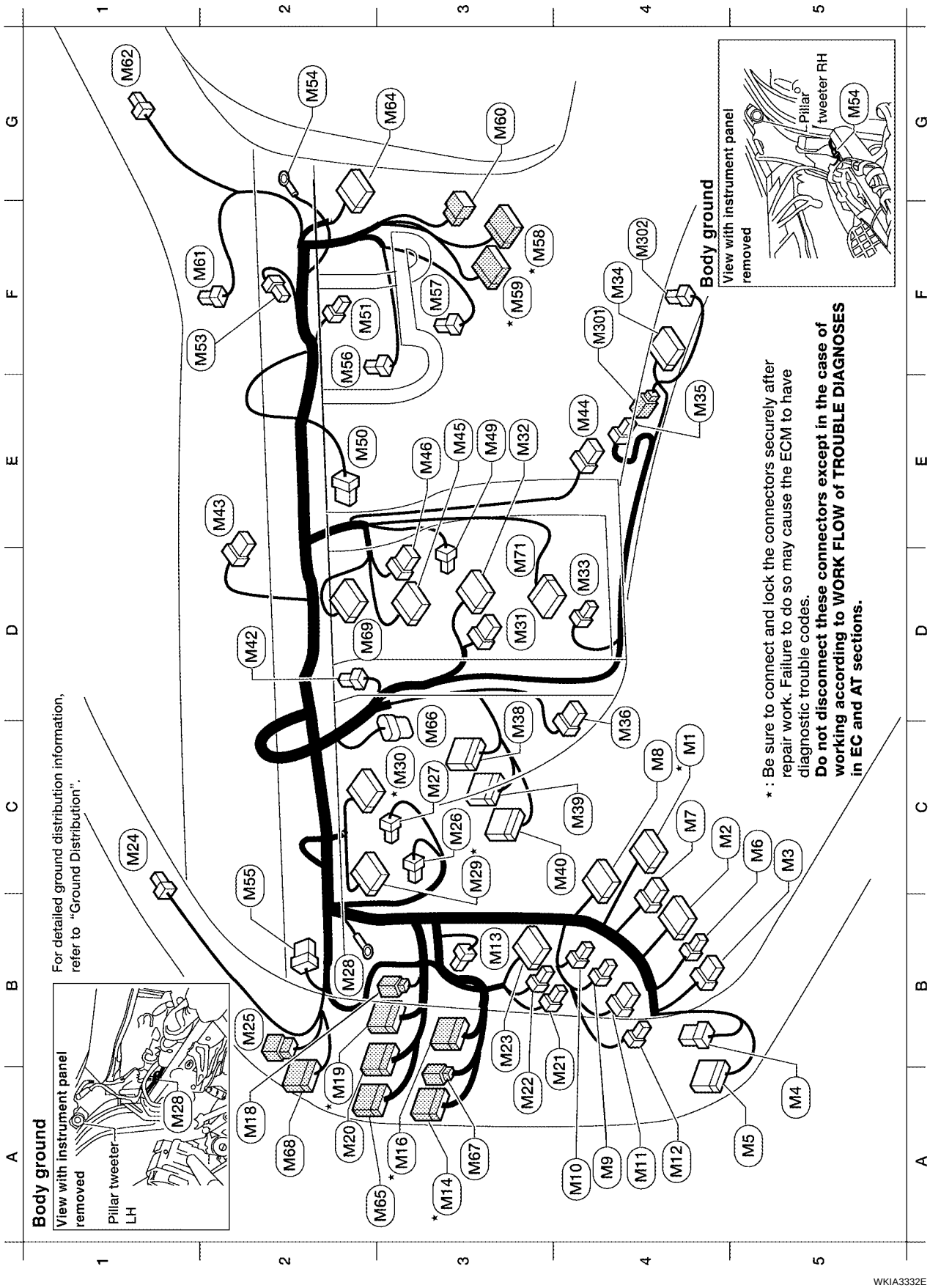
Connector type	Water proof type		Standard type	
	Male	Female	Male	Female
● Cavity: Less than 4 ● Relay connector				
● Cavity: From 5 to 8				
● Cavity: More than 9				
● Ground terminal etc.	—			

OUTLINE



NOTE:
For detailed ground distribution information, refer to PG-13, "Ground Distribution" .

MAIN HARNESS



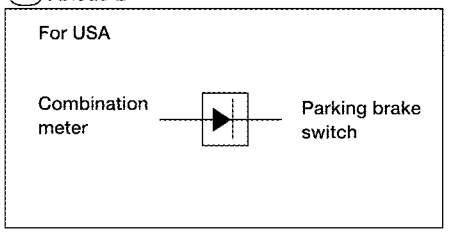
Main harness

C4 *(M1) W/16 : Fuse block (J/B)
C4 (M2) W/12 : Fuse block (J/B)
C5 (M3) L/4 : Heated mirror relay (for Canada)
A5 (M4) W/8 : To (D1)
A5 (M5) W/16 : To (D2)
C5 (M6) W/2 : Circuit breaker
C4 (M7) W/6 : Fuse block (J/B)
C4 (M8) W/16 : Data link connector
A4 (M9) L/4 : Power window relay
A4 (M10) L/4 : Trunk lid opener relay
A4 (M11) BR/6 : Remote keyless entry relay
A4 (M12) L/4 : Power socket relay
B3 (M13) L/2 : ASCD clutch switch (M/T with ASCD)
A3 *(M14) BR/16 : To (B1)
A3 *(M16) W/20 : To (B3)
A2 (M18) W/2 : To (E107)
A2 *(M19) W/16 : To (E108)
A2 (M20) W/10 : To (E109) (QG18DE)
A2 (M20) W/16 : To (E109) (QR25DE)
A4 (M21) B/2 : Trunk lid opener switch
A3 (M22) W/3 : Illumination control switch
B3 (M23) W/10 : Door mirror remote control switch
C1 (M24) BR/2 : Pillar tweeter LH
B2 (M25) W/6 : To (R1)
C3 (M26) B/2 : Stop lamp switch (With M/T)
C3 (M26) W/4 : Stop lamp switch (With A/T)
C3 (M27) BR/2 : ASCD brake switch
B2 *(M28) - : Body ground
C3 (M29) W/24 : Combination meter (without tachometer)
C3 *(M29) BR/24 : Combination meter (with tachometer)
C3 *(M30) BR/20 : Combination meter (without tachometer)
C3 *(M30) W/24 : Combination meter (with tachometer)
D3 (M31) W/6 : Fan control switch
E3 (M32) W/12 : Air control
D4 (M33) W/3 : Cigarette lighter socket
F4 (M34) Y/20 : Air bag diagnosis sensor unit
E4 (M35) W/2 : To (M301)
C4 (M36) Y/7 : Spiral cable
C3 (M38) W/18 : Smart entrance control unit (with power door locks)
C4 (M39) B/24 : Smart entrance control unit (with power door locks)
C4 (M40) W/10 : Time control unit (without power door locks)
D2 (M42) B/3 : Combination flasher unit
E2 (M43) W/8 : Hazard switch
E4 (M44) W/8 : A/T device
E3 (M45) W/10 : Audio unit
E3 (M46) W/6 : Audio unit
E3 (M49) W/2 : Intake sensor
E2 (M50) B/6 : Intake door motor
F3 (M51) Y/2 : Front passenger air bag module
F2 (M53) GY/2 : Diode-2
G2 (M54) - : Body ground
C2 (M55) L/3 : Diode-3
F2 (M56) BR/4 : Fan resistor
F3 (M57) W/2 : Blower motor
F3 *(M58) W/16 : To (F26)
F3 *(M59) BR/16 : To (F27) (with QG18DE)
F3 *(M59) W/24 : To (F27) (with QR25DE)
G3 (M60) W/6 : To (F28)
F2 (M61) BR/2 : Security indicator lamp
G1 (M62) BR/2 : Pillar tweeter RH
G3 (M64) W/16 : To (D102)
A2 (M65) W/12 : To (B50)
C3 (M66) B/6 : Accelerator pedal position sensor
A3 (M67) W/2 : To (B51)
A2 (M68) W/24 : To (B55)
D2 (M69) W/12 : Audio unit
D3 (M71) W/16 : CD autochanger

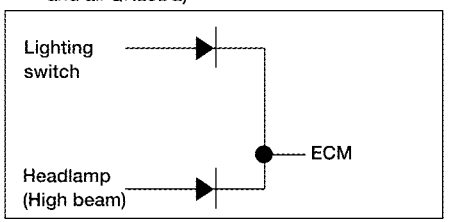
Console Sub-harness

F4 (M301) W/2 : To (M35)
F4 (M302) B/3 : Power socket

(M53) : Diode-2



(M55) : Diode-3 (QG18DE Canada models and all QR25DE)



*: Be sure to connect and lock the connectors securely after repair work. Failure to do so may cause the ECM to have diagnostic trouble codes.
Do not disconnect these connectors except in the case of working according to WORK FLOW of TROUBLE DIAGNOSES in EC and AT sections.

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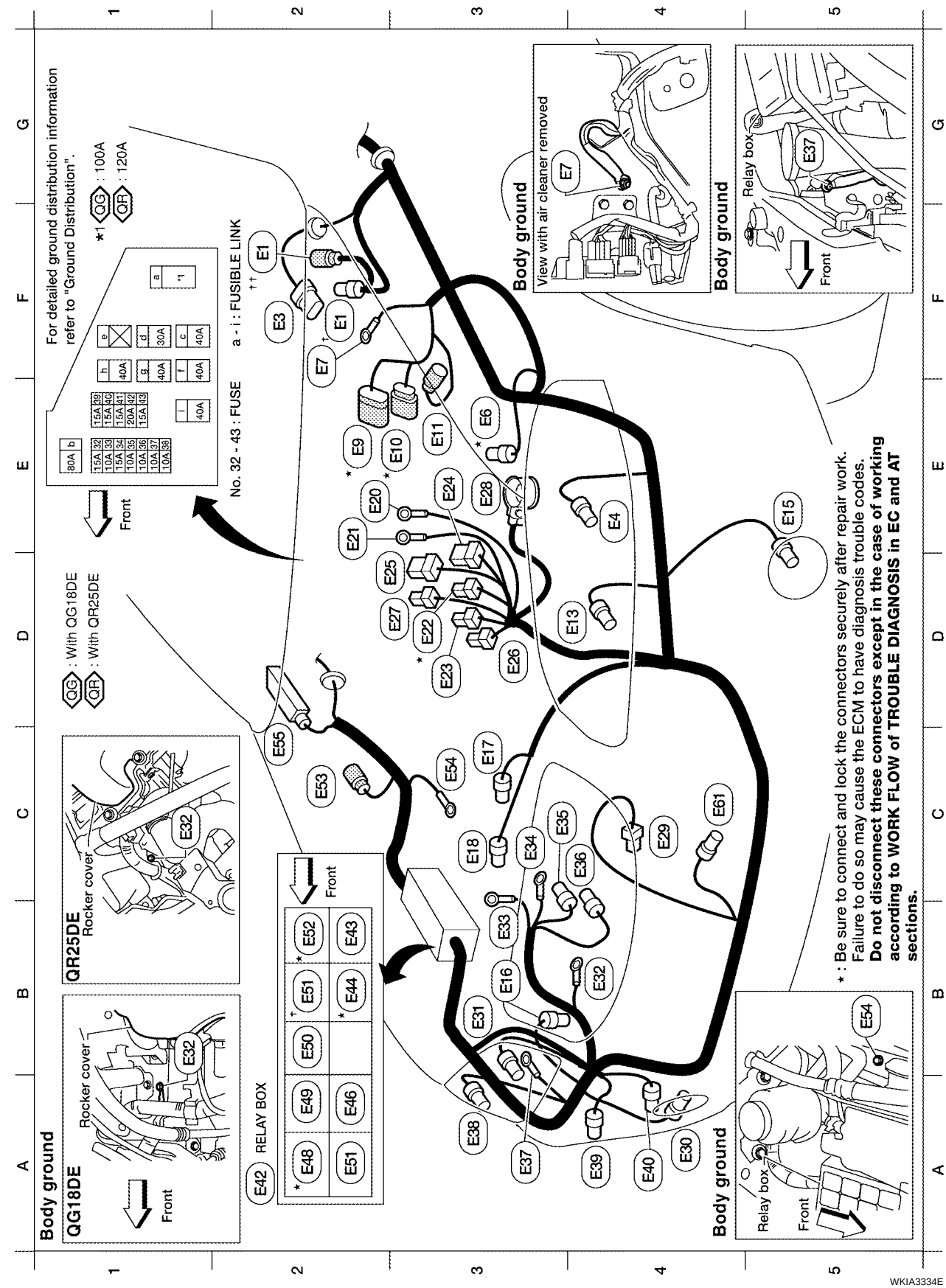
ENGINE ROOM HARNESS



F2 † E1 GY/2 : Brake fluid level switch (with QG18DE)
F2 †† E1 GY/2 : Brake fluid level switch (with QR25DE)
F2 E3 GY/6 : Front wiper motor
E4 E4 B/3 : Front combination lamp LH
E3 E6 GY/2 : Dropping resistor
F2 E7 - : Body ground
E2 E9 GY/9 : To F47
E3 E10 G/8 : To F48
E3 E11 BR/2 : Front wheel sensor LH
D4 E13 G/3 : Headlamp LH
E5 E15 B/2 : Front fog lamp LH
B3 E16 B/3 : Refrigerant pressure sensor
C3 E17 GY/4 : Cooling fan motor 1
C3 E18 GY/2 : Cooling fan motor 2 (with QG18DE)
C3 E18 GY/4 : Cooling fan motor 2 (with QR25DE)
E2 E20 - : Fuse and fusible link box
E2 E21 - : Fuse and fusible link box
D3 E22 W/3 : Fuse and fusible link box
D3 E23 W/4 : Fuse and fusible link box
E3 E24 W/6 : Fuse and fusible link box
D3 E25 B/6 : Fuse and fusible link box
D3 E26 W/1 : Fuse and fusible link box
D3 E27 B/1 : Fuse and fusible link box
E3 E28 - : Battery (positive)
C4 E29 B/1 : Horn
A4 E30 B/2 : Front fog lamp RH

B3 E31 G/3 : Headlamp RH
B4 E32 - : Body ground
B3 E33 - : Generator
C3 E34 - : Generator
C3 E35 GY/2 : Generator
C4 E36 B/1 : A/C compressor
A3 E37 - : Body ground
A3 E38 B/3 : Front combination lamp RH
A4 E39 GY/2 : Front washer motor
A4 E40 BR/2 : Washer fluid level switch
A2 E42 - : Relay box
B2 E43 BR/6 : Vehicle security lamp relay
B2 * E44 BR/6 : Cooling fan relay-3 (with QR25DE)
A2 E46 L/4 : Front fog lamp relay
A2 * E48 BR/6 : Cooling fan relay-1
A2 E49 W/3 : Horn relay
B2 E50 L/4 : A/C relay
A2 E51 L/4 : Clutch interlock relay (M/T)
B2 † E51 L/4 : Park/neutral position (PNP) relay (A/T)
B2 * E52 BR/6 : Cooling fan relay-2
C2 E53 GY/2 : Front wheel sensor RH
C3 E54 - : Body ground
C2 E55 B/31 : ABS actuator and electric unit (control unit)
C4 E61 B/2 : Ambient air temperature sensor

★ : Be sure to connect and lock the connectors securely after repair work. Failure to do so may cause the ECM to have diagnostic trouble codes.
Do not disconnect these connectors except in the case of working according to WORK FLOW of TROUBLE DIAGNOSES in EC and AT sections.

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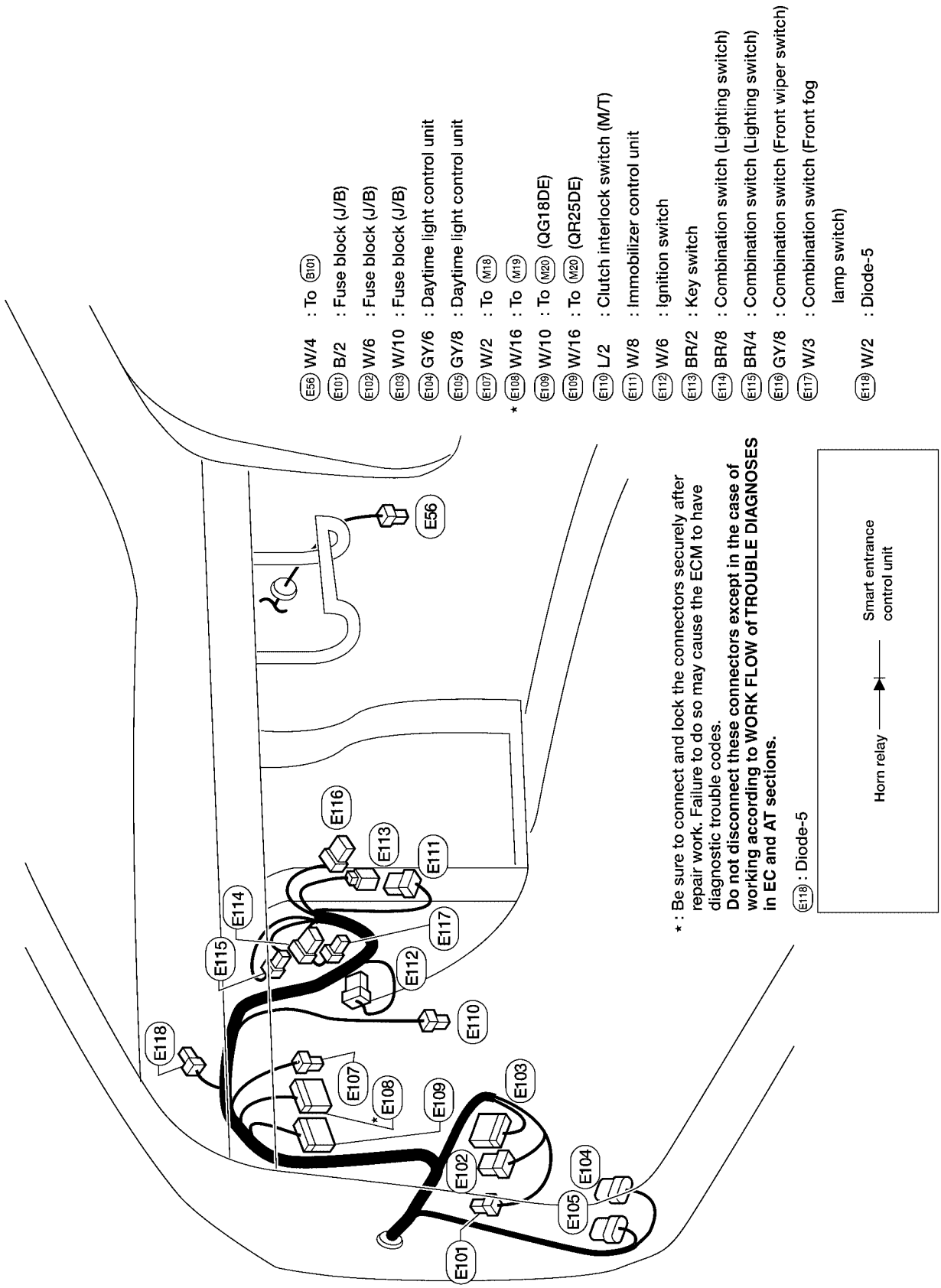
E56 W/4 : To B101
E101 B/2 : Fuse block (J/B)
E102 W/6 : Fuse block (J/B)
E103 W/10 : Fuse block (J/B)
E104 GY/6 : Daytime light control unit
E105 GY/8 : Daytime light control unit
E107 W/2 : To M18
* E108 W/16 : To M19
E109 W/10 : To M20 (QG18DE)
E109 W/16 : To M20 (QR25DE)
E110 L/2 : Clutch interlock switch (M/T)
E111 W/8 : Immobilizer control unit
E112 W/6 : Ignition switch
E113 BR/2 : Key switch
E114 BR/8 : Combination switch (Lighting switch)
E115 BR/4 : Combination switch (Lighting switch)
E116 GY/8 : Combination switch (Front wiper switch)
E117 W/3 : Combination switch (Front fog lamp switch)
E118 W/2 : Diode-5
* : Be sure to connect and lock the connectors securely after repair work. Failure to do so may cause the ECM to have diagnostic trouble codes.
Do not disconnect these connectors except in the case of working according to WORK FLOW of TROUBLE DIAGNOSES in EC and AT sections.
E118 : Diode-5
Horn relay
Smart entrance control unit
E56
E116
E113
E111
E114
E117
E115
E112
E110
E118
E107
E108
E109
E103
E102
E104
E105
E101

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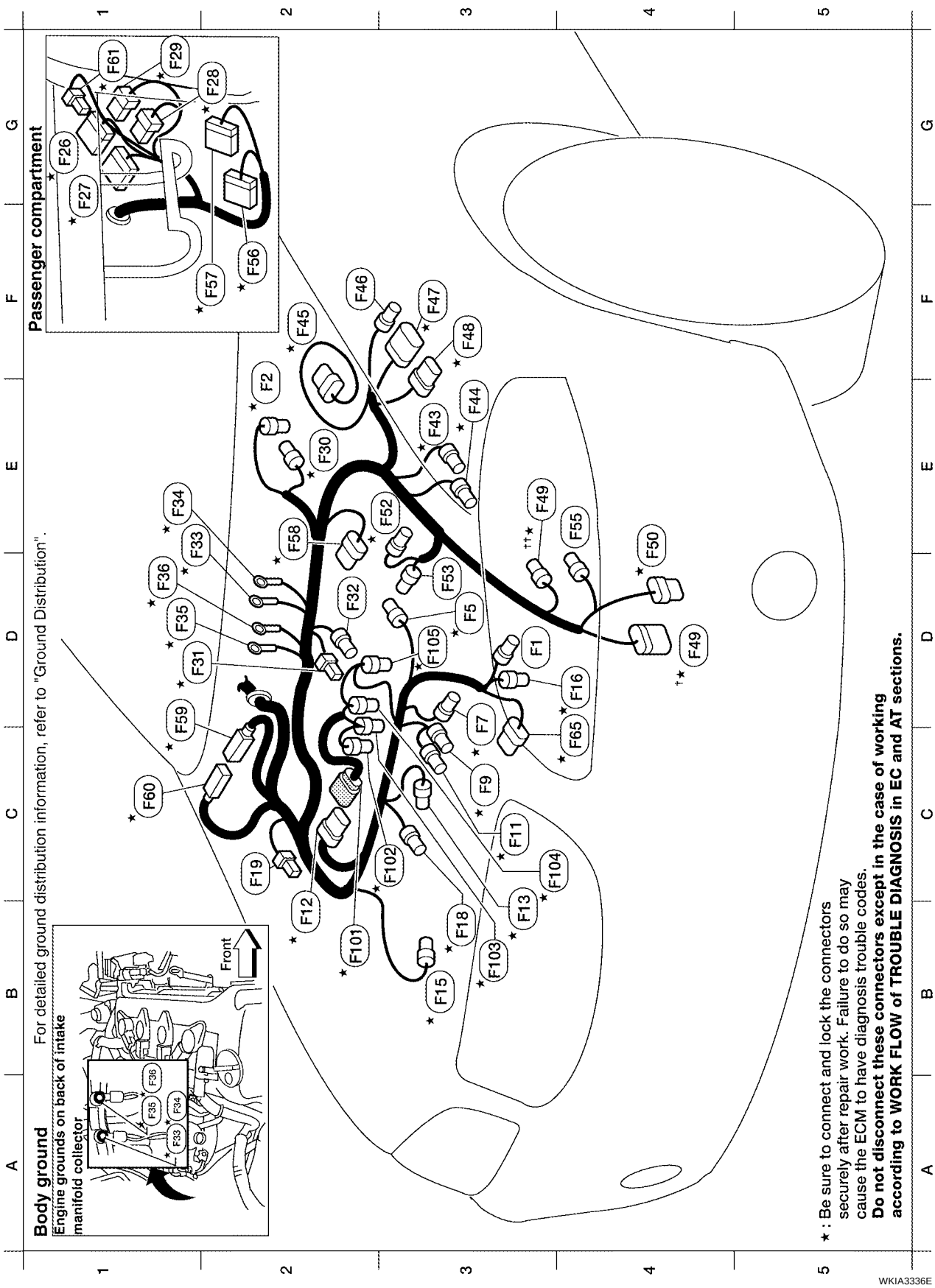
ENGINE CONTROL HARNESS
QG18DE (ULEV)



Engine control harness

D3	*F1	G/4	: Heated oxygen sensor 1
E2	*F2	G/4	: Heated oxygen sensor 2
D3	*F5	L/2	: EVAP canister purge volume control solenoid valve
D3	*F7	GY/3	: Ignition coil No. 4
C3	*F9	GY/3	: Ignition coil No. 3
C3	*F11	GY/3	: Ignition coil No. 2
B2	*F12	GY/6	: To F101
B3	*F13	GY/3	: Ignition coil No. 1
B3	*F15	GY/2	: Engine coolant temperature sensor
D4	*F16	B/3	: Camshaft position sensor (PHASE)
B3	*F18	G/2	: Intake valve timing control solenoid valve
C2	F19	GY/2	: Condenser
G1	*F26	W/16	: To M58
F1	*F27	BR/16	: To M59
G2	*F28	W/6	: To M60
G1	*F29	BR/6	: ECM Relay
E2	*F30	B/3	: Power steering pressure sensor
D1	*F31	B/2	: Knock sensor
D2	F32	GY/1	: Oil pressure switch
E1	*F33	-	: Engine ground
E1	*F34	-	: Engine ground
D1	*F35	-	: Engine ground
D1	*F36	-	: Engine ground
E3	*F43	GY/2	: Vehicle speed sensor
E3	*F44	BR/3	: Revolution sensor (A/T)
F2	*F45	B/6	: Mass air flow sensor
F2	F46	GY/1	: To E8
F3	*F47	GY/9	: To E9
F3	*F48	GY/8	: To E10
E3 ††	*F49	B/2	: Park/neutral position (PNP) switch (M/T)
D4 †	*F49	B/10	: Park/neutral position (PNP) switch (A/T)
D4	*F50	B/8	: Terminal cord assembly (A/T)
E3	*F52	B/3	: Crankshaft position sensor (POS)
D3	F53	GY/1	: Starter motor
E4	F55	B/2	: Back-up lamp switch (M/T)
F2	*F56	W/24	: TCM (Transmission control module) (A/T)
F2	*F57	GY/24	: TCM (Transmission control module) (A/T)
E2	*F58	G/6	: Electric throttle control actuator
D1	*F59	SMJ	: ECM
C1	*F60	SMJ	: ECM
G1	*F61	L/4	: Throttle control motor relay
C4	*F65	B/6	: Air fuel ratio (A/F) sensor 1

Engine control sub-harness

B2	*F101	GY/6	: To F12
C3	*F102	GY/2	: Injector No. 1
B3	*F103	GY/2	: Injector No. 2
C4	*F104	GY/2	: Injector No. 3
D3	*F105	GY/2	: Injector No. 4

⋆ : Be sure to connect and lock the connectors securely after repair work. Failure to do so may cause the ECM to have diagnostic trouble codes.
Do not disconnect these connectors except in the case of working according to WORK FLOW of TROUBLE DIAGNOSES in EC and AT sections.

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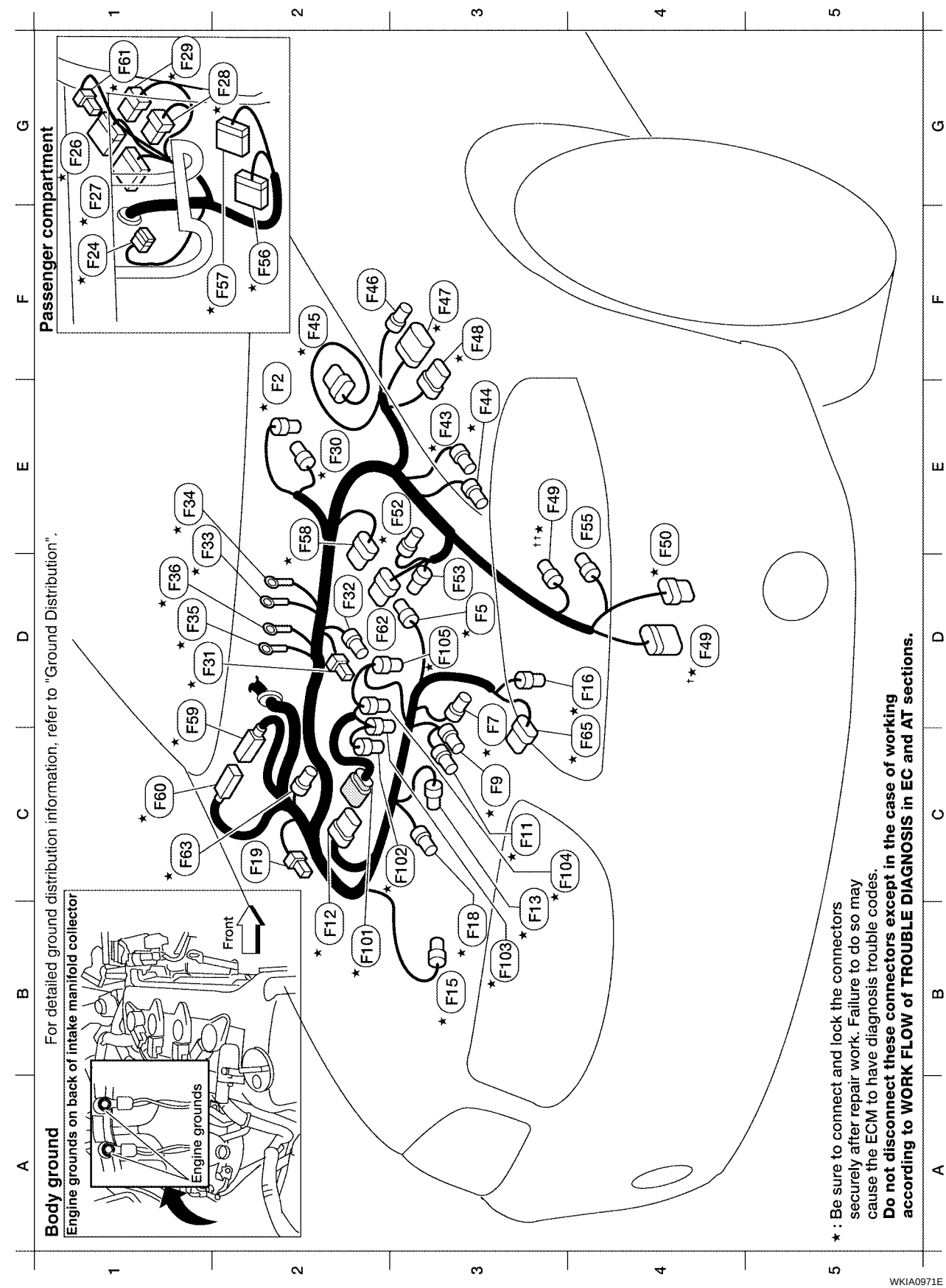
QG18DE (SULEV)



E2 * (F2) G/4 : Heated oxygen sensor 2
D3 * (F5) L/2 : EVAP canister purge volume control solenoid valve
D3 * (F7) GY/3 : Ignition coil No. 4
C3 * (F9) GY/3 : Ignition coil No. 3
C3 * (F11) GY/3 : Ignition coil No. 2
B2 * (F12) GY/6 : To (F101)
B3 * (F13) GY/3 : Ignition coil No. 1
B3 * (F15) GY/2 : Engine coolant temperature sensor
D4 * (F16) B/3 : Camshaft position sensor (PHASE)
B3 * (F18) G/2 : Intake valve timing control solenoid valve
C2 (F19) GY/2 : Condenser
G1 * (F26) W/16 : To (M58)
F1 * (F27) BR/16 : To (M59)
G2 * (F28) W/6 : To (M60)
G1 * (F29) BR/6 : ECM Relay
E2 * (F30) B/3 : Power steering pressure sensor
D1 * (F31) B/2 : Knock sensor
D2 (F32) GY/1 : Oil pressure switch
E1 * (F33) - : Engine ground
E1 * (F34) - : Engine ground
D1 * (F35) - : Engine ground
D1 * (F36) - : Engine ground
E3 * (F43) GY/2 : Vehicle speed sensor
E3 * (F44) BR/3 : Revolution sensor (A/T)

F2 * (F45) B/6 : Mass air flow sensor
F2 (F46) GY/1 : To (E8)
F3 * (F47) GY/9 : To (E9)
F3 * (F48) GY/8 : To (E10)
E3 †† * (F49) B/2 : Park/neutral position (PNP) switch (M/T)
D4 † * (F49) B/10 : Park/neutral position (PNP) switch (A/T)
D4 * (F50) B/8 : Terminal cord assembly (A/T)
E3 * (F52) B/3 : Crankshaft position sensor (POS)
D3 (F53) GY/1 : Starter motor
E4 (F55) B/2 : Back-up lamp switch (M/T)
F2 * (F56) W/24 : TCM (Transmission control module) (A/T)
F2 * (F57) GY/24 : TCM (Transmission control module) (A/T)
E2 * (F58) G/6 : Electric throttle control actuator
D1 * (F59) SMJ : ECM
C1 * (F60) SMJ : ECM
G1 * (F61) L/4 : Throttle control motor relay
D2 * (F62) GY/6 : Swirl control valve
C1 * (F63) BR/3 : Swirl control valve position sensor
D4 * (F65) B/6 : Air fuel ratio (A/F) sensor 1

Engine control sub-harness
B2 * (F101) GY/6 : To (F12)
C2 * (F102) GY/2 : Injector No. 1
B3 * (F103) GY/2 : Injector No. 2
C4 * (F104) GY/2 : Injector No. 3
D3 * (F105) GY/2 : Injector No. 4

⋆ : Be sure to connect and lock the connectors securely after repair work. Failure to do so may cause the ECM to have diagnostic trouble codes.
Do not disconnect these connectors except in the case of working according to WORK FLOW of TROUBLE DIAGNOSES in EC and AT sections.

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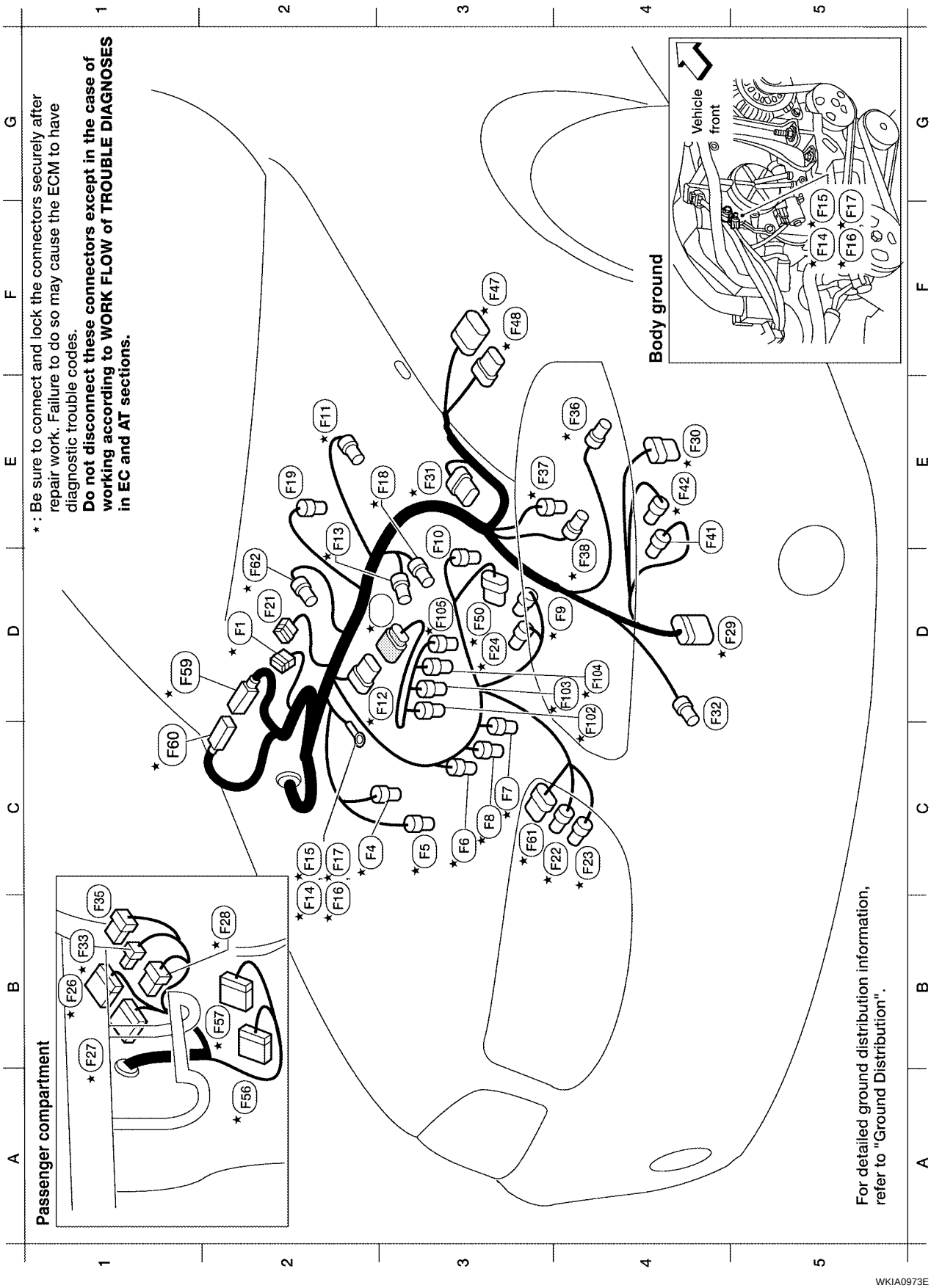
QR25DE


★: Be sure to connect and lock the connectors securely after repair work. Failure to do so may cause the ECM to have diagnostic trouble codes.
Do not disconnect these connectors except in the case of working according to WORK FLOW of TROUBLE DIAGNOSES in EC and AT sections.
Passenger compartment
Body ground
Vehicle front
For detailed ground distribution information, refer to "Ground Distribution".
WKIA0973E

D2	* (F1)	BR/20	: Joint connector -1
C2	* (F4)	G/2	: Intake valve timing control solenoid valve
C3	* (F5)	GY/3	: Ignition coil No. 1
C3	* (F6)	GY/3	: Ignition coil No. 2
C3	* (F7)	GY/3	: Ignition coil No. 4
C3	* (F8)	GY/3	: Ignition coil No. 3
D4	* (F9)	B/3	: Camshaft position sensor (PHASE)
E3	* (F10)	L/2	: EVAP canister purge volume control solenoid valve
E2	* (F11)	B/3	: Crankshaft position sensor
D3	* (F12)	GY/6	: To (F101)
E2	* (F13)	BR/2	: VIAS control solenoid valve
B2	* (F14)	-	: Engine ground
C2	* (F15)	-	: Engine ground
B2	* (F16)	-	: Engine ground
C2	* (F17)	-	: Engine ground
E3	* (F18)	B/2	: Knock sensor
E2	* (F19)	GY/1	: Oil presure switch
D2	(F21)	GY/2	: Condenser
C3	* (F22)	G/4	: Heated oxygen sensor 1 (except LEV Federal)
C4	* (F23)	G/4	: Heated oxygen sensor 2
D3	* (F24)	GY/2	: Engine coolant temperature sensor
B1	* (F26)	W/16	: To (M58)
B1	* (F27)	W/24	: To (M59)
B2	* (F28)	W/6	: To (M60)
D4	* (F29)	B/10	: Park/neutral position (PNP) switch (with A/T)
E4	* (F30)	B/8	: Terminal cord assembly (with A/T)
E3	* (F31)	B/6	: Mass air flow sensor
D4	(F32)	GY/1	: Starter motor
B1	* (F33)	L/4	: Throttle control motor relay
B1	* (F35)	BR/6	: ECM relay
E4	* (F36)	GY/2	: Vehicle speed sensor
E4	* (F37)	B/3	: Turbine revolution sensor (with A/T)
D4	* (F38)	B/3	: Revolution sensor (with A/T)
E4	(F41)	B/2	: Back-up lamp switch (with M/T)
E4	* (F42)	B/2	: Park/neutral position (PNP) switch (with M/T)
F3	* (F47)	GY/9	: To (E9)
F3	* (F48)	GY/8	: To (E10)
D3	* (F50)	G/6	: Electric throttle control actuator
A2	* (F56)	W/24	: TCM (transmission control module) (with A/T)
B2	* (F57)	GY/24	: TCM (transmission control module) (with A/T)
D2	* (F59)	SMJ	: ECM
C2	* (F60)	SMJ	: ECM
C3	* (F61)	B/6	: Air fuel ratio (A/F) sensor 1 (LEV Federal)
D2	* (F62)	B/3	: Power steering pressure sensor

Engine Control Sub-harness

D3	* (F101)	B/6	: To (F12)
D4	* (F102)	GY/2	: Injector No. 1
D4	* (F103)	GY/2	: Injector No. 2
D4	* (F104)	GY/2	: Injector No. 3
D3	* (F105)	GY/2	: Injector No. 4

*: Be sure to connect and lock the connectors securely after repair work. Failure to do so may cause the ECM to have diagnostic trouble codes. **Do not disconnect these connectors except in the case of working according to WORK FLOW of TROUBLE DIAGNOSES in EC and AT sections.**

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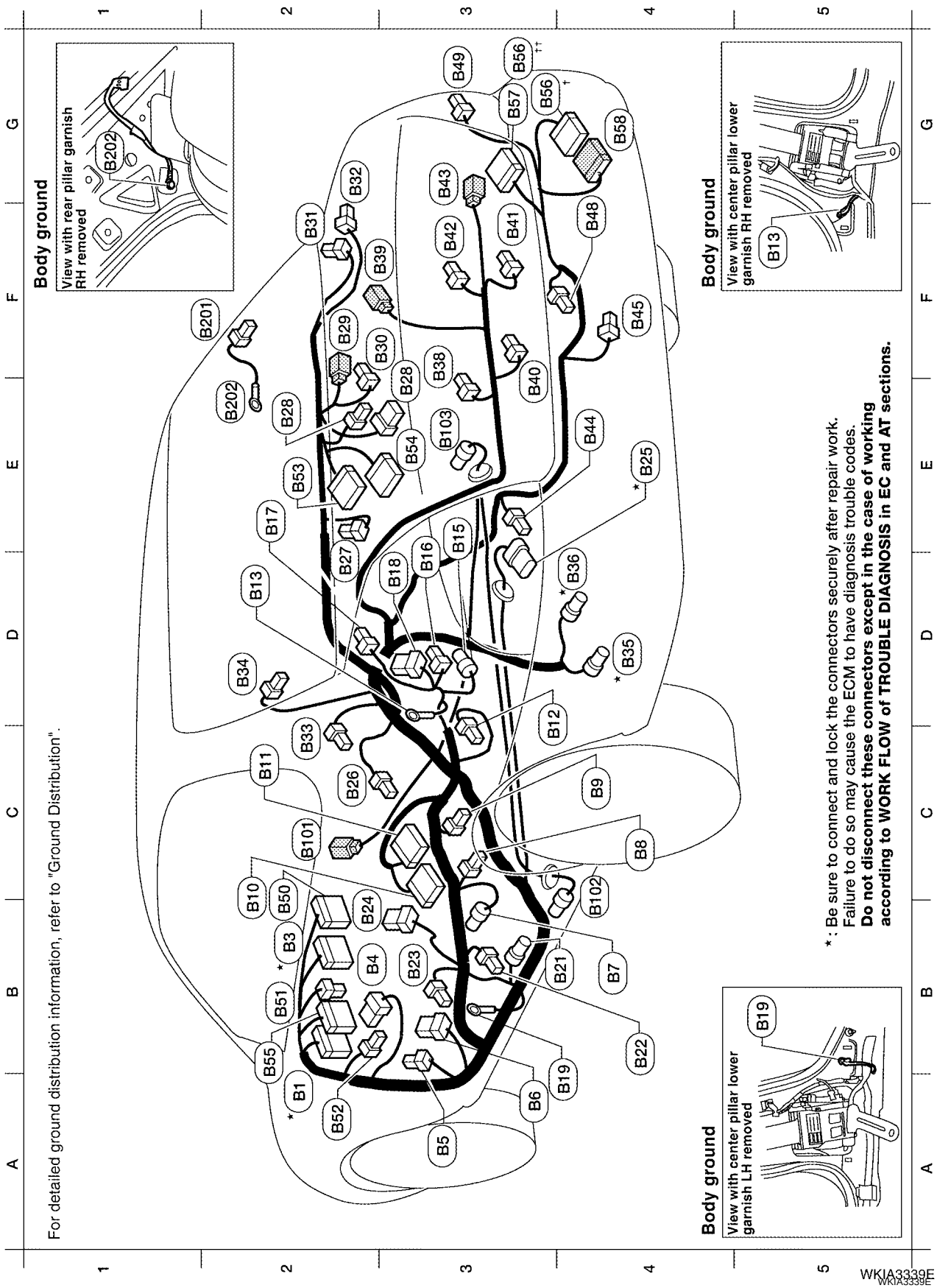
BODY HARNESS



Body harness

A2 * (B1) BR/16 : To (M14)
B2 * (B3) W/20 : To (M16)
B2 (B4) W/8 : Fuse block (J/B)
A3 (B5) L/4 : Fuel pump relay
A3 (B6) BR/6 : Rear window defogger relay
B4 (B7) Y/2 : Front LH side air bag module
C4 (B8) W/3 : Seat belt buckle switch LH
C4 (B9) B/1 : Parking brake switch
C2 (B10) Y/12 : Air bag diagnosis sensor unit
C2 (B11) Y/12 : Air bag diagnosis sensor unit
D4 (B12) Y/2 : Front RH side air bag module
D2 (B13) – : Body ground
E3 (B15) Y/2 : RH side air bag (satellite) sensor
E3 (B16) Y/2 : Front RH seat belt pre-tensioner
E2 (B17) W/3 : Front door switch RH
D3 (B18) W/8 : To (D301)
A4 (B19) – : Body ground
B3 (B21) Y/2 : LH side air bag (satellite) sensor
B4 (B22) Y/2 : Front LH seat belt pre-tensioner
B3 (B23) W/3 : Front door switch LH
B2 (B24) W/8 : To (D201)
E4 * (B25) GY/5 : Fuel level sensor unit and fuel pump
C2 (B26) W/1 : Rear door switch LH
E2 (B27) BR/2 : Rear speaker LH
E3 (B28) W/8 : Subwoofer (with mid level audio system)
E2 (B28) W/4 : Subwoofer (with premium audio system)
F2 (B29) W/2 : High-mounted stop lamp (without rear air spoiler)
F3 (B30) W/2 : Trunk room lamp
F2 (B31) BR/2 : Rear speaker RH

⋆ : Be sure to connect and lock the connectors securely after repair work. Failure to do so may cause the ECM to have diagnostic trouble codes. **Do not disconnect these connectors except in the case of working according to WORK FLOW of TROUBLE DIAGNOSES in EC and AT sections.**

G2 (B32) W/1 : Rear door switch RH
C2 (B33) W/2 : Diode-4
D2 (B34) B/1 : Rear window defogger
D4 * (B35) B/2 : EVAP canister vent control valve
D4 * (B36) GY/3 : EVAP control system pressure sensor
F3 (B38) W/2 : Back-up lamp LH
F2 (B39) BR/2 : High-mounted stop lamp (with rear air spoiler)
E3 (B40) W/2 : License plate lamp LH
F3 (B41) W/2 : License plate lamp RH
F3 (B42) W/2 : Back-up lamp RH
G3 (B43) W/2 : Trunk lid key cylinder switch (unlock switch) (with vehicle security system)
E4 (B44) W/4 : Rear combination lamp LH
F4 (B45) W/4 : Trunk lid opener actuator
F4 (B48) W/2 : Trunk room lamp switch
G3 (B49) W/4 : Rear combination lamp RH
B2 (B50) W/12 : To (M65)
B2 (B51) W/2 : To (M67)
A2 (B52) W/4 : To (D9)
E2 (B53) W/12 : Audio amplifier (with premium audio system)
E3 (B54) W/12 : Audio amplifier (with premium audio system)
B2 (B55) W/24 : To (M68)
G3 †† (B56) W/16 : Satellite radio tuner (pre-wiring)
G3 † (B56) W/16 : To (B58) (with CD autochanger)
G3 (B58) W/16 : To (B56) (with CD autochanger)
G3 (B57) W/16 : Satellite radio tuner (pre-wiring) (with CD autochanger)

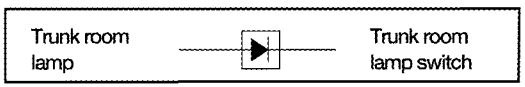
Body No. 2 harness

C2 (B101) W/4 : To (E56)
C4 (B102) BR/2 : Rear wheel sensor LH
E3 (B103) GY/2 : Rear wheel sensor RH

Rear window defogger ground sub-harness

F2 (B201) B/1 : Rear window defogger
E2 (B202) – : Body ground

(B33) : Diode-4



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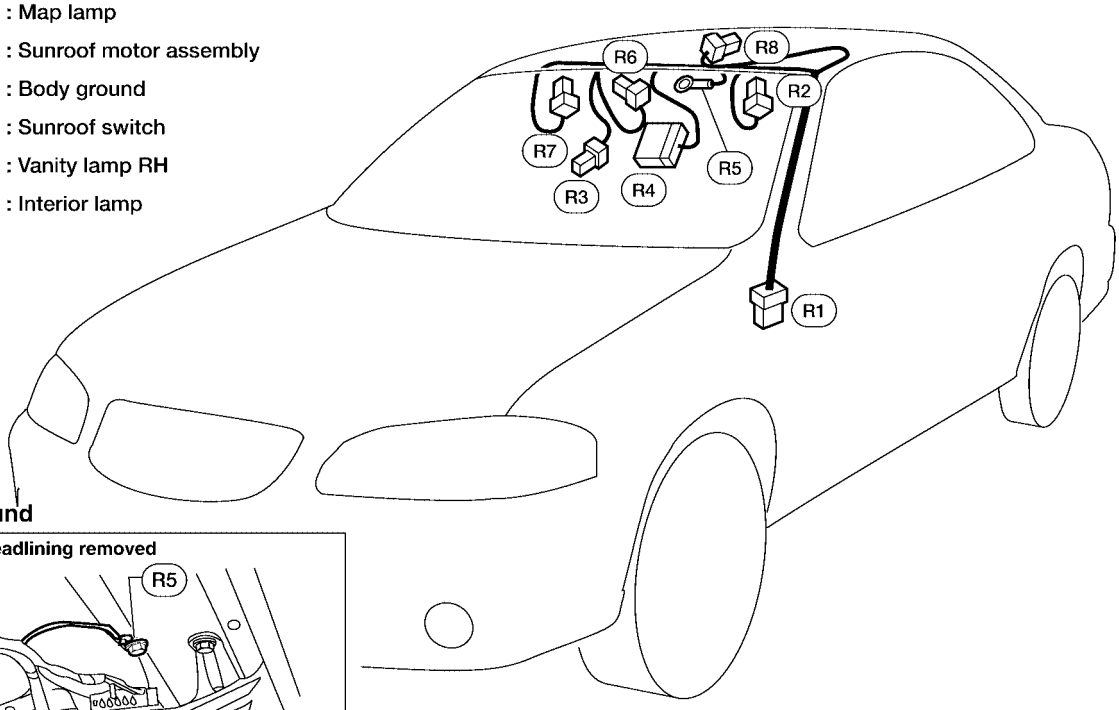
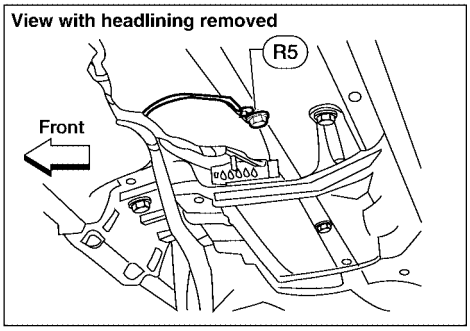
ROOM LAMP HARNESS

(R1) W/6 : To (M25)
(R2) W/2 : Vanity lamp LH
(R3) W/3 : Map lamp
(R4) B/12 : Sunroof motor assembly
(R5) - : Body ground
(R6) W/4 : Sunroof switch
(R7) W/2 : Vanity lamp RH
(R8) W/2 : Interior lamp



Body ground

View with headlining removed



For detailed ground distribution information, refer to "Ground Distribution".

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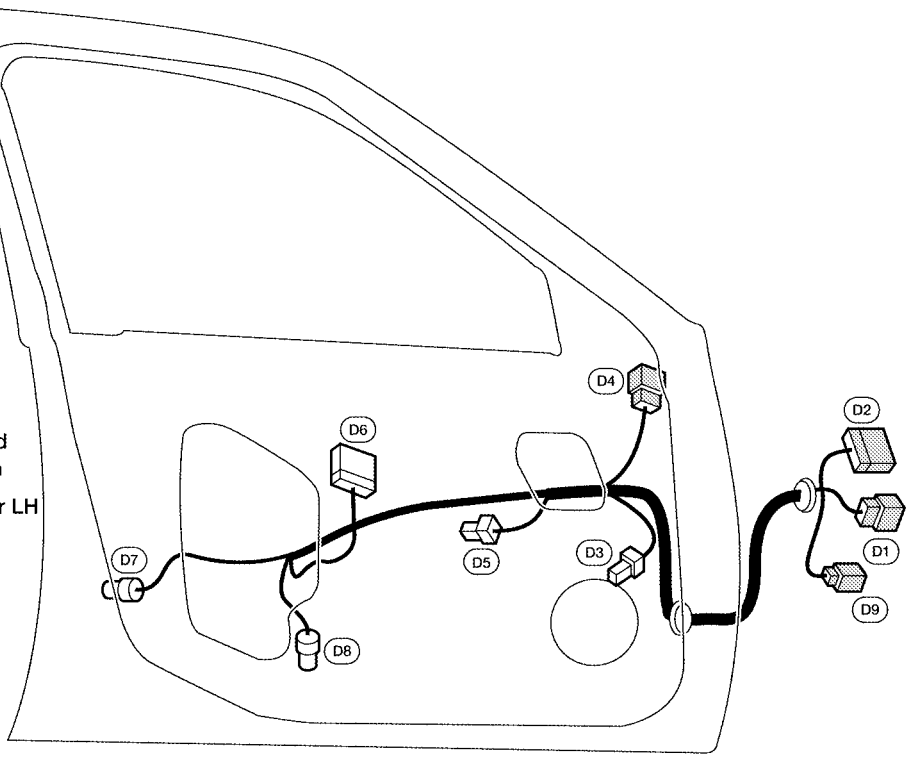
FRONT DOOR HARNESS
LH SIDE

(D1) W/8 : To (M4)
(D2) W/16 : To (M5)
(D3) W/2 : Front door speaker LH
(D4) GY/6 : Door mirror LH
(D5) B/2 : Front power window motor LH
(D6) W/16 : Main power window and door lock/unlock switch
(D7) SB/4 : Front door lock actuator LH
(D8) BR/3 : Front door key cylinder switch LH
(D9) W/4 : To (B52)



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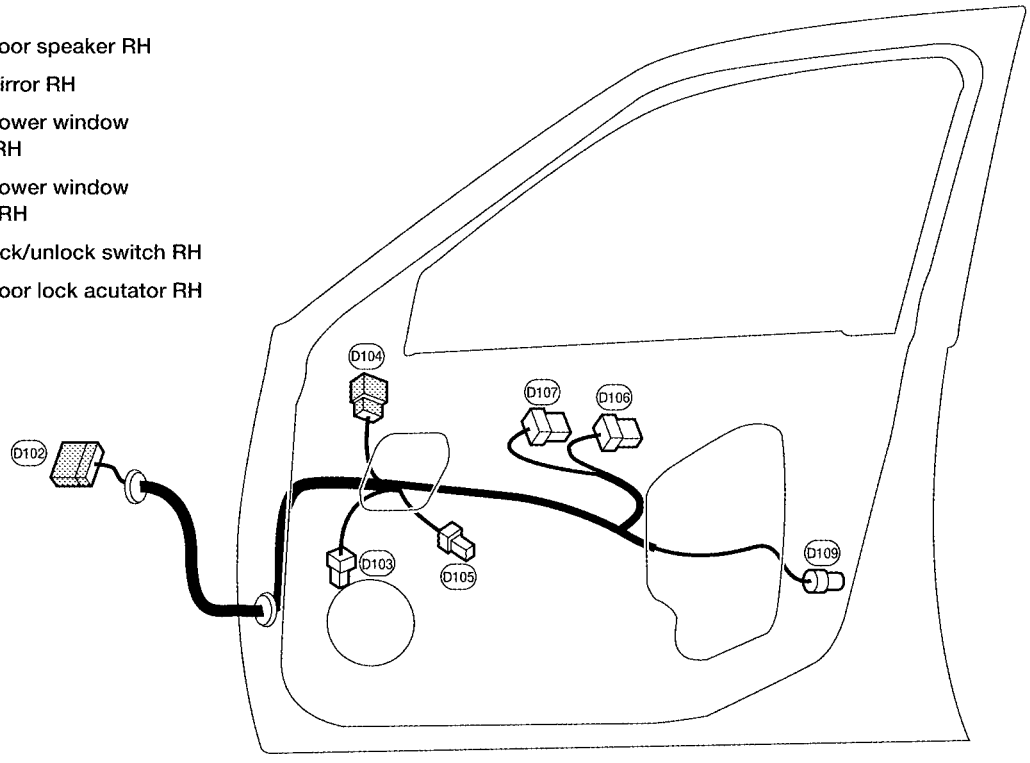
RH SIDE

(D102) W/16 : To (M64)
(D103) W/2 : Front door speaker RH
(D104) GY/6 : Door mirror RH
(D105) B/2 : Front power window motor RH
(D106) W/8 : Front power window switch RH
(D107) GY/8 : Door lock/unlock switch RH
(D109) SB/4 : Front door lock acutator RH



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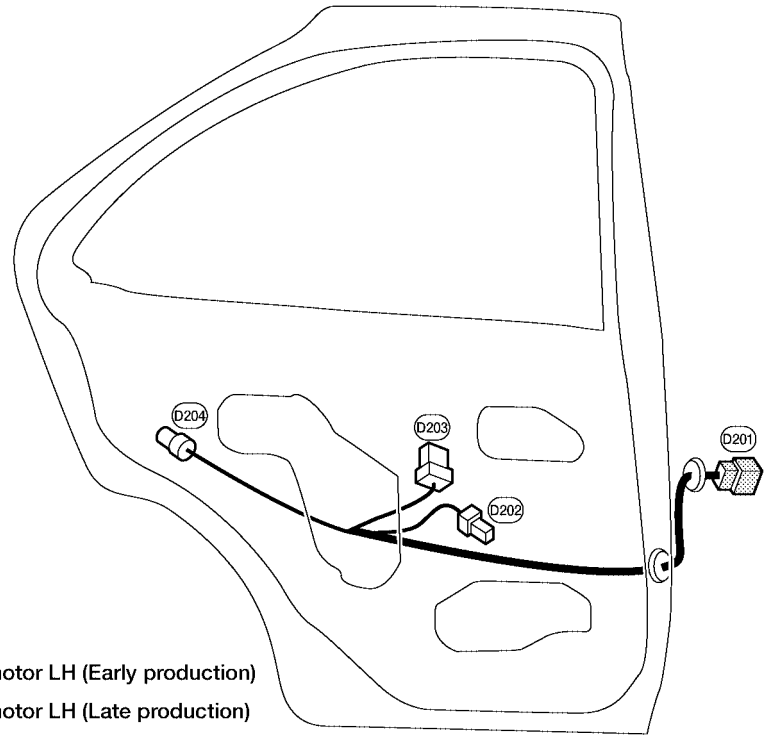
REAR DOOR HARNESS

LH SIDE

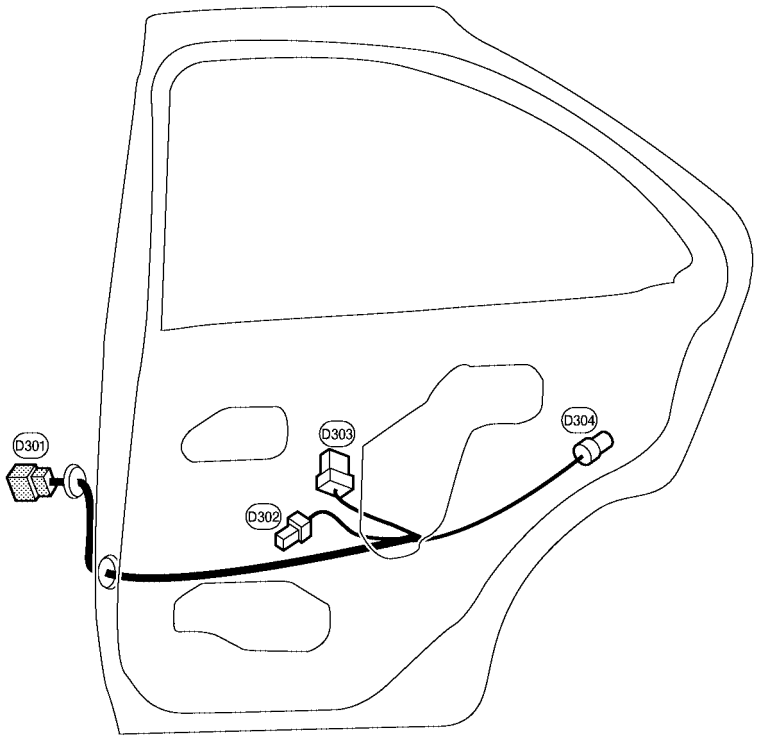


D201 W/8 : To B24
D202 B/2 : Rear power window motor LH (Early production)
D202 GY/2 : Rear power window motor LH (Late production)
D203 W/8 : Rear power window switch LH
D204 SB/4 : Rear door lock actuator LH

WKIA2769E

RH SIDE

D301 W/8 : To B18
D302 B/2 : Rear power window motor RH (Early production)
D302 GY/2 : Rear power window motor RH (Late production)
D303 W/8 : Rear power window switch RH
D304 SB/4 : Rear door lock actuator RH



WKIA2770E

Wiring Diagram Codes (Cell Codes)

EKS003B3

Use the chart below to find out what each wiring diagram code stands for.
Refer to the wiring diagram code in the alphabetical index to find the location (page number) of each wiring diagram.

Code	Section	Wiring Diagram Name
1STSIG	AT	A/T 1ST Signal
2NDSIG	AT	A/T 2ND Signal
3RDSIG	AT	A/T 3RD Signal
4THSIG	AT	A/T 4TH Signal
ABS	BRC	Anti-lock Brake System
A/C,M	MTC	Air Conditioner
A/F	EC	Air Fuel Ratio (A/F) Sensor 1
A/FH	EC	Air Fuel Ratio (A/F) Sensor 1 Heater
APPS1	EC	Accelerator Pedal Position Sensor
APPS2	EC	Accelerator Pedal Position Sensor
APPS3	EC	Accelerator Pedal Position Sensor
ASC/BS	EC	ASCD Brake Switch
ASCBOF	EC	ASCD Brake Switch
ASCIND	EC	ASCD Indicator
ASC/SW	EC	ASCD Steering Switch
AUDIO	AV	Audio
B/COMP	DI	Board computer
BACK/L	LT	Back-up Lamp
BA/FTS	AT	A/T Fluid Temperature Sensor and TCM Power Supply
BRK/SW	EC	Brake Switch
CAN	AT	CAN Communication Line
CAN	EC	CAN Communication Line
CAN	LAN	CAN Communication Line
CHARGE	SC	Charging System
CHIME	DI	Warning Chime
CIGAR	WW	Cigarette Lighter
COOL/F	EC	Cooling Fan Control
DEF	GW	Rear Window Defogger
DLC	EC	Data Link Connector
D/LOCK	BL	Power Door Lock
DTRL	LT	Headlamp - With Daytime Light System (For Canada)
ECM/PW	EC	ECM Power Supply For Back-Up
ECTS	EC	Engine Coolant Temperature Sensor
ENGSS	AT	Engine Speed Signal
ETC1	EC	Electric Throttle Control Function
ETC2	EC	Throttle Control Motor Relay
ETC3	EC	Throttle Control Motor
F/FOG	LT	Front Fog Lamp
F/PUMP	EC	Fuel Pump Control
FTS	AT	A/T Fluid Temperature Sensor
FTTS	EC	Fuel Tank Temperature Sensor

Code	Section	Wiring Diagram Name
FUEL	EC	Fuel Injection System Function
HEATER	MTC	Heater System
H/LAMP	LT	Headlamp
H/MIRR	GW	Heated Mirror
HO2S1	EC	Heated Oxygen Sensor 1
HO2S1H	EC	Heated Oxygen Sensor 1 Heater
HO2S2	EC	Heated Oxygen Sensor 2
HO2S2H	EC	Heated Oxygen Sensor 2 Heater
HORN	WW	Horn
IATS	EC	Intake Air Temperature Sensor
IGNSYS	EC	Ignition Signal
ILL	LT	Illumination
INJECT	EC	Injector
INT/L	LT	Interior, Step, Spot, Vanity Mirror and Trunk Room Lamps
IVC	EC	Intake Valve Timing Control Solenoid Valve
KEYLES	BL	Remote Keyless Entry System
KS	EC	Knock Sensor
LOAD	EC	Load Signal
LPSV	AT	Line Pressure Solenoid Valve
MAFS	EC	Mass Air Flow Sensor
MAIN	AT	Main Power Supply and Ground Circuit
MAIN	EC	Main Power Supply and Ground Circuit
METER	DI	Speedometer, Tachometer, Temp., and Fuel Gauges
MIL/DL	EC	Malfunction Indicator Lamp and Data Link Connector
MIRROR	GW	Power Door Mirror
NATS	BL	NVIS (Nissan Vehicle Immobilizer System — NATS)
NONDTC	AT	Non-detectable Items
OVRCSV	AT	Overrun Clutch Solenoid Valve
PGC/V	EC	EVAP Canister Purge Volume Control Solenoid Valve
PHASE	EC	Camshaft Position Sensor (PHASE)
PNP/SW	AT	Park/Neutral Position Switch
PNP/SW	EC	Park/Neutral Position Switch
POS	EC	Crankshaft Position Sensor (POS)
POWER	PG	Power Supply Routing
PRE/SE	EC	EVAP Control System Pressure Sensor
PS/SEN	EC	Power Steering Pressure Sensor
ROOM/L	LT	Room Lamp
RP/SEN	EC	Refrigerant Pressure Sensor
SEN/PW	EC	Sensor Power Supply
SHIFT	AT	A/T Shift Lock System
SROOF	RF	Sunroof
SRS	SRS	Supplemental Restraint System
SSV/A	AT	Shift Solenoid Valve A
SSV/B	AT	Shift Solenoid Valve B

Code	Section	Wiring Diagram Name
START	SC	Starting System
STOP/L	LT	Stop Lamp
SWL/S	EC	Swirl Control Valve Position Sensor [QG18DE (SULEV)]
SWL/V	EC	Swirl Control Valve [QG18DE (SULEV)]
TAIL/L	LT	Parking, License and Tail Lamps
TCCSIG	AT	A/T TCC Signal (Lock Up)
TCV	AT	Torque Converter Clutch Solenoid Valve
TLID	BL	Trunk Lid Opener
TPS	AT	Throttle Position Sensor
TPS1	EC	Throttle Position Sensor
TPS2	EC	Throttle Position Sensor
TPS3	EC	Throttle Position Sensor
TRSA/T	AT	Turbine Revolution Sensor (QR25DE Model)
TURN	LT	Turn Signal and Hazard Warning Lamps
VIAS	EC	Variable Air Induction Control System (QR25DE Model)
VEHSEC	BL	Vehicle Security System
VENT/V	EC	EVAP Canister Vent Control Valve
VSS	EC	Vehicle Speed Sensor
VSSA/T	AT	Vehicle Speed Sensor A/T (Revolution Sensor)
VSSMTR	AT	Vehicle Speed Sensor MTR
WARN	DI	Warning Lamps
WINDOW	GW	Power Window
WIPER	WW	Front Wiper and Washer

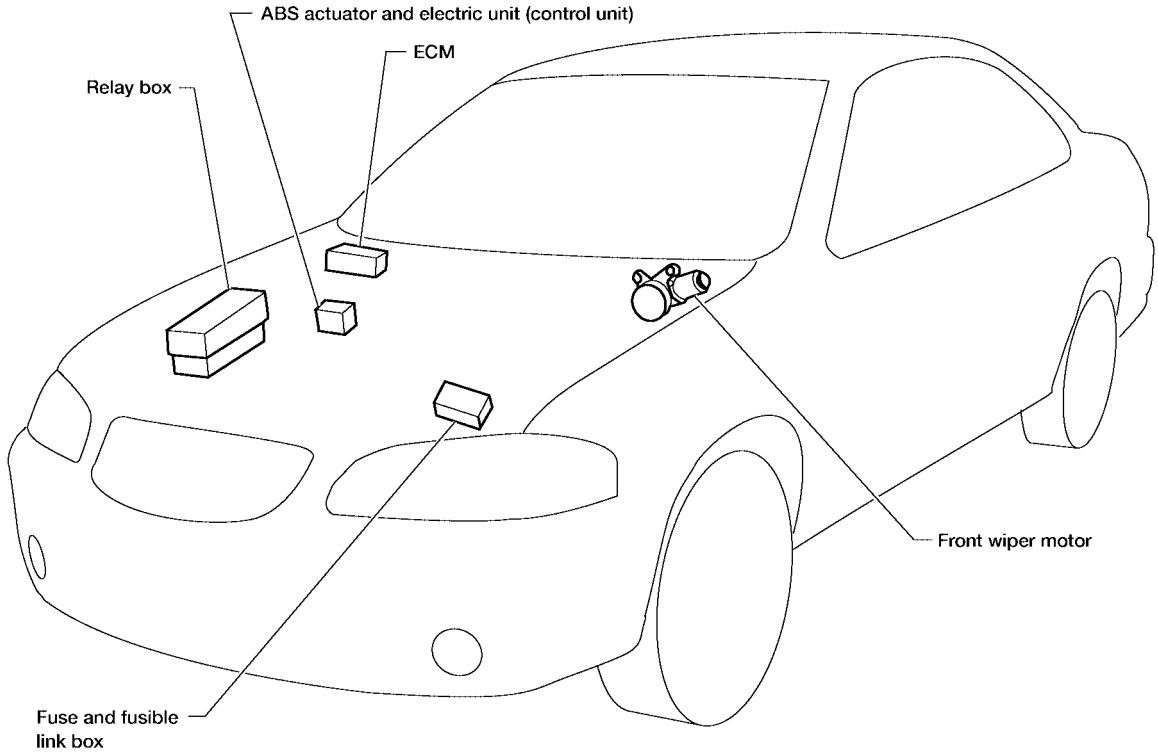
ELECTRICAL UNITS LOCATION

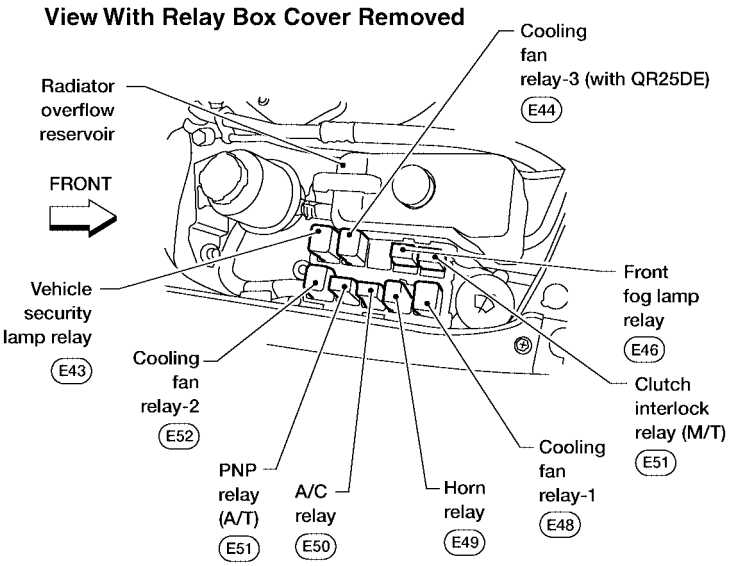
PFP:25230

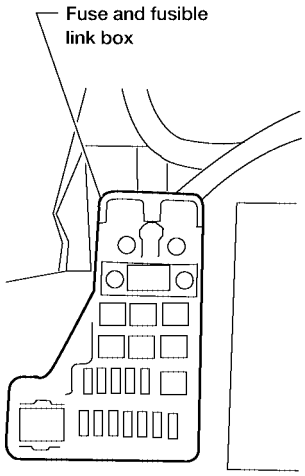
Electrical Units Location

EKS003B4

ENGINE COMPARTMENT

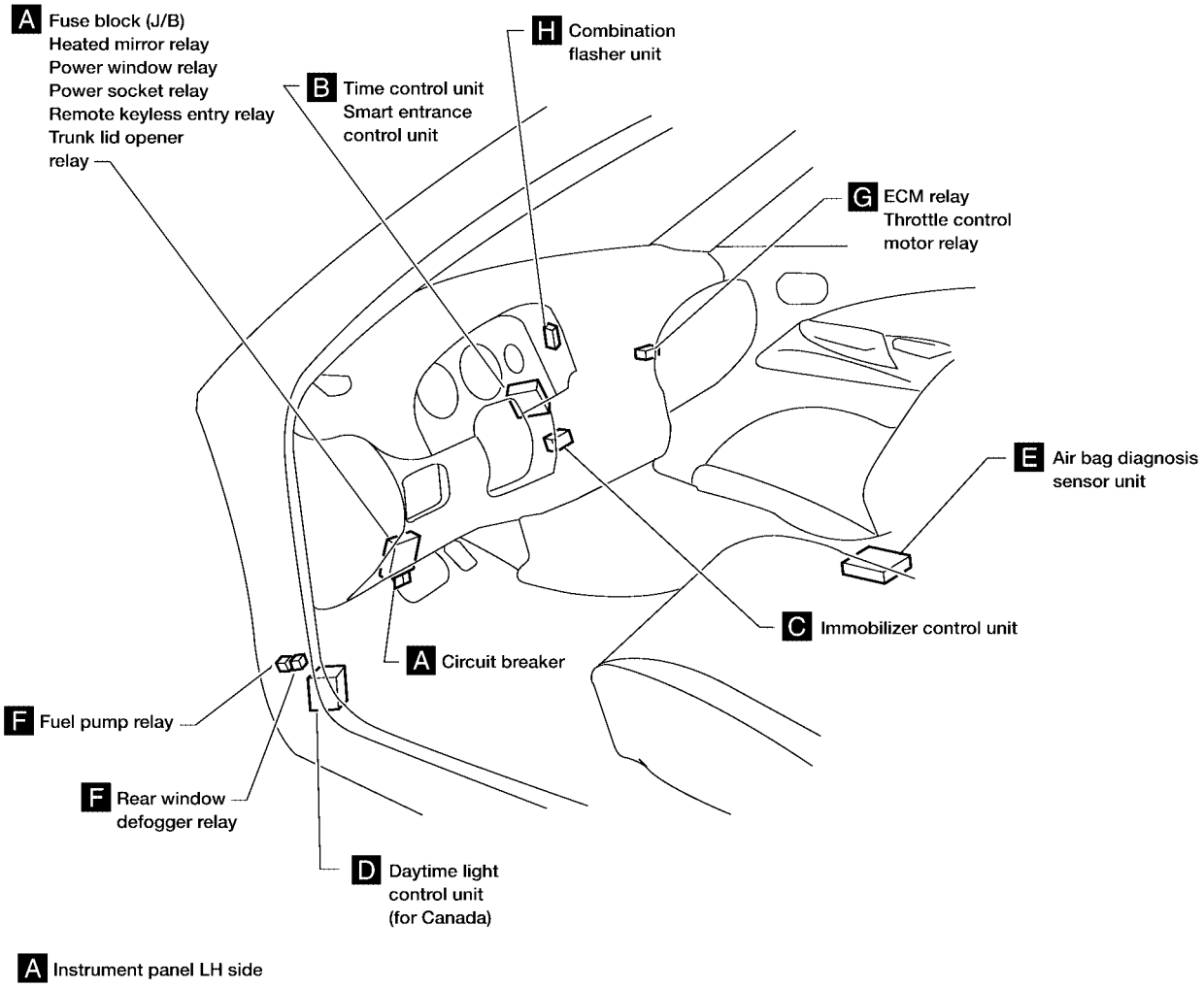




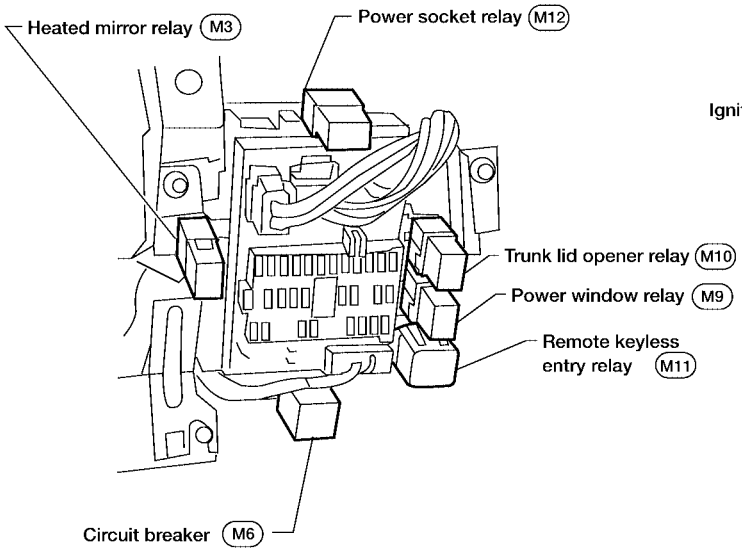


WKIA0980E

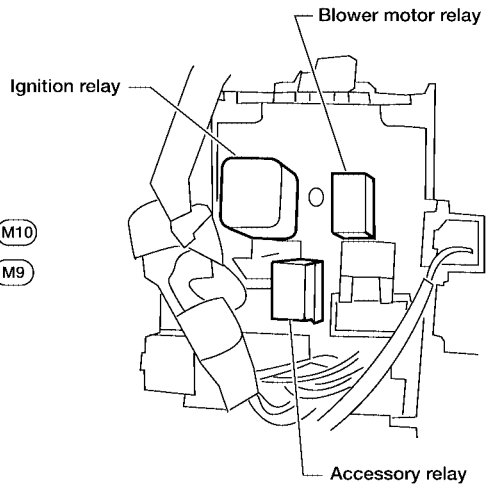
PASSENGER COMPARTMENT



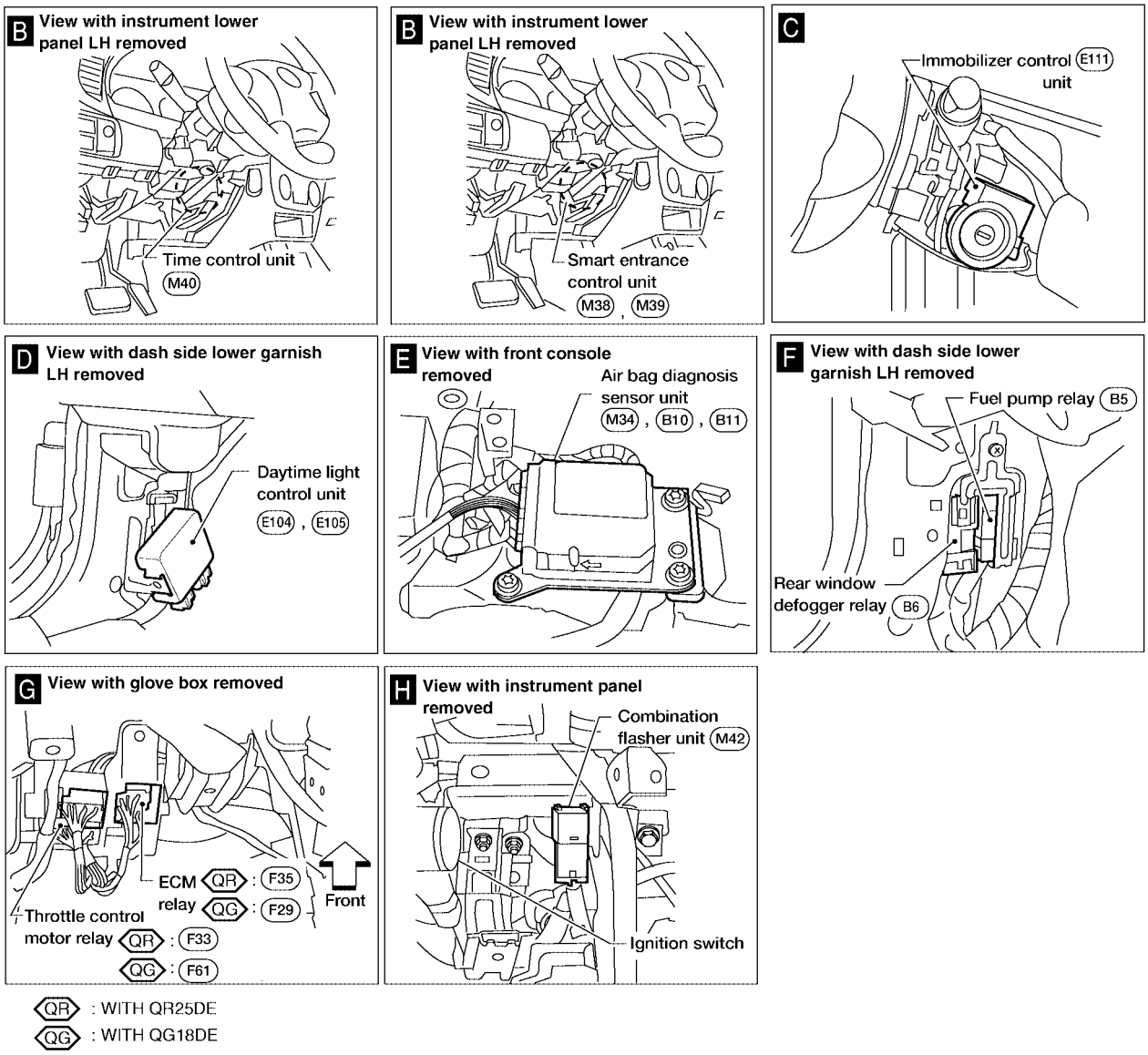
View with instrument panel removed



View of rear of fuse block (J/B)



WKIA0249E

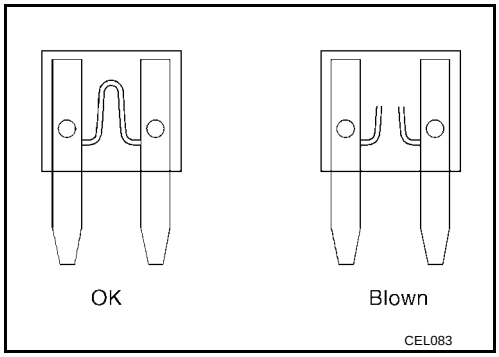

B View with instrument lower panel LH removed
Time control unit
M40
B View with instrument lower panel LH removed
Smart entrance control unit
M38 , M39
C
Immobilizer control unit
E111
D View with dash side lower garnish LH removed
Daytime light control unit
E104 , E105
E View with front console removed
Air bag diagnosis sensor unit
M34 , B10 , B11
F View with dash side lower garnish LH removed
Fuel pump relay
B5
Rear window defogger relay
B6
G View with glove box removed
ECM relay
QR : F35
QG : F29
Front
Throttle control motor relay
QR : F33
QG : F61
H View with instrument panel removed
Combination flasher unit
M42
Ignition switch
QR : WITH QR25DE
QG : WITH QG18DE

WKIA0981E

Fuse

EKS003B5

- If fuse is blown, be sure to eliminate cause of incident before installing new fuse.
- Use fuse of specified rating. Never use fuse of more than specified rating.
- Do not partially install fuse; always insert it into fuse holder properly.
- Remove fuse for “ELECTRICAL PARTS (BAT)” if vehicle is not used for a long period of time.



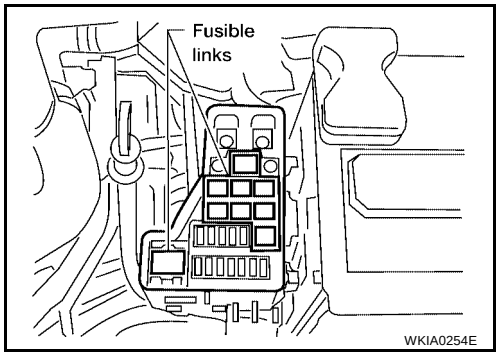
Fusible Link

EKS003B6

A melted fusible link can be detected either by visual inspection or by feeling with finger tip. If its condition is questionable, use circuit tester or test lamp.

CAUTION:

- **If fusible link should melt, it is possible that critical circuit (power supply or large current carrying circuit) is shorted. In such a case, carefully check and eliminate cause of incident.**
- **Never wrap outside of fusible link with vinyl tape. Important: Never let fusible link touch any other wiring harness, vinyl or rubber parts.**

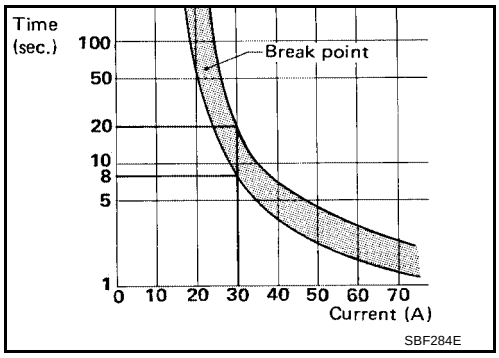


Circuit Breaker

EKS003B7

For example, when current is 30A, the circuit is broken within 8 to 20 seconds.
A circuit breaker is used for the following systems:

- Power door locks
- Power sunroof
- Power windows
- Remote keyless entry system



HARNESS CONNECTOR

PFP:24010

Description

EKS003B8

HARNESS CONNECTOR (TAB-LOCKING TYPE)

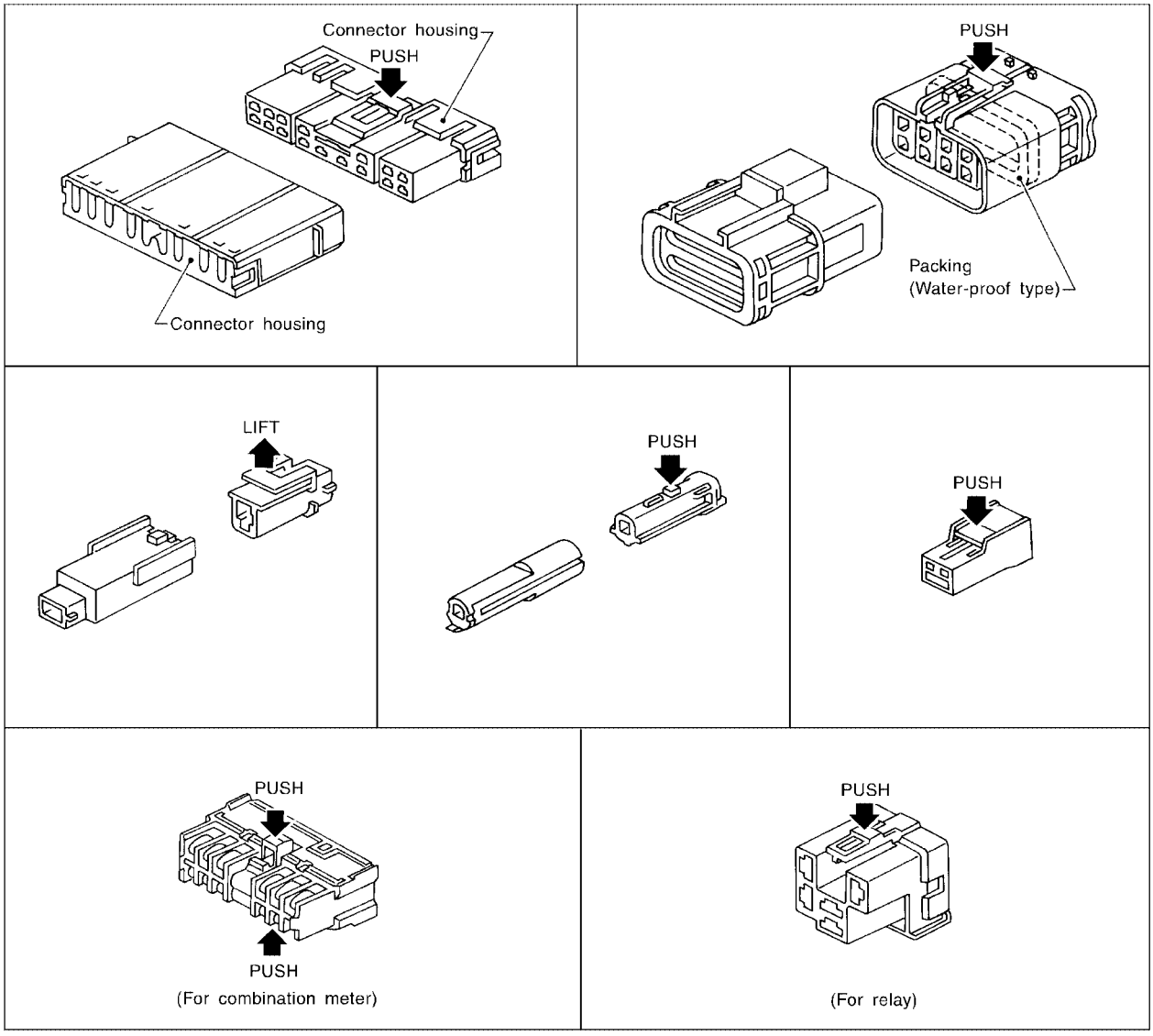
- The tab-locking type connectors help prevent accidental looseness or disconnection.
- The tab-locking type connectors are disconnected by pushing or lifting the locking tab(s). Refer to the illustration below.

Refer to the next page for description of the slide-locking type connector.

CAUTION:

Do not pull the harness or wires when disconnecting the connector.

[Example]



SEL769DA

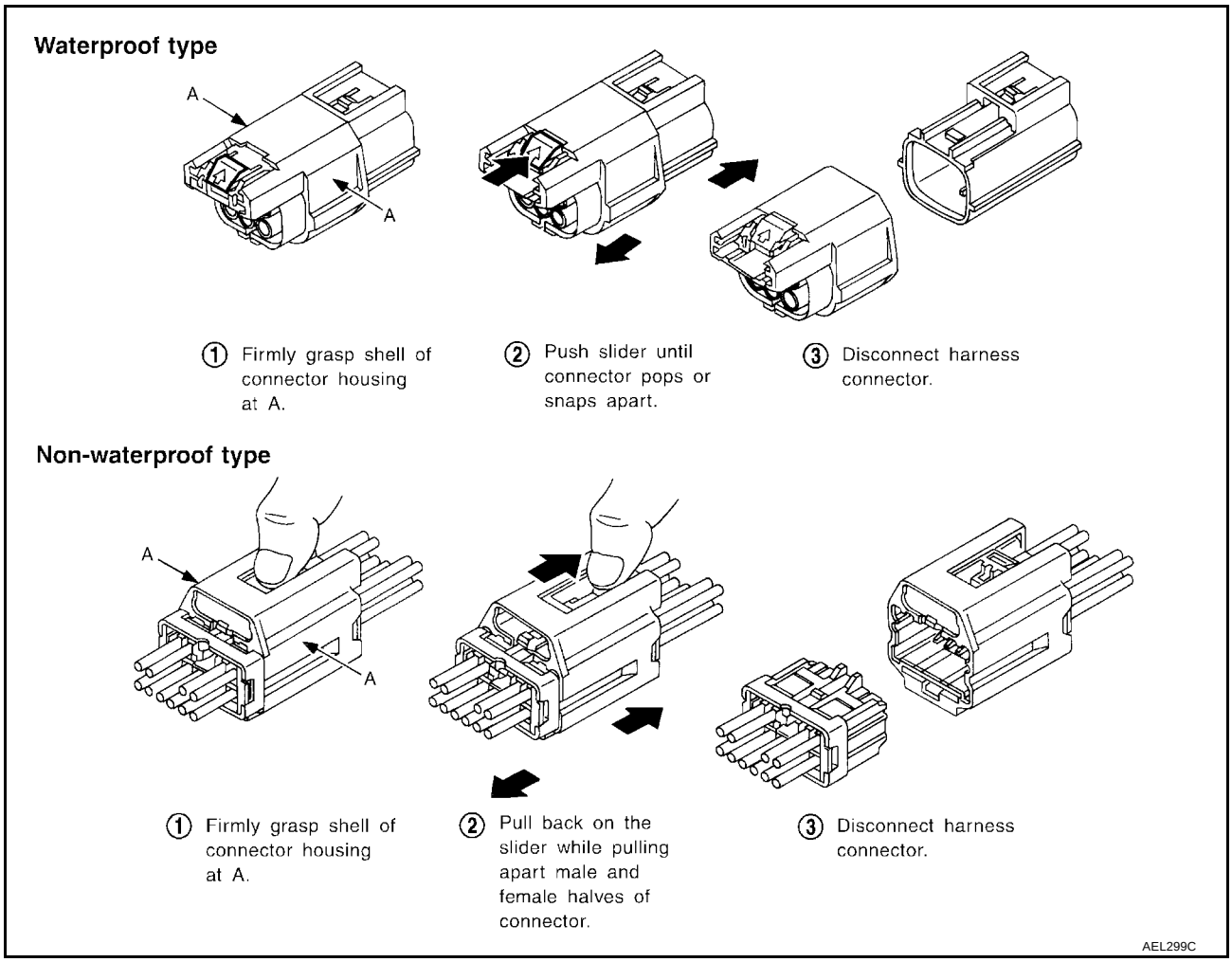
HARNESS CONNECTOR (SLIDE-LOCKING TYPE)

- A new style slide-locking type connector is used on certain systems and components, especially those related to OBD.
- The slide-locking type connectors help prevent incomplete locking and accidental looseness or disconnection.
- The slide-locking type connectors are disconnected by pushing or pulling the slider. Refer to the illustration below.

CAUTION:

- **Do not pull the harness or wires when disconnecting the connector.**
- **Be careful not to damage the connector support bracket when disconnecting the connector.**

[Example]

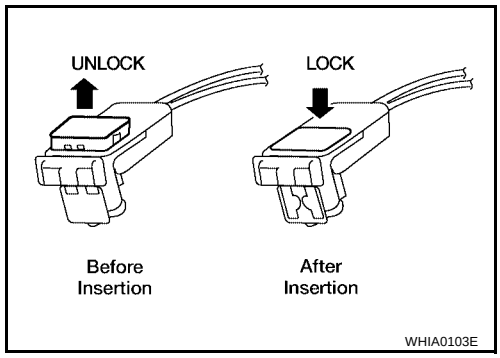


HARNESS CONNECTOR (DIRECT-CONNECT SRS COMPONENT TYPE)

- SRS direct-connect type harness connectors are used on certain SRS components such as air bag modules and seat belt pre-tensioners.
- Always pull up to release black locking tab prior to removing connector from SRS component.
- Always push down to lock black locking tab after installing connector to SRS component. When locked, the black locking tab is level with the connector housing.

CAUTION:

- **Do not pull the harness or wires when removing connectors from SRS components.**

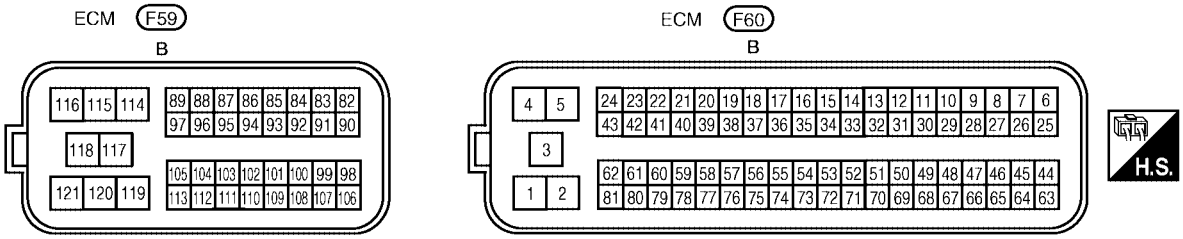


ELECTRICAL UNITS

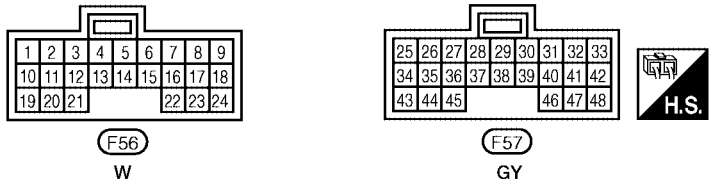
PFP:23710

Terminal Arrangement

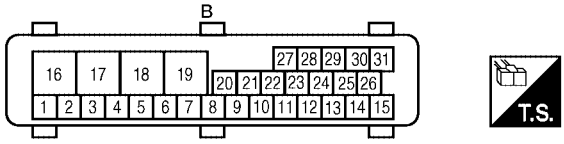
EKS003BA



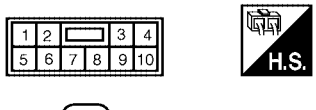
TCM (TRANSMISSION CONTROL MODULE)



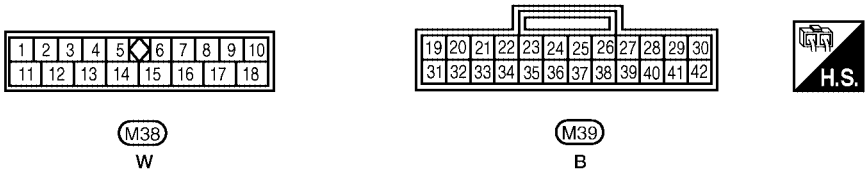
ABS ACTUATOR AND ELECTRIC UNIT
(CONTROL UNIT) E55
B



TIME CONTROL UNIT : OD



SMART ENTRANCE CONTROL UNIT : DL



OD : WITHOUT POWER DOOR LOCKS
DL : WITH POWER DOOR LOCKS

WKIA0983E

STANDARDIZED RELAY

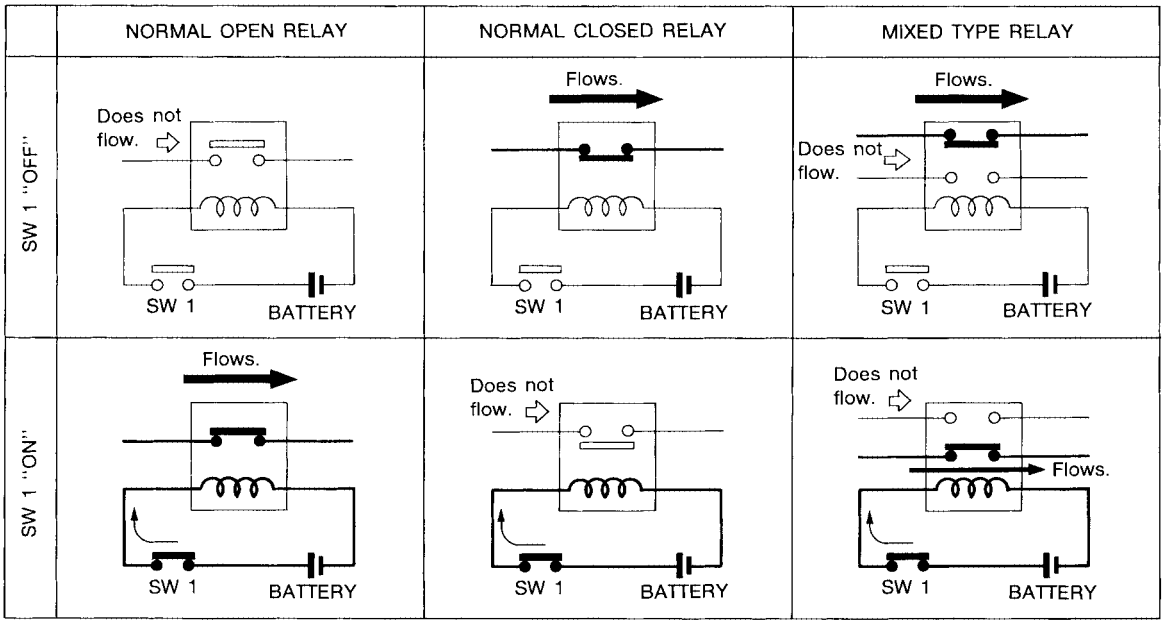
PFP:25230

Description

EKS003BB

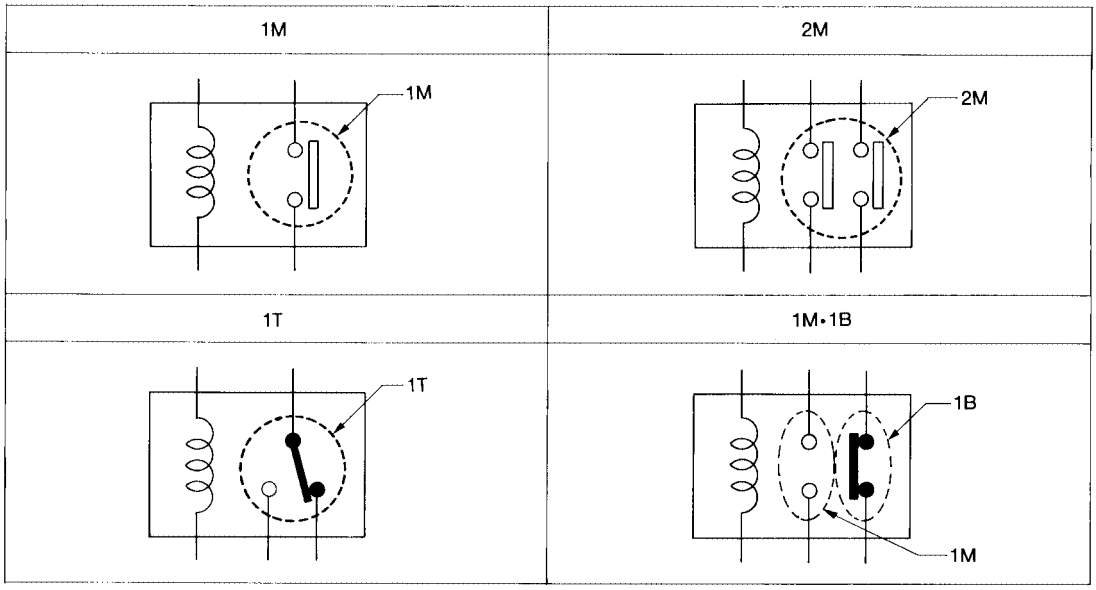
NORMAL OPEN, NORMAL CLOSED AND MIXED TYPE RELAYS

Relays can mainly be divided into three types: normal open, normal closed and mixed type relays.



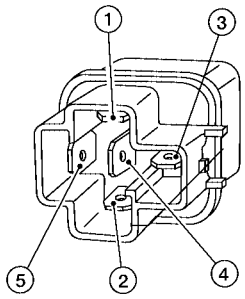
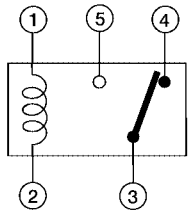
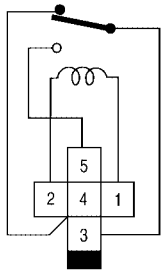
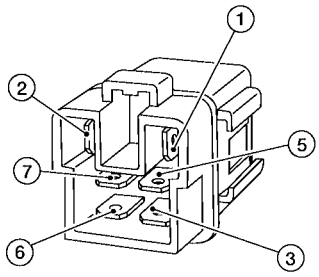
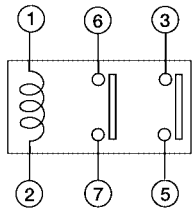
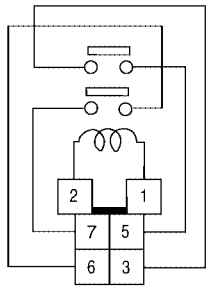
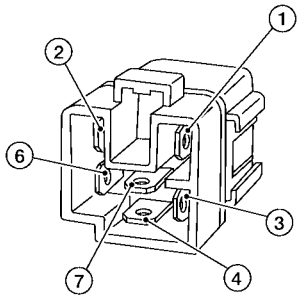
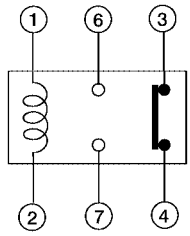
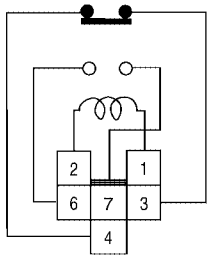
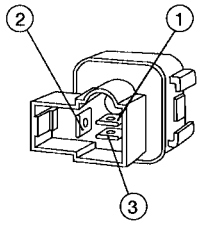
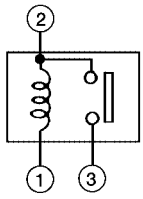
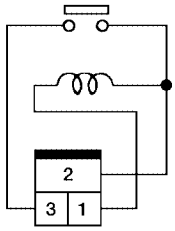
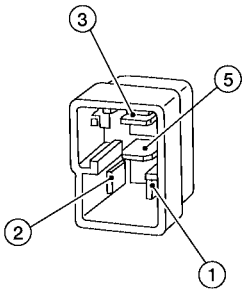
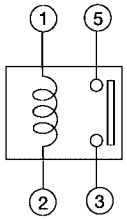
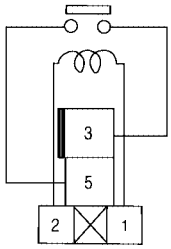
SEL881H

TYPE OF STANDARDIZED RELAYS



SEL882H

1M	1 Make		2M	2 Make
1T	1 Transfer		1M·1B	1 Make 1 Break

Type	Outer view	Circuit	Connector Symbol and connection	Case color
1T				BLACK
2M				BROWN
1M -1B				GRAY
1M				BLACK
				BLUE

The arrangement of terminal numbers on the actual relays may differ from those shown above.

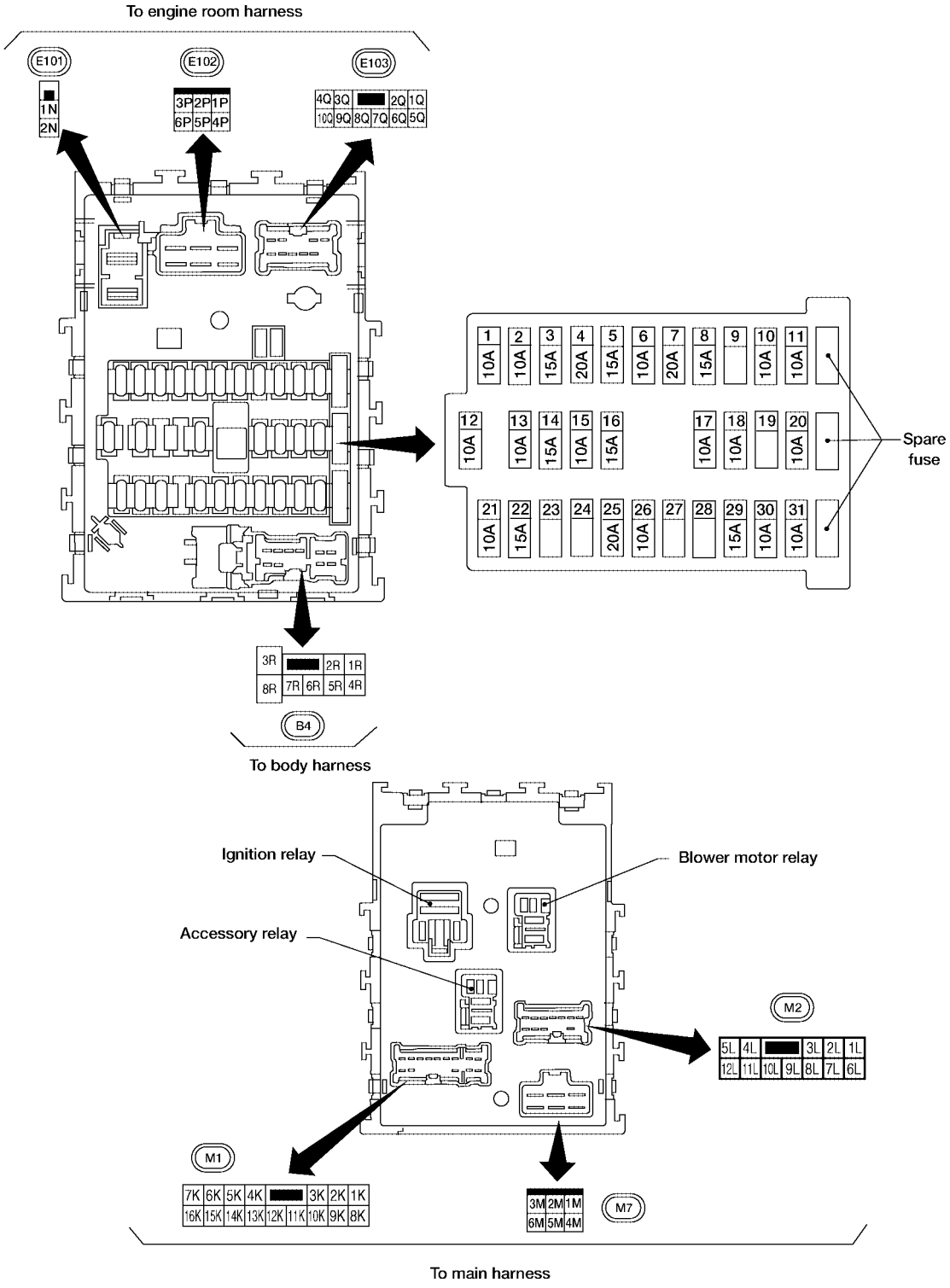
WKIA0253E

FUSE BLOCK — JUNCTION BOX (J/B)

PFP:24350

Terminal Arrangement

EKS003BC



WKIA0984E

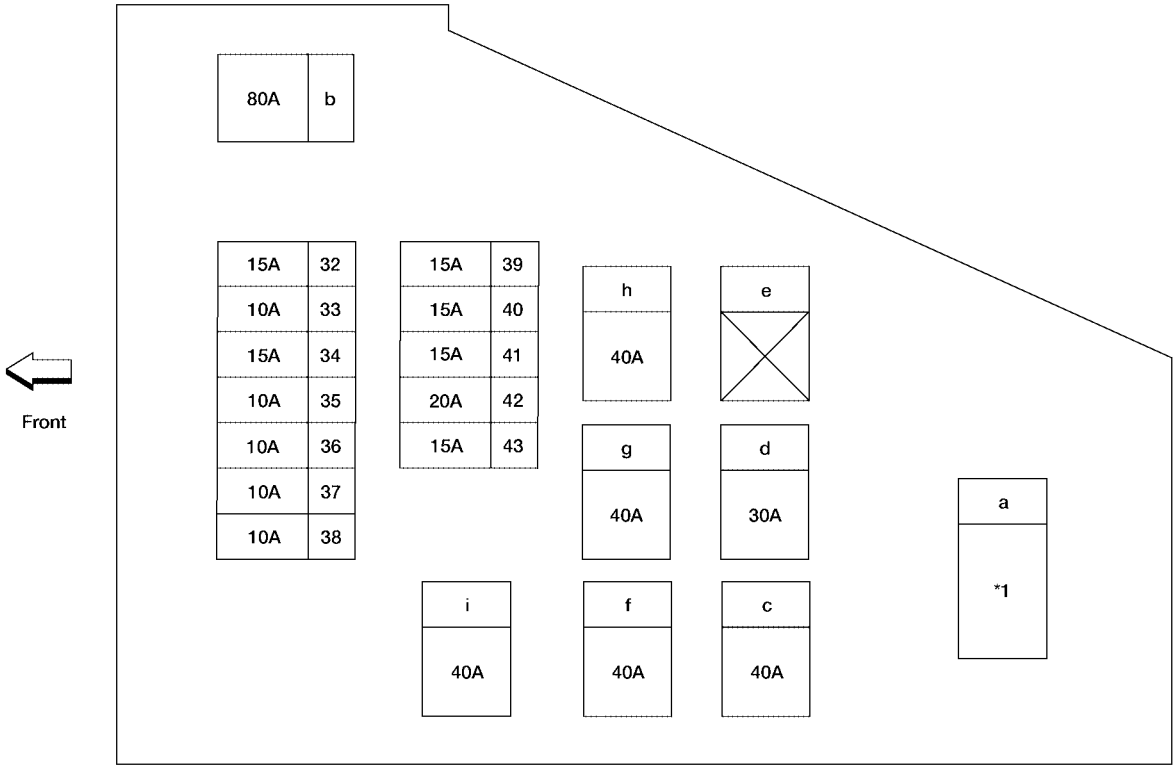
FUSE AND FUSIBLE LINK BOX

PFP:24381

Terminal Arrangement

EKS003BD

QG : With QG18DE
QR : With QR25DE



No. 32 - 43 : FUSE a - i : FUSIBLE LINK

*1 QG : 100A
QR : 120A

WKIA0985E

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MAINTENANCE

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PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

ELS000IF

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harness connectors.**

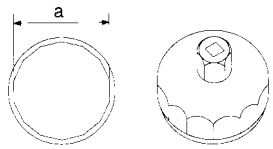
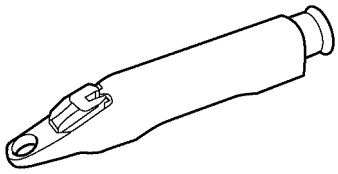
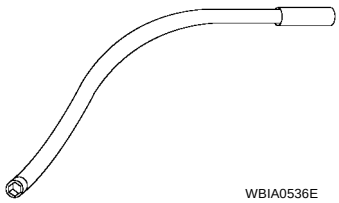
PREPARATION

PFP:00002

Special Service Tool

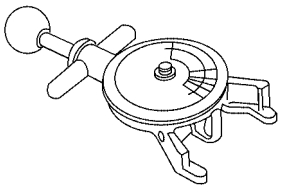
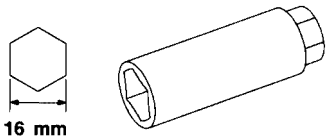
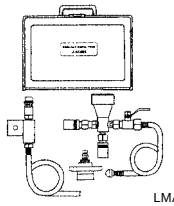
ELS000IG

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name		Description
KV10115801 (J-37140-A) Oil filter cap wrench	 NT375	Removing oil filter **a: 64.3 mm (2.531 in)**
— (J-23688) Engine coolant refractometer	 WBIA0539E	Checking concentration of ethylene glycol in engine coolant
— (J-46535) Drive belt tension releaser	 WBIA0536E	Releasing drive belt tension

Commercial Service Tool

ELS000IH

Tool name (Kent-Moore No.)		Description
(BT3373-F) Belt tension gauge	 AMA126	Checking drive belt tension of QG18DE engine
Spark plug wrench	 S-NT047	Removing and installing spark plugs
(J-45695) Coolant refill tool	 LMA053	Refilling engine coolant

GENERAL MAINTENANCE

PFP:00000

Explanation of General Maintenance

ELS000II

General Maintenance

ELS000IJ

General maintenance includes those items which should be checked during the normal day-to-day operation of the vehicle. They are essential if the vehicle is to continue operating properly. The owners can perform checks and inspections themselves or they can have their NISSAN dealers do them.

OUTSIDE THE VEHICLE

The maintenance items listed here should be performed from time to time, unless otherwise specified.

Item		Reference page
Tires	Check the pressure including the spare, at least once a month and always prior to a long distance trip. Adjust to the specified pressure if necessary. Check carefully for damage, cuts or excessive wear.	WT-6, "Tire"
Wheel nuts	When checking the tires, make sure no nuts are missing, and check for any loose nuts. Tighten if necessary.	MA-32, "Tire Rotation"
Windshield	Clean the windshield on a regular basis. Check the windshield at least every six months for cracks or other damage. Repair as necessary.	—
Tire rotation	Tires should be rotated every 12,000 km (7,500 miles).	MA-32, "Tire Rotation"
Wheel alignment and balance	If the vehicle pulls to either side while driving on a straight and level road, or if you detect uneven or abnormal tire wear, there may be a need for wheel alignment. If the steering wheel or seat vibrates at normal highway speeds, wheel balancing may be needed.	FSU-6, "Front Wheel Alignment" and MA-32, "Balancing Wheels"
Windshield wiper blades	Check for cracks or wear if they do not wipe properly.	—
Doors and engine hood	Check that all doors and the engine hood operate smoothly as well as the trunk lid and back hatch. Also make sure that all latches lock securely. Lubricate if necessary. Make sure that the secondary latch keeps the hood from opening when the primary latch is released. When driving in areas using road salt or other corrosive materials, check lubrication frequently.	MA-37, "Lubricating Locks, Hinges and Hood Latches"
Lamps	Make sure that the headlamps, stop lamps, tail lamps, turn signal lamps, and other lamps are all operating properly and installed securely. Also check headlamp aim. Clean the headlamps on a regular basis.	—

INSIDE THE VEHICLE

The maintenance items listed here should be checked on a regular basis, such as when performing periodic maintenance, cleaning the vehicle, etc.

Item		Reference page
Warning lamps and buzzers/chimes	Make sure that all warning lamps and buzzers/chimes are operating properly.	—
Windshield wiper and washer	Check that the wipers and washer operate properly and that the wipers do not streak.	—
Windshield defroster	Check that the air comes out of the defroster outlets properly and in sufficient quantity when operating the heater or air conditioning.	—
Steering wheel	Check that it has the specified play. Be sure to check for changes in the steering condition, such as excessive play, hard steering or strange noises. **Free play: Less than 35 mm (1.38 in)**	—
Seats	Check seat position controls such as seat adjusters, seat back recliner, etc. to make sure they operate smoothly and that all latches lock securely in every position. Check that the head restraints move up and down smoothly and that the locks (if equipped) hold securely in all latched positions. Check that the latches lock securely for folding-down rear seat backs.	—
Seat belts	Check that all parts of the seat belt system (e.g. buckles, anchors, adjusters and retractors) operate properly and smoothly and are installed securely. Check the belt webbing for cuts, fraying, wear or damage.	SB-7, "Seat Belt Inspection"
Accelerator pedal	Check the pedal for smooth operation and make sure the pedal does not catch or require uneven effort. Keep the floor mats away from the pedal.	—

Item		Reference page
Clutch pedal	Make sure the pedal operates smoothly and check that it has the proper free play.	CL-7, "CLUTCH PEDAL INSPECTION AND ADJUSTMENT"
Brakes	Check that the brake does not pull the vehicle to one side when applied.	—
Brake pedal and booster	Check the pedal for smooth operation and make sure it has the proper distance under it when depressed fully. Check the brake booster function. Be sure to keep floor mats away from the pedal.	BR-12, "BRAKE PEDAL HEIGHT" and BR-16, "OPERATING CHECK"
Parking brake	Check that the lever has the proper travel and make sure that the vehicle is held securely on a fairly steep hill when only the parking brake is applied.	PB-2, "Inspection"
Automatic transaxle "Park" mechanism	Check that the lock release button on the selector lever operates properly and smoothly. On a fairly steep hill check that the vehicle is held securely with the selector lever in the "P" position without applying any brakes.	—

UNDER THE HOOD AND VEHICLE

The maintenance items listed here should be checked periodically (e.g. each time you check the engine oil or refuel).

Item		Reference page	
		QG18DE	QR25DE
Windshield washer fluid	Check that there is adequate fluid in the tank.	—	
Engine coolant level	Check the coolant level when the engine is cold.	CO-8, "CHECKING RESERVOIR LEVEL"	CO-26, "CHECKING RESERVOIR LEVEL"
A/C condenser, radiator and hoses	Check the front of the condenser and radiator and clean off any dirt, insects, leaves, etc., that may have accumulated. Make sure the radiator hoses have no cracks, deformation, deterioration or loose connections.	—	
Brake and clutch fluid levels	Make sure that the brake and clutch fluid levels are between the "MAX" and "MIN" lines on the reservoirs.	MA-32, "Checking Brake Fluid Level and Leaks" and MA-30, "Checking Clutch Fluid Level and Leaks"	
Battery	Check the fluid level in each cell. It should be between the "MAX" and "MIN" lines. Vehicles operated in high temperatures or under severe conditions require frequent checks of the battery fluid level.	—	
Engine drive belts	Make sure that no belt is frayed, worn, cracked or oily.	MA-16, "Checking Drive Belts"	MA-23, "Checking Drive Belts"
Engine oil level	Check the level on the dipstick after parking the vehicle on a level spot and turning off the engine.	LU-5, "Inspection"	LU-16, "Inspection"
Power steering fluid level and lines	Check the level is between the "MAX" and "MIN" lines on the reservoir with the engine off. Check the lines for improper attachment, leaks, cracks, etc.	MA-35, "Checking Power Steering Fluid and Lines"	
Automatic transaxle fluid level	Check the level on the dipstick after putting the selector lever in "P" with the engine idling.	MA-31, "Checking A/T Fluid"	
Exhaust system	Make sure there are no loose supports, cracks or holes. If the sound of the exhaust seems unusual or there is a smell of exhaust fumes, immediately locate the trouble and correct it.	MA-30, "Checking Exhaust System"	
Underbody	The underbody is frequently exposed to corrosive substances such as those used on icy roads or to control dust. It is very important to remove these substances, otherwise rust will form on the floor pan, frame, fuel lines and around the exhaust system. At the end of winter, the underbody should be thoroughly flushed with plain water, being careful to clean those areas where mud and dirt can easily accumulate.	—	
Fluid leaks	Check under the vehicle for fuel, oil, water or other fluid leaks after the vehicle has been parked for a while. Water dripping from the air conditioner after use is normal. If you should notice any leaks or gasoline fumes are evident, check for the cause and correct it immediately.	—	

PERIODIC MAINTENANCE

PFP:00026

Introduction of Periodic Maintenance

ELS000IK

Two different maintenance schedules are provided, and should be used, depending upon the conditions in which the vehicle is mainly operated. **After 60,000 miles (96,000 km) or 48 months, continue the periodic maintenance at the same mileage/time intervals.**

Schedule 1	Follow Periodic Maintenance Schedule 1 if your driving habits frequently includes one or more of the following driving conditions: ● Repeated short trips of less than 5 miles (8 km). ● Repeated short trips of less than 10 miles (16 km) with outside temperatures remaining below freezing. ● Operating in hot weather in stop-and-go “rush hour” traffic. ● Extensive idling and/or low speed driving for long distances, such as police, taxi or door-to-door delivery use. ● Driving in dusty conditions. ● Driving on rough, muddy, or salt spread roads. ● Towing a trailer, using a camper or a car-top carrier.	Emission Control System Maintenance	MA-7, "Emission Control System Maintenance"
		Chassis and Body Maintenance	MA-9, "Chassis and Body Maintenance"
Schedule 2	Follow Periodic Maintenance Schedule 2 if none of the driving conditions shown in Schedule 1 apply to your driving habits.	Emission Control System Maintenance	MA-11, "Emission Control System Maintenance"
		Chassis and Body Maintenance	MA-12, "Chassis and Body Maintenance"

Schedule 1

ELS000IL

EMISSION CONTROL SYSTEM MAINTENANCE

Abbreviations: R = Replace. I = Inspect. Correct or replace if necessary. [ ]: At the mileage intervals only

MAINTENANCE OPERATION		MAINTENANCE INTERVAL								Reference Section - Page or - Content Title	
Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000) Months	3.75 (6) 3	7.5 (12) 6	11.25 (18) 9	15 (24) 12	18.75 (30) 15	22.5 (36) 18	26.25 (42) 21	30 (48) 24	QG18DE	QR25DE
Drive belt	NOTE (1)									MA-16, "Checking Drive Belts"	MA-23, "Checking Drive Belts"
Air cleaner filter	NOTE (2)								[R]	MA-19, "Changing Air Cleaner Filter"	MA-26, "Changing Air Cleaner Filter"
EVAP vapor lines									I*	MA-22, "Checking EVAP Vapor Lines"	MA-29, "Checking EVAP Vapor Lines"
Fuel lines									I*	MA-19, "Checking Fuel Lines"	MA-25, "Checking Fuel Lines"
Fuel filter	NOTE (3)									—	

MAINTENANCE OPERATION		MAINTENANCE INTERVAL								Reference Section - Page or - Content Title	
Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000) Months	3.75 (6) 3	7.5 (12) 6	11.25 (18) 9	15 (24) 12	18.75 (30) 15	22.5 (36) 18	26.25 (42) 21	30 (48) 24	QG18DE	QR25DE
Engine coolant	NOTE (4)									MA-16, "Changing Engine Coolant"	MA-23, "Changing Engine Coolant"
Engine oil		R	R	R	R	R	R	R	R	MA-20, "Changing Engine Oil"	MA-26, "Changing Engine Oil"
Engine oil filter (Use part No. 15208-65F01, 15208-9E000 or equiv.)		R	R	R	R	R	R	R	R	MA-20, "Changing Oil Filter"	—
Engine oil filter (Use part No. 15208-9E000 or equiv.)		R	R	R	R	R	R	R	R	—	MA-27, "Changing Oil Filter"
Spark plugs (Double PLATINUM-TIPPED type)		Replace every 105,000 miles (169,000 km)								MA-21, "Changing Spark Plugs (Double Platinum - Tipped Type)"	MA-28, "Changing Spark Plugs (Double Platinum - Tipped Type)"
Intake and exhaust valve clearance	NOTE (5)*									EM-38, "Valve Clearance"	—

Abbreviations: R = Replace. I = Inspect. Correct or replace if necessary. [ ]: At the mileage intervals only

MAINTENANCE OPERATION		MAINTENANCE INTERVAL								Reference Section - Page or - Content Title	
Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000) Months	33.75 (54) 27	37.5 (60) 30	41.25 (66) 33	45 (72) 36	48.75 (78) 39	52.5 (84) 42	56.25 (90) 45	60 (96) 48	QG18DE	QR25DE
Drive belt	NOTE (1)								I*	MA-16, "Checking Drive Belts"	MA-23, "Checking Drive Belts"
Air cleaner filter	NOTE (2)								[R]	MA-19, "Changing Air Cleaner Filter"	MA-26, "Changing Air Cleaner Filter"
EVAP vapor lines									I*	MA-22, "Checking EVAP Vapor Lines"	MA-29, "Checking EVAP Vapor Lines"
Fuel lines									I*	MA-19, "Checking Fuel Lines"	MA-25, "Checking Fuel Lines"
Fuel filter	NOTE (3)									—	

MAINTENANCE OPERATION		MAINTENANCE INTERVAL								Reference Section - Page or - Content Title	
Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000) Months	33.75 (54) 27	37.5 (60) 30	41.25 (66) 33	45 (72) 36	48.75 (78) 39	52.5 (84) 42	56.25 (90) 45	60 (96) 48	QG18DE	QR25DE
Engine coolant	NOTE (4)								R*	MA-16, "Changing Engine Coolant"	MA-23, "Changing Engine Coolant"
Engine oil		R	R	R	R	R	R	R	R	MA-20, "Changing Engine Oil"	MA-26, "Changing Engine Oil"
Engine oil filter (Use part No. 15208-65F01, 15208-9E000 or equiv.)		R	R	R	R	R	R	R	R	MA-20, "Changing Oil Filter"	—
Engine oil filter (Use part No. 15208-9E000 or equiv.)		R	R	R	R	R	R	R	R	—	MA-27, "Changing Oil Filter"
Spark plugs (Double PLATINUM-TIPPED type)		Replace every 105,000 miles (169,000 km)								MA-21, "Changing Spark Plugs (Double Platinum - Tipped Type)"	MA-28, "Changing Spark Plugs (Double Platinum - Tipped Type)"
Intake and exhaust valve clearance	NOTE (5)*									EM-38, "Valve Clearance"	—

NOTE:

- (1) After 60,000 miles (96,000 km) or 48 months, inspect every 15,000 miles (24,000 km) or 12 months. Replace the drive belt if found damaged or if the auto belt tensioner reading (for QR25DE engine) reaches the maximum limit.
- (2) If operating mainly in dusty conditions, more frequent maintenance may be required.
- (3) Maintenance-free item.
- (4) After 60,000 miles (96,000 km) or 48 months, replace every 30,000 miles (48,000 km) or 24 months.
- (5) If valve noise increases, inspect valve clearance.

Maintenance items and intervals with "*" are recommended by NISSAN for reliable vehicle operation. The owner need not perform such maintenance in order to maintain the emission warranty or manufacturer recall liability. Other maintenance items and intervals are required.

CHASSIS AND BODY MAINTENANCE

Abbreviations: R = Replace. I = Inspect. Correct or replace if necessary. L = Lubricate.

MAINTENANCE OPERATION		MAINTENANCE INTERVAL								Reference Section - Page or - Content Title
Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000) Months	3.75 (6) 3	7.5 (12) 6	11.25 (18) 9	15 (24) 12	18.75 (30) 15	22.5 (36) 18	26.25 (42) 21	30 (48) 24	
Brake lines & cables					I				I	MA-32
Brake pads, rotors, drums & linings (QG18DE)			I		I		I		I	MA-33 and MA-34
Brake pads & rotors (QR25DE)			I		I		I		I	MA-33

MAINTENANCE OPERATION		MAINTENANCE INTERVAL								Reference Section - Page or - Content Title
Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000) Months	3.75 (6) 3	7.5 (12) 6	11.25 (18) 9	15 (24) 12	18.75 (30) 15	22.5 (36) 18	26.25 (42) 21	30 (48) 24	
Manual transaxle oil or automatic transaxle fluid	NOTE (1)				I				I	MA-30 or MA-31
Steering gear & linkage, axle & suspension parts			I		I		I		I	MA-35, MA-36
Tire rotation	NOTE (2)									MA-32
Front drive shaft boots			I		I		I		I	MA-37
Exhaust system			I		I		I		I	MA-30
In-cabin microfilter					R				R	MTC-73

Abbreviations: R = Replace. I = Inspect. Correct or replace if necessary. L = Lubricate.

MAINTENANCE OPERATION		MAINTENANCE INTERVAL								Reference Section - Page or - Content Title
Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000) Months	33.75 (54) 27	37.5 (60) 30	41.25 (66) 33	45 (72) 36	48.75 (78) 39	52.5 (84) 42	56.25 (90) 45	60 (96) 48	
Brake lines & cables					I				I	MA-32
Brake pads, rotors, drums & linings (QG18DE)			I		I		I		I	MA-33 and MA-34
Brake pads & rotors (QR25DE)			I		I		I		I	MA-33
Manual transaxle oil or automatic transaxle fluid	NOTE (1)				I				I	MA-30 or MA-31
Steering gear & linkage, axle & suspension parts			I		I		I		I	MA-35, MA-36
Tire rotation	NOTE (2)									MA-32
Front drive shaft boots			I		I		I		I	MA-37
Exhaust system			I		I		I		I	MA-30
In-cabin microfilter					R				R	MTC-73

NOTE:

- (1) If towing a trailer, using a camper or a car-top carrier, or driving on rough or muddy roads, change (not just inspect) oil (exc. LSD) at every 30,000 miles (48,000 km) or 24 months, and change LSD gear oil every 15,000 miles (24,000 km) or 12 months.
- (2) Refer to “Tire rotation” under the “GENERAL MAINTENANCE” heading earlier in this section.

Schedule 2

ELS000IM

EMISSION CONTROL SYSTEM MAINTENANCE

Abbreviations: R = Replace. I = Inspect. Correct or replace if necessary. [ ]: At the mileage intervals only

MAINTENANCE OPERATION		MAINTENANCE INTERVAL								Reference Section - Page or - Content Title	
Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000) Months	7.5 (12) 6	15 (24) 12	22.5 (36) 18	30 (48) 24	37.5 (60) 30	45 (72) 36	52.5 (84) 42	60 (96) 48	QG18DE	QR25DE
Drive belt	NOTE (1)								I*	MA-16, "Checking Drive Belts"	MA-23, "Checking Drive Belts"
Air cleaner filter					[R]				[R]	MA-19, "Changing Air Cleaner Filter"	MA-26, "Changing Air Cleaner Filter"
EVAP vapor lines					I*				I*	MA-22, "Checking EVAP Vapor Lines"	MA-29, "Checking EVAP Vapor Lines"
Fuel lines					I*				I*	MA-19, "Checking Fuel Lines"	MA-25, "Checking Fuel Lines"
Fuel filter	NOTE (2)									—	
Engine coolant	NOTE (3)								R*	MA-16, "Changing Engine Coolant"	MA-23, "Changing Engine Coolant"
Engine oil		R	R	R	R	R	R	R	R	MA-20, "Changing Engine Oil"	MA-26, "Changing Engine Oil"
Engine oil filter (Use part No. 15208-65F01, 15208-9E000 or equivalent.)		R	R	R	R	R	R	R	R	MA-20, "Changing Oil Filter"	—
Engine oil filter (Use part No. 15208-9E000 or equiv.)		R	R	R	R	R	R	R	R	—	MA-26, "Changing Engine Oil"
Spark plugs (Double PLATINUM-TIPPED type)		Replace every 105,000 miles (169,000 km)								MA-21, "Changing Spark Plugs (Double Platinum - Tipped Type)"	MA-28, "Changing Spark Plugs (Double Platinum - Tipped Type)"
Intake and exhaust valve clearance)	NOTE (4)*									EM-38, "Valve Clearance"	—

NOTE:

Replace the drive belt if found damaged or if the auto belt tensioner reading reaches the maximum limit.

- (1) After 60,000 miles (96,000 km) or 48 months, inspect every 15,000 miles (24,000 km) or 12 months. Replace the drive belt if found damaged or if the auto belt tensioner reading (for QR25DE engine) reaches the maximum limit.
- (2) Maintenance-free item.
- (3) After 60,000 miles (96,000 km) or 48 months, replace every 30,000 miles (48,000 km) or 24 months.
- (4) If valve noise increases, inspect valve clearance.

Maintenance items and intervals with "*" are recommended by NISSAN for reliable vehicle operation. The owner need not perform such maintenance in order to maintain the emission warranty or manufacturer recall liability. Other maintenance items and intervals are required.

CHASSIS AND BODY MAINTENANCE

Abbreviations: R = Replace. I = Inspect. Correct or replace if necessary. L = Lubricate.

MAINTENANCE OPERATION		MAINTENANCE INTERVAL								Reference Section - Page or - Content Title
Perform at number of miles, kilometers or months, whichever comes first.	Miles x 1,000 (km x 1,000) Months	7.5 (12) 6	15 (24) 12	22.5 (36) 18	30 (48) 24	37.5 (60) 30	45 (72) 36	52.5 (84) 42	60 (96) 48	
Brake lines & cables			I		I		I		I	MA-32
Brake pads, rotors, drums & linings (QG18DE)			I		I		I		I	MA-33, MA-34
Brake pads & rotors (QR25DE)			I		I		I		I	MA-33
Manual transaxle oil or automatic transaxle fluid			I		I		I		I	MA-30 or MA-31
Steering gear & linkage, axle & suspension parts					I				I	MA-35, MA-36
Tire rotation	NOTE (1)									MA-32
Front drive shaft boots			I		I		I		I	MA-37
Exhaust system					I				I	MA-30
In-cabin microfilter			R		R		R		R	MTC-73

NOTE:

- (1) Refer to "Tire rotation" under the "GENERAL MAINTENANCE" heading earlier in this section.

RECOMMENDED FLUIDS AND LUBRICANTS

PFP:00000

Fluids and Lubricants

ELS000IN

QG18DE		Capacity (Approximate)			Recommended Fluids/Lubricants
		US measure	Imp measure	Liter	
Fuel		13 1/4 gal	11 gal	50	Unleaded gasoline with an octane rating of at least 87 AKI (RON 91)
Engine oil Drain and refill	With oil filter change	2 7/8 qt	2 3/8 qt	2.7	● API Certification Mark *1 ● API grade SG/SH, Energy Conserving I & II or API grade SJ or SL, Energy Conserving *1 ● ILSAC grade GF-I, GF-II & GF-III *1
	Without oil filter change	2 5/8 qt	2 1/4 qt	2.5	
Dry engine (engine overhaul)		3 1/4 qt	2 3/4 qt	3.1	
Cooling system (with reservoir)	M/T	1 3/4 gal	1 1/2 gal	6.7	Genuine NISSAN Long Life Anti-freeze coolant or equivalent
	A/T	1 3/4 gal	1 1/2 gal	6.6	
Manual transaxle fluid (MTF)	RS5F70A	3 1/8 qt	2 5/8 qt	3.0	Genuine NISSAN Manual Transmission Fluid (MTF) HQ multi 75W-85
Automatic transaxle fluid (ATF)	RE4F03B	7 3/8 qt	6 1/8 qt	7.0	Genuine NISSAN Matic “D” ATF (Continental U.S. and Alaska) or Canada NISSAN Automatic Transmission Fluid *2
Power steering fluid (PSF)		1 1/8 qt	7/8 qt	1.0	Genuine NISSAN PSF or equivalent *4
Brake and clutch fluid		—	—	—	Genuine NISSAN Super Heavy Duty Brake Fluid*3 or equivalent DOT 3 (US FMVSS No. 116)
Multi-purpose grease		—	—	—	NLGI No. 2 (Lithium soap base)
Windshield washer fluid		—	—	—	Genuine NISSAN Windshield Washer Concentrate Cleaner & Anti-Freeze or equivalent
Air conditioning system refrigerant		0.99 - 1.21 lb	0.99 - 1.21 lb	0.45 - 0.55 kg	HFC-134a (R-134a) *5
Air conditioning system lubricant		6.1 fl oz	6.3 fl oz	180 m ℓ	NISSAN A/C System Lubricant Type R or equivalent *5

*1: For further details, see “SAE Viscosity Number”.

*2: DEXRON™ III / MERCON™ , or equivalent may also be used. Outside the continental United States and Alaska contact a NISSAN dealership for more information regarding suitable fluids, including recommended brand(s) of DEXRON™ III / MERCON™ Automatic Transmission Fluid.

*3: Available in mainland U.S.A. through your NISSAN dealer.

*4: For Canada, Genuine NISSAN Automatic Transmission Fluid (ATF), DEXRON™ III / MERCON™ or equivalent ATF may also be used.

*5: For further details, see “Air conditioner specification label”.

QR25DE		Capacity (Approximate)			Recommended Fluids/Lubricants
		US measure	Imp measure	Liter	
Fuel		13 1/4 gal	11 gal	50	Unleaded gasoline with an octane rating of at least 87 AKI (RON 91)
Engine oil Drain and refill	With oil filter change	4 1/4 qt	3 1/2 qt	4.0	● API Certification Mark *1 ● API grade SG/SH, Energy Conserving I & II or API grade SJ or SL, Energy Conserving*1 ● ILSAC grade GF-I, GF-II & GF-III *1
	Without oil filter change	4 qt	3 3/8 qt	3.8	
Dry engine (engine overhaul)		4 3/4 qt	4 qt	4.5	
Cooling system (with reservoir)	M/T	1 3/4 gal	1 1/2 gal	6.8	Genuine NISSAN Long Life Anti-freeze coolant or equivalent
	A/T	1 3/4 gal	1 1/2 gal	6.7	
Manual transaxle fluid (MTF)	RS6F51H	2 3/8 qt	2 qt	2.2	Genuine NISSAN Manual Transmission Fluid (MTF) HQ multi 75W-85

QR25DE		Capacity (Approximate)			Recommended Fluids/Lubricants
		US measure	Imp measure	Liter	
Automatic transaxle fluid (ATF)	RE4F04B	9.0 qt	7.5 qt	8.5	Genuine NISSAN Matic “D” ATF (Continental U.S. and Alaska) or Canada NISSAN Automatic Transmission Fluid *2
Power steering fluid (PSF)		1 1/8 qt	7/8 qt	1.0	Genuine NISSAN PSF or equivalent *4
Brake and clutch fluid		—	—	—	Genuine NISSAN Super Heavy Duty Brake Fluid*3 or equivalent DOT 3 (US FMVSS No. 116)
Multi-purpose grease		—	—	—	NLGI No. 2 (Lithium soap base)
Brake grease (OPB27VA type)		—	—	—	Molykote AS88ON
Windshield washer fluid		—	—	—	Genuine NISSAN Windshield Washer Concentrate Cleaner & Anti-Freeze or equivalent
Air conditioning system refrigerant		0.99 - 1.21 lb	0.99 - 1.21 lb	0.45 - 0.55 kg	HFC-134a (R-134a) *5
Air conditioning system lubricant		6.1 fl oz	6.3 fl oz	180 m ℓ	NISSAN A/C System Lubricant Type R or equivalent *5

*1: For further details, see “SAE Viscosity Number”.

*2: DEXRON™ III / MERCON™ , or equivalent may also be used. Outside the continental United States and Alaska contact an authorized NISSAN dealership for more information regarding suitable fluids, including recommended brand(s) of DEXRON™ III / MERCON™ Automatic Transmission Fluid.

*3: Available in mainland U.S.A. through your authorized NISSAN dealer.

*4: For Canada, Genuine NISSAN Automatic Transmission Fluid (ATF), DEXRON ™ III / MERCON™ or equivalent ATF may also be used.

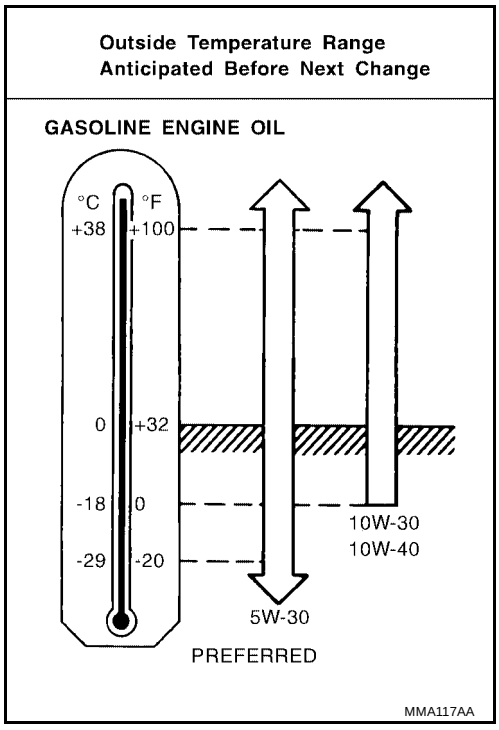
*5: For further details, see “Air conditioner specification label”.

SAE Viscosity Number

ELS000IO

SAE 5W-30 viscosity oil is preferred for all temperatures. SAE 10W-30 and 10W-40 viscosity oil may be used if the ambient temperature is above –18°C (0°F).

NOTE:
Use of 5W-30 viscosity oil will increase fuel economy.



Anti-freeze Coolant Mixture Ratio

ELS000IP

The engine cooling system is filled at the factory with a high-quality, long life, year-round, anti-freeze coolant solution. The anti-freeze solution contains rust and corrosion inhibitors. Therefore, additional cooling system additives are not necessary.

Maximum outside temperature		Genuine NISSAN Anti-freeze Coolant or equivalent	Demineralized water or distilled water
°C	°F		
-35	-30	50%	50%

CAUTION:

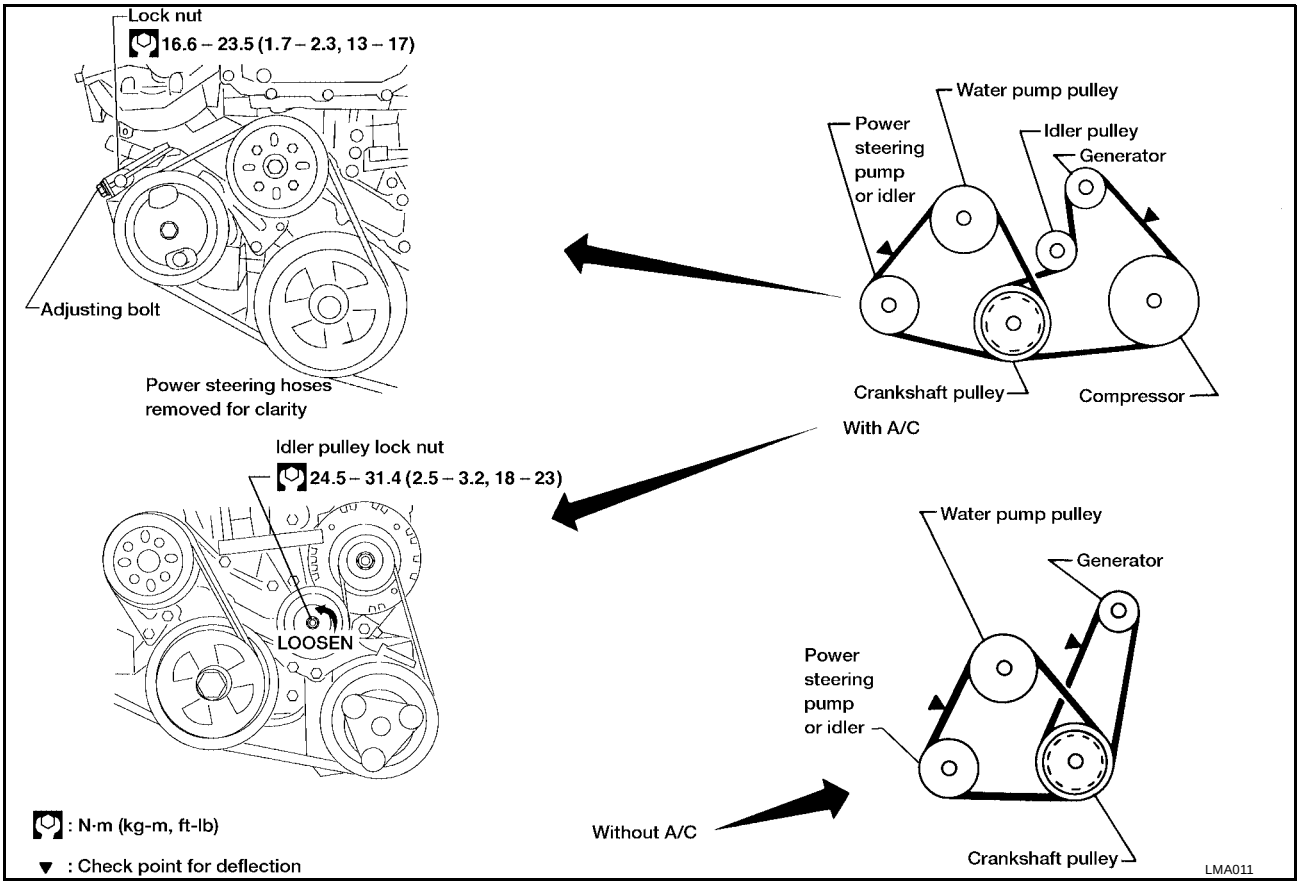
- **When adding or replacing coolant, be sure to use only a Genuine NISSAN Long Life Anti-Freeze coolant or equivalent with the proper mixture ratio.**
- **The use of other types of coolant solutions may damage the engine cooling system.**

ENGINE MAINTENANCE (QG18DE ENGINE)

PFP:10001

Checking Drive Belts

ELS000IQ



1. Inspect belt for cracks, fraying, wear and oil. If necessary, replace.
2. Inspect drive belt deflection or tension at a point on the belt midway between pulleys.
   - **Check belt tension using Belt Tension Gauge BT3373-F or equivalent. Refer to MA-39, "BELT DEFLECTION AND TENSION" .**
   - **Inspect drive belt deflection or tension when engine is cold.**
   - **Adjust if belt deflection exceeds the limit or if belt tension is not within specifications.**

Changing Engine Coolant

ELS000IR

WARNING:

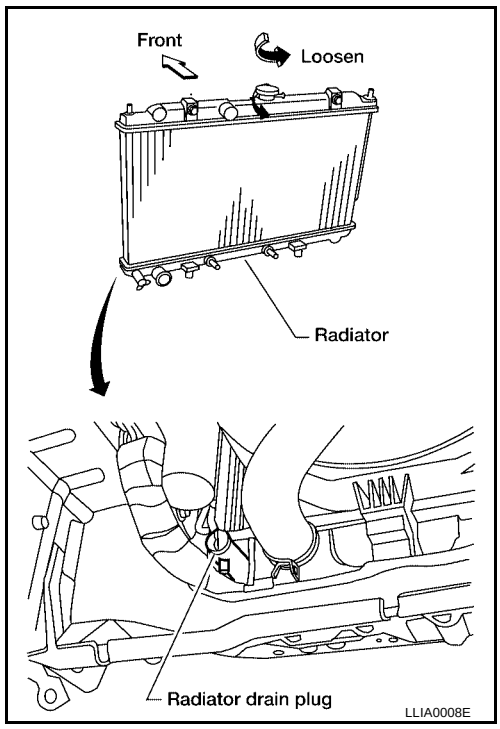
To avoid the danger of being scalded, never change the coolant when the engine is hot.

DRAINING ENGINE COOLANT

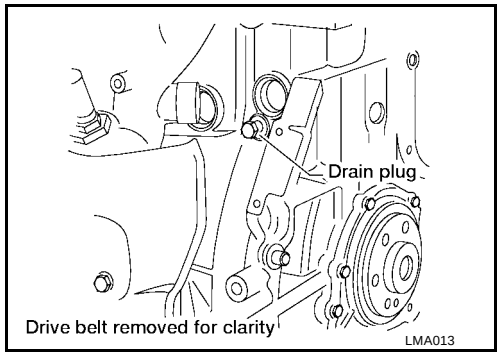
1. Set climate control system as follows to prevent coolant from remaining in the system.
   - Turn ignition switch “ON” and set temperature controller to maximum hot position.
   - Wait 10 seconds before turning ignition switch “OFF”.

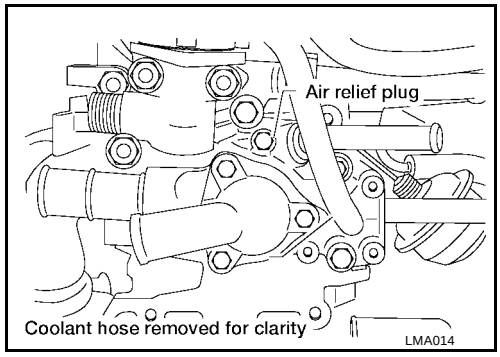
2. Open radiator drain plug at the bottom of the radiator, and remove radiator filler cap.

CAUTION:
Be careful not to allow coolant to contact drive belts.



3. Remove cylinder block drain plug and air relief plug.





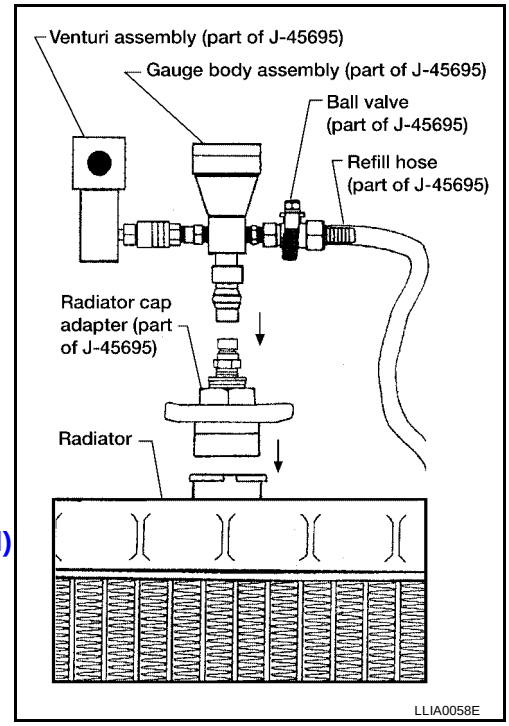
4. Check drained coolant for contaminants such as rust, corrosion or discoloration. If contaminated, flush engine cooling system. Refer to MA-19, "FLUSHING COOLING SYSTEM" .

REFILLING ENGINE COOLANT

1. Close radiator drain plug. Install the reservoir tank and cylinder block drain plug, if removed for a total system drain for engine removal or repair.
   - **The radiator must be completely empty of coolant and water.**
   - **Apply sealant to the threads of the cylinder block drain plugs. Use Genuine High Performance Thread Sealant or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .**

Cylinder block drain plug : 34.3 - 44.1 N·m (3.5 - 4.5 kg-m, 26 - 32 ft-lb)

2. If disconnected, reattach the upper radiator hose at the engine side.
3. Set the vehicle heater controls to the full HOT and heater ON position. Turn the vehicle ignition ON with the engine OFF as necessary to activate the heater mode.
4. Install the Tool by installing the radiator cap adapter onto the radiator neck opening. Then attach the gauge body assembly with the refill tube and the venturi assembly to the radiator cap adapter.
5. Insert the refill hose into the coolant mixture container that is placed at floor level. Make sure the ball valve is in the closed position.
   - **Use Genuine NISSAN Long Life Anti-Freeze Coolant or equivalent, mixed 50/50 with distilled water or demineralized water.**
     Refer to MA-14, "Anti-freeze Coolant Mixture Ratio".



Coolant capacity (without reservoir tank)

M/T	**: 6.0 ℓ (1 5/8 US gal, 1 3/8 Imp gal)**
A/T	**: 5.9 ℓ (1 5/8 US gal, 1 3/8 Imp gal)**

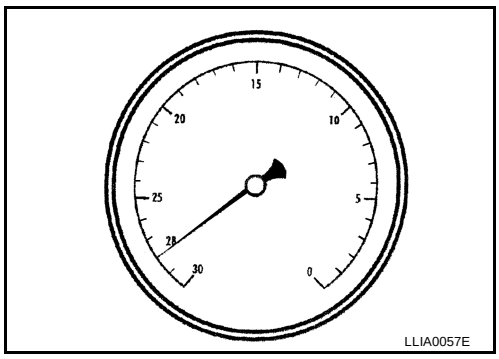
Reservoir tank capacity (for MAX level) **: 0.7 ℓ (1/8 US gal, 1/8 Imp gal)**

6. Install an air hose to the venturi assembly, the air pressure must be within specification.

Compressed air supply pressure **: 5.7 - 8.5 kPa (5.6 - 8.4 kg/cm^2 , 80 - 120 psi)**

CAUTION:
The compressed air supply must be equipped with an air dryer.

7. The vacuum gauge will begin to rise and there will be an audible hissing noise. During this process open the ball valve on the refill hose slightly. Coolant will be visible rising in the refill hose. Once the refill hose is full of coolant, close the ball valve. This will purge any air trapped in the refill hose.
8. Continue to draw the vacuum until the gauge reaches 28 inches of vacuum. The gauge may not reach 28 inches in high altitude locations, refer to the vacuum specifications based on the altitude above sea level.



Altitude above sea level	Vacuum gauge reading
0 - 100 m (328 ft)	: 28 inches of vacuum
300 m (984 ft)	: 27 inches of vacuum
500 m (1,641 ft)	: 26 inches of vacuum
1,000 m (3,281 ft)	: 24 - 25 inches of vacuum

9. When the vacuum gauge has reached the specified amount, disconnect the air hose and wait 20 seconds to see if the system loses any vacuum. If the vacuum level drops, perform any necessary repairs to the system and repeat steps 6 - 8 to bring the vacuum to the specified amount. Recheck for any leaks.
10. Place the coolant container (with the refill hose inserted) at the same level as the top of the radiator. Then open the ball valve on the refill hose so the coolant will be drawn up to fill the cooling system. The cooling system is full when the vacuum gauge reads zero.

CAUTION:
Do not allow the coolant container to get too low when filling, to avoid air from being drawn into the cooling system.

11. Remove the Tool from the radiator neck opening.
12. Fill the cooling system reservoir tank to the specified level and install the radiator cap. Run the engine to warm up the cooling system and top up the system as necessary.

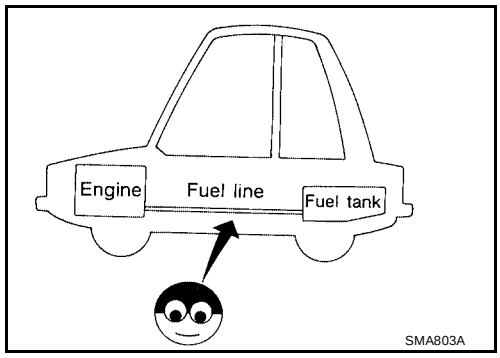
FLUSHING COOLING SYSTEM

1. Open air relief plug.
2. Fill radiator with water until water spills from the air relief hole, then close air relief plug. Fill radiator and reservoir tank with water and reinstall radiator cap.
3. Run engine and warm it up to normal operating temperature.
4. Rev engine two or three times under no-load.
5. Stop engine and wait until it cools down.
6. Drain water.
7. Repeat steps 1 through 6 until clear water begins to drain from radiator.

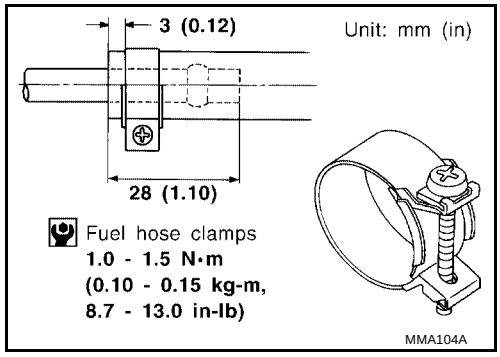
Checking Fuel Lines

ELS000IS

- Inspect fuel lines and tank for improper attachment, leaks, cracks, damage, loose connections, chafing or deterioration.



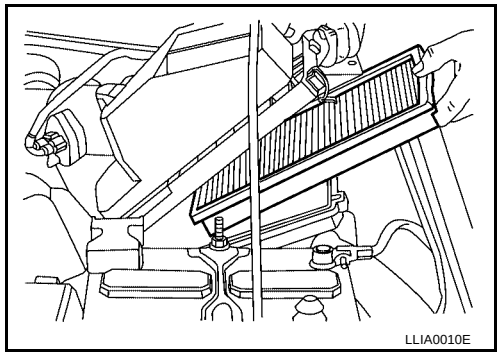
- If necessary, repair or replace faulty parts.



Changing Air Cleaner Filter

ELS000IT

Unfasten clamps to change air cleaner filter.

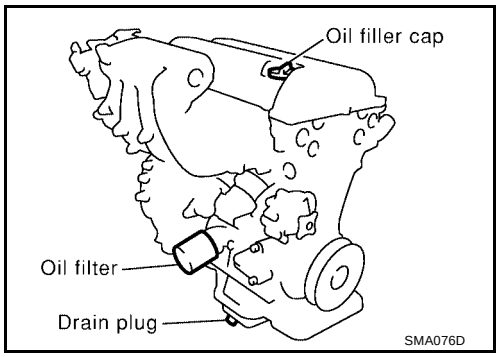


Changing Engine Oil

ELS000IU

WARNING:

- **Be careful not to burn yourself, as the engine oil is hot.**
- **Prolonged and repeated contact with used engine oil may cause skin cancer; try to avoid direct skin contact with used oil. If skin contact is made, wash thoroughly with soap or hand cleaner as soon as possible.**



1. Warm up engine, and check for oil leakage from engine components.
2. Stop engine.
3. Remove drain plug and oil filler cap.
4. Drain oil and refill with new engine oil.

Oil pan drain plug : 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)

Oil Specification and Viscosity

- Refer to MA-13, "Fluids and Lubricants" .

Oil Capacity (Approximate)

Unit: ℓ (US qt., Imp qt.)

Drain and refill	With oil filter change	2.7 (2-7/8, 2-3/8)
	Without oil filter change	2.5 (2-5/8, 2-1/4)
Dry engine (engine overhaul)		3.1 (3-1/4, 2-3/4)

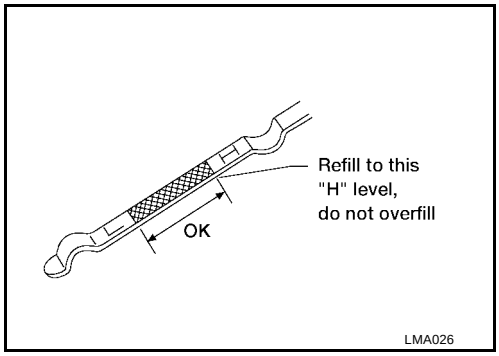
CAUTION:

- **Be sure to clean drain plug and install with new washer.**

Oil pan drain plug : 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)

- **The refill capacity depends on the oil temperature and drain time. Use these specifications for reference only.**
  Always use the dipstick to determine when the proper amount of oil is in the engine.

5. Warm up engine and check area around drain plug and oil filter for oil leakage.
6. Stop engine.
7. Check oil level.



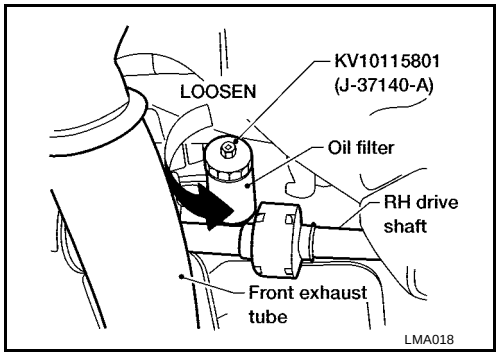
Changing Oil Filter

ELS000IV

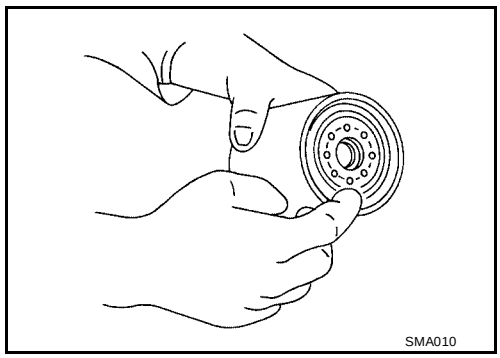
1. Remove oil filter with Tool.

WARNING:
Be careful not to burn yourself, as the engine and engine oil are hot.

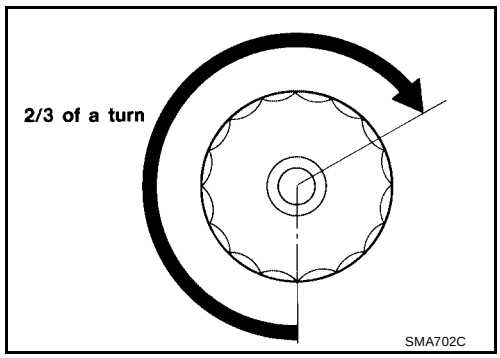
NOTE:
The filter is a full-flow cartridge type and is provided with a relief valve.



2. Clean oil filter mounting surface on cylinder block. Coat rubber seal of new oil filter with engine oil.



3. Screw in the oil filter until a slight resistance is felt, then tighten an additional 2/3 turn.

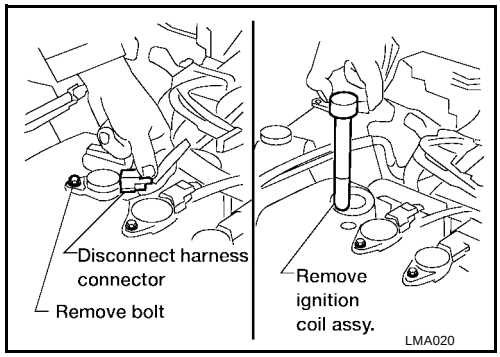


4. Add engine oil. Refer to MA-20, "Changing Engine Oil" .
   - Clean excess oil from engine.

Changing Spark Plugs (Double Platinum - Tipped Type)

ELS000IW

1. Disconnect ignition coil harness connectors.
2. Remove ignition coils.



3. Remove spark plugs with spark plug socket.

Spark Plug Type

Hot type	PLFR4A-11
Standard type	PLFR5A-11
Cold type	PLFR6A-11
Gap (nominal)	1.1 mm (0.043 in)

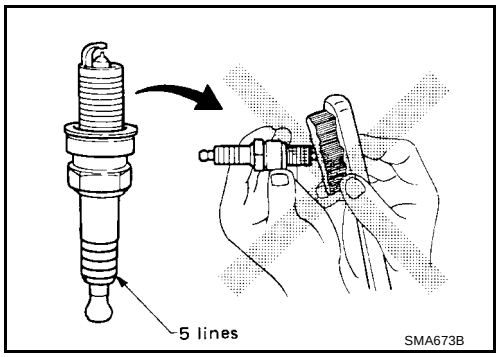
Use standard type spark plug for normal condition.

- The hot type spark plug is suitable when fouling occurs with the standard type spark plug under conditions such as:
  - Frequent engine starts
  - Low ambient temperatures
- The cold type spark plug is suitable when spark knock occurs with the standard type spark plug under conditions such as:
  - Extended highway driving
  - Frequent high engine revolution

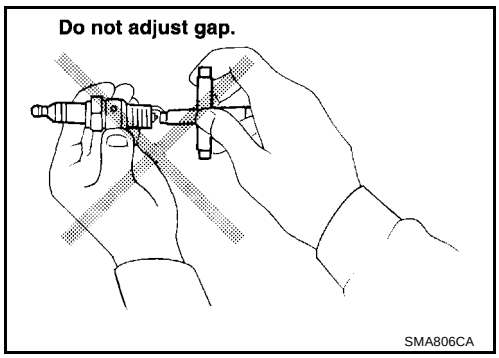
CAUTION:

Do not use wire brush for cleaning. If plug is covered with carbon, spark plug cleaner may be used.

Cleaner air pressure	**: Less than 588 kPa (6 kg/cm^2 , 85 psi)**
Cleaning time	**: less than 20 seconds**



- Checking and adjusting plug gap is not required between change intervals.



4. Install spark plugs.

   Spark plug : 20 - 29 N·m (2.0 - 3.0 kg-m, 14 - 22 ft-lb)

5. Install ignition coils and ignition wires.

   Ignition coil : 3.8 - 5.0 N·m (0.38 - 0.51 kg-m, 33 - 44 in-lb)

Checking EVAP Vapor Lines

ELS000IX

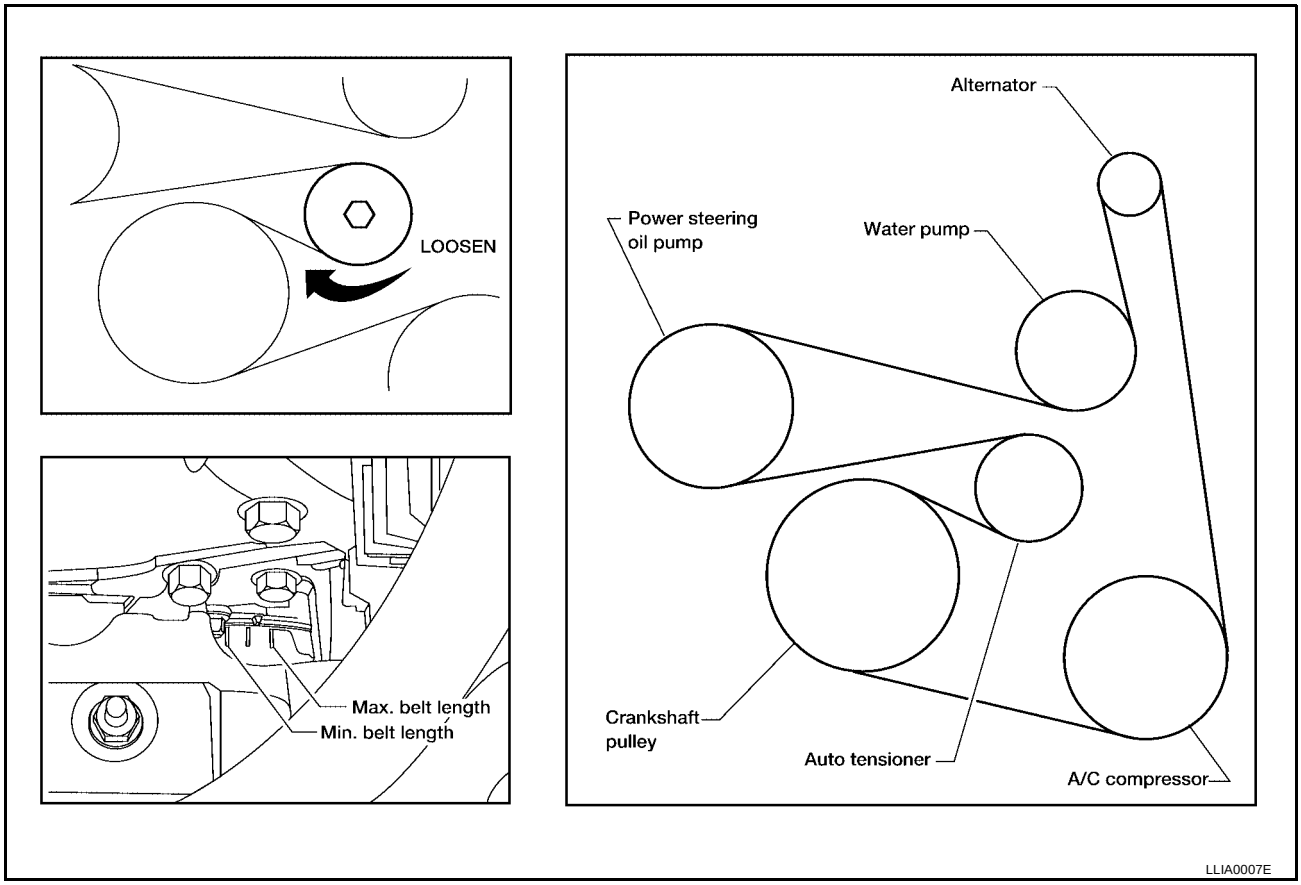
1. Visually inspect EVAP vapor lines for improper attachment, cracks, damage, loose connections, chafing or deterioration.
2. Inspect vacuum relief valve of fuel tank filler cap for clogging, sticking, etc. Refer to EC-39, "FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)" .

ENGINE MAINTENANCE (QR25DE ENGINE)

PFP:10001

Checking Drive Belts

ELS000IY



WARNING:

Be sure to perform when the engine is stopped.

- Make sure that indicator (single line notch) of each automatic tensioner is within the allowable working range (between three notches).

  NOTE:

  - Check the automatic tensioner indicator when the engine is cold.
  - The indicator notch is located on the moving side of the tensioner.
- Visually check entire belt for wear, damage or cracks.
- If the indicator is out of allowable working range or belt is damaged, replace the belt.
- Belt tensioning is not necessary, as it is automatically adjusted by auto belt tensioner.

Changing Engine Coolant

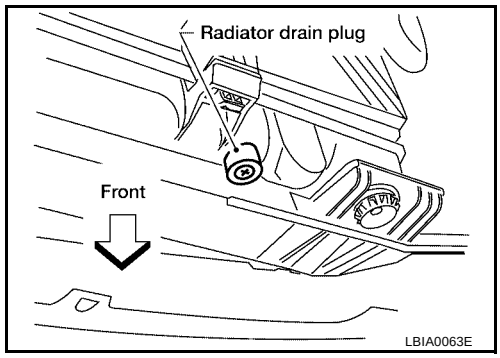
ELS000IZ

WARNING:

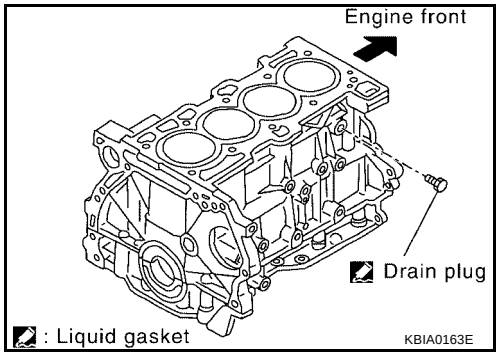
To avoid the danger of being scalded, never change the coolant when the engine is hot.

DRAINING ENGINE COOLANT

1. Open radiator drain plug at the bottom of the radiator, and remove radiator filler cap.



2. Remove cylinder block drain plug and air relief plug.



3. Check drained coolant for contaminants such as rust, corrosion or discoloration. If contaminated, flush engine cooling system.
   Refer to MA-25, "FLUSHING COOLING SYSTEM" .

REFILLING ENGINE COOLANT

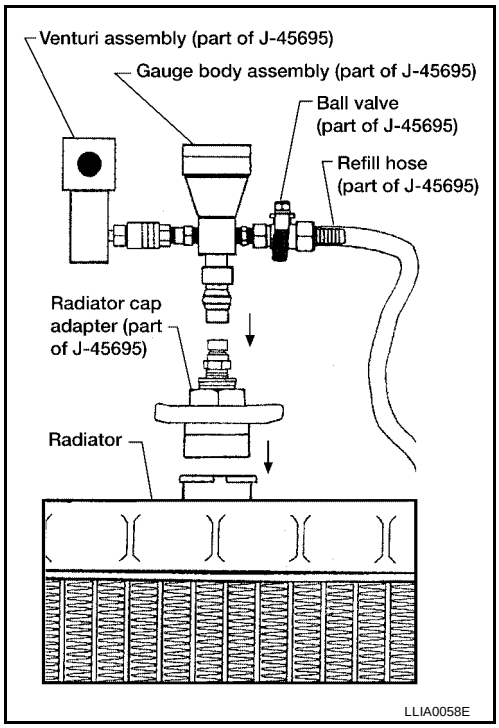
1. Install the radiator drain plug. Install the reservoir tank and cylinder block drain plug, if removed for a total system drain for engine removal or repair.
   - **The radiator must be completely empty of coolant and water.**
   - **Apply sealant to the threads of the cylinder block drain plugs. Use Genuine High Performance Thread Sealant or equivalent. Refer to GI-45, "RECOMMENDED CHEMICAL PRODUCTS AND SEALANTS" .**

   Radiator drain plug : 7.8 - 11.8 N·m (0.8 - 1.2 kg-m , 69 - 104 in-lb)
   Cylinder block drain plug : 34 - 44 N·m (3.5 - 4.5 kg-m, 25 - 33 ft-lb)

2. If disconnected, reattach the upper radiator hose at the engine side.
3. Set the vehicle heater controls to the full HOT and heater ON position. Turn the vehicle ignition ON with the engine OFF as necessary to activate the heater mode.
4. Install the Tool by installing the radiator cap adapter onto the radiator neck opening. Then attach the gauge body assembly with the refill tube and the venturi assembly to the radiator cap adapter.
5. Insert the refill hose into the coolant mixture container that is placed at floor level. Make sure the ball valve is in the closed position.
   - **Use Genuine NISSAN Long Life Anti-Freeze Coolant or equivalent, mixed 50/50 with distilled water or demineralized water.**
     Refer to MA-14, "Anti-freeze Coolant Mixture Ratio".

   Coolant capacity (Without reservoir tank) : M/T 6.1 ℓ (1 5/8 US gal, 1 3/8 Imp gal)
   A/T 6.0 ℓ (1 5/8 US gal, 1 3/8 Imp gal)

   Reservoir tank capacity (for MAX level) : 0.7 ℓ (1/8 US gal, 1/8 Imp gal)



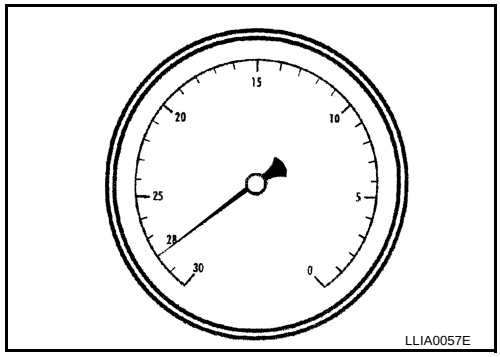
6. Install an air hose to the venturi assembly, the air pressure must be within specification.

   Compressed air supply pressure : 5.7 - 8.5 kPa (5.6 - 8.4 kg/cm^2 , 80 - 120 psi)

CAUTION:
The compressed air supply must be equipped with an air dryer.

7. The vacuum gauge will begin to rise and there will be an audible hissing noise. During this process open the ball valve on the refill hose slightly. Coolant will be visible rising in the refill hose. Once the refill hose is full of coolant, close the ball valve. This will purge any air trapped in the refill hose.

8. Continue to draw the vacuum until the gauge reaches 28 inches of vacuum. The gauge may not reach 28 inches in high altitude locations, refer to the vacuum specifications based on the altitude above sea level.



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Altitude above sea level	Vacuum gauge reading
0 - 100 m (328 ft)	: 28 inches of vacuum
300 m (984 ft)	: 27 inches of vacuum
500 m (1,641 ft)	: 26 inches of vacuum
1,000 m (3,281 ft)	: 24 - 25 inches of vacuum

9. When the vacuum gauge has reached the specified amount, disconnect the air hose and wait 20 seconds to see if the system loses any vacuum. If the vacuum level drops, perform any necessary repairs to the system and repeat steps 6 - 8 to bring the vacuum to the specified amount. Recheck for any leaks.
10. Place the coolant container (with the refill hose inserted) at the same level as the top of the radiator. Then open the ball valve on the refill hose so the coolant will be drawn up to fill the cooling system. The cooling system is full when the vacuum gauge reads zero.

    CAUTION:
    Do not allow the coolant container to get too low when filling, to avoid air from being drawn into the cooling system.
11. Remove the Tool from the radiator neck opening.
12. Fill the cooling system reservoir tank to the specified level and install the radiator cap. Run the engine to warm up the cooling system and top up the system as necessary.

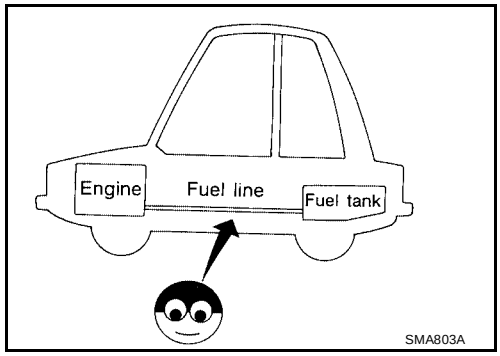
FLUSHING COOLING SYSTEM

1. Fill radiator and reservoir tank with water and reinstall radiator cap.
2. Run engine and warm it up to normal operating temperature.
3. Rev engine two or three times under no-load.
4. Stop engine and wait until it cools down.
5. Drain water.
6. Repeat steps 1 through 5 until clear water begins to drain from radiator.

Checking Fuel Lines

ELS000J0

- Inspect fuel lines and tank for improper attachment, leaks, cracks, damage, loose connections, chafing or deterioration.



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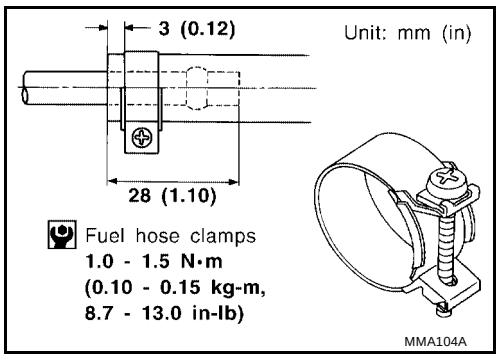
- If necessary, repair or replace faulty parts.

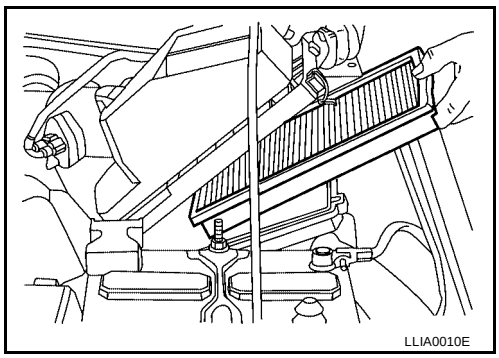


Changing Air Cleaner Filter

ELS000J1

Unfasten clamps to change air cleaner filter.

- **The viscous paper-type filter does not need cleaning.**



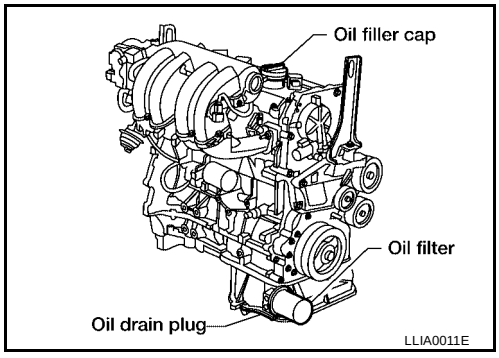
Changing Engine Oil

ELS000J2

WARNING:

- **Be careful not to burn yourself, as the engine oil is hot.**
- **Prolonged and repeated contact with used engine oil may cause skin cancer; try to avoid direct skin contact with used oil. If skin contact is made, wash thoroughly with soap or hand cleaner as soon as possible.**

1. Warm up engine, and check for oil leakage from engine components.
2. Stop engine.
3. Remove drain plug and oil filler cap.



4. Drain oil and refill with new engine oil.

Oil Specification and Viscosity

- Refer to MA-13, "Fluids and Lubricants" .

Oil Capacity (Approximate)

Unit: ℓ (US qt., Imp qt.)

Drain and refill	With oil filter change	4.0 (4 1/4, 3 1/2)
	Without oil filter change	3.8 (4, 3 3/8)
Dry engine (engine overhaul)		4.5 (4 3/4, 4)

CAUTION:

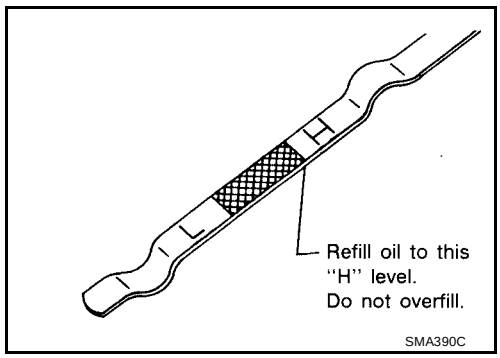
- **Be sure to clean drain plug and install with new washer.**

Oil pan drain plug : 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)

- **The refill capacity depends on the oil temperature and drain time. Use these specifications for reference only.**
  Always use the dipstick to determine when the proper amount of oil is in the engine.

5. Warm up engine and check area around drain plug and oil filter for oil leakage.
6. Stop engine.

7. Check oil level.



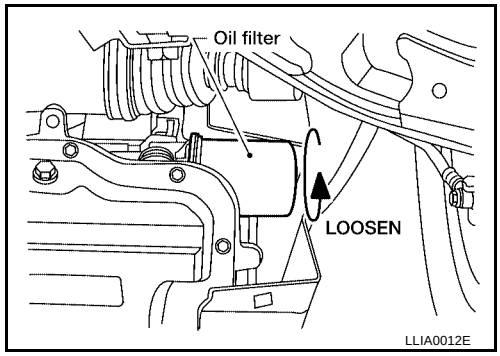
ELS000J3

Changing Oil Filter

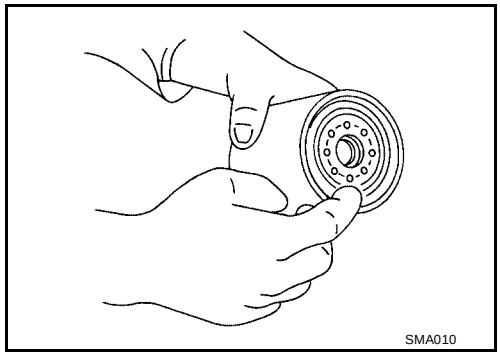
1. Remove oil filter with Tool.

   WARNING:
   Be careful not to burn yourself, as the engine and engine oil are hot.

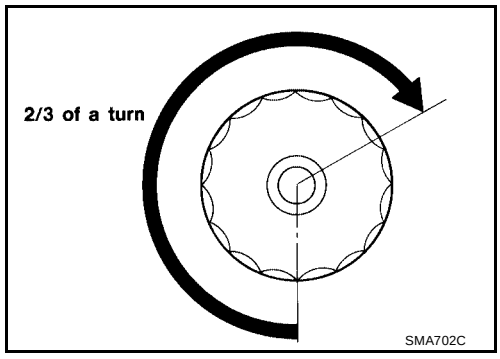
   NOTE:
   The filter is a full-flow cartridge type and is provided with a relief valve.



2. Clean oil filter mounting surface on cylinder block. Coat rubber seal of new oil filter with engine oil.



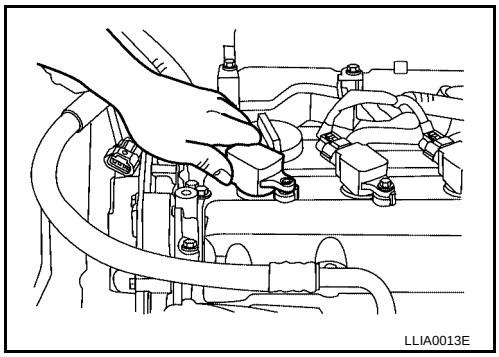
3. Screw in the oil filter until a slight resistance is felt, then tighten an additional 2/3 turn.
4. Add engine oil.Refer to MA-26, "Changing Engine Oil" .
   - **Clean excess oil from engine.**



Changing Spark Plugs (Double Platinum - Tipped Type)

ELS000J4

1. Disconnect ignition coil harness connectors.



2. Remove ignition coils.
3. Remove spark plugs with spark plug socket.

Spark Plug Type

Hot type	PLFR4A-11
Standard type	PLFR5A-11
Cold type	PLFR6A-11

Gap (Nominal) : 1.1 mm (0.043 in)

Use standard type spark plug for normal condition.

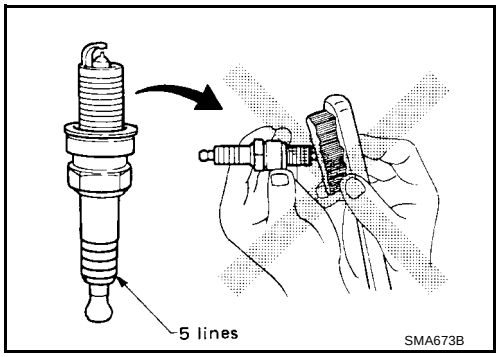
- The hot type spark plug is suitable when fouling occurs with the standard type spark plug under conditions such as:
  - Frequent engine starts
  - Low ambient temperatures
- The cold type spark plug is suitable when spark knock occurs with the standard type spark plug under conditions such as:
  - Extended highway driving
  - Frequent high engine revolution

CAUTION:

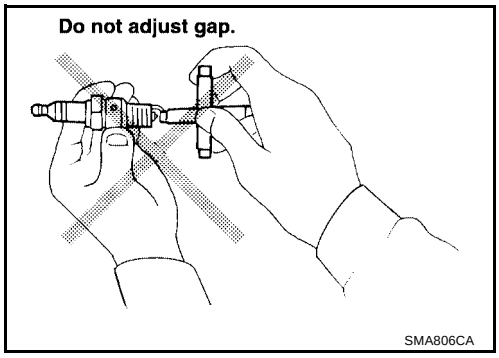
Do not use a wire brush for cleaning. If plug tip is covered with carbon, spark plug cleaner may be used.

Cleaner air pressure : Less than 588 kPa (6 kg/cm^2 , 85 psi)

Cleaning time : Less than 20 seconds



- **Checking and adjusting plug gap is not required between change intervals.**



4. Install spark plugs.

Spark plug : 20 - 29 N·m (2.0 - 3.0 kg-m, 14 - 22 ft-lb)

5. Install ignition coils and reconnect ignition wires according to numbers indicated on them.

Ignition coils : 5.4 - 7.3 N·m (0.55 - 0.73 kg-m, 46 - 64 in-lb)

Checking EVAP Vapor Lines

ELS000J5

1. Visually inspect EVAP vapor lines for improper attachment, cracks, damage, loose connections, chafing or deterioration.
2. Inspect vacuum relief valve of fuel tank filler cap for clogging, sticking, etc. Refer to EC-683, "FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FULLER CAP)" .

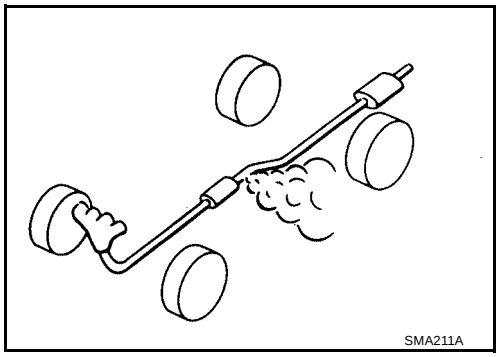
CHASSIS AND BODY MAINTENANCE

PFP:00000

Checking Exhaust System

ELS000J6

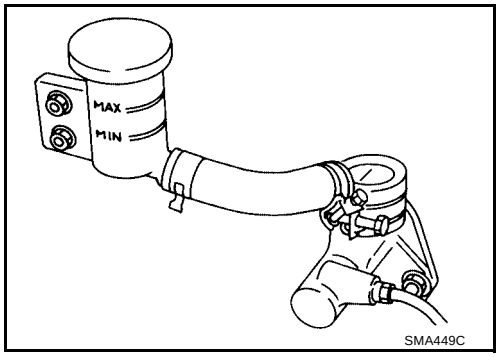
Check exhaust pipes, muffler and mounting for improper attachment, leaks, cracks, damage, loose connections, chafing or deterioration.



Checking Clutch Fluid Level and Leaks

ELS000J7

If fluid level is extremely low, check clutch system for leaks.



Checking M/T Oil

ELS000J8

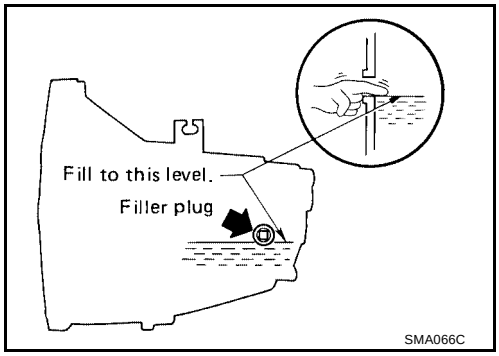
1. Check that oil is not leaking from transaxle or around it.
2. Check oil level.

Never start engine while checking oil level.

Filler plug

RS5F70A (QG18DE) : **10 - 19 N·m (1.0 - 2.0 kg-m, 87 - 173 in-lb)**

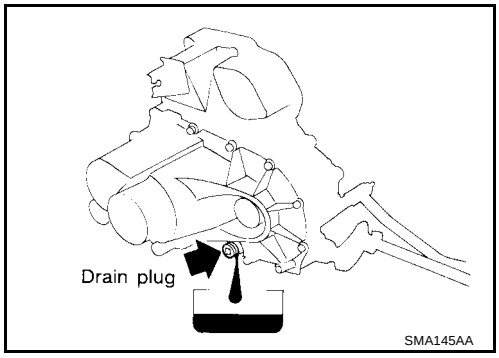
RS6F51H, (QR25DE) : **30 - 39 N·m (3.1 - 4.0 kg-m, 23 - 28 lb-ft)**



Changing M/T Oil

ELS000J9

1. Drain oil from drain plug and refill with new gear oil.

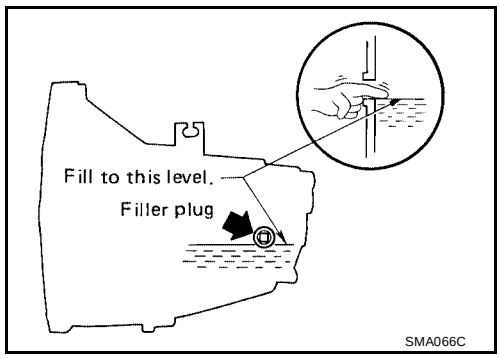


2. Check oil level.

Oil grade and viscosity : Refer to MA-13, "Fluids and Lubricants" .

Capacity : **RS5F70A (QG18DE)**
3.0 ℓ (3 1/8 US qt, 2 5/8 Imp qt)
RS6F51H (QR25DE)
2.2 ℓ (2 3/8 US qt, 2 Imp qt)

Drain plug : **RS5F70A (QG18DE)**
10 - 19 N·m (1.0 - 2.0 kg-m, 87 - 173 in-lb)
RS6F51H (QR25DE)
30 - 39 N·m (3.1 - 4.0 kg-m, 23 - 28 ft-lb)

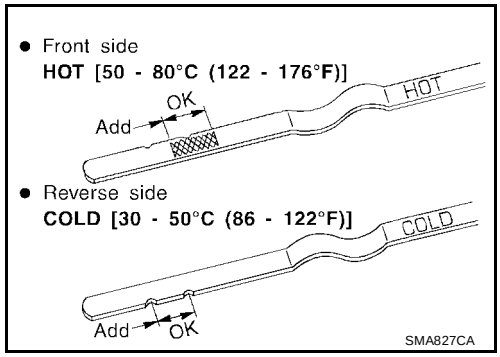


Checking A/T Fluid

ELS000JA

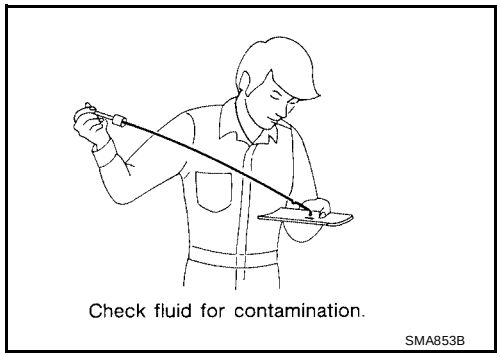
1. Check for fluid leakage.
2. Warm up engine.
3. Before driving, fluid level can be checked at fluid temperatures of 30 - 50°C (86 - 122°F) using “COLD” range on dipstick.

a. Park vehicle on level surface and set parking brake.
b. Start engine and move selector lever through each gear position. Leave selector lever in “P” position.
c. Check fluid level with engine idling.
d. Remove dipstick and note reading. If level is at low side of either range, add fluid to the charging pipe.
e. Re-insert dipstick into charging pipe as far as it will go.
f. Remove dipstick and note reading. If reading is at low side of range, add fluid to the charging pipe.



Do not overfill.

4. Drive vehicle for approximately 5 minutes in urban areas.
5. Re-check fluid level at fluid temperatures of 50 - 80°C (122 - 176°F) using “HOT” range on dipstick.
6. Check fluid condition.
   - If fluid is very dark or smells burned, refer to AT-63, "FLUID CONDITION CHECK" . Flush cooling system after repair of A/T.
   - If A/T fluid contains frictional material (clutches, bands, etc.), replace radiator and flush cooler line using cleaning solvent and compressed air after repair of A/T. Refer to CO-14, "RADIATOR" .

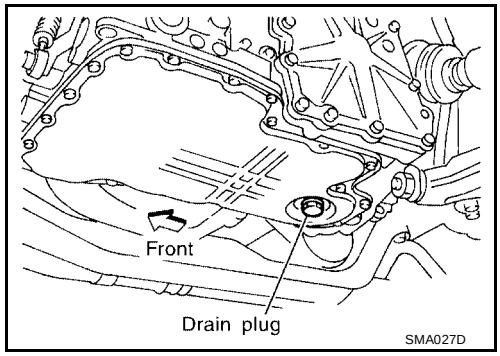


Changing A/T Fluid

ELS000JB

1. Warm up A/T fluid.
2. Stop engine.
3. Drain A/T fluid from drain plug and refill with new A/T fluid. Always refill same volume with drained fluid.

Fluid grade : **NISSAN Matic “D” (Continental U.S. and Alaska) or Canada NISSAN Automatic Transmission Fluid. Refer to MA-13, "Fluids and Lubricants" .**



Fluid capacity (With torque converter)	**: RE4F03B (QG18DE)** **7.0 ℓ (7-3/8 US qt, 6-1/8 Imp qt)** **RE4F04B (QR25DE)** **8.5 ℓ (9.0 US qt, 7-1/2 Imp qt)**
Drain plug	**: 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)**

4. Run engine at idle speed for five minutes.
5. Check fluid level and condition. Refer to MA-31, "Checking A/T Fluid" . If fluid is still dirty, repeat steps 2 through 5.

Balancing Wheels

ELS000JC

Adjust wheel balance using the road wheel center.

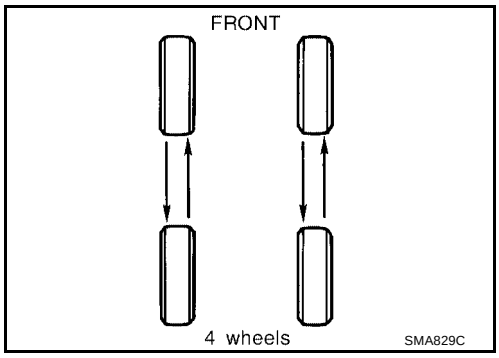
Wheel balance (maximum allowable unbalance) : Refer to MA-32, "Balancing Wheels" .

Tire Rotation

ELS000JD

- After rotating the tires, adjust the tire pressure.
- Retighten the wheel nuts when the vehicle has been driven for the first 1,000 km (600 miles) or any time the wheel and tire assembly has been removed and installed.
- Tighten wheel nuts in a criss-cross pattern to specification, making several passes.

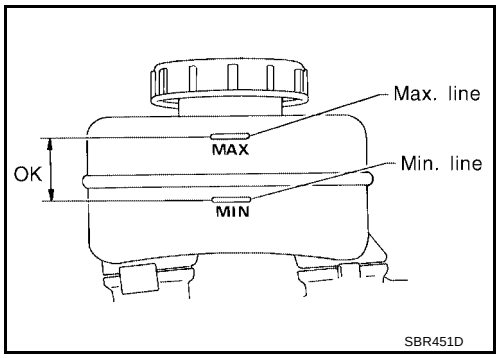
Wheel nuts : 98 - 117 N·m (10 - 12 kg-m, 73 - 86 ft-lb)



Checking Brake Fluid Level and Leaks

ELS000JE

- Check fluid level in reservoir tank. It should be between MAX and MIN lines on reservoir tank.
- If fluid level is extremely low, check brake system for leaks.
- Release parking brake lever and see if brake warning lamp goes off. If not, check brake system for leaks.



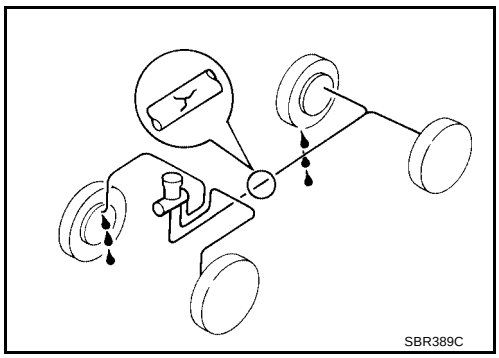
Checking Brake Lines and Cables

ELS000JF

CAUTION:

If leakage occurs around joints, retighten or, if necessary, replace damaged parts.

1. Check brake lines (tubes and hoses) for cracks, deterioration and other damage. Replace damaged parts.
2. Check for oil leakage by fully depressing brake pedal while engine is running.



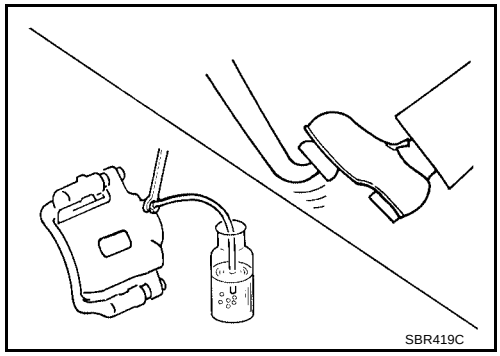
Changing Brake Fluid

ELS000JG

CAUTION:

- **Refill with new brake fluid. Refer to MA-13, "Fluids and Lubricants" .**
- **Always keep fluid level higher than minimum line on reservoir tank.**
- **Never reuse drained brake fluid.**
- **Be careful not to splash brake fluid on painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, wash it away with water immediately.**

1. Clean inside of reservoir tank, and refill with new brake fluid.
2. Connect a vinyl tube to each bleeder valve.
3. Drain brake fluid from each air bleeder valve by depressing brake pedal.
4. Refill until brake fluid comes out of each air bleeder valve. Use same procedure as in bleeding hydraulic system to refill brake fluid. Refer to BR-7, "Bleeding Brake System" .

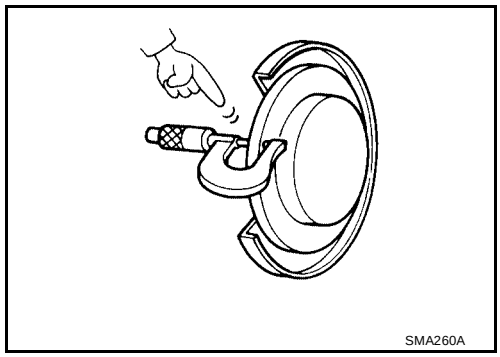

SBR419C

Checking Disc Brakes

ELS000JH

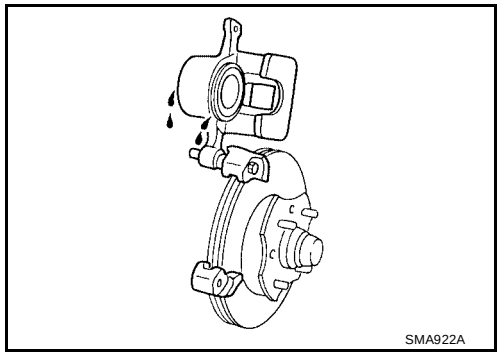
ROTOR

Check condition, wear, and damage. Refer to BR-22, "DISC ROTOR INSPECTION" (CL25VA/CL25VB) and BR-27, "DISC ROTOR INSPECTION" (OPB27VA) for front disc brake and BR-34, "DISC ROTOR INSPECTION" for rear disc brake.


SMA260A

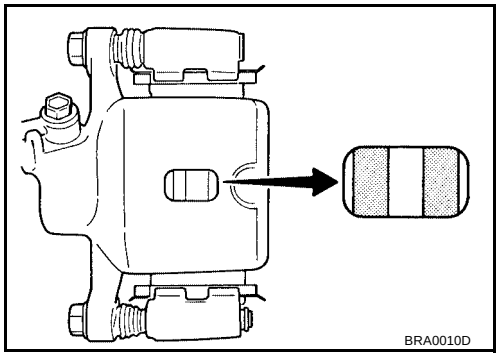
CALIPER

Check for leakage. Refer to Refer to BR-21, "CALIPER INSPECTION" (CL25VA/CL25VB) and BR-27, "CALIPER INSPECTION" (OPB27VA) for front disc brake and BR-33, "CALIPER INSPECTION" for rear disc brake.


SMA922A

PAD

Check condition and thickness. Refer to BR-19, "PAD WEAR INSPECTION" (CL25VA/CL25VB), BR-23, "PAD WEAR INSPECTION" (OPB27VA) for front disk brake and BR-29, "PAD WEAR INSPECTION" for rear disc brake.

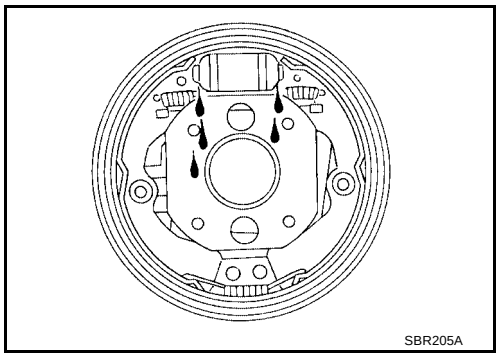


Checking Drum Brake

ELS000JI

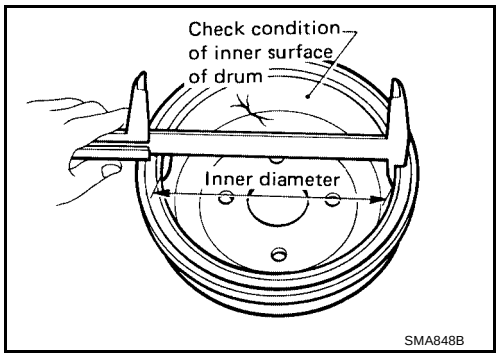
WHEEL CYLINDER

Check operation and for leakage. Refer to BR-40, "WHEEL CYLINDER" .



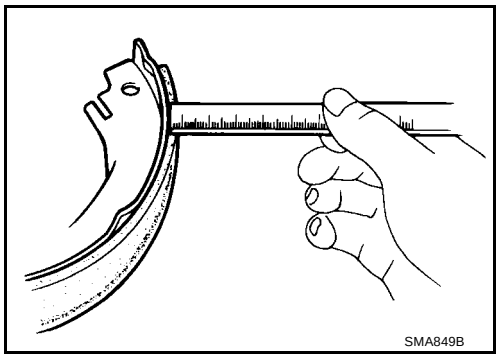
DRUM

Check condition of inner surface. Refer to BR-40, "DRUM" .



LINING

Measure wear and check for damage. Refer to BR-40, "LINING" .

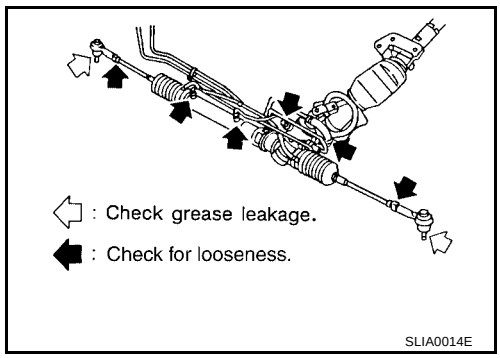


Checking Steering Gear and Linkage

ELS000JJ

STEERING GEAR

- Check gear housing and boots for looseness, damage and grease leakage.
- Check connection with steering column for looseness.



STEERING LINKAGE

- Check ball joint, dust cover and other component parts for looseness, wear, damage and grease leakage.

Checking Power Steering Fluid and Lines

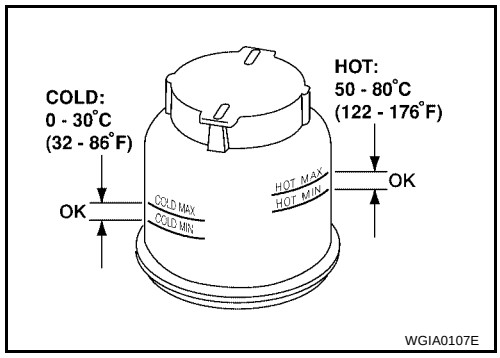
ELS000JK

CHECKING FLUID LEVEL

- Check fluid level with engine off.
- Use the correct range of the tank depending on the fluid temperature. Use “HOT” range at fluid temperatures of 50 - 80°C (122 - 176°F). Use “COLD” range at fluid temperatures of 0 - 30°C (32 - 86°F).

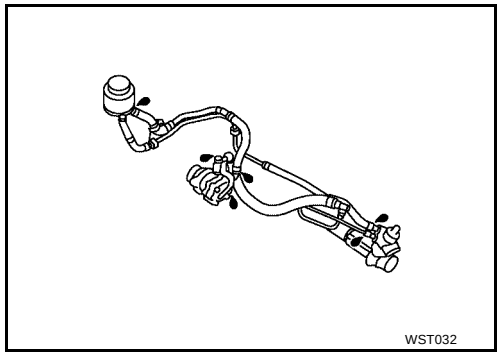
CAUTION:

- **Do not overfill.**
- **Recommended fluid is Genuine NISSAN PSF or equivalent. Refer to MA-13, "RECOMMENDED FLUIDS AND LUBRICANTS" .**



CHECKING LINES

- Check lines for improper attachment, leaks, cracks, damage, loose connections, chafing and deterioration.
- Check rack boots for accumulation of power steering fluid.

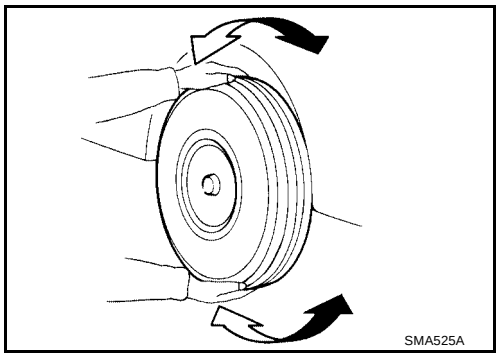


Axle and Suspension Parts

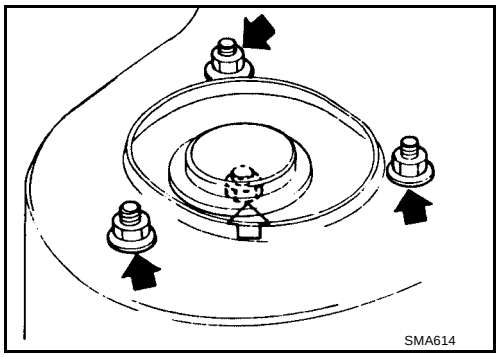
ELS000JL

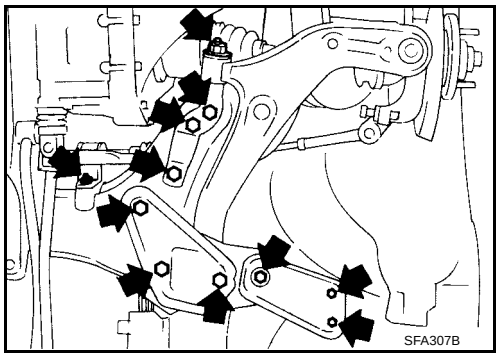
Check front and rear axle and suspension parts for excessive play, cracks, wear, or other damage.

- Shake each wheel to check for excessive play.
- Rotate each wheel to check for abnormal noise.

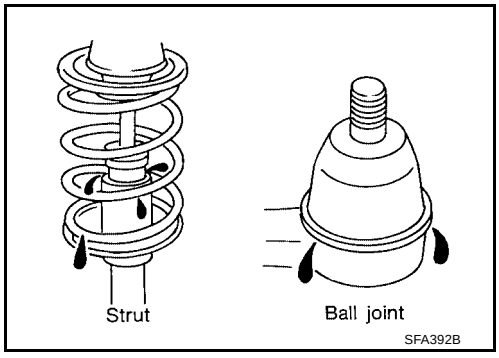

SMA525A

- Check axle and suspension nuts and bolts for looseness.


SMA614


SFA307B

- Check strut (shock absorber) for oil leakage or other damage.
- Check suspension ball joint for grease leakage and ball joint dust cover for cracks or other damage.

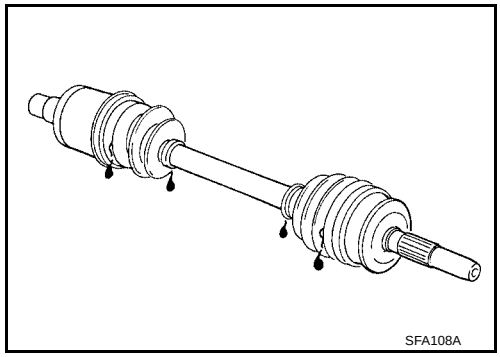


SFA392B

Drive Shaft

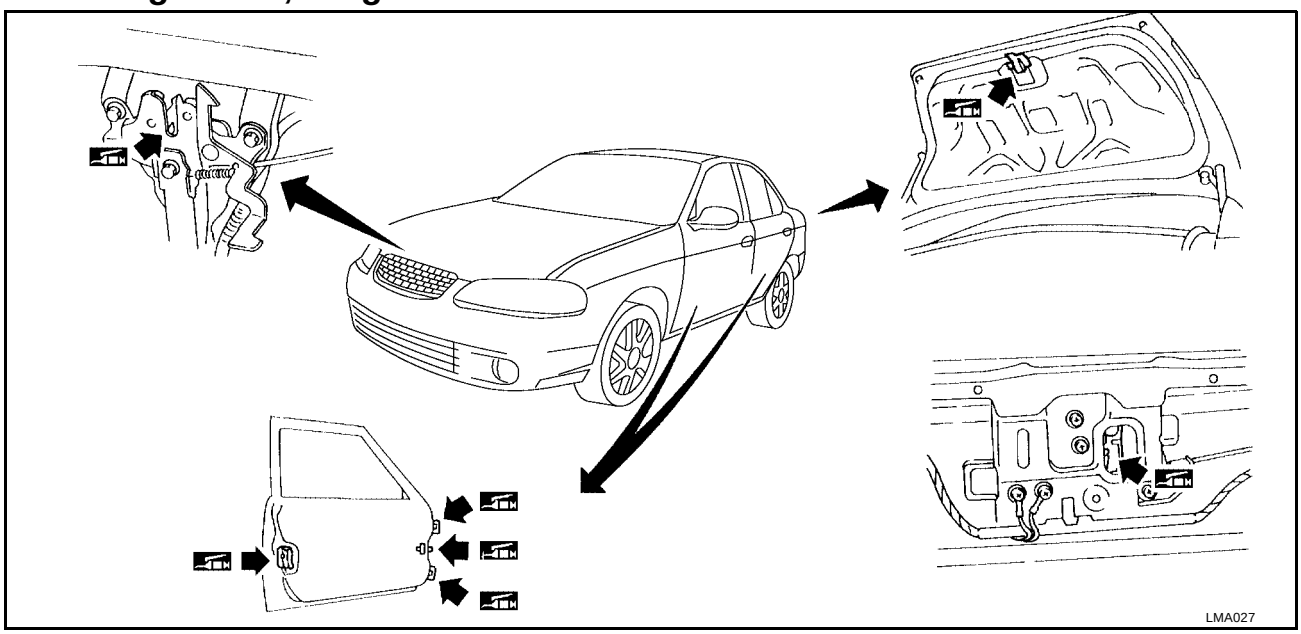
ELS000JM

- Check boot and drive shaft for cracks, wear, damage and grease leakage.



Lubricating Locks, Hinges and Hood Latches

ELS000JN



Checking Seat Belt, Buckles, Retractors, Anchors and Adjusters

ELS000JO

CAUTION:

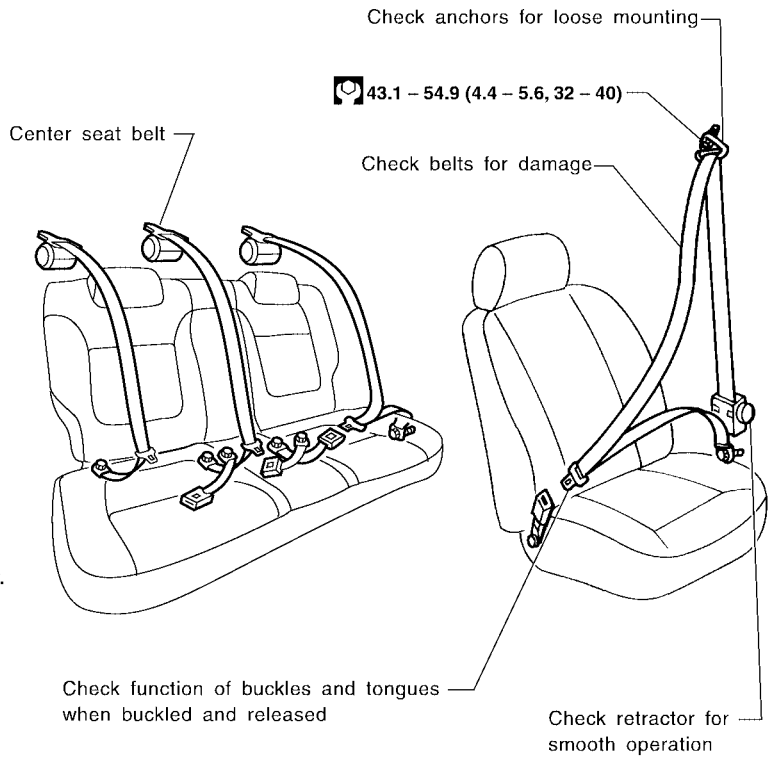
- **After any collision, inspect all seat belt assemblies, including retractors and other attached hardwares (i.e. anchor bolt, guide rail set). Nissan recommends to replace all seat belt assemblies in use during a collision, unless not damaged and properly operating after minor collision.**
  Also inspect seat belt assemblies not in use during a collision, and replace if damaged or improperly operating.
  Seat belt pre-tensioner should be replaced even if the seat belts are not in use during a frontal collision where the driver and passenger air bags are deployed.
- **If any component of seat belt assembly is questionable, do not repair. Replace as seat belt assembly.**
- **If webbing is cut, frayed, or damaged, replace belt assembly.**
- **Never oil tongue and buckle.**
- **Use a Genuine NISSAN seat belt assembly.**

For details, refer to "Seat Belt Inspection" in SB section.

Anchor bolt

43.1 – 54.9 (4.4 – 5.6, 32 – 40)

: N·m (kg-m, ft-lb)



LLIA0020E

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Engine Maintenance (QG18DE)

ELS000JP

BELT DEFLECTION AND TENSION

Component		Deflection adjustment Unit: mm (in)			Tension adjustment *1 Unit: N (kg, lb)		
		Used Belt		New Belt	Used Belt		New Belt
		Limit	After Adjustment		Limit	After Adjustment	
Generator	With air conditioner compressor	8.1 (0.319)	5.3 - 5.7 (0.209 - 0.244)	4.5 - 5.0 (0.177- 0.197)	292 (30, 66)	652 - 740 (66.5 - 75.5, 146.6 - 166.4)	789 - 877 (80.5 - 89.5, 177.4 - 197.1)
	Without air conditioner compressor	10.2 (0.402)	6.5 - 7.0 (0.256 - 0.276)	5.5 - 6.1 (0.217 - 0.240)	292 (30, 60)	652 - 740 (66.5 - 75.5, 146.6 - 166.4)	789 - 877 (80.5 - 89.5, 177.4 - 197.1)
Power steering oil pump		7.1 (0.280)	4.4 - 4.9 (0.173 - 0.193)	3.9 - 4.4 (0.154 - 0.173)	196 (20, 44)	495 - 583 (50.5 -59.5, 111.4 - 131.2)	603- 691 (61.5 - 70.5, 135.6 - 155.5)
Applied pushing force		98 N (10 kg, 22 lb)			—		

*1: If the belt tension gauge cannot be installed at check points shown, check belt tension at a different location on the belt.

SPARK PLUGS (DOUBLE PLATINUM - TIPPED)

Type	Standard	PLFR5A-11
	Hot	PLFR4A-11
	Cold	PLFR6A-11
Plug gap		Nominal: 1.1 mm (0.043 in)

Engine Maintenance (QR25DE)

ELS000JQ

BELT DEFLECTION AND TENSION

Tension of drive belts	Auto-adjustment by auto tensioner

SPARK PLUGS (DOUBLE PLATINUM - TIPPED)

Type	Standard	PLFR5A-11
	Hot	PLFR4A-11
	Cold	PLFR6A-11
Plug gap		Nominal: 1.1 mm (0.043 in)

Chassis and Body Maintenance

ELS000JR

WHEEL BALANCE

Maximum allowable unbalance	Dynamic (At rim flange) g (oz)	10 (0.35) (one side)
	Static g (oz)	20 (0.71)

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ALPHABETICAL INDEX

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SECTION MT
MANUAL TRANSAXLE

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PRECAUTIONS

PFP:00001

Precautions

ECS005TD

- Do not reuse transaxle oil, once it has been drained.
- Check oil level or replace oil with vehicle on level ground.
- During removal or installation, keep inside of transaxle clear of dust or dirt.
- Check for the correct installation status prior to removal or disassembly. If mating marks are required, be certain they do not interfere with the function of the parts they are applied to.
- In principle, tighten bolts or nuts gradually in several steps working diagonally from inside to outside. If tightening sequence is specified, use it.
- Be careful not to damage sliding surfaces and mating surfaces.

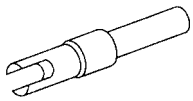
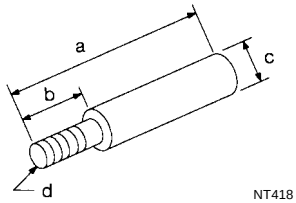
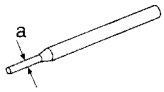
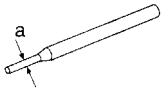
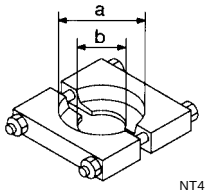
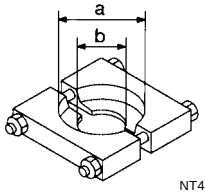
PREPARATION

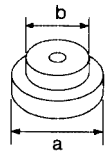
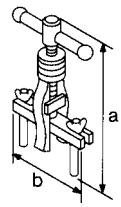
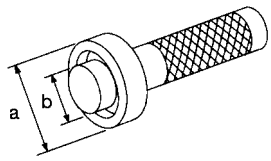
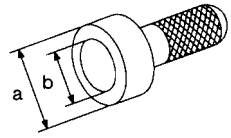
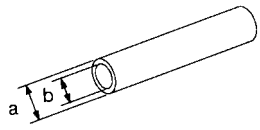
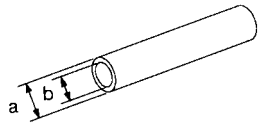
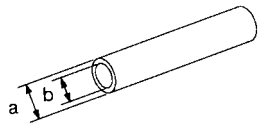
PFP:00002

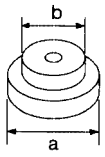
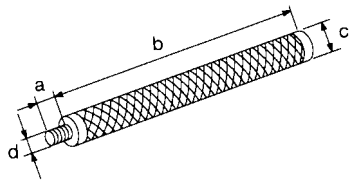
Special Service Tools

ECS005TE

The actual shapes of the Kent-Moore tools may differ from those of the special service tools illustrated here.

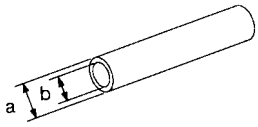
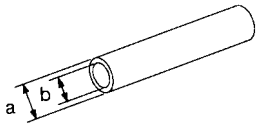
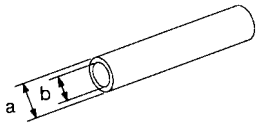
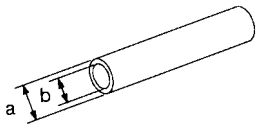
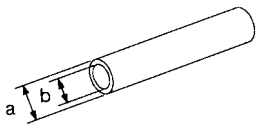
Tool number (Kent-Moore No.) Tool name	Description
KV38107700 (J39027) Preload adapter  NT087	Measuring turning torque of final drive assembly Measuring total turning torque Measuring clearance between side gear and differential case with washer Selecting differential side bearing adjusting shim [Use with KV38106000 (J34291-B).]
KV38106000 (J34291-B) Height gauge adapter (differential side bearing)  NT418	Selecting differential side bearing adjusting shim [Use with KV38107700 (J39027).] **a: 140 mm (5.51 in)** **b: 40 mm (1.57 in)** **c: 16 mm (0.63 in) dia.** **d: M8 × 1.25P**
KV32101000 (J25689-A) Pin punch  NT410	Removing and installing retaining pin Removing and installing lock pin Removing selector shaft Removing welch plug **a: 4 mm (0.16 in) dia.**
KV31100300 (J25689-A) Pin punch  NT410	Removing and installing retaining pin **a: 4.5 mm (0.177 in) dia.**
ST30031000 (J22912-01) Puller  NT411	Removing 3rd, 5th input gear Removing 3rd & 4th and 5th & Rev synchronizer hub Removing mainshaft rear bearing Removing 2nd gear, 5th gear bush Removing 1st & 2nd synchronizer hub, 1st and 4th main gear Removing and installing differential side bearing **a: 90 mm (3.54 in) dia.** **b: 50 mm (1.97 in) dia.**
ST30021000 (J22912-01) Puller  NT411	Removing input shaft front and rear bearing Installing input shaft front and rear bearing Installing 5th input gear, 3rd main gear and 4th main gear Installing 1st & 2nd, 3rd & 4th and 5th & Rev synchronizer hub Installing 2nd gear bush, 5th gear bush, Rev gear bush Installing mainshaft rear bearing **a: 110 mm (4.33 in) dia.** **b: 68 mm (2.68 in) dia.**

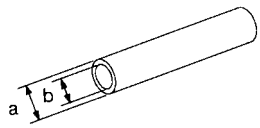
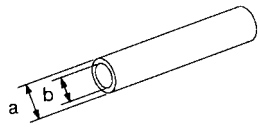
Tool number (Kent-Moore No.) Tool name	Description
ST33061000 (J8107-2) Drift  NT073	Removing differential side bearing **a: 39 mm (1.54 in) dia.** **b: 29.5 mm (1.16 in) dia.**
ST33290001 (J34286) Puller  NT414	● Removing idler gear bearing outer race **a: 250 mm (9.84 in)** **b: 160 mm (6.30 in)**
ST33230000 (J25805-01) Drift  NT084	Removing differential oil seal Installing differential side bearing **a: 51 mm (2.01 in) dia.** **b: 28.5 mm (1.122 in) dia.**
ST30720000 (J25405) Drift  NT115	Installing differential side bearing outer race **a: 77 mm (3.03 in) dia.** **b: 55.5 mm (2.185 in) dia.**
ST22350000 (J25678-01) Drift  NT065	Installing input shaft front and rear bearing **a: 34 mm (1.34 in) dia.** **b: 28 mm (1.10 in) dia.**
ST22452000 (J34335) Drift  NT065	Installing 3rd and 4th main gear Installing 5th gear bush Installing 5th & Rev synchronizer hub Installing Rev gear bush Installing mainshaft rear bearing **a: 45 mm (1.77 in) dia.** **b: 36 mm (1.42 in) dia.**
ST37750000 (J34335) Drift  NT065	Installing input shaft oil seal Installing 5th synchronizer Installing mainshaft rear bearing Installing 5th main gear Installing 3rd & 4th synchronizer hub Installing striking rod oil seal Installing clutch housing dust seal **a: 40 mm (1.57 in) dia.** **b: 31 mm (1.22 in) dia.**

Tool number (Kent-Moore No.) Tool name	Description
ST30621000 (J35869) Drift  NT073	Installing differential side bearing outer race [Use with ST30611000 (J25742-1).] **a: 79 mm (3.11 in) dia.** **b: 59 mm (2.32 in) dia.**
ST30611000 (J25742-1) Drift handle  NT419	Installing differential side bearing outer race [Use with ST30621000 (J35869).] **a: 15 mm (0.59 in)** **b: 335 mm (13.19 in)** **c: 25 mm (0.98 in) dia.** **d: M12 × 1.5P**

Commercial Service Tools

ECS005TF

Tool name	Description
Drift  NT065	Installing differential side bearing inner race **a: 56 mm (2.20 in) dia.** **b: 50.5 mm (1.988 in) dia.**
Drift  NT065	Removing input shaft rear bearing Removing mainshaft rear bearing **a: 22 mm (0.87 in) dia.** **b: 16 mm (0.63 in) dia.**
Drift  NT065	Installing differential oil seal (Transaxle case side) **a: 58 mm (2.28 in) dia.** **b: 50 mm (1.97 in) dia.**
Drift  NT065	Installing differential oil seal (Clutch housing side) **a: 54 mm (2.13 in) dia.** **b: 50 mm (1.97 in) dia.**
Drift  NT065	Installing 2nd gear bush **a: 38 mm (1.50 in) dia.** **b: 33 mm (1.30 in) dia.**

Tool name	Description
Drift  NT065	Installing 3rd & 4th and 1st & 2nd synchronizer hub Installing mainshaft front bearing **a: 50 mm (1.97 in) dia.** **b: 41 mm (1.61 in) dia.**
Drift  NT065	Installing input shaft oil seal Installing 5th input gear **a: 39 mm (1.54 in) dia.** **b: 30 mm (1.18 in) dia.**

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

ECS005TG

Use the chart below to help you find the cause of the symptom. The numbers indicate the order of the inspection. If necessary, repair or replace these parts.

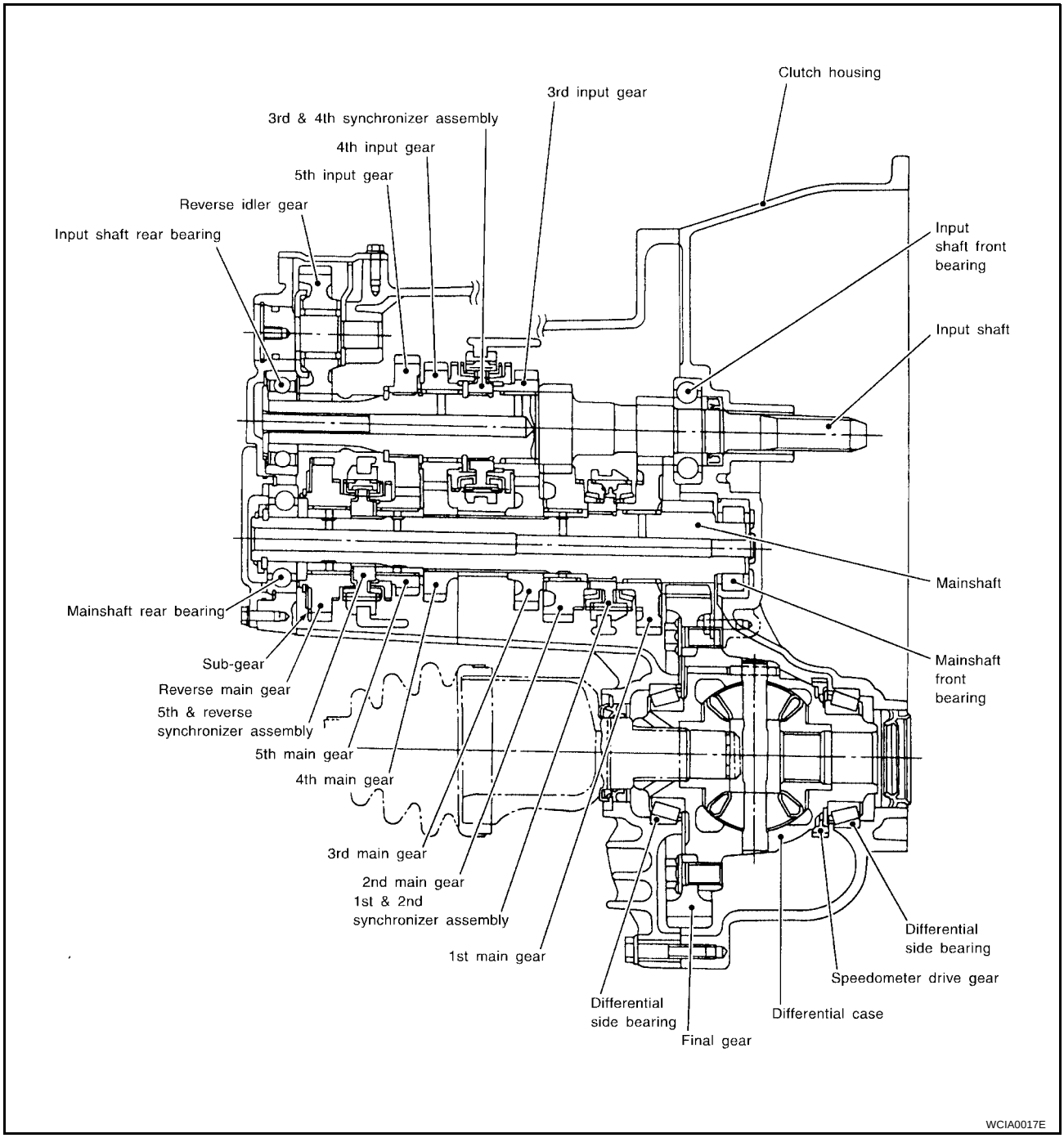
Reference page		MT-10	MT-10	MT-10	MT-18			MT-13	MT-20		MT-19, MT-21			
Suspected Parts (Possible cause)		(Oil level is low)	(Wrong oil)	(Oil level is high)	Gasket (Damaged)	Oil Seal (Worn or damaged)	O-Ring (Worn or damaged)	Control Rod (Worn)	Check Plug Return Spring and Check Ball (Worn or damaged)	Shift Fork (Worn)	Gear (Worn or damaged)	Bearing (Worn or damaged)	Baulk Ring (Worn or damaged)	Insert Spring, Shifting Insert (Damaged)
Symptom	Noise	1	2								3	3		
	Oil leakage		3	1	2	2	2							
	Hard to shift or will not shift		1	1				2					3	3
	Jumps out of gear							1	2	3	3			

DESCRIPTION

PFP:00000

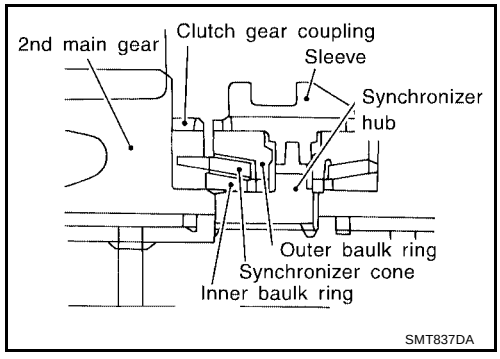
Cross-sectional View

ECS005TH



DOUBLE-CONE SYNCHRONIZER

Double-cone synchronizer is used for 1st and 2nd gears to reduce operating force of the shift lever.



M/T OIL

PFP:KLD20

Replacement

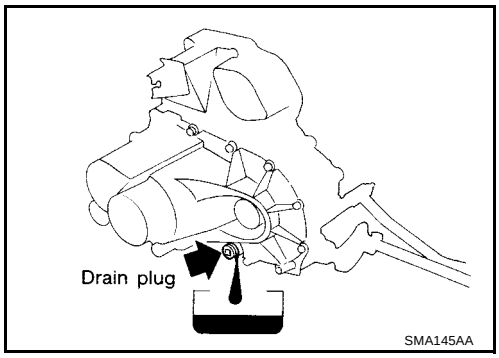
ECS005TI

DRAINING

1. Start the engine and let it run to warm up the transaxle.
2. Stop the engine. Remove drain plug and drain oil.
3. Set a gasket on the drain plug and install it on the transaxle.

Drain plug : 10 - 19 N·m (1.0 - 2.0 kg-m, 87 - 173 in-lb)

CAUTION:
Do not reuse gasket.



FILLING

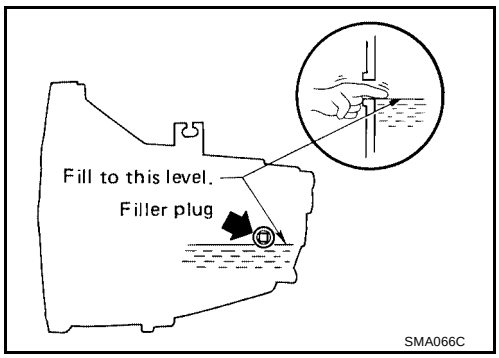
1. Remove filler plug. Fill with new oil until oil level reaches the specified limit near filler plug mounting hole as shown.

Oil grade : API GL-4, Viscosity SAE 75W-85
Capacity (approximately) : 3.0 ℓ (3 1/8 US qt, 2 5/8 Imp qt)

2. After refilling oil, check oil level as shown.
3. Install the filler plug in the transaxle case using a new gasket.

Filler plug : 10 - 19 N·m (1.0 - 2.0 kg-m, 87 - 173 in-lb)

CAUTION:
Do not reuse gasket.



Checking

ECS005TJ

OIL LEAKAGE AND OIL LEVEL

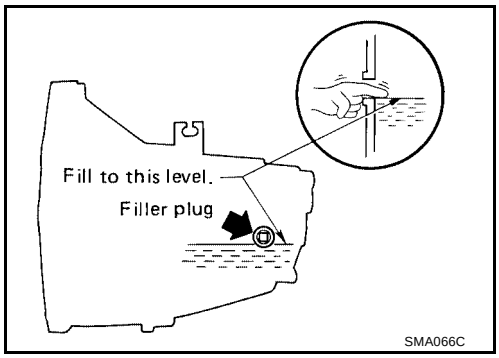
1. Check that oil is not leaking from transaxle.
2. Check oil level from filler plug mounting hole as shown.

CAUTION:
Never start the engine while checking the oil level.

3. Install the filler plug in the transaxle case using a new gasket.

Filler plug : 10 - 19 N·m (1.0 - 2.0 kg-m, 87 - 173 in-lb)

CAUTION:
Do not reuse gasket.



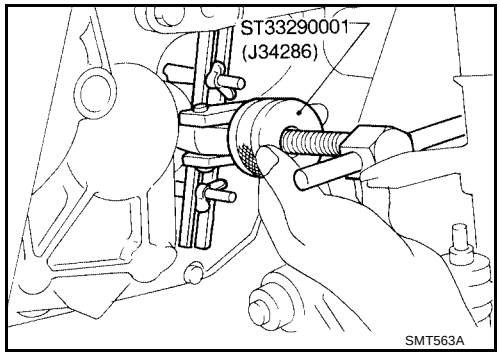
SIDE OIL SEAL

PFP:32113

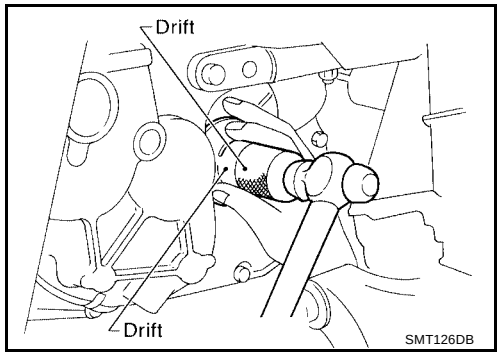
Removal and Installation

ECS005TK

1. Remove drain plug and drain the oil from transaxle. Refer to MT-10, "DRAINING" .
2. Remove drive shafts. Refer to FAX-14, "Removal" .
3. Remove differential oil seal using Tool.



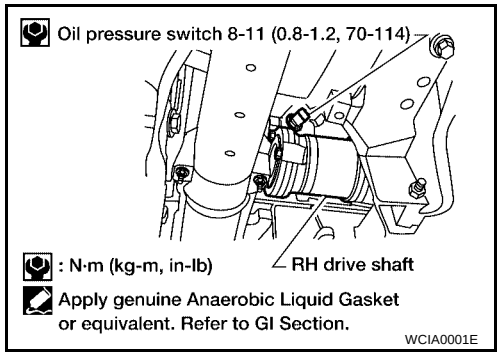
4. Install differential oil seal with a suitable tool (drift).
   - Apply multi-purpose grease to seal lip of oil seal before installing.



5. Install drive shafts. Refer to FAX-16, "Installation" .
   - Install differential oil seal so that dimensions “A” and “B” are within specifications.

Unit: mm (in)

Model	Dimension “A”	Dimension “B”
QG18DE (RS5F70A)	0.5 (0.020) or less	5.5 - 6.5 (0.217 - 0.256)



6. Refill the transaxle oil and install the drain plug using a new gasket. Refer to MT-10, "FILLING" .

POSITION SWITCH

PFP:32005

Position Switch Check

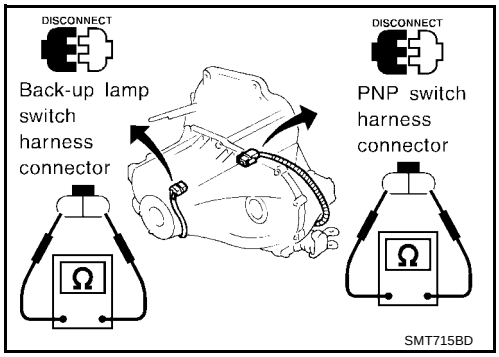
ECS005TL

NOTE:
For removal and installation of the switches. Refer to MT-18, "CASE COMPONENTS" .

BACK-UP LAMP SWITCH

- Check continuity.

Gear position	Continuity
Reverse	Yes
Except reverse	No



PNP SWITCH

- Check continuity.

Gear position	Continuity
Neutral	Yes
Except neutral	No

CONTROL LINKAGE

PFP:34103

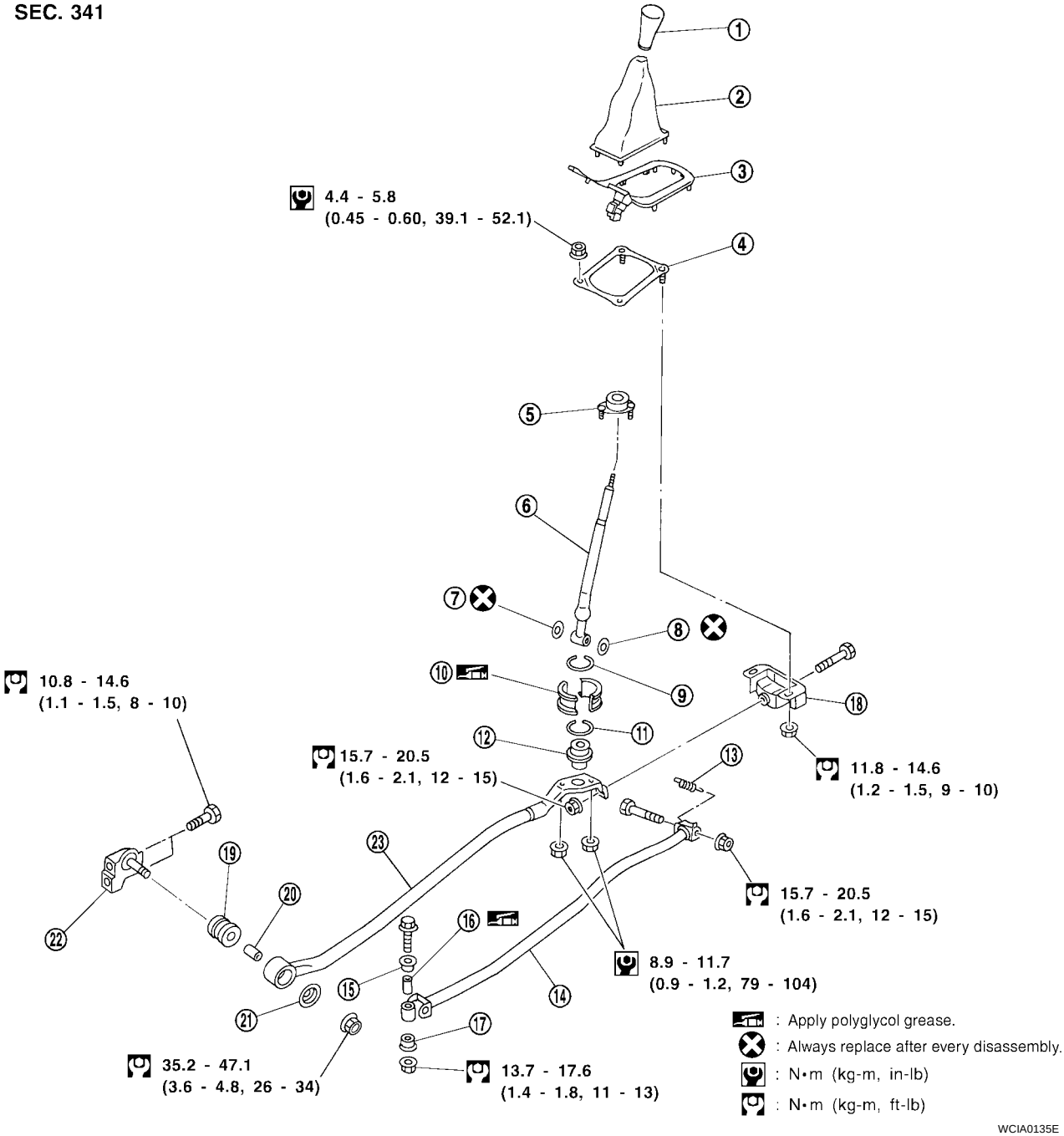
Removal and Installation

ECS005TM

TRANSAXLE GEAR CONTROL

Refer to the illustration for the removal and installation procedure.

SEC. 341

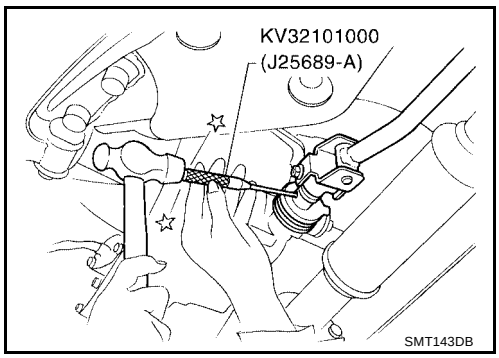


1. Control lever knob
2. Boot
3. Finisher
4. Control lever bracket
5. Socket
6. Control lever
7. O-ring
8. O-ring
9. Ring spring
10. Bearing seat
11. Ring spring
12. Seat
13. Return spring
14. Control rod
15. Bushing
16. Collar
17. Bushing
18. Bracket
19. Bushing
20. Collar
21. Washer
22. Support rod bracket
23. Support rod

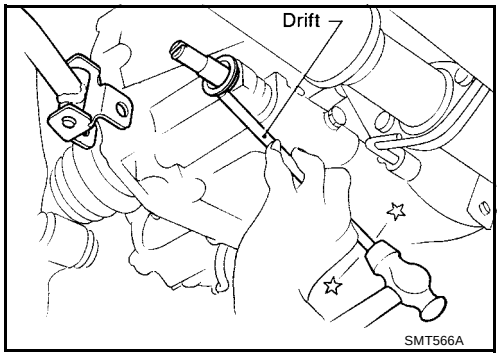
STRIKING ROD OIL SEAL

1. Remove the transaxle control rod from yoke.
2. Remove the retaining pin from the yoke using Tool as shown.

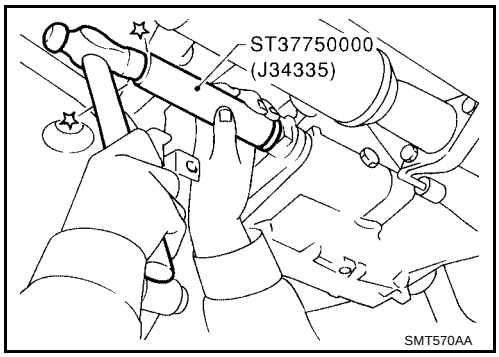
   CAUTION:
   Be careful not to damage the boot.



3. Remove the boot.
4. Remove the striking rod oil seal with a suitable tool (drift).



5. Install the striking rod oil seal using Tool as shown.
   - Apply multi-purpose grease to the seal lip of the oil seal before installing.



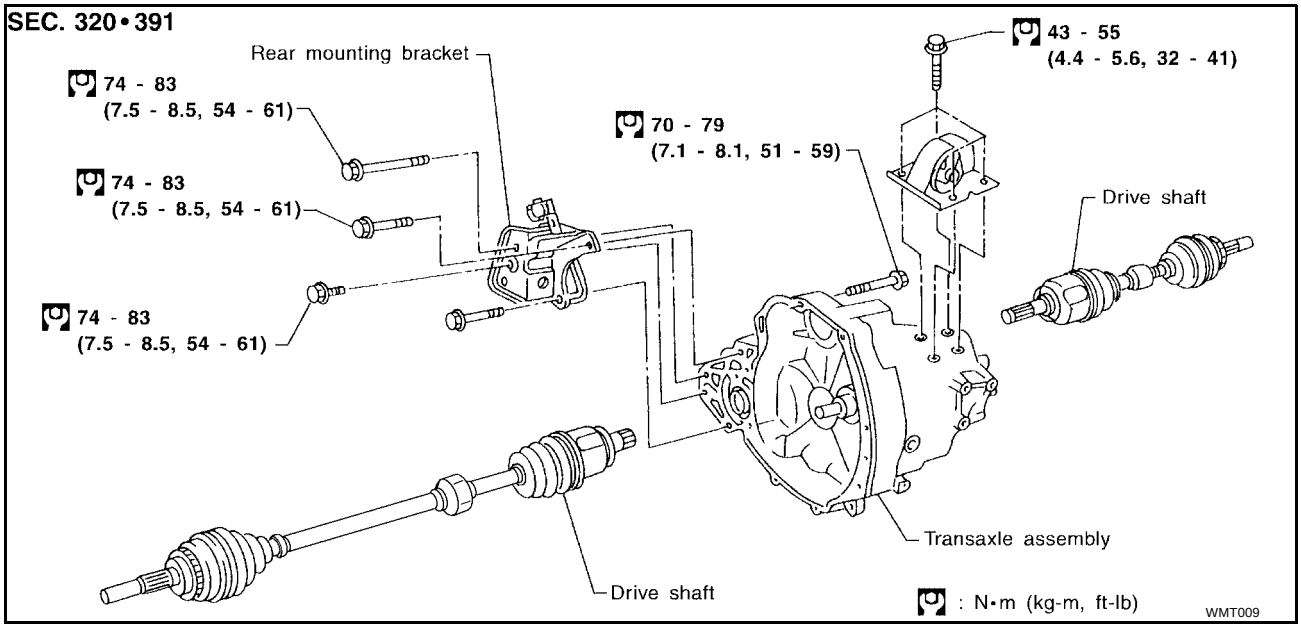
6. Install the boot.
7. Install the yoke and retaining pin.
8. Connect the transaxle control rod to the yoke.

TRANSAXLE ASSEMBLY

PFP:32010

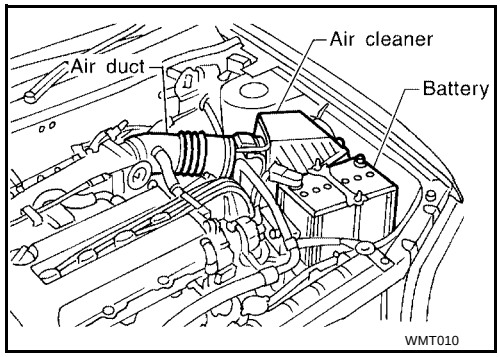
Removal and Installation

ECS005TN

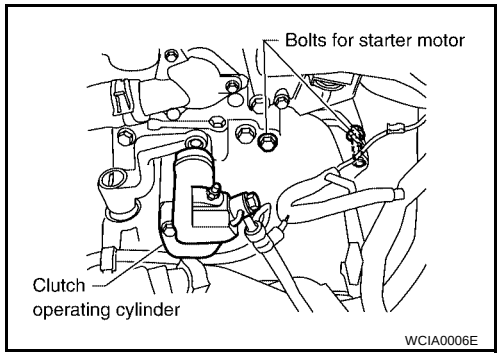


REMOVAL

1. Disconnect the negative battery terminal.
2. Remove the air cleaner and air duct. Refer to EM-15, "Removal and Installation" .

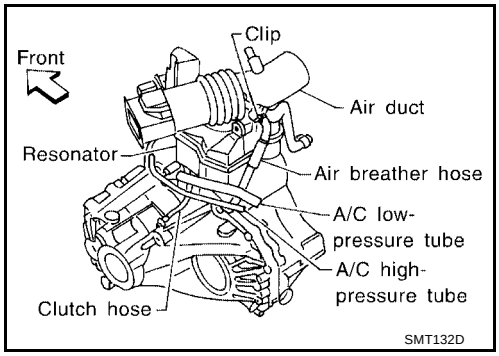


3. Disconnect the clutch operating cylinder from the transaxle and position aside. Refer to CL-11, "Removal" .

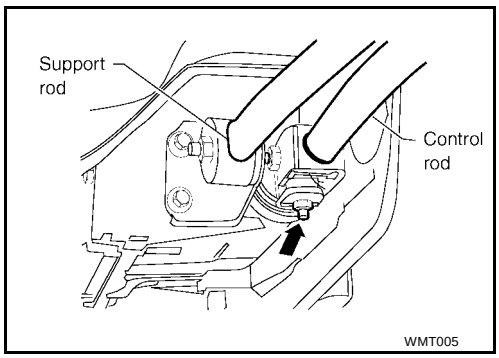


4. Disconnect back-up lamp switch, VSS sensor, PNP switch, and ground harness connectors.
5. Remove the starter motor. Refer to SC-20, "Removal" .

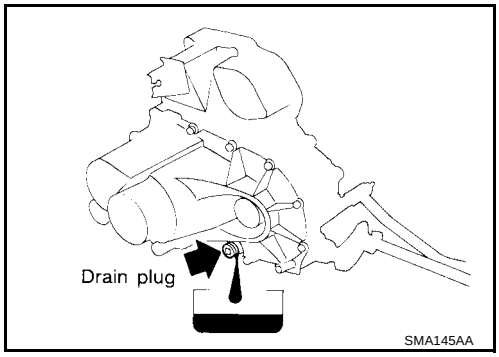
6. Remove the air breather hose.



7. Remove the shift control rod and support rod from transaxle.



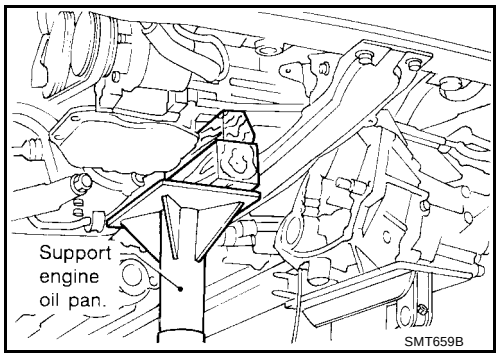
8. Remove the drain plug and drain the gear oil from the transaxle.



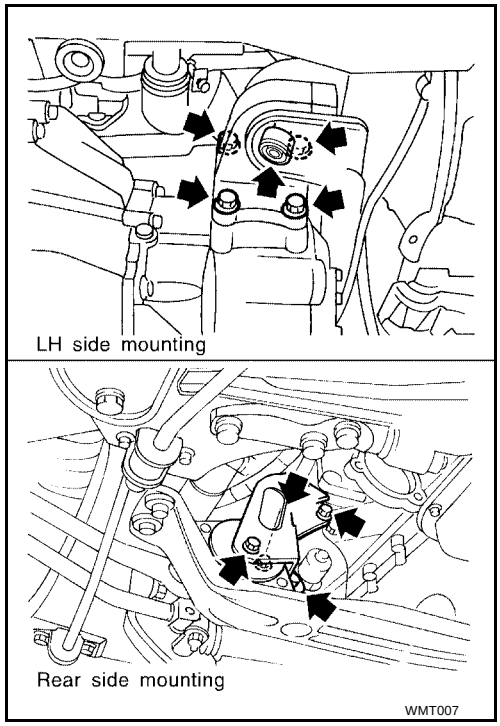
9. Remove the drive shafts from the transaxle. Refer to FAX-14, "Removal" .

10. Support the engine by placing a jack under the oil pan as shown.

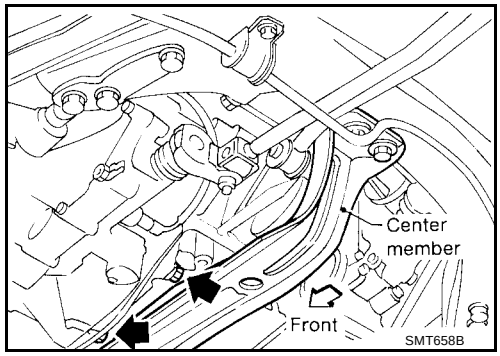
CAUTION:
Do not place the jack under the oil pan drain plug.



11. Remove LH side and rear side mounting bolts.



12. Remove the lower housing bolts.



13. Remove the bolts securing the transaxle to the engine.
14. Lower the transaxle while supporting it with the jack.

INSTALLATION

Installation is in the reverse order of removal.

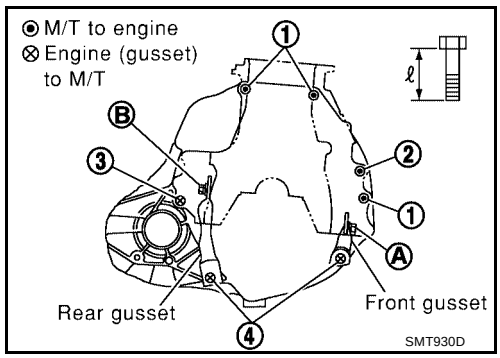
- Tighten the starter motor bolts to specification.

Starter motor bolts : 31 - 42 N·m (3.2 - 4.3 kg-m, 23 - 31 ft-lb)

- Tighten the LH and rear mounts to specification. Refer to MT-15, "Removal and Installation" .
- Tighten the transaxle to engine bolts to specification.

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	" ℓ " mm (in)
1	30 - 40 (3.1 - 4.1, 22 - 30)	70 (2.76)
2	30 - 40 (3.1 - 4.1, 22 - 30)	80 (3.15)
3	30 - 40 (3.1 - 4.1, 22 - 30)	30 (1.18)
4*	16 - 21 (1.6 - 2.1, 12 - 15)	25 (0.98)
Front gusset A to engine	30 - 40 (3.1 - 4.1, 22 - 30)	20 (0.79)
Rear gusset B to engine	16 - 21 (1.6 - 2.1, 12 - 15)	16 (0.63)

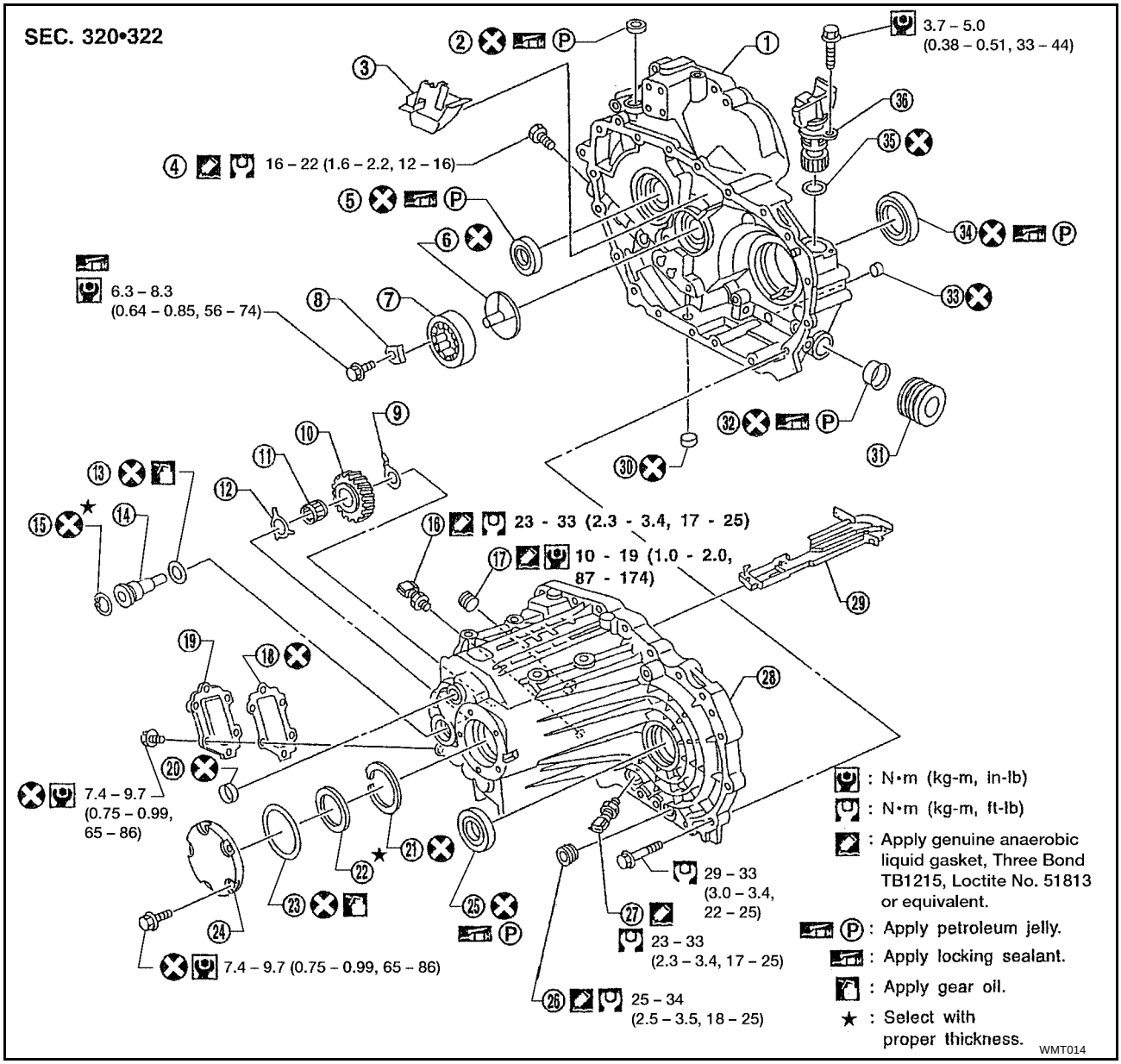
*: With gussets



Component Parts

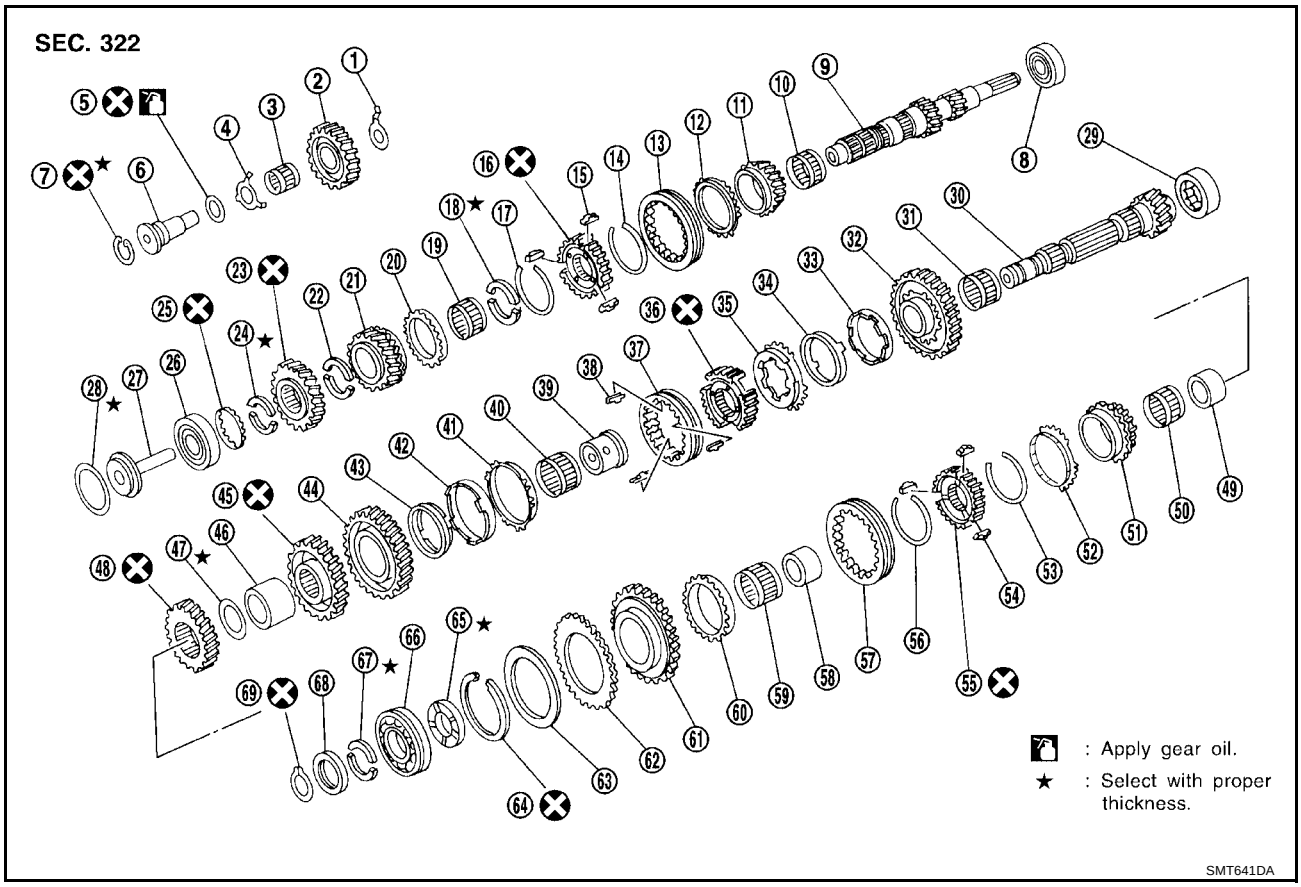
ECS005TO

CASE COMPONENTS



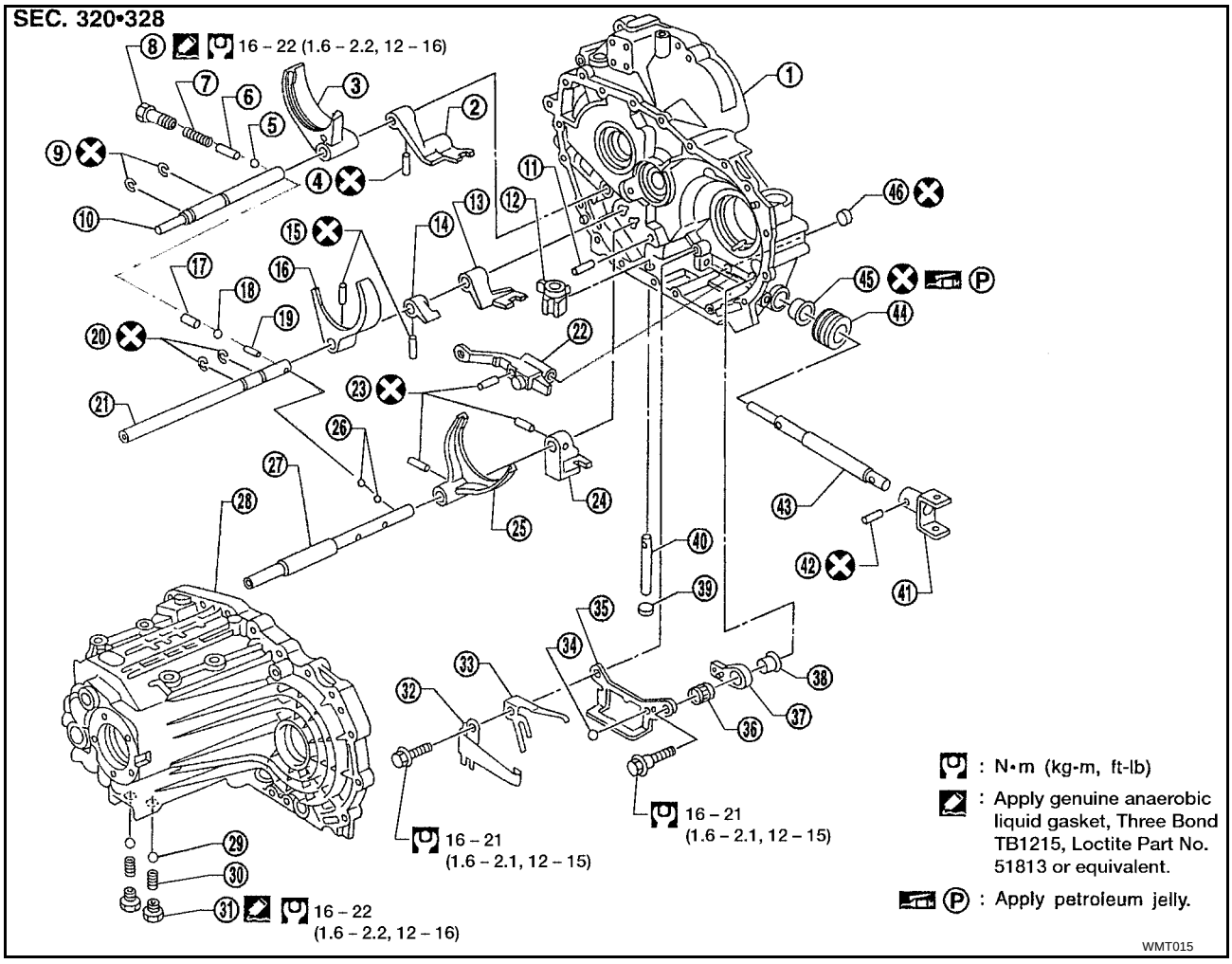
1.	Clutch housing	2.	Dust seal	3.	Oil pocket
4.	Check plug	5.	Input shaft oil seal	6.	Oil channel
7.	Mainshaft front bearing	8.	Bearing retainer	9.	Reverse idler gear front thrust washer
10.	Reverse idler gear	11.	Reverse idler gear bearing	12.	Reverse idler gear rear thrust washer
13.	O-ring	14.	Reverse idler gear shaft	15.	Snap ring
16.	Back-up lamp switch	17.	Filler plug	18.	Side cover gasket
19.	Side cover	20.	Welch plug	21.	Mainshaft bearing snap ring
22.	Mainshaft rear bearing adjusting shim	23.	O-ring	24.	Rear cover
25.	Differential oil seal	26.	Drain plug	27.	PNP switch
28.	Transmission case	29.	Oil gutter	30.	Welch plug
31.	Boot	32.	Striking rod oil seal	33.	Welch plug
34.	Differential oil seal	35.	O-ring	36.	Speedometer pinion

GEAR COMPONENTS



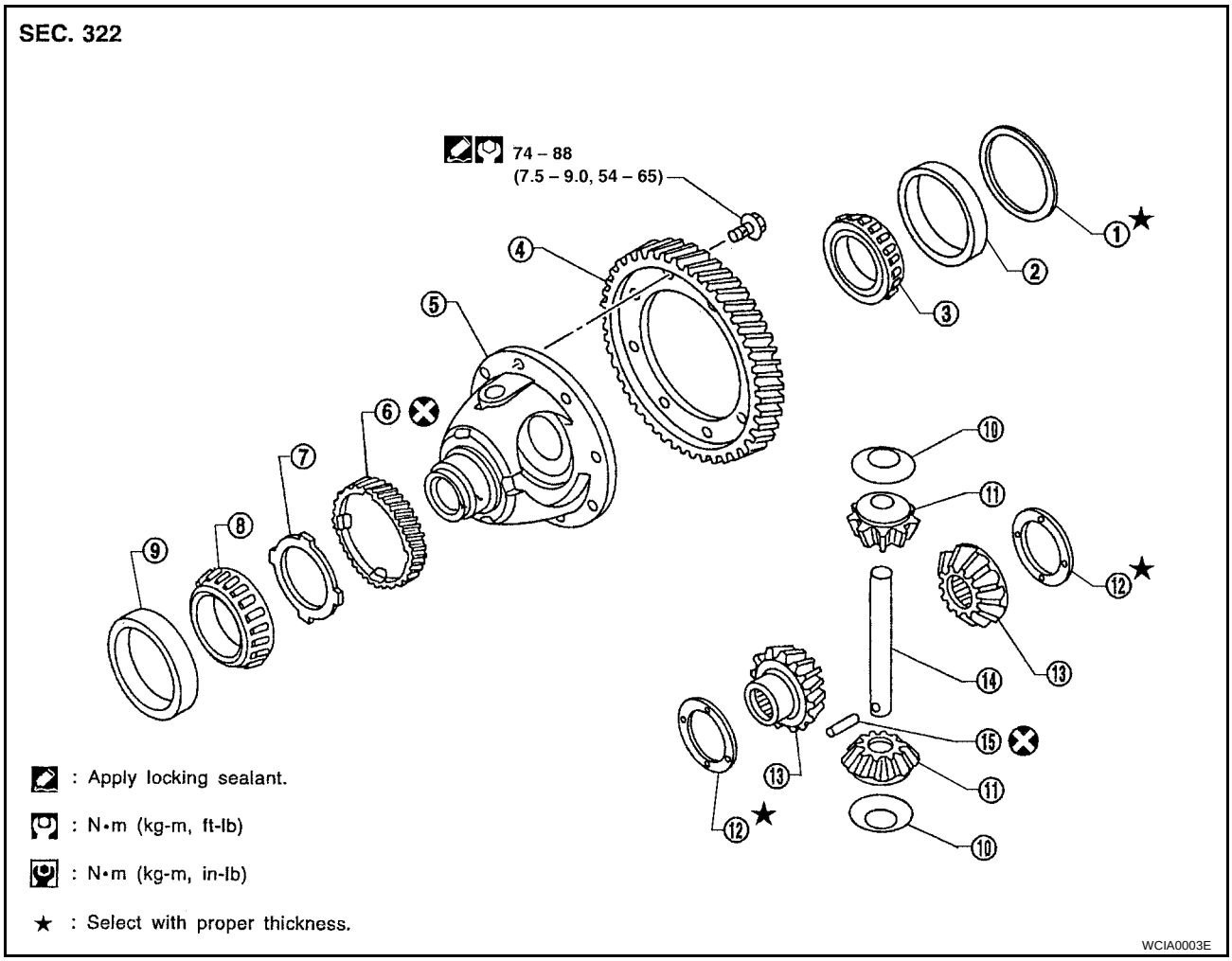
1.	Reverse idler gear front thrust washer	2.	Reverse idler gear	3.	Reverse idler gear bearing
4.	Reverse idler gear rear thrust washer	5.	O-ring	6.	Reverse idler gear shaft
7.	Snap ring	8.	Input shaft front bearing	9.	Input shaft
10.	3rd gear needle bearing	11.	3rd input gear	12.	3rd gear baulk ring
13.	Coupling sleeve	14.	Spread spring	15.	Shifting insert
16.	3rd & 4th synchronizer hub	17.	Spread spring	18.	4th gear C-ring
19.	4th gear needle bearing	20.	4th gear baulk ring	21.	4th input gear
22.	5th gear front C-ring	23.	5th input gear	24.	5th gear rear C-ring
25.	C-ring holder	26.	Input shaft rear bearing	27.	Oil channel
28.	Input shaft rear bearing adjusting shim	29.	Mainshaft front bearing	30.	Mainshaft
31.	1st gear needle bearing	32.	1st main gear	33.	1st inner baulk ring
34.	1st synchronizer cone	35.	1st outer baulk ring	36.	1st & 2nd synchronizer hub
37.	Coupling sleeve	38.	Insert spring	39.	2nd gear bushing
40.	2nd gear needle bearing	41.	2nd gear outer baulk ring	42.	2nd gear synchronizer cone
43.	2nd inner baulk ring	44.	2nd main gear	45.	3rd main gear
46.	Spacer	47.	Mainshaft adjusting shim	48.	4th main gear
49.	5th gear bushing	50.	5th gear needle bearing	51.	5th main gear
52.	5th gear baulk ring	53.	Spread spring	54.	Shifting insert
55.	5th & reverse synchronizer hub	56.	Spread spring	57.	Coupling sleeve
58.	Reverse gear bushing	59.	Reverse gear needle bearing	60.	Reverse gear baulk ring
61.	Reverse main gear	62.	Sub-gear	63.	Sub-gear washer
64.	Snap ring	65.	Mainshaft thrust washer	66.	Mainshaft rear bearing
67.	Mainshaft C-ring	68.	C-ring holder	69.	Snap ring

SHIFT CONTROL COMPONENTS



1. Clutch housing
2. 3rd & 4th bracket
3. 3rd & 4th shift fork
4. Retaining pin
5. Check ball
6. Check pin
7. Check spring
8. Check plug
9. Stopper ring
10. 3rd & 4th fork rod
11. Selector shaft pin
12. Selector
13. 5th & reverse bracket
14. Reverse switch bracket
15. Retaining pin
16. 5th & reverse shift fork
17. Interlock plunger
18. Check ball
19. Interlock pin
20. Stopper ring
21. 5th & reverse fork rod
22. Striking lever
23. Retaining pin
24. 1st & 2nd bracket
25. 1st & 2nd shift fork
26. Check ball
27. 1st & 2nd fork rod
28. Transaxle case
29. Check ball
30. Check spring
31. Check plug
32. Select check leaf spring
33. Return spring
34. Steel ball
35. Reverse gate
36. Return bearing
37. Selector arm
38. Bushing
39. Welch plug
40. Selector shaft
41. Striking yoke
42. Retaining pin
43. Striking rod
44. Dust boot
45. Striking rod oil seal
46. Welch plug

FINAL DRIVE COMPONENTS



1. Differential side bearing adjusting shim
2. Differential side bearing outer race
3. Differential side bearing
4. Final gear
5. Differential case
6. Speedometer drive gear
7. Speedometer stopper
8. Differential side bearing
9. Differential side bearing outer race
10. Pinion mate thrust washer
11. Pinion mate gear
12. Side gear thrust washer
13. Side gear
14. Pinion mate shaft
15. Lock pin

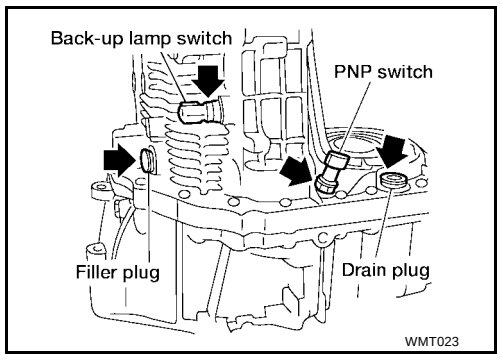
Disassembly and Assembly

ECS005TP

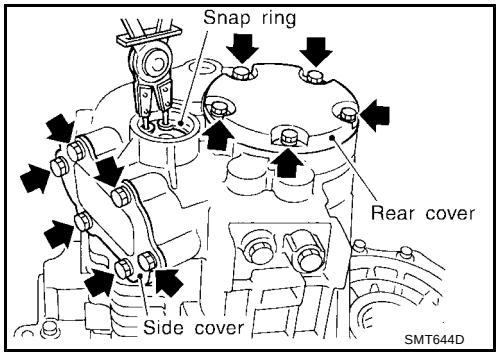
DISASSEMBLY

Transaxle Case

1. Remove the back-up lamp switch, PNP switch, drain plug, and filler plug from the transaxle case.

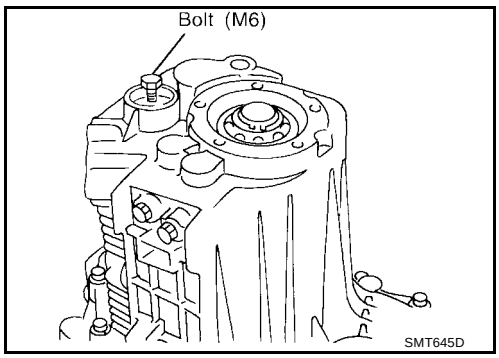


2. Remove snap ring from reverse idler shaft as shown.
3. Remove side cover and rear cover from case.

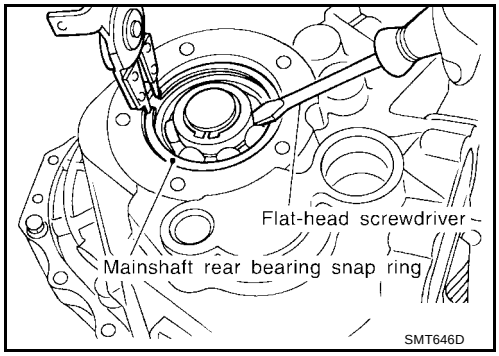


4. Remove O-ring and mainshaft bearing adjusting shim.
5. Remove reverse idler gear shaft.

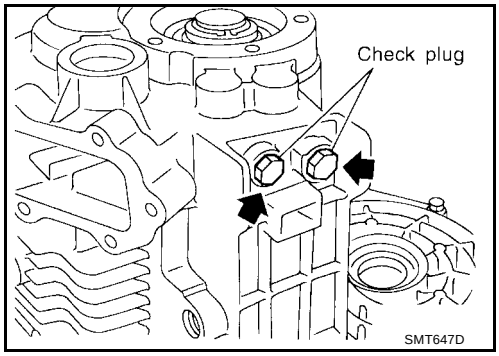
a. Attach bolt (M6) to thread of reverse idler gear shaft end as shown.
b. Pull out the attached bolt (M6), and remove reverse idler gear shaft from case.



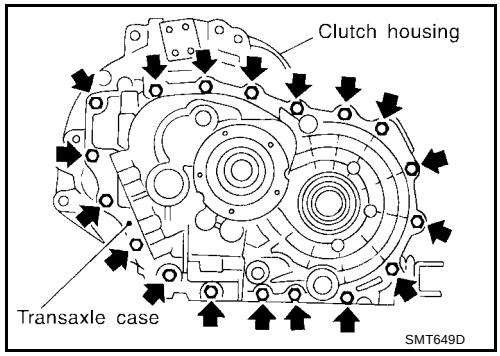
6. Remove reverse idler gear, thrust washer (front and rear), and bearing from case.
7. Remove mainshaft rear bearing snap ring from case.



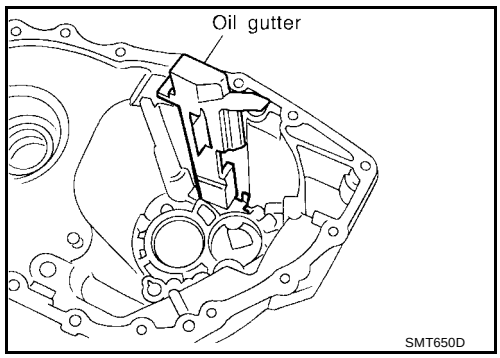
8. Remove check plugs, springs, and check balls from case.



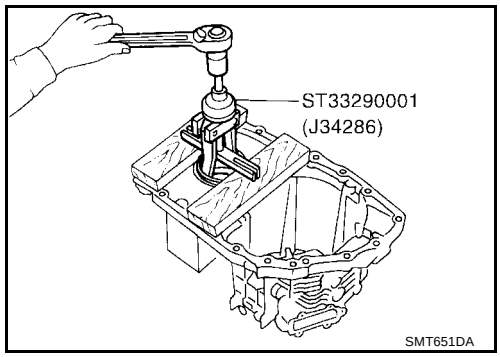
9. Remove transaxle case mounting bolts.



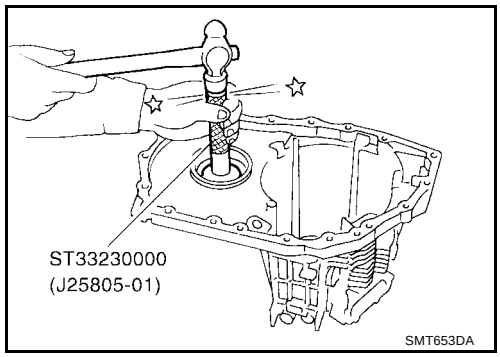
10. Remove input shaft rear bearing adjusting shim from transaxle case.
11. Remove oil gutter from transaxle case.



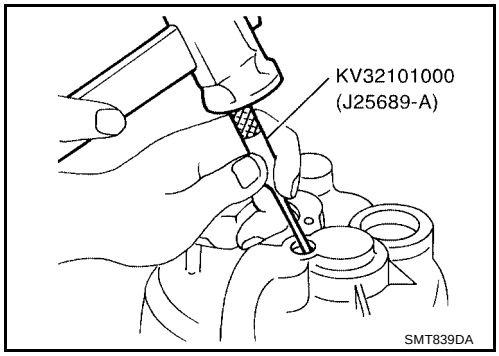
12. Remove differential side bearing outer race and adjusting shim from transaxle case using Tool.



13. Remove differential oil seal from transaxle case using Tool.

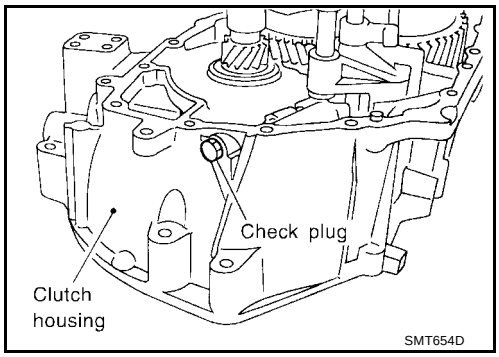


14. Remove welch plugs from transaxle case using Tool.

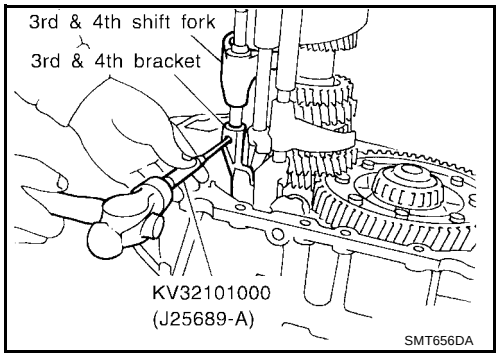


Clutch Housing

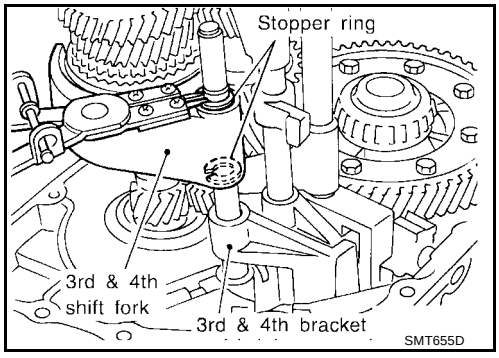
1. Remove transaxle case from the clutch housing.
2. Remove check plugs, check springs, check pins, and check balls from the clutch housing.



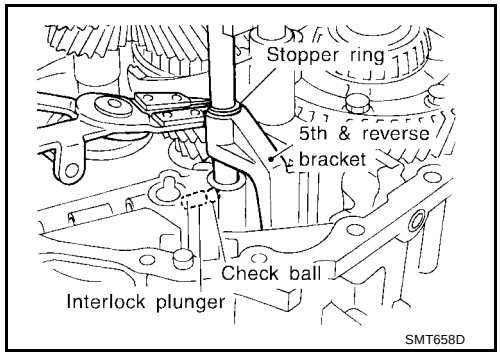
3. Remove 3rd & 4th bracket retaining pin using Tool.



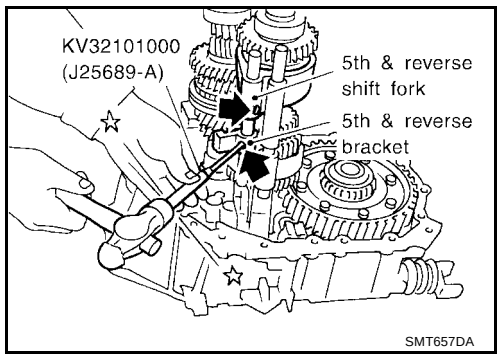
4. Remove 3rd & 4th shift fork stopper ring.
5. Remove 3rd & 4th fork rod.
6. Remove 3rd & 4th shift fork and bracket.



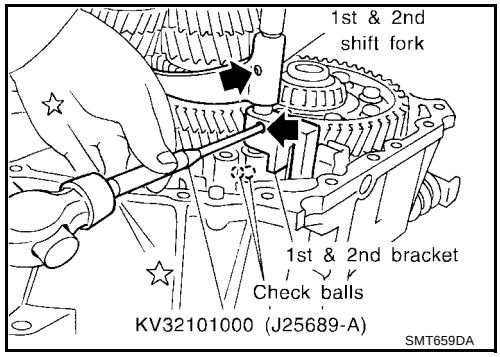
7. Remove interlock plunger and check ball.
8. Remove 5th & reverse bracket stopper ring.



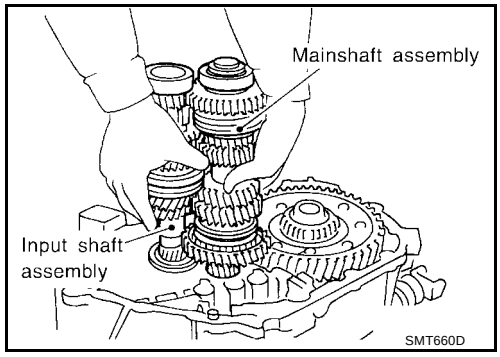
9. Remove retaining pins from 5th & reverse shift fork and 5th & reverse bracket using Tool.
10. Remove 5th & reverse fork rod.
11. Remove interlock pin from 5th & reverse fork rod using Tool.
12. Remove reverse switch bracket and 5th & reverse bracket.



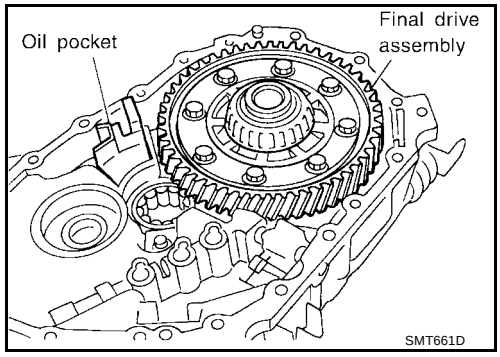
13. Remove check ball from housing.
14. Remove retaining pin for 1st & 2nd shift fork and 1st & 2nd bracket using Tool.
15. Remove 1st & 2nd fork rod.
16. Remove 5th & reverse and 1st & 2nd shift forks, and 1st & 2nd bracket.



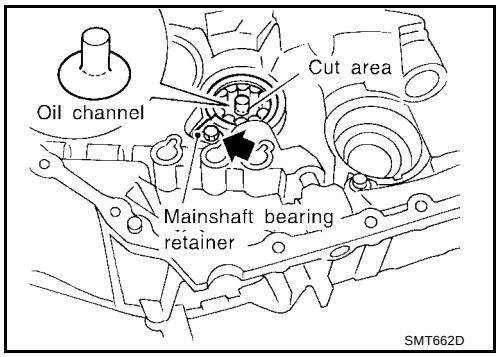
17. Remove both input shaft and mainshaft assemblies from housing.



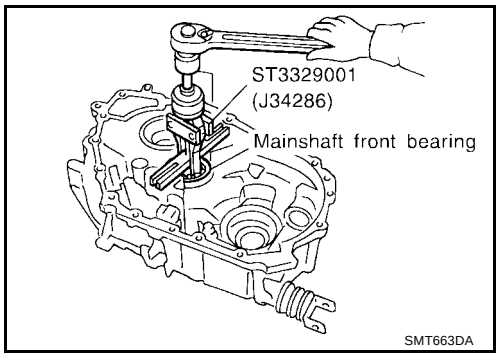
18. Remove final drive assembly from housing.
19. Remove oil pocket from housing.



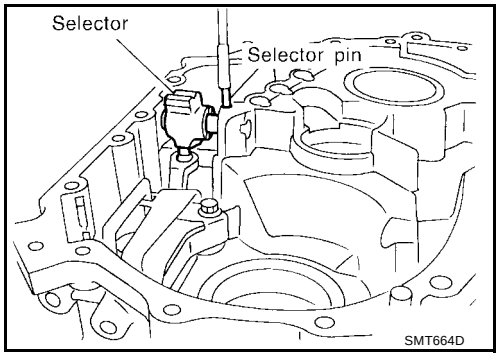
20. Remove mainshaft bearing retainer from housing.
21. Cut off oil channel using a cutter as shown.



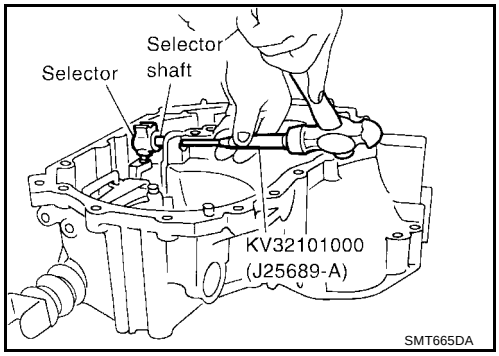
22. Remove mainshaft front bearing from housing using Tool.



23. Using a magnet or other suitable tool, remove selector pin from selector shaft.

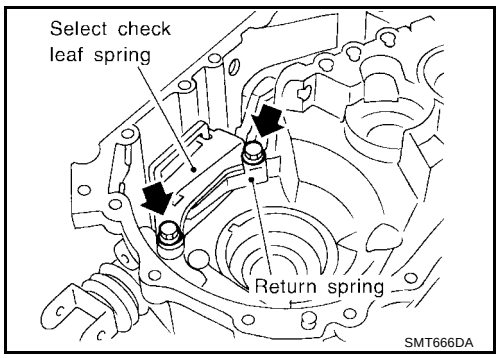


24. Remove selector shaft and plug, then remove selector using Tool.

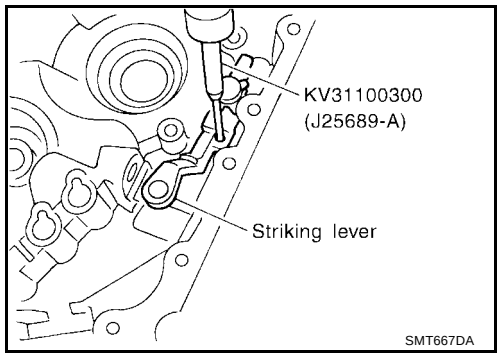


25. Remove reamer bolts, then remove select check leaf spring, return spring, steel ball, reverse gate, selector arm, bearing, and bushing.

CAUTION:
Be careful not to lose the steel ball.

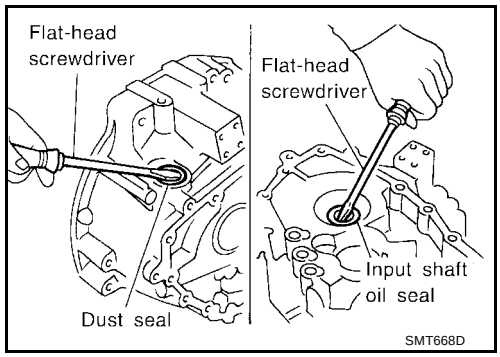


26. Remove retaining pin and plug from striking lever using Tool.
27. Remove striking rod, then striking lever from housing.

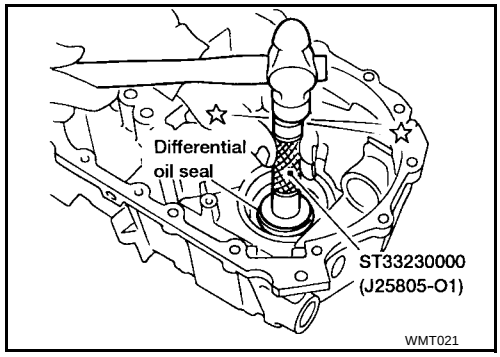


28. Using a flat-head screwdriver or other suitable tool, remove dust seal, input shaft oil seal, and striking rod oil seal from housing.

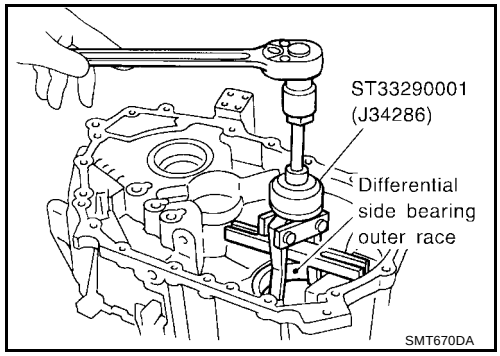
CAUTION:
When removing dust and oil seals, be careful not to damage mounting surfaces of dust seal and oil seal.



29. Remove differential oil seal from housing using Tool.



30. Remove differential side outer race from housing using Tool.

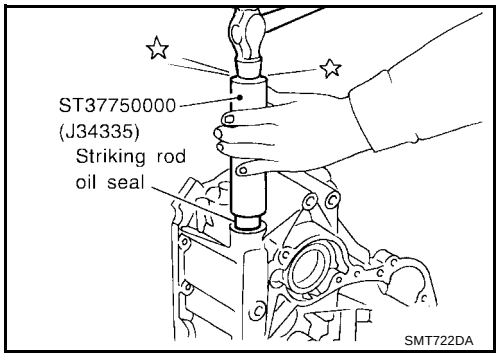


ASSEMBLY

Clutch Housing

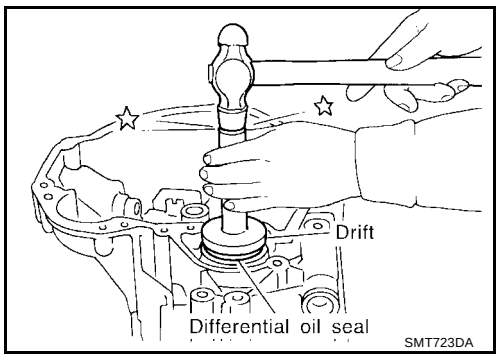
1. Hammer the new striking rod oil seal into clutch housing as far as it will go using Tool.

   CAUTION:
   Do not reuse striking rod oil seal.



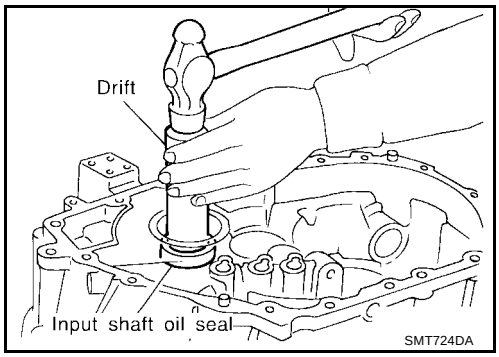
2. Hammer the differential oil seal into clutch housing with a suitable tool until it becomes flush with clutch housing end face.

   CAUTION:
   Do not reuse differential oil seal.



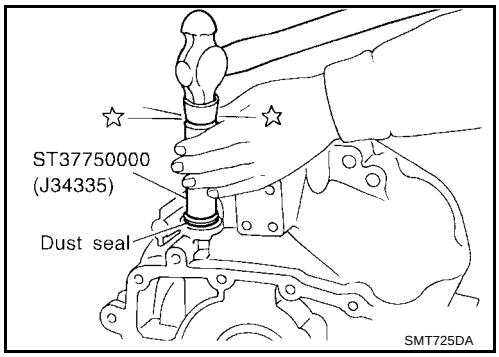
3. Hammer input shaft oil seal into clutch housing as far as it will go with a suitable tool.

   CAUTION:
   Do not reuse input shaft oil seal.

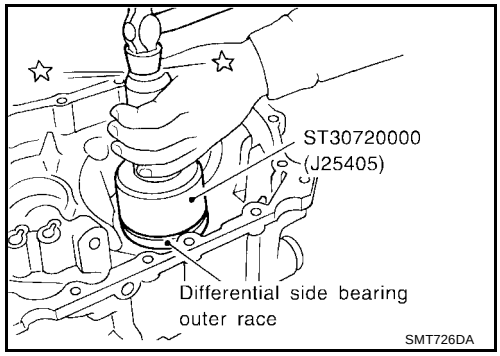


4. Hammer the dust seal into clutch housing as far as it will go using Tool.

   CAUTION:
   Do not reuse dust seal.

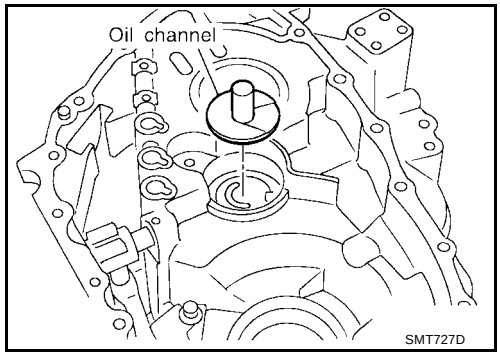


5. Install outer race of differential side bearing using Tool.

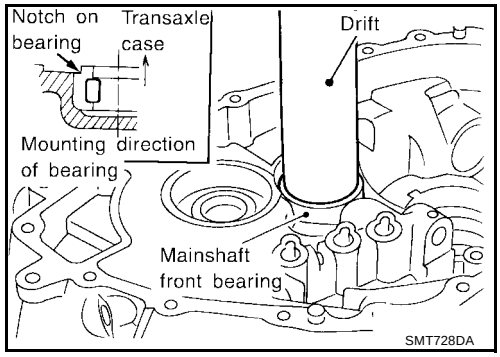


6. Install new oil channel (mainshaft).

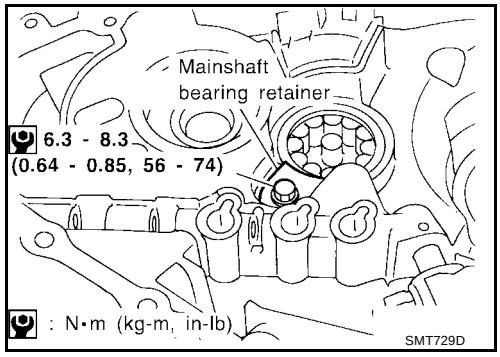
CAUTION:
Pay attention to installation direction of oil channel.



7. Align the notches on mainshaft front bearing and transaxle case. Then, install mainshaft front bearing with a suitable tool.

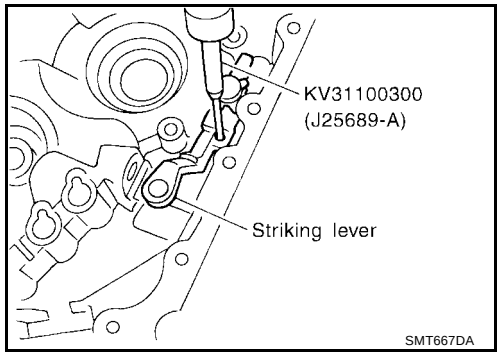


8. Install mainshaft bearing retainer, tighten bolt to specification.



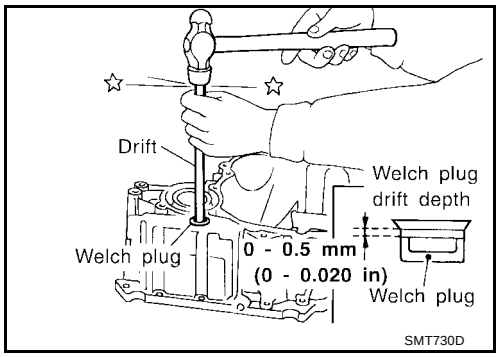
9. Attach boot, striking rod, and striking lever to clutch housing. Install new retaining pin for striking lever using Tool.

CAUTION:
- **Before installing striking rod, wrap the end with a vinyl tape or similar product to prevent oil seal from being damaged.**
- **Do not reuse retaining pin.**

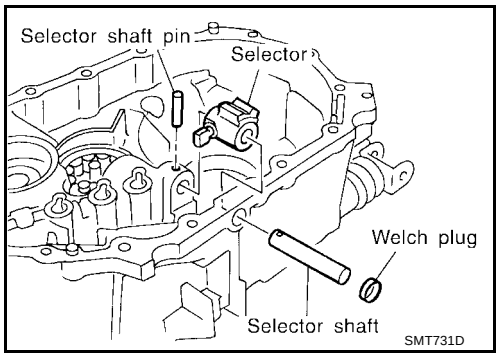


10. Hammer the new welch plug (striking lever side) with a general-purpose drift [OD: 12 mm (0.47 in)].

CAUTION:
Do not reuse welch plug.

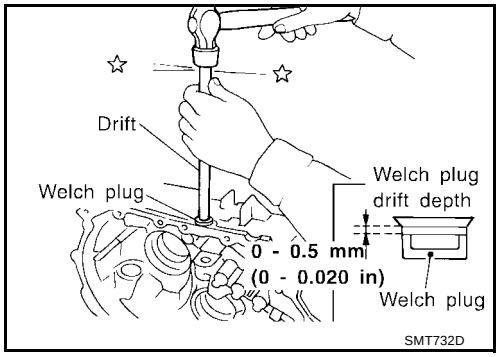


11. Install selector, selector shaft, and selector shaft pin into clutch housing.

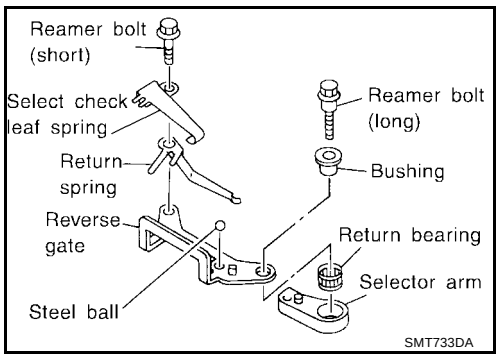


12. Hammer the new welch plug (selector shaft side) with a general-purpose drift [OD: 12 mm (0.47 in)].

CAUTION:
Do not reuse welch plug.

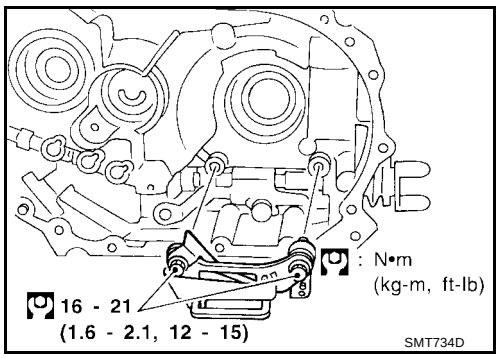


13. Install select check leaf spring, return spring, steel ball, reverse gate, selector arm, bushing, and return bearing.

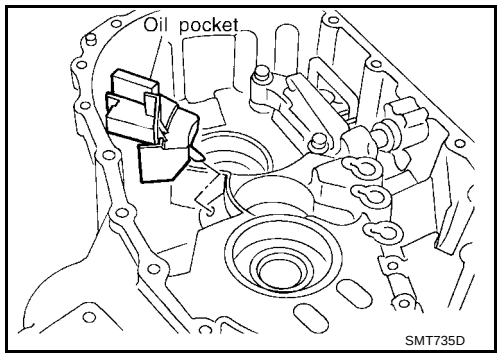


14. Tighten the two reamer bolts to specification.

CAUTION:
Use correct reamer bolts for each installation point, because each bolt has a different length.

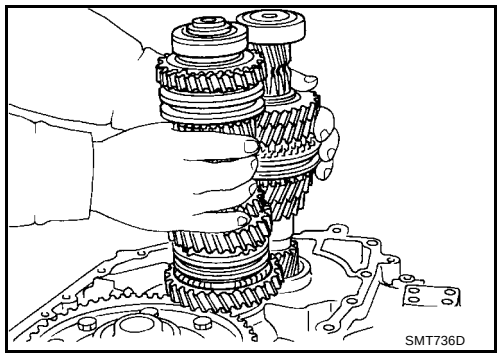


15. Install oil pocket.



16. Install differential assembly, input shaft assembly, and mainshaft assembly into clutch housing.

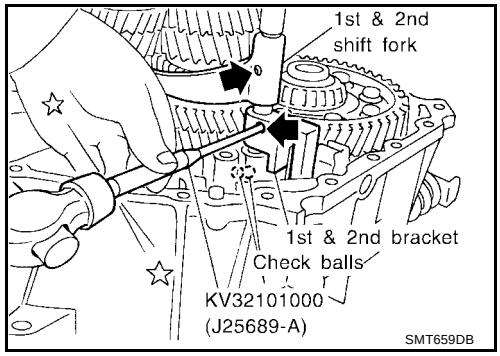
CAUTION:
Be careful not to damage input shaft oil seal during installation of input shaft assembly.



17. Install 5th & reverse shift fork.
18. Install 1st & 2nd shift fork, bracket, and fork rod.
19. Install retaining pin for 1st & 2nd bracket using Tool.

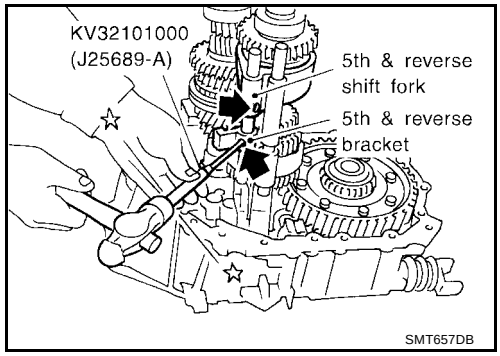
CAUTION:
Do not reuse retaining pin.

20. Install two check balls.



21. Install interlock pin into 5th & reverse fork rod using Tool.
22. Install reverse switch bracket, 5th & reverse bracket, and fork rod.
23. Install new retaining pin for 5th & reverse shift fork and reverse switch bracket using Tool.

CAUTION:
Do not reuse retaining pin.



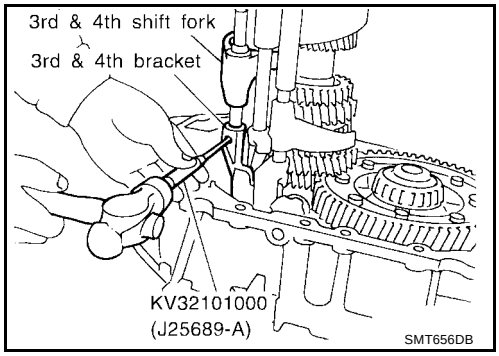
24. Install 5th & reverse bracket stopper ring.

CAUTION:
Do not reuse stopper pin.

25. Install check ball and interlock plunger.

26. Install 3rd & 4th shift fork, bracket, and fork rod.
27. Install 3rd & 4th bracket retaining pin using Tool.

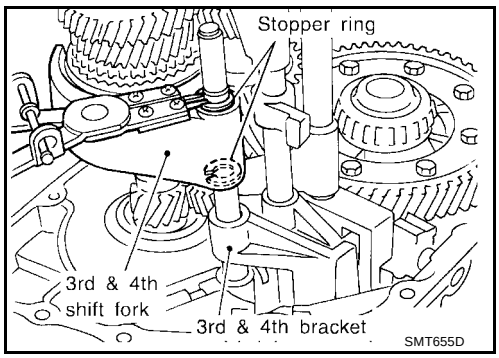
CAUTION:
Do not reuse retaining pin.



28. Install 3rd & 4th shift fork stopper ring.

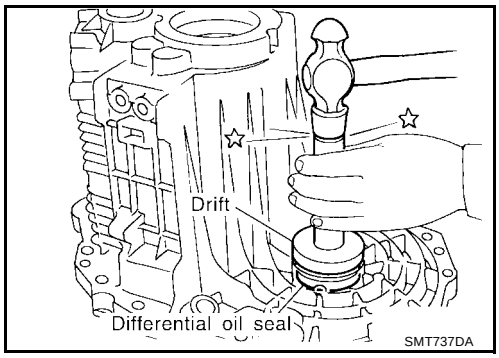
CAUTION:
Do not reuse stopper ring.

29. Install check ball, check pin, and check spring, and apply Anaerobic Liquid Gasket or equivalent onto the check plug. Then, tighten the check plug to specification.
Refer to MT-20, "SHIFT CONTROL COMPONENTS" .

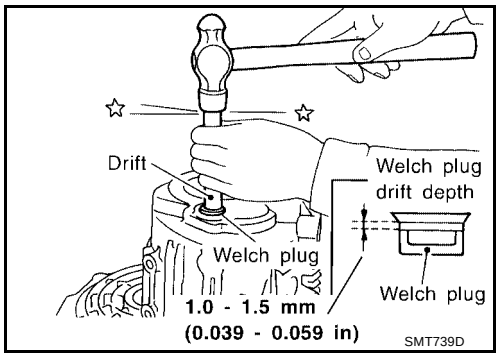


Transaxle Case

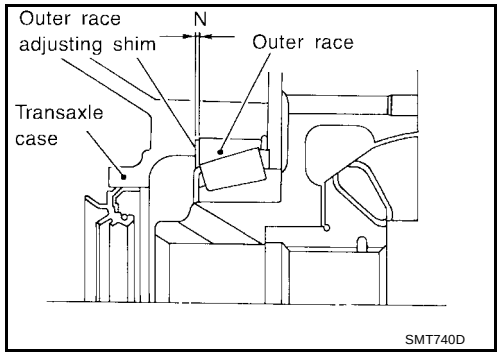
1. Insert differential oil seal into differential case with a suitable tool until it becomes flush with case end face.



2. Install welch plug into transaxle case with a suitable tool.



3. Calculate dimension “N” (thickness of adjusting shim) using the following procedure to satisfy specification of end play for differential side bearing.



End play : 0.15 - 0.21 mm (0.0059 - 0.0083 in)

Dimension “N” = (“N_1 ” – “N_2 ”) + End play

“N” : Thickness of adjusting shim

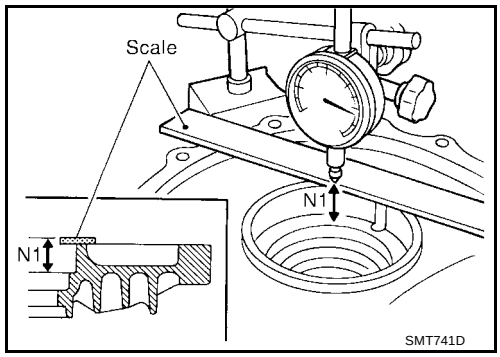
“N_1 ” : Distance between clutch housing case end face and mounting face of adjusting shim

“N_2 ” : Distance between differential side bearing and transaxle case

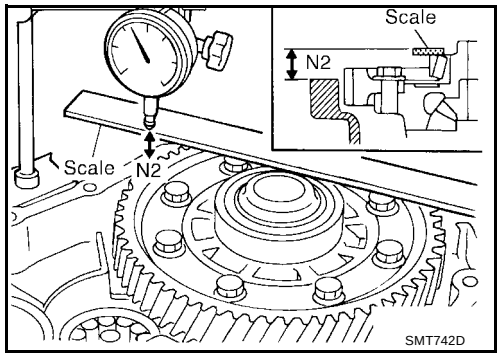
Use the “Available Shims” table for the available shim sizes. Refer to MT-65, "Available Shims — Differential Side Bearing Preload and Adjusting Shim" .

a. Using dial gauge and scale, measure dimension “N_1 ” between clutch housing case end face and mounting face of adjusting shim.

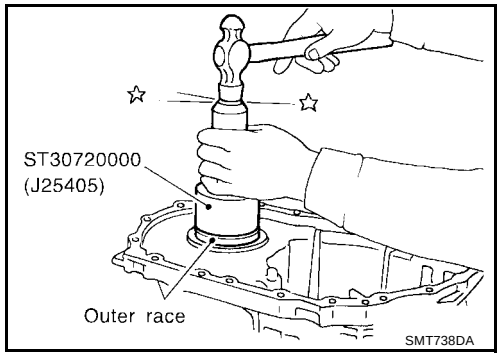
b. Install outer race onto differential side bearing on final gear side. Holding the outer race horizontally by hand, rotate the final gear five times or more (for smooth movement of bearing roller).



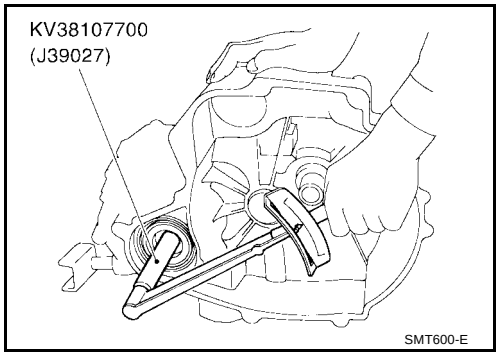
c. Using dial gauge and scale as shown, measure dimension “N_2 ” between differential side bearing outer race and transaxle case end face.



4. Install the selected shim and bearing outer race using Tool.



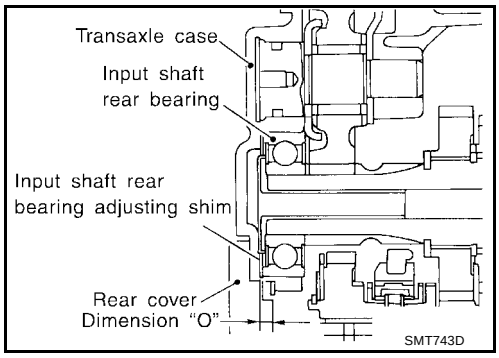
5. Measure the turning torque of the final drive assembly using Tool.



Turning torque of final drive assembly (New bearing) : **2.9 - 6.9 N-m (30 - 70 kg-cm, 26 - 61 in-lb)**

- When the old bearing is used again, turning torque will be slightly less than the above.
- Make sure turning torque is close to the specified range.
- Changes in turning torque of final drive assembly per revolution should be within 1.0 N-m (10 kg-cm, 8.7 in-lb) without binding.

6. Calculate dimension “O” (thickness of adjusting shim) using the following procedure to satisfy specification of end play for input shaft rear bearing.



End play : **0 - 0.06 mm (0 - 0.0024 in)**

Dimension “O” = (“O_1 ” – “O_2 ”) + End play

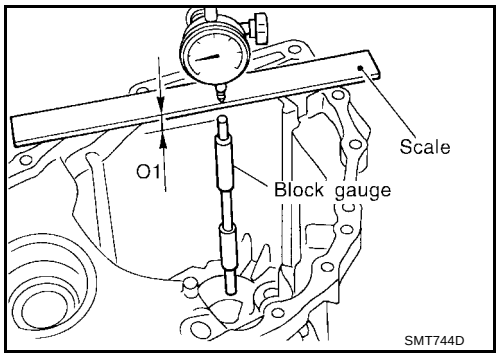
“O” : **Thickness of adjusting shim**

“O_1 ” : **Distance between transaxle case end face and mounting face of adjusting shim**

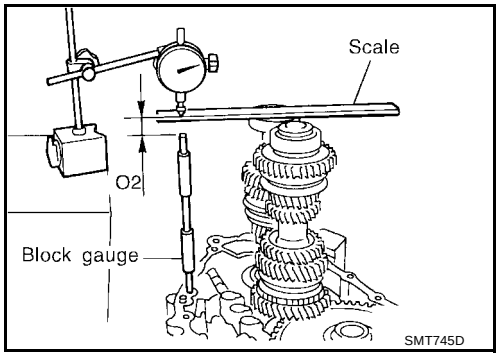
“O_2 ” : **Distance between clutch housing case end face and end face of input shaft rear bearing**

Use the “Available Shims” table for the available shim sizes. Refer to MT-62, "Available Adjusting Shims" .

a. Using block gauge, scale, and dial gauge, measure dimension “O_1 ” between transaxle case end face and mounting face of adjusting shim.

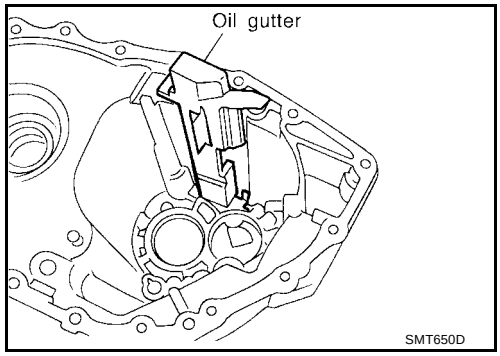


b. Using block gauge, scale, and dial gauge as shown in the figure, measure dimension “O_2 ” between clutch housing case end face and end face of input shaft rear bearing.

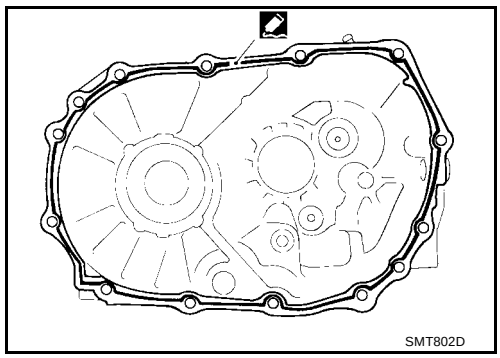


7. Install selected input shaft rear bearing adjusting shim onto input shaft.

8. Install oil gutter into transaxle case.

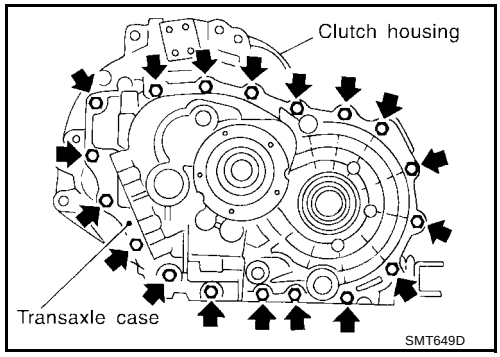


9. Clean mating surfaces of clutch housing and transaxle case. Check for cracks and damage, then apply sealant. Use Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI-45, "Recommended Chemical Products and Sealants" .



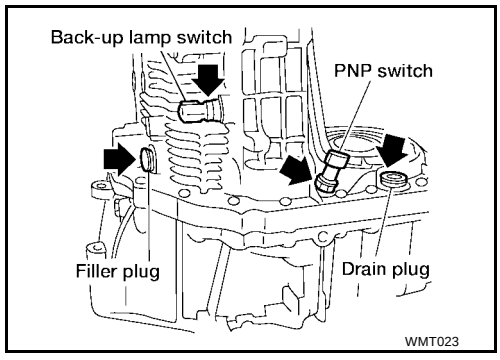
10. Install transaxle case onto clutch housing, and tighten mounting bolts with specified torque.

Transaxle case mounting bolts	**: Refer to MT-18, "CASE COMPONENTS" .**



11. Apply sealant to threads of back-up lamp switch, PNP switch, and drain plug, then install them. Use Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI-45, "Recommended Chemical Products and Sealants" .

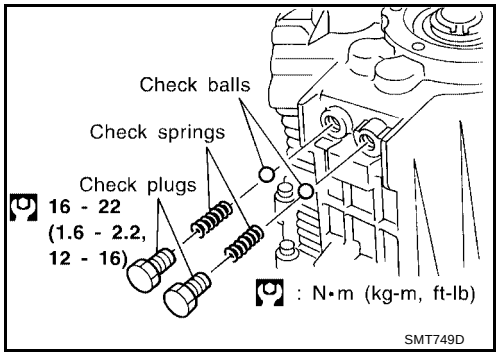
NOTE:
Fill the case with oil before installation of the filler plug.



12. Install speedometer pinion assembly.

CAUTION:
Do not reuse O-ring.

13. Install check springs and check balls. Apply sealant to the thread on the check plug, and install it.



14. Calculate thickness “P” of the adjusting shim using the following procedure to satisfy the specification of the end play for the mainshaft rear bearing.

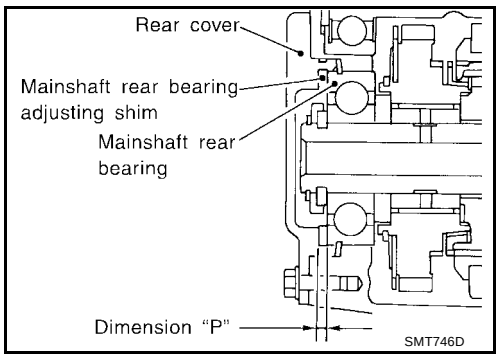
End play : 0 - 0.06 mm (0 - 0.0024 in)

Dimension “P” = (“P_1 ” – “P_2 ”) + End play

“P” : Thickness of adjusting shim

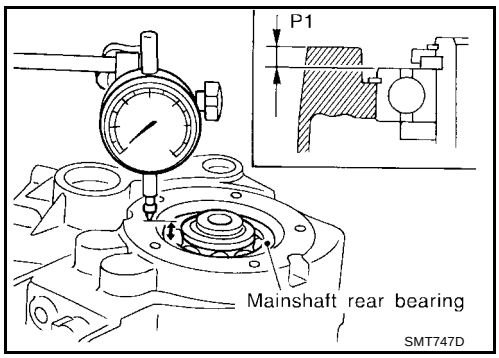
“P_1 ” : Distance between transaxle case end face and mainshaft rear bearing

“P_2 ” : Distance between adjusting shim end face of rear cover and transaxle mounting face

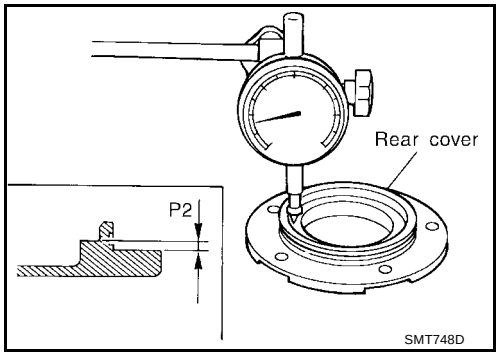


Use the "Available Shims" table for the available shim sizes. Refer to MT-62, "Available Adjusting Shims" .

a. Using a dial gauge as shown, measure dimension “P_1 ” between the transaxle case end face and the mainshaft rear bearing.

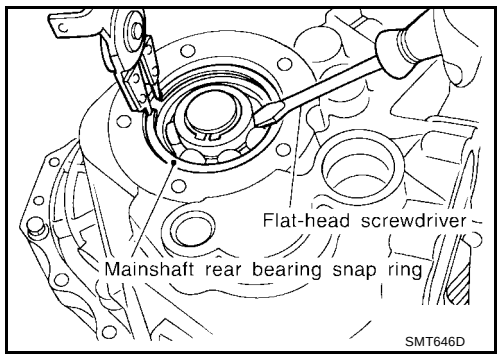


b. Using a dial gauge as shown, measure dimension “P_2 ” between the adjusting shim mounting face of rear cover and the transaxle mounting face.

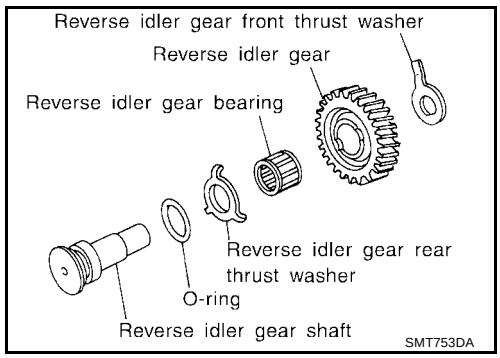


15. Using snap ring pliers and flat-head screwdriver as shown, install snap ring.

CAUTION:
Do not reuse snap ring.



16. Install selected mainshaft adjusting shim.
17. Install reverse idler gear, O-ring, thrust washers (front and rear), and bearing onto reverse idler shaft.



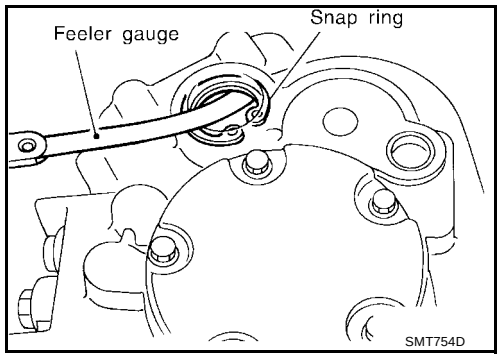
18. Install snap ring into transaxle case using snap ring pliers.

CAUTION:
- **Do not reuse snap ring.**
- **Do not reuse O-ring.**
- **Before installation, apply gear oil to O-ring.**

19. Using feeler gauge, measure the end play of snap ring, and select a snap ring suitable to meet the specified end play.

End play : 0.05 - 0.25 mm (0.0020 - 0.0098 in)

Use the "Available Shims" table for the available shim sizes. Refer to MT-61, "Available Snap Rings" .

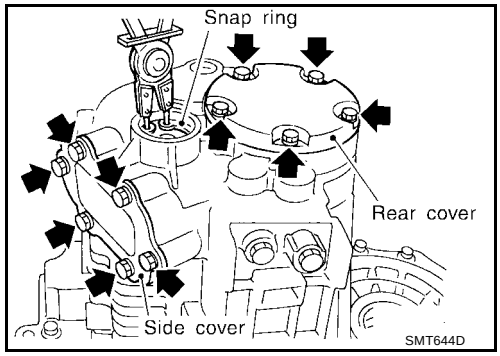


20. Install selected snap ring with a suitable tool.

CAUTION:
Do not reuse snap ring.

21. Apply gear oil to rear cover O-ring, and install rear cover, side cover gasket, and side cover. Then tighten mounting bolts with specified torque.
Use the "Available Shims" table for the available shim sizes. Refer to MT-18, "CASE COMPONENTS" .

CAUTION:
Do not reuse mounting bolts for rear cover and side cover.



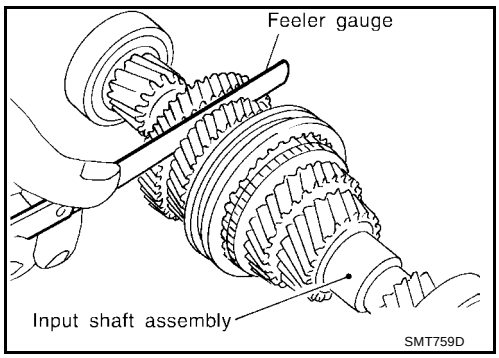
INPUT SHAFT AND GEARS

PFP:32200

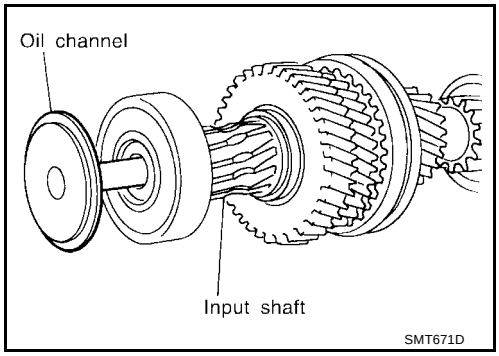
Disassembly

ECS005TQ

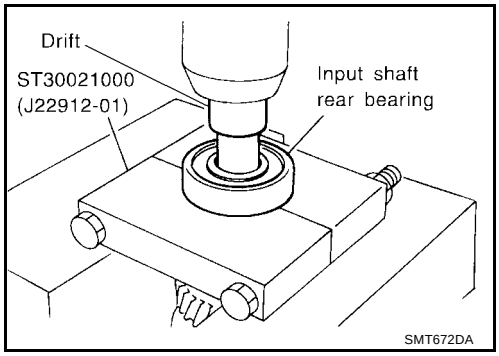
1. Before disassembly, measure the end plays of 3rd and 4th input gears with a suitable tool. Refer to MT-61, "Gear End Play" .
   - If end play is not within specification, disassemble and check the parts.



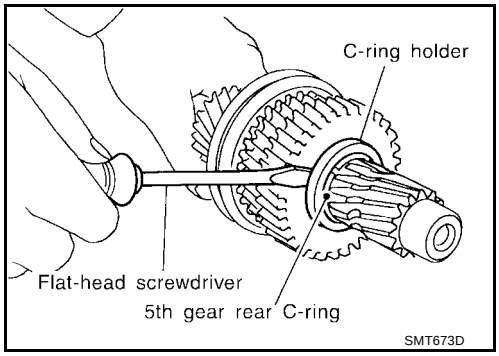
2. Remove oil channel from input shaft rear bearing.



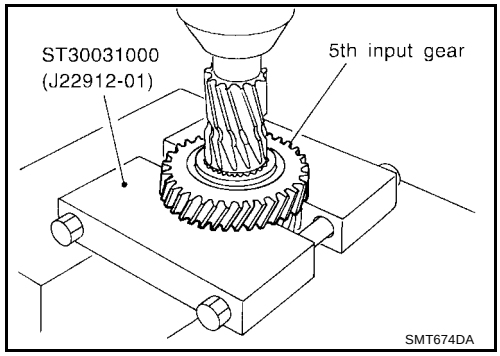
3. Press out input shaft rear bearing using Tool.



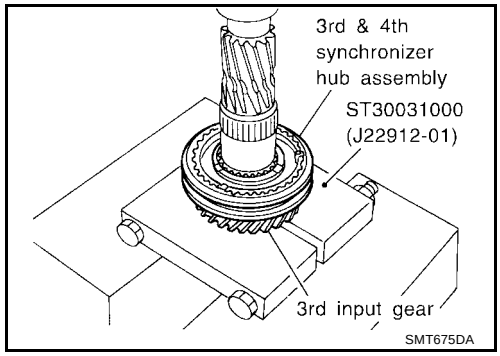
4. Remove C-ring holder.
5. Remove 5th gear rear C-ring.



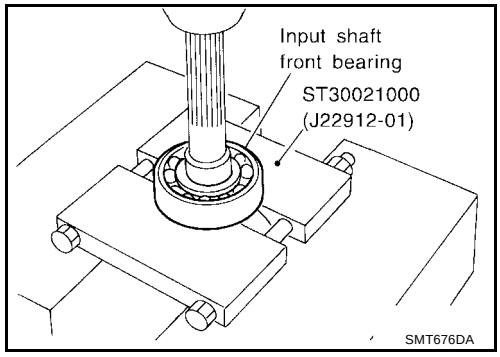
6. Remove 5th input gear from input shaft using Tool.
7. Remove 5th gear front C-ring.



8. Remove 4th input gear, baulk ring, 4th gear needle bearing, and 4th gear C-ring from input shaft.
9. Press out both 3rd & 4th synchronizer hub assembly and 3rd input gear from input shaft using Tool.
10. Remove 3rd gear needle bearing.



11. Press out input shaft front bearing from input shaft using Tool.

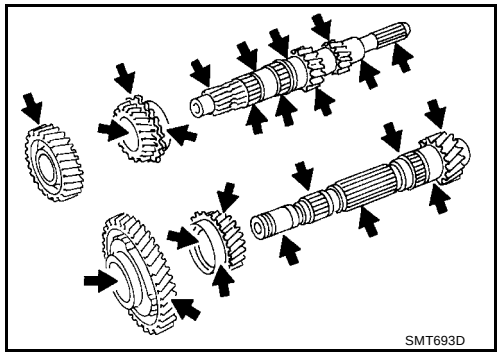


Inspection

GEAR AND SHAFT

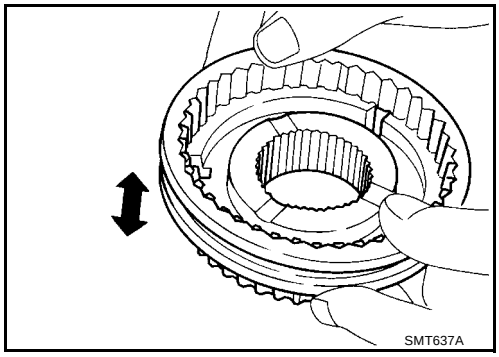
ECS005TR

- Check shaft for cracks, wear or bending.
- Check gears for excessive wear, chips or cracks.

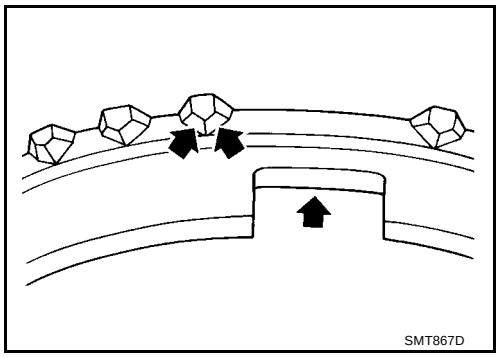


SYNCHRONIZERS

- Check spline area of coupling sleeves, hubs and gears for wear or cracks.
- Check baulk rings for cracks or deformation.
- Check insert springs for wear or deformation.

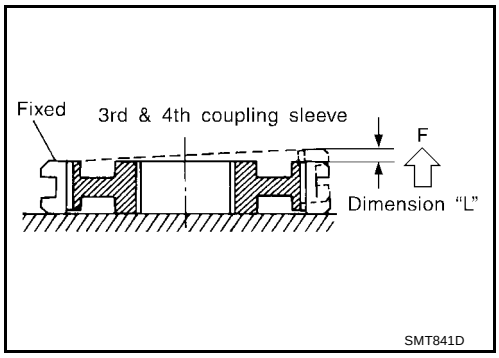

SMT637A

- If any crack, damage, or excessive wear is found on cam face of baulk ring or working face of insert, replace it.


SMT867D

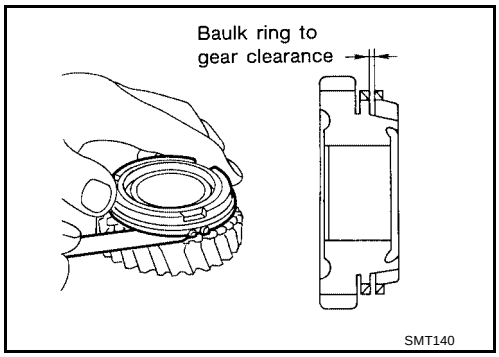
- Measure the movement (free play in dimension “L”) of 3rd & 4th coupling sleeve with the end fixed and the other end lifted as shown in the figure. If the movement exceeds specification, replace the sleeve.

Coupling sleeve	Dimension “L”
3rd & 4th	0 - 0.95 mm (0 - 0.0374 in)



SMT841D

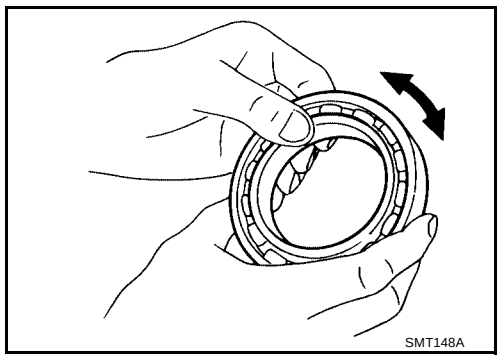
- Measure clearance between baulk ring and gear. Refer to MT-61, "Clearance Between Baulk Ring and Gear" .



SMT140

BEARING

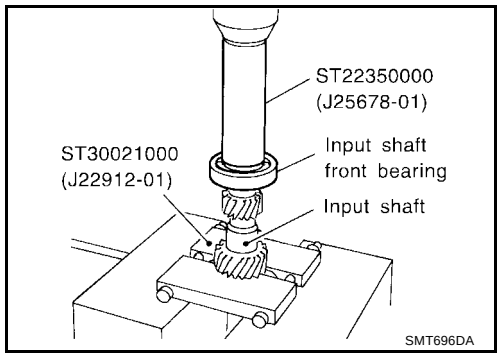
Make sure bearings roll freely and are free from noise, cracks, pitting or wear.



Assembly

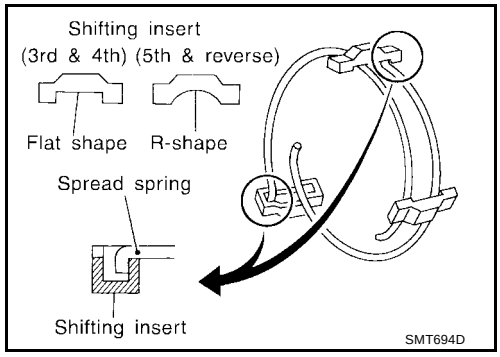
ECS005TS

1. Press on input shaft front bearing using Tool.

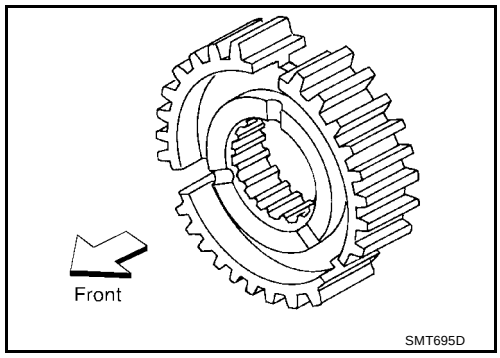


2. Install 3rd gear needle, 3rd input gear and 3rd gear baulk ring bearing to input shaft.
3. Install spread spring, shifting insert, and 3rd & 4th synchronizer hub onto 3rd & 4th coupling sleeve.
   - Pay attention to the shape of spread spring and shifting insert for correct assembly.
     Do not install spread spring hook onto the same shifting insert.

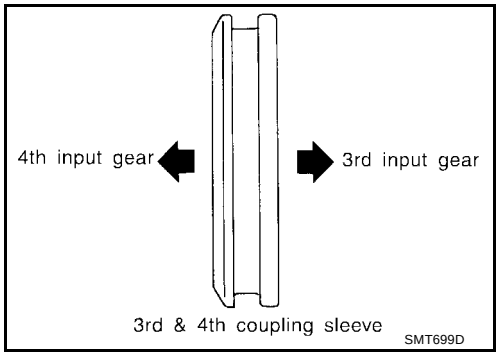
     CAUTION:
     Do not reuse 3rd & 4th synchronizer hub.



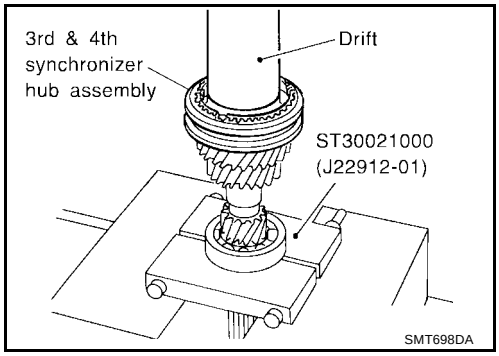
   - Install synchronizer hub with its three grooves facing the front side (3rd input gear side).



- Install 3rd & 4th coupling sleeve with its chamfered surface facing the 4th input gear side.



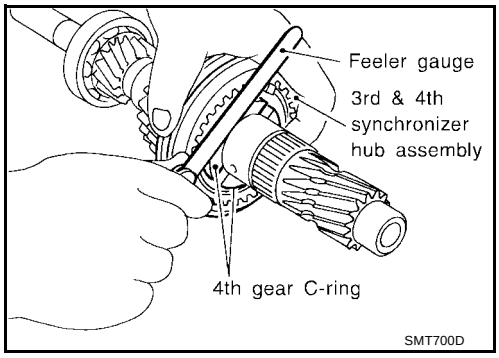
4. Position bearing replacer to the front side of input shaft front bearing.
   - Align grooves of shifting insert and 3rd gear baulk ring. Then, press it onto 3rd & 4th synchronizer hub assembly using a drift.



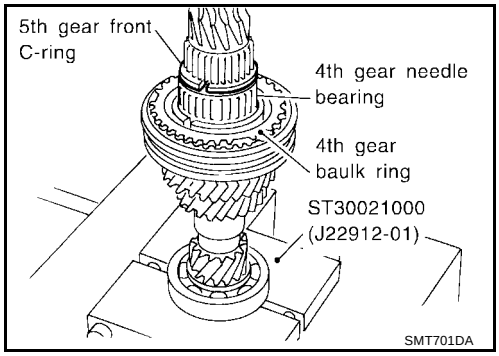
5. Install 4th gear C-ring onto input shaft using Tool.
6. Measure the end play of 3rd & 4th synchronizer hub with a suitable tool, and check if it is within allowable specification.

   End play : 0 - 0.06 mm (0 - 0.0024 in)

7. If not within specification, adjust the end play by changing thickness of 4th (input) gear C-ring. Refer to MT-61, "Available C-rings" .

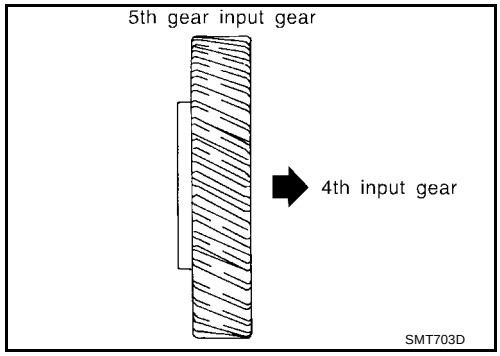


8. Install 4th gear needle bearing, 4th gear baulk ring, and 5th gear front C-ring.



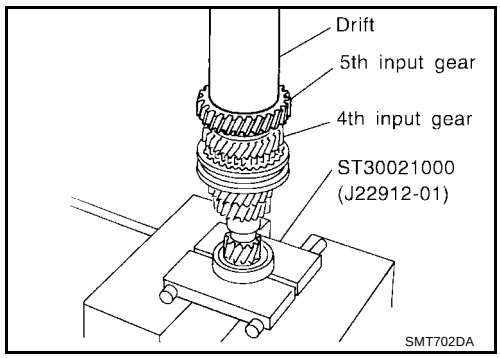
9. Install 4th input gear using Tool.

10. Position 5th input gear as shown, to install it on input shaft.



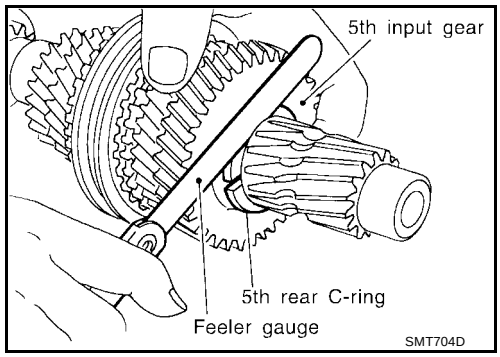
11. Install 5th input gear using Tool as shown.

CAUTION:
Do not reuse 5th input gear.



12. Install 5th gear rear C-ring onto input shaft using Tool.
13. Measure the end play of 5th input gear with a suitable tool, and check if it is within the allowable specification below.

End play : 0 - 0.06 mm (0 - 0.0024 in)

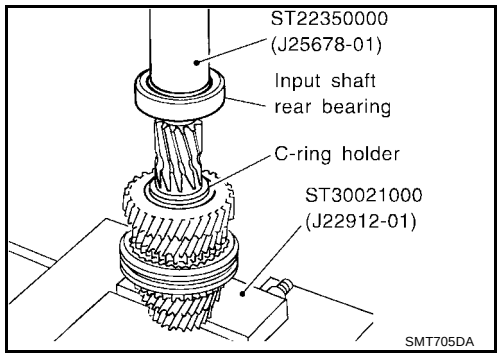


14. If not within specification, adjust the end play by changing thickness of the 5th (input gear) rear C-ring. Refer to MT-61, "Available C-rings" .
15. Install C-ring holder onto 5th gear rear C-ring using Tool.

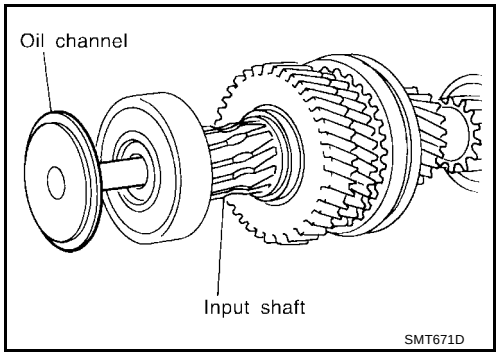
CAUTION:
Do not reuse C-ring holder.

16. Install input shaft rear bearing using Tool.

CAUTION:
Install input shaft rear bearing with its brown surface facing the input gear side.



17. Install oil channel onto input shaft.



18. Measure gear end play as a final check. Refer to MT-61, "Gear End Play" .

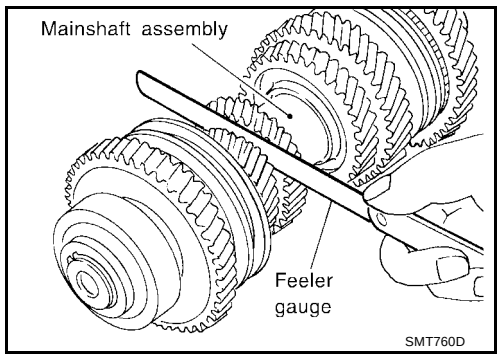
MAINSHAFT AND GEARS

PFP:32241

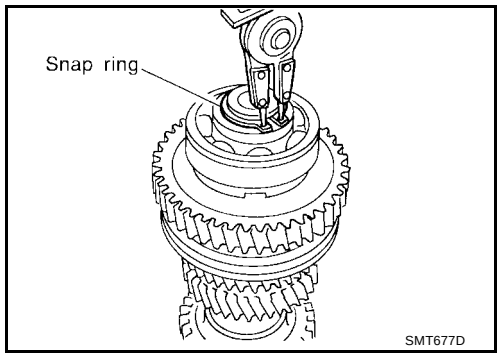
Disassembly

ECS005TT

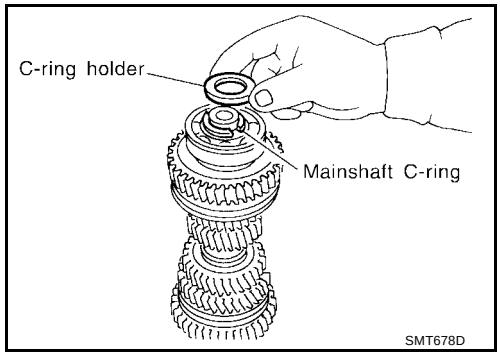
1. Before disassembly, measure gear end play with a suitable tool. Refer to MT-61, "Gear End Play" .
   - If end play is not within the specified limit, disassemble and check the parts.



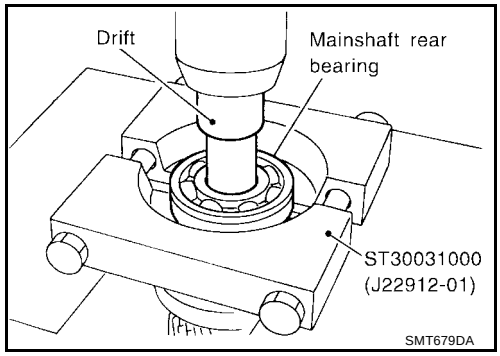
2. Remove snap ring with a suitable tool.



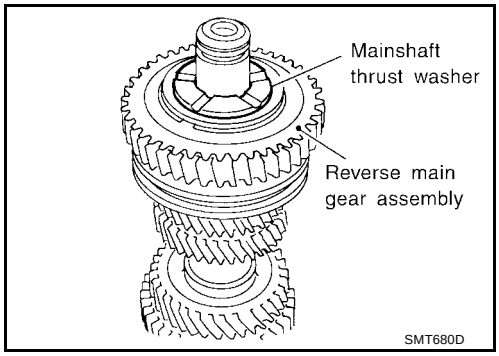
3. Remove C-ring holder and mainshaft C-ring.



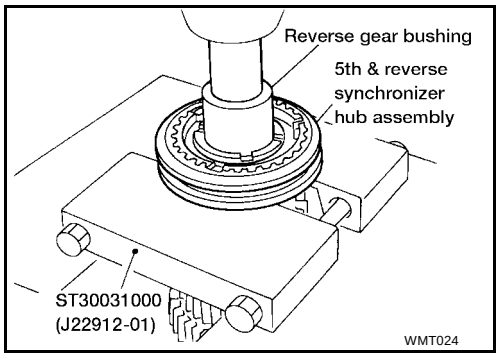
4. Press out mainshaft rear bearing from mainshaft using Tool.



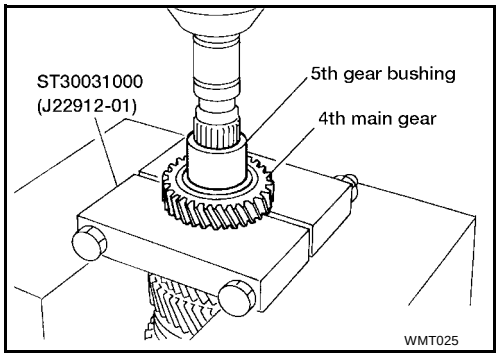
5. Remove mainshaft thrust washer.



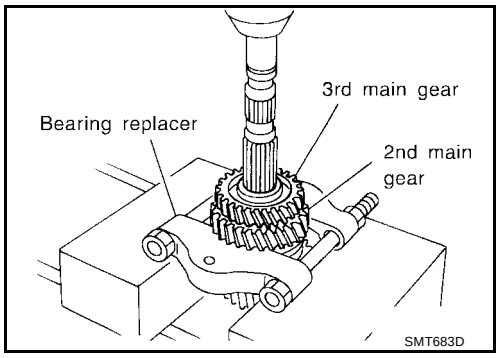
6. Remove snap ring from mainshaft. Then, remove reverse main gear assembly, reverse gear needle bearing, and reverse gear baulk ring.
7. Place bearing replacer between 5th & reverse synchronizer hub and 5th main gear, and press out both reverse gear bushing and 5th & reverse synchronizer assembly using Tool.



8. Remove 5th main gear, 5th gear baulk ring, and 5th gear needle bearing.
9. Place bearing replacer between 3rd and 4th main gears, and press out both 5th gear bushing and 4th main gear using Tool.

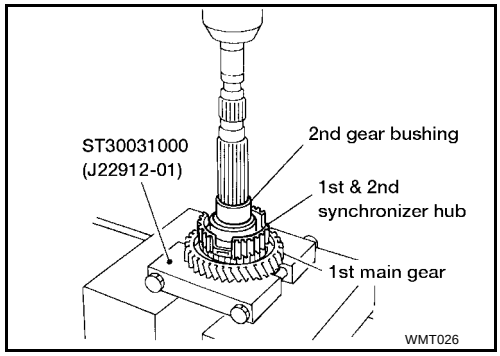


10. Remove mainshaft adjusting shim and spacer.



11. Place bearing replacer between 2nd main gear and 1st & 2nd synchronizer hub, and press out both 3rd and 2nd main gears.
12. Remove 2nd double cone assembly, 2nd gear bushing, and coupling sleeve assembly.

13. Place bearing replacer on 1st gear front side, and press out all of 2nd gear bushing, 1st & 2nd synchronizer hub, 1st main gear, and 1st double cone using Tool.



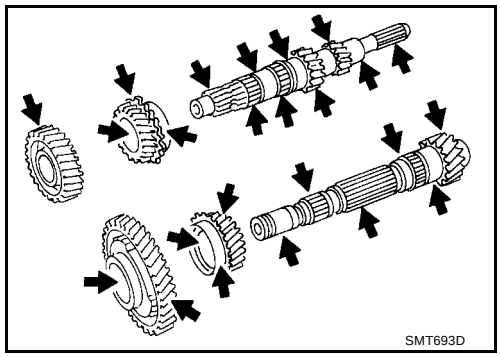
14. Remove 1st gear needle bearing.

Inspection

ECS005TU

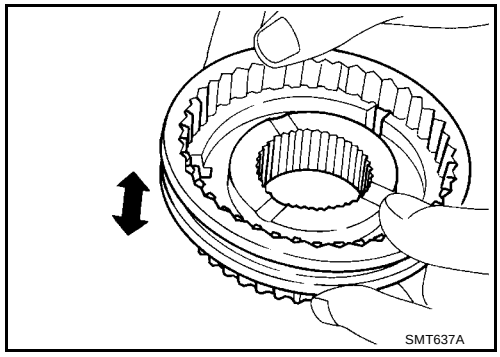
GEAR AND SHAFT

- Check shaft for cracks, wear or bending.
- Check gears for excessive wear, chips or cracks.

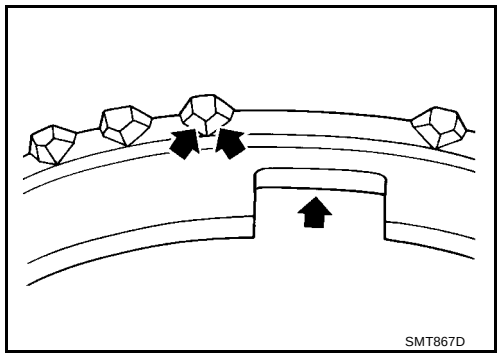


SYNCHRONIZERS

- Check spline area of coupling sleeves, hubs and gears for wear or cracks.
- Check baulk rings for cracks or deformation.
- Check insert springs for wear or deformation.

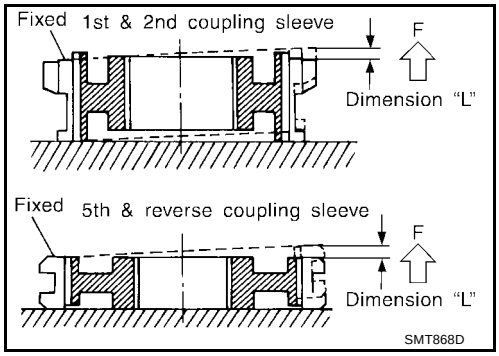


- If any crack, damage, or excessive wear is found on cam face of baulk ring or working face of insert, replace it.

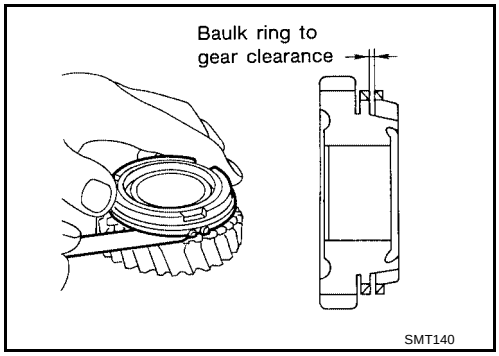


- Measure the movement (play, dimension “L”) of 1st & 2nd coupling sleeve and 5th & reverse coupling sleeve with their end fixed and the other end lifted as shown in the figure. If the movement exceeds specification, replace the sleeve.

Coupling sleeve	Length “L”
1st & 2nd	0 - 0.68 mm (0 - 0.0268 in)
5th & Reverse	0 - 0.89 mm (0 - 0.0350 in)

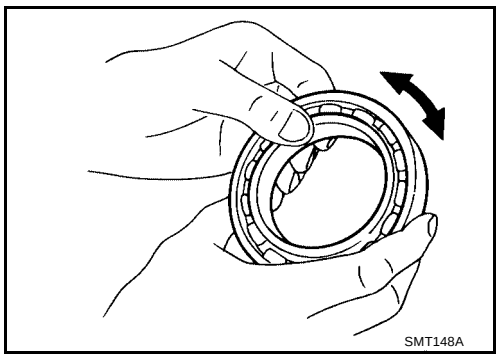


- Measure clearance between baulk ring and gear. Refer to MT-61, "Clearance Between Baulk Ring and Gear" .

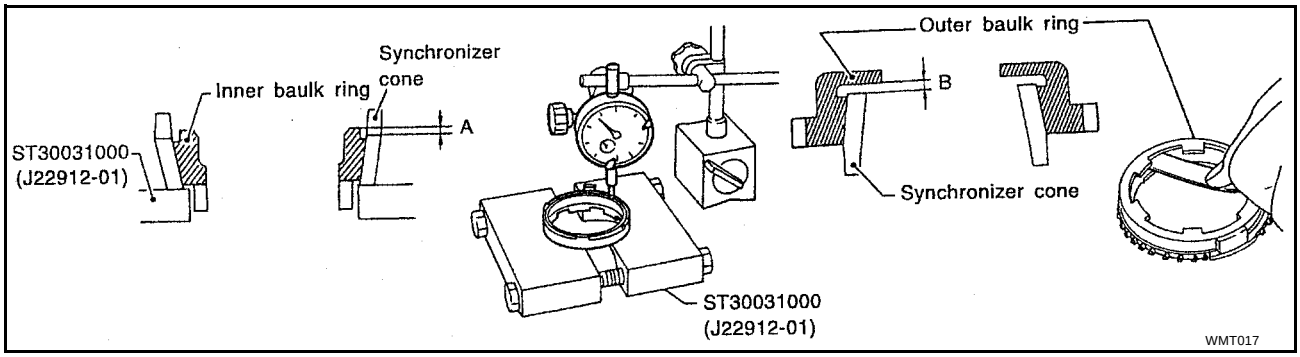


BEARING

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.



- Measure wear of inner and outer baulk ring as shown.



- Place baulk rings in position on synchronizer cone.
- While holding baulk ring against synchronizer cone as far as it will go, measure dimensions “A” and “B” using Tool.

Standard

“A” : 0.6 - 0.8 mm (0.024 - 0.031 in)

“B” : 0.6 - 1.1 mm (0.024 - 0.043 in)

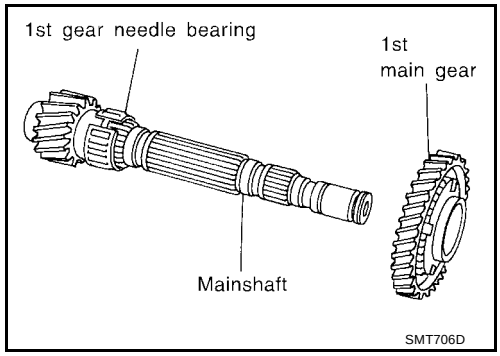
Wear limit : 0.2 mm (0.008 in)

- If dimension “A” or “B” is smaller than the wear limit, replace outer baulk ring, inner baulk ring and synchronizer cone as a set.

Assembly

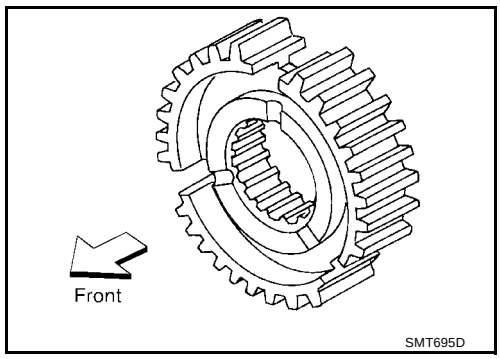
ECS005TV

1. Install 1st gear needle bearing and 1st main gear onto mainshaft.

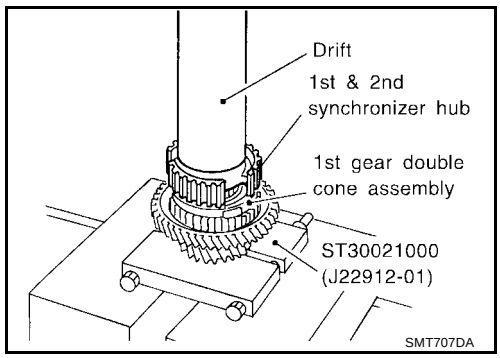


2. Install 1st double cone assembly onto mainshaft.
3. Install 1st & 2nd synchronizer hub with its three grooves facing the front side (1st main gear side) onto mainshaft.

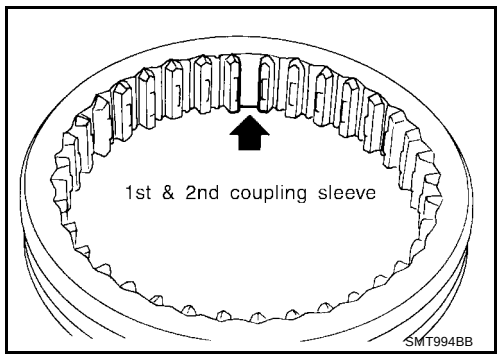
CAUTION:
Do not reuse 1st & 2nd synchronizer hub.



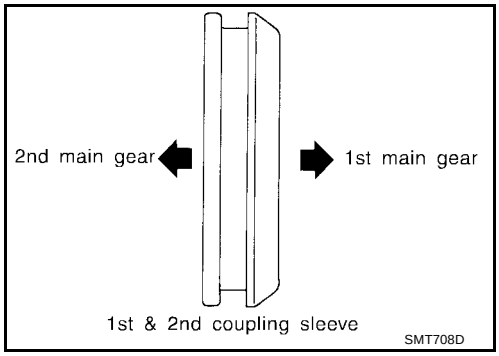
4. Install 1st & 2nd synchronizer hub using Tool.



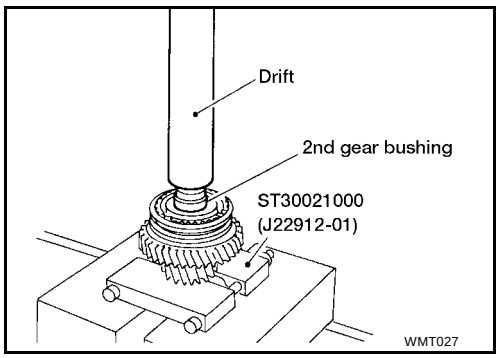
5. Install insert spring onto 1st & 2nd coupling sleeve.



6. Install 1st & 2nd coupling sleeve with its chamfered surface facing the 1st main gear side onto 1st & 2nd synchronizer hub.

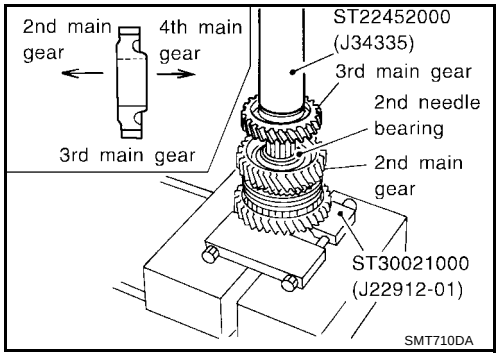


7. Install 2nd gear bushing with its flange surface facing 1st & 2nd synchronizer hub side using Tool.



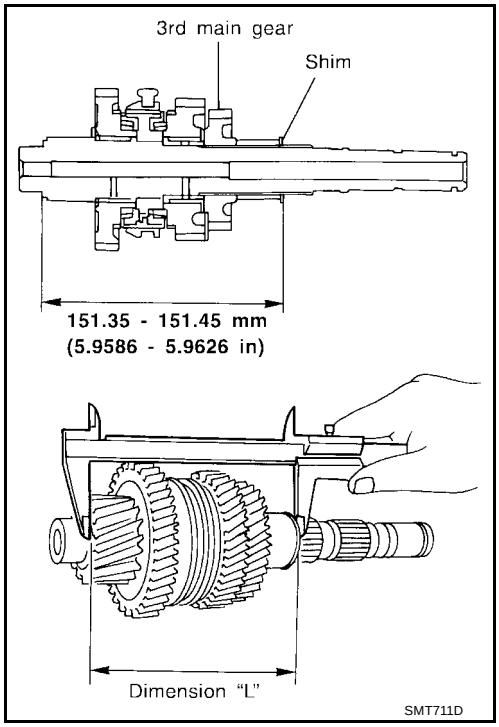
8. Install 2nd needle bearing, 2nd double cone assembly, and 2nd main gear onto mainshaft using Tool.
9. Position 3rd main gear as shown, and install it using Tool.

CAUTION:
Do not reuse 3rd main gear.

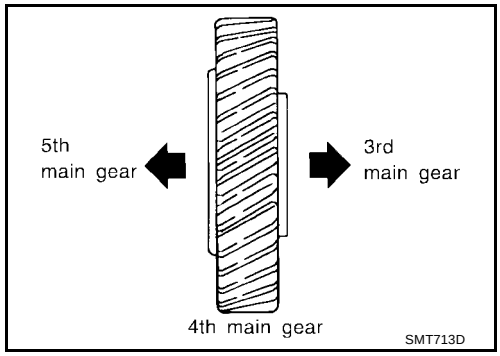


10. Install spacer and mainshaft adjusting shim onto mainshaft.
11. Select a mainshaft adjusting shim suitable to satisfy the following specification of dimension “L” and install it onto mainshaft.

Dimension “L”	**: 151.35 - 151.45 mm (5.9586 - 5.9626 in)**
Mainshaft adjusting shims	**: Refer to MT-62, "Available Adjusting Shims" .**

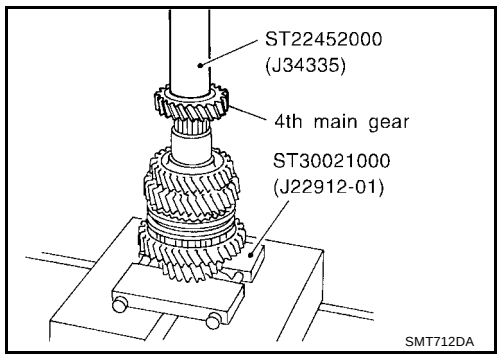


12. Position 4th main gear as shown, and install it onto mainshaft.

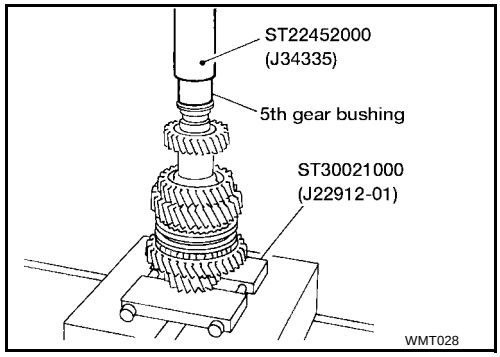


13. Install 4th main gear onto mainshaft using Tool.

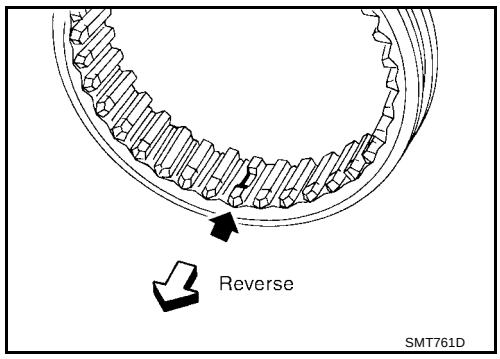
CAUTION:
Do not reuse 4th main gear.



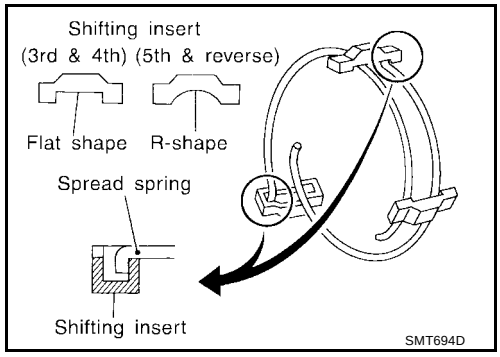
14. Install 5th gear bushing with its flange surface facing the 4th main gear side using Tool.



15. Install 5th needle bearing, 5th main gear, and 5th gear baulk ring onto mainshaft.

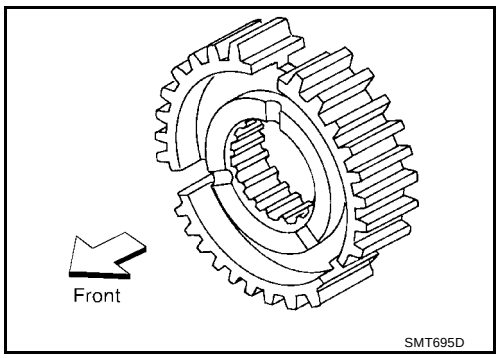


16. Being careful of the following points, install spread spring, shifting insert, and 5th & reverse synchronizer hub onto 5th & reverse coupling sleeve.

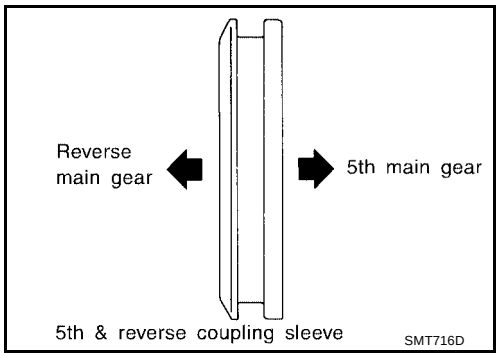


- Pay attention to the shape of spread spring and shifting insert for correct assembly.
  Do not install spread spring hook onto the same shifting insert.
- Install synchronizer hub with its three grooves facing the front side (5th main gear side).

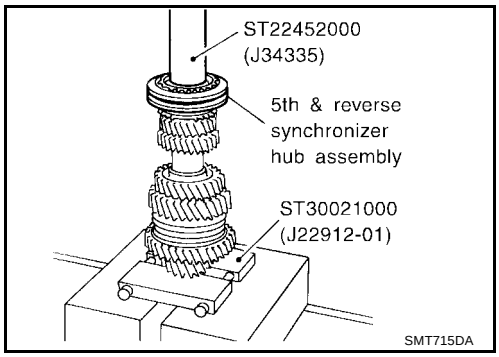
CAUTION:
Do not reuse 5th & reverse synchronizer hub.



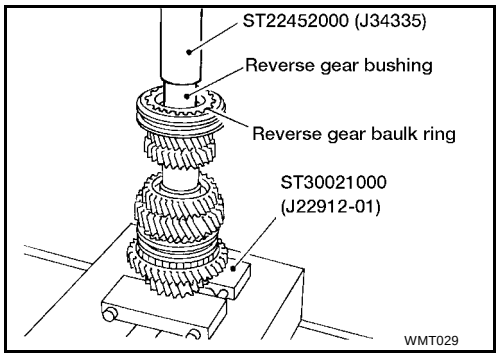
- Install 5th & reverse coupling sleeve with its chamfered surface facing the reverse main gear side.



17. Install 5th & reverse synchronizer hub assembly using Tool.

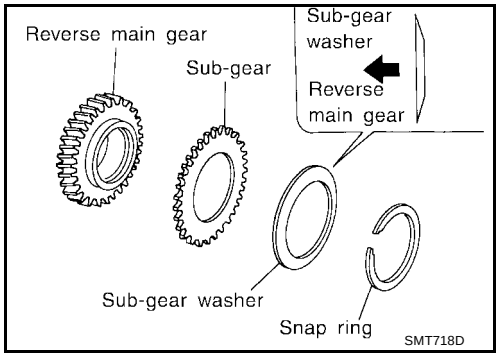


18. Install reverse gear baulk ring using Tool.
19. Install reverse gear bushing using Tool.
20. Install reverse gear needle bearing using Tool.



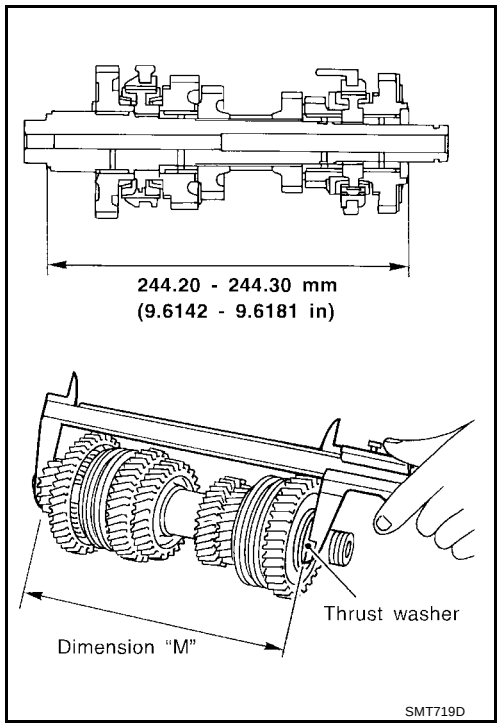
21. Install sub-gear, sub-gear washer, and snap ring onto reverse main gear.

CAUTION:
- **Pay attention to direction of sub-gear washer.**
- **Do not reuse snap ring.**

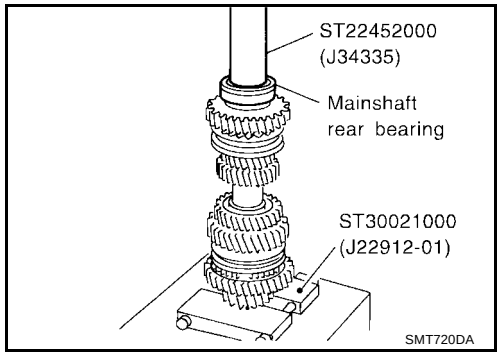


22. Install reverse main gear assembly onto mainshaft.
23. Select a thrust washer suitable to satisfy the following specification of dimension “M” as shown, and install it onto mainshaft.

Dimension “M”	**: 244.20 - 244.30 mm (9.6142 - 9.6181 in)**
Available thrust washers	**: Refer to MT-64, "Available Thrust Washer" .**

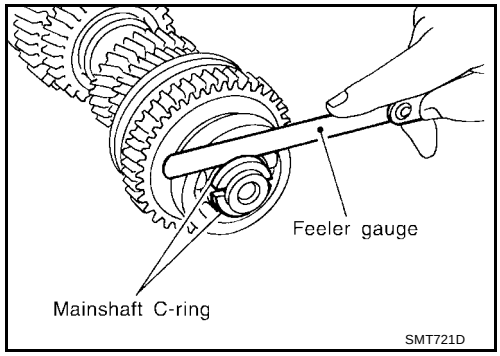


24. Install mainshaft rear bearing using Tool.

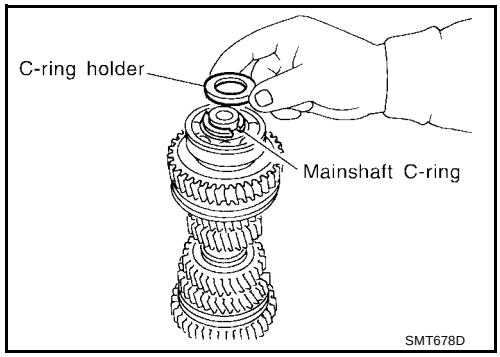


25. Install mainshaft C-ring.
26. Using feeler gauge, measure the end play of mainshaft rear bearing with a suitable tool, and check if it satisfies the following specification.

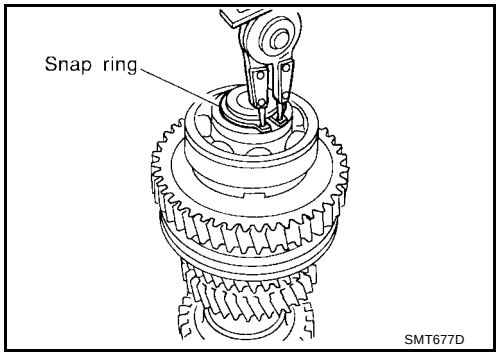
End play	**: 0 - 0.06 mm (0 - 0.0024 in)**
Mainshaft C-rings	**: Refer to MT-61, "Available C-rings" .**



27. Install C-ring holder.



28. Install snap ring with a suitable tool.



29. Measure gear end play as a final check. Refer to MT-61, "Gear End Play" .

FINAL DRIVE

PFP:38411

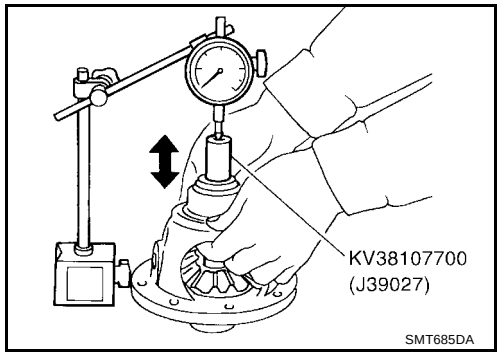
Pre-inspection

ECS005TW

DIFFERENTIAL CASE SIDE

1. Clean final drive assembly sufficiently to prevent side gear thrust washer, differential case, side gear, and other parts from sticking by gear oil.
2. Upright the differential case so that the side gear to be measured faces upward.
3. Place final drive adapter and dial gauge onto side gear. Move side gear up and down, and measure the clearance using Tool.

Side gear and differential case clearance : 0.1 - 0.2 mm (0.004 - 0.008 in)

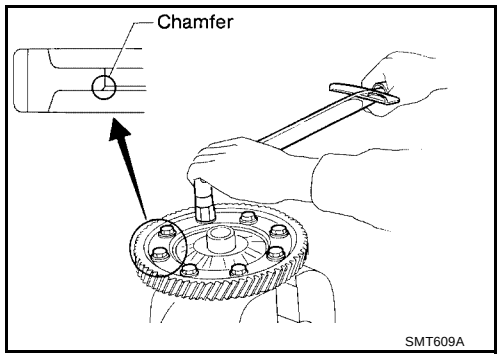


4. If not within specification, adjust the clearance by changing thrust washer thickness.
5. Turn differential case upside down, and measure the clearance between side gear and differential case on the other side in the same way using Tool.

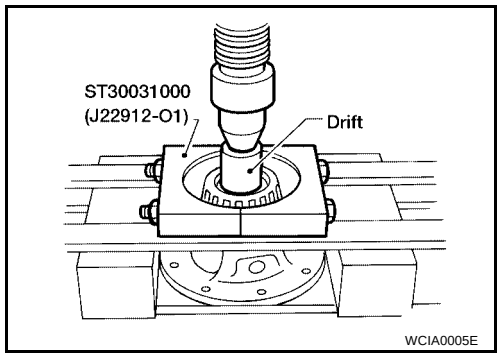
Disassembly

ECS005TX

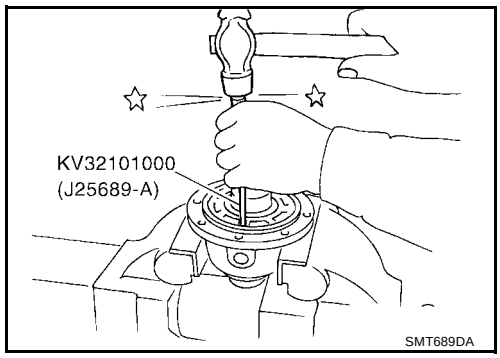
1. Remove mounting bolts. Then, separate the final gear from differential case.
2. Make a notch and remove speedometer drive gear using a scraper or other suitable tool.
   - **Bearing replacer cannot be positioned unless speedometer drive gear is removed.**



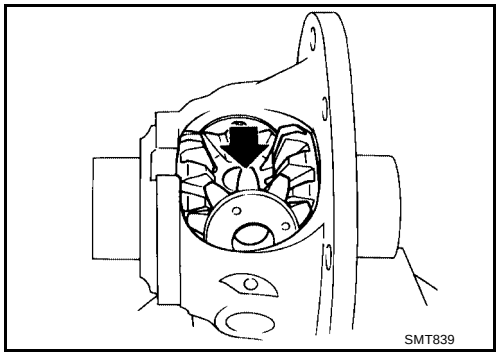
3. Remove differential side bearing of final gear side using Tool.
4. Turn differential case upside down, and remove differential side bearing of speedometer drive gear side using Tool.
   - **Be careful not to mix up the differential side bearings.**



5. Remove speedometer stopper.
6. Remove lock pins from pinion mate shaft using Tool.



7. Remove pinion mate shaft.
8. Rotate pinion mate gear, and remove pinion mate gear, pinion mate thrust washer, side gear, and side gear thrust washer from differential case.

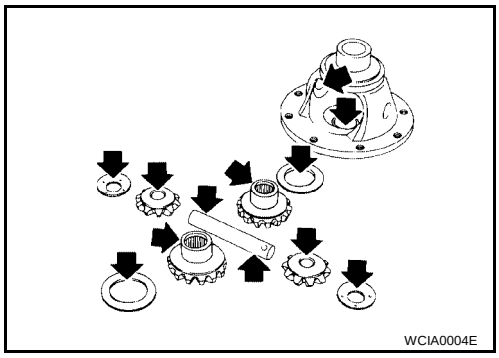

SMT839

Inspection

ECS005TY

GEAR, WASHER, SHAFT AND CASE

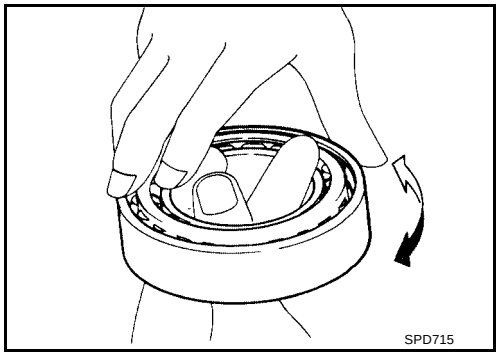
- Check mating surfaces of differential case, side gears and pinion mate gears.
- Check washers for wear.


WCIA0004E

BEARING

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.

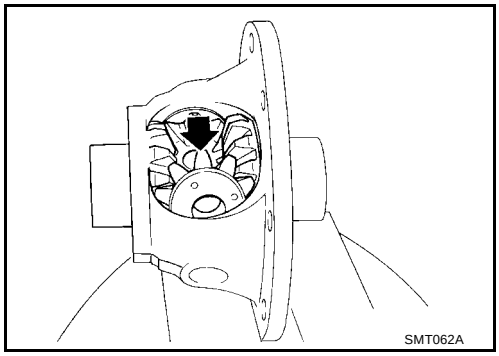
  CAUTION:
  When replacing tapered roller bearing, replace outer and inner race as a set.


SPD715

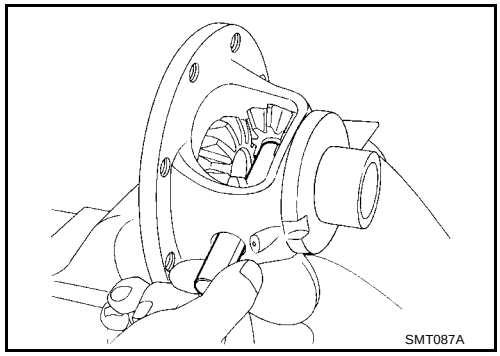
Assembly

ECS005TZ

1. Apply gear oil to sliding area of differential case, each gear, and thrust washer.
2. Install side gear thrust washer and side gear into differential case.
3. Position pinion mate gear and pinion mate thrust washer diagonally, and install them into differential case while rotating.


SMT062A

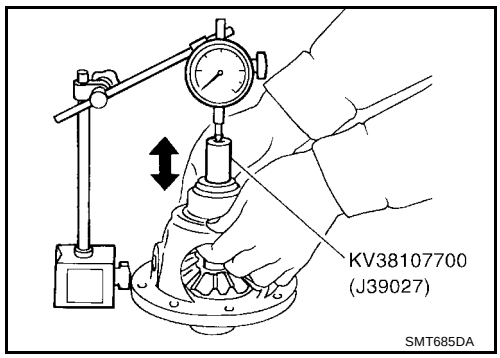
4. Insert pinion mate shaft into differential case.



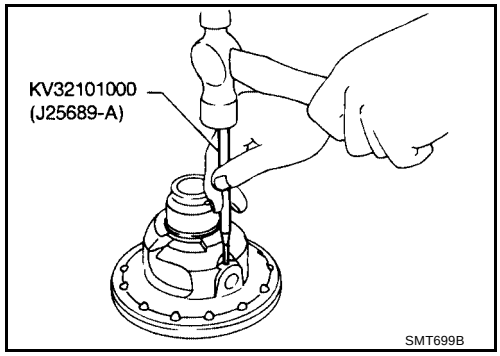
5. Upright the differential case so that its side gear to be measured faces upward.
6. Place preload adapter and dial gauge onto side gear. Move side gear up and down, and measure the clearance using Tool.
7. Turn differential case upside down, and measure the clearance between side gear and differential case on the other side in the same way using Tool.

Clearance of side gear and differential case : **0.1 - 0.2 mm (0.004 - 0.008 in)**

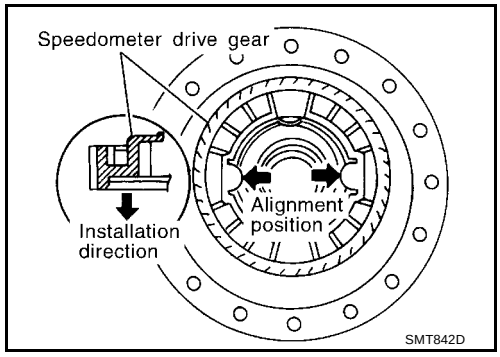
Differential side gear thrust washers : **Refer to MT-64, "Available Washers" .**



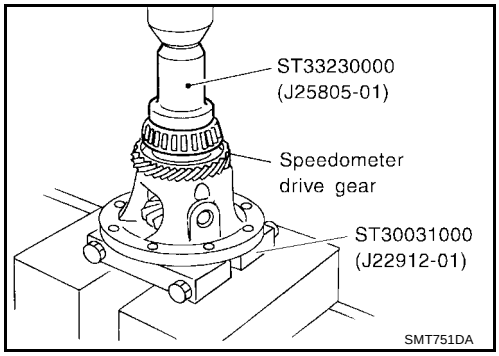
8. Install retaining pin using Tool.
   - **Make sure that retaining pin is flush with case.**



9. Align and install speedometer drive gear into differential case.
10. Install speedometer stopper.

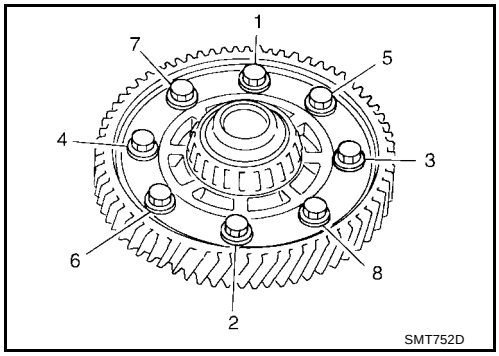


11. Install differential side bearing using Tool.
12. Turn differential case upside down, and install another differential side bearing on the other side in the same way using Tool.



13. Install differential gear into differential case. Apply sealant onto mounting bolts, and tighten them in order as shown in the figure with specified torque.

Differential gear mounting bolts	**: Refer to MT-21, "FINAL DRIVE COMPONENTS" .**



SHIFT CONTROL

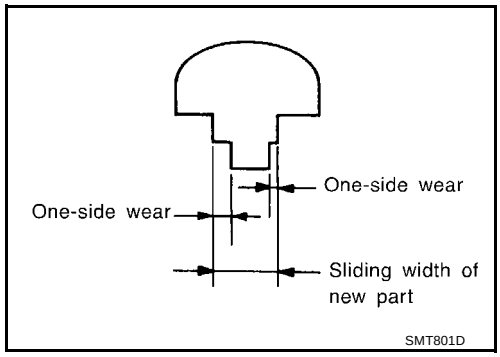
PFP:32982

Inspection

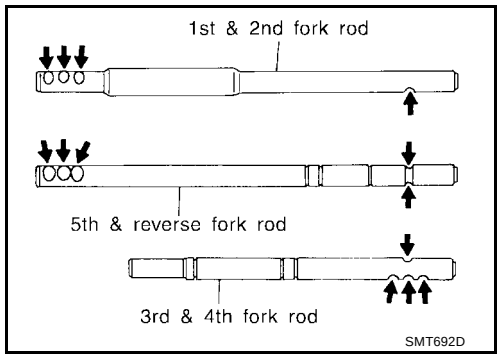
ECS005U0

- Check if the width of shift fork hook (sliding area with coupling sleeve) is within allowable specification below.

Item	One-side wear	Sliding width of new part
1st & 2nd	0.2 mm (0.008 in)	7.80 - 7.93 mm (0.3071 - 0.3122 in)
3rd & 4th	0.2 mm (0.008 in)	7.80 - 7.93 mm (0.3071 - 0.3122 in)
5th & reverse	0.2 mm (0.008 in)	7.80 - 7.93 mm (0.3071 - 0.3122 in)



- Check if shift check groove of fork rod or 5th & reverse check groove is worn, or has any other abnormalities.



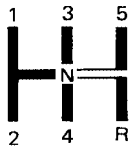
SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

ECS005U1

TRANSAXLE

Engine			QG18DE
Transaxle model			RS5F70A
Number of speeds			5
Synchromesh type			Warner
Shift pattern			
Gear ratio	1st		3.333
	2nd		1.955
	3rd		1.286
	4th		0.926
	5th		0.756
	Reverse		3.214
Number of teeth	Input gear	1st	15
		2nd	22
		3rd	28
		4th	41
		5th	45
		Rev.	14
	Main gear	1st	50
		2nd	43
		3rd	36
		4th	38
		5th	34
		Rev.	45
	Reverse idler gear		37
Oil level (reference) mm (in)*1			75.5 - 80.5 (2.972 - 3.169)
Oil capacity ℓ (US qt, Imp qt)			3.0 (3 1/8, 2 5/8)
Remarks			1st & 2nd double baulk ring type synchronizer
			Reverse sub-gear

*1: Refer to MA-13, "Fluids and Lubricants" .

FINAL GEAR

Engine		QG18DE
Transaxle model		RS5F70A
Final gear ratio		4.176
Number of teeth	Final gear/pinion	71/17
	Side gear/pinion mate gear	16/10

Gear End Play

ECS005U2

Unit: mm (in)

Gear	End play
1st main gear	0.18 - 0.31 (0.0071 - 0.0122)
2nd main gear	
5th main gear	
Reverse main gear	
3rd input gear	
4th input gear	0.17 - 0.44 (0.0067 - 0.0173)

Clearance Between Baulk Ring and Gear

ECS005U3

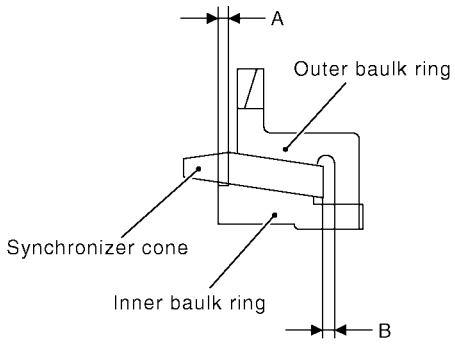
3RD, 4TH, 5TH, REVERSE BAULK RING

Unit: mm (in)

Gear	Standard	Wear limit
3rd	0.90 - 1.45 (0.0354 - 0.0571)	0.7 (0.028)
4th		
5th		
Reverse	0.9 - 1.35 (0.0354 - 0.0531)	

1ST AND 2ND BAULK RING

Unit: mm (in)



SMT906D

Dimension	Standard	Wear limit
A	0.6 - 0.8 (0.024 - 0.031)	0.2 (0.008)
B	0.6 - 1.1 (0.024 - 0.043)	

Available Snap Rings

ECS005U4

SNAP RING

End play	0.05 - 0.25 mm (0.0020 - 0.0098 in)
Thickness	Part number*
1.45 mm (0.0571 in)	32204-6J000
1.55 mm (0.0610 in)	32204-6J001
1.65 mm (0.0650 in)	32204-6J002
1.75 mm (0.0689 in)	32204-6J003
1.85 mm (0.0728 in)	32204-6J004

*: Always check with the parts department for the latest information.

Available C-rings

ECS005U5

4TH INPUT GEAR C-RING

End play	0 - 0.06 mm (0 - 0.0024 in)
Thickness	Part number*

3.00 mm (0.1181 in)	32205-6J000
3.03 mm (0.1193 in)	32205-6J001
3.06 mm (0.1205 in)	32205-6J002
3.09 mm (0.1217 in)	32205-6J003
3.12 mm (0.1228 in)	32205-6J004

*: Always check with the parts department for the latest information.

5TH INPUT GEAR REAR C-RING

End play	0 - 0.06 mm (0 - 0.0024 in)
Thickness	Part number*
2.59 mm (0.1020 in)	32205-6J005
2.62 mm (0.1031 in)	32205-6J006
2.65 mm (0.1043 in)	32205-6J007
2.68 mm (0.1055 in)	32205-6J008
2.71 mm (0.1067 in)	32205-6J009
2.74 mm (0.1079 in)	32205-6J010

*: Always check with the parts department for the latest information.

MAINSHAFT C-RING

End play	0 - 0.06 mm (0 - 0.0024 in)
Thickness	Part number*
3.48 mm (0.1370 in)	32348-6J000
3.51 mm (0.1382 in)	32348-6J001
3.54 mm (0.1394 in)	32348-6J002
3.57 mm (0.1406 in)	32348-6J003
3.60 mm (0.1417 in)	32348-6J004
3.63 mm (0.1429 in)	32348-6J005
3.66 mm (0.1441 in)	32348-6J006
3.69 mm (0.1453 in)	32348-6J007
3.72 mm (0.1465 in)	32348-6J008
3.75 mm (0.1476 in)	32348-6J009
3.78 mm (0.1488 in)	32348-6J010
3.81 mm (0.1500 in)	32348-6J011
3.84 mm (0.1512 in)	32348-6J012
3.87 mm (0.1524 in)	32348-6J013
3.90 mm (0.1535 in)	32348-6J014
3.93 mm (0.1547 in)	32348-6J015
3.96 mm (0.1559 in)	32348-6J016

*: Always check with the parts department for the latest information.

Available Adjusting Shims

ECS005U6

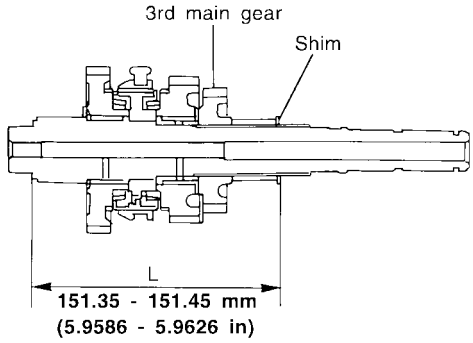
INPUT SHAFT REAR BEARING ADJUSTING SHIM

End play	0 - 0.06 mm (0 - 0.0024 in)
Thickness	Part number*
0.74 mm (0.0291 in)	32225-6J003
0.78 mm (0.0307 in)	32225-6J004
0.82 mm (0.0323 in)	32225-6J005
0.86 mm (0.0339 in)	32225-6J006

0.90 mm (0.0354 in)	32225-6J007
0.94 mm (0.0370 in)	32225-6J008
0.98 mm (0.0386 in)	32225-6J009
1.02 mm (0.0402 in)	32225-6J010
1.06 mm (0.0417 in)	32225-6J011
1.10 mm (0.0433 in)	32225-6J012
1.14 mm (0.0449 in)	32225-6J013
1.18 mm (0.0465 in)	32225-6J014
1.22 mm (0.0480 in)	32225-6J015
1.26 mm (0.0496 in)	32225-6J016
1.30 mm (0.0512 in)	32225-6J017
1.34 mm (0.0528 in)	32225-6J018
1.38 mm (0.0543 in)	32225-6J019
1.42 mm (0.0559 in)	32225-6J020
1.46 mm (0.0575 in)	32225-6J021
1.50 mm (0.0591 in)	32225-6J022
1.54 mm (0.0606 in)	32225-6J023
1.58 mm (0.0622 in)	32225-6J024
1.62 mm (0.0638 in)	32225-6J060
1.66 mm (0.0654 in)	32225-6J061

*: Always check with the parts department for the latest information.

MAINSHAFT ADJUSTING SHIM



SMT907D

Standard length “L”	151.35 - 151.45 mm (5.9586 - 5.9626 in)
Thickness	Part number*
0.48 mm (0.0189 in)	32238-6J000
0.56 mm (0.0220 in)	32238-6J001
0.64 mm (0.0252 in)	32238-6J002
0.72 mm (0.0283 in)	32238-6J003
0.80 mm (0.0315 in)	32238-6J004
0.88 mm (0.0346 in)	32238-6J005

*: Always check with the parts department for the latest information.

MAINSHAFT REAR BEARING ADJUSTING SHIM

End play	0 - 0.06 mm (0 - 0.0024 in)
Thickness	Part number*
2.99 mm (0.1177 in)	32238-6J010
3.03 mm (0.1193 in)	32238-6J011

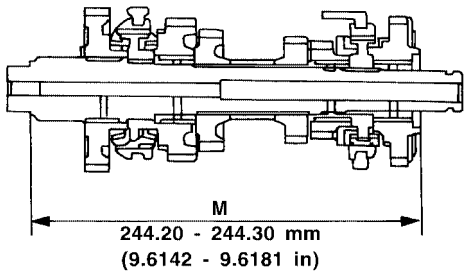
3.07 mm (0.1209 in)	32238-6J012
3.11 mm (0.1224 in)	32238-6J013
3.15 mm (0.1240 in)	32238-6J014
3.19 mm (0.1256 in)	32238-6J015
3.23 mm (0.1272 in)	32238-6J016
3.27 mm (0.1287 in)	32238-6J017
3.31 mm (0.1303 in)	32238-6J018
3.35 mm (0.1319 in)	32238-6J019
3.39 mm (0.1335 in)	32238-6J020
3.43 mm (0.1350 in)	32238-6J021
3.47 mm (0.1366 in)	32238-6J022
3.51 mm (0.1382 in)	32238-6J023

*: Always check with the parts department for the latest information.

Available Thrust Washer

ECS005U7

MAINSHAFT THRUST WASHER



SMT843D

Standard length “M”	244.20 - 244.30 mm (9.6142 - 9.6181 in)
Thickness	Part number*
6.04 mm (0.2378 in)	32246-6J000
6.12 mm (0.2409 in)	32246-6J001
6.20 mm (0.2441 in)	32246-6J002
6.28 mm (0.2472 in)	32246-6J003
6.36 mm (0.2504 in)	32246-6J004

*: Always check with the parts department for the latest information.

Available Washers

ECS005U8

DIFFERENTIAL SIDE GEAR THRUST WASHER

Clearance between side gear and differential case	0.1 - 0.2 mm (0.004 - 0.008 in)
Thickness mm (in)	Part number*
0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111
0.80 - 0.85 (0.0315 - 0.0335)	38424-D2112
0.85 - 0.90 (0.0335 - 0.0354)	38424-D2113
0.90 - 0.95 (0.0354 - 0.0374)	38424-D2114
0.95 - 1.00 (0.0374 - 0.0394)	38424-D2115

*: Always check with the parts department for the latest information.

Available Shims — Differential Side Bearing Preload and Adjusting Shim

ECS005U9

BEARING PRELOAD

Unit: mm (in)

Differential side bearing preload T*	0.15 - 0.21 (0.0059 - 0.0083)

* Install shims which are “deflection of differential case” + “T” in thickness.

DIFFERENTIAL SIDE BEARING ADJUSTING SHIMS

Thickness mm (in)	Part number*
0.44 (0.0173)	38454-M8000
0.48 (0.0189)	38454-M8001
0.52 (0.0205)	38454-M8002
0.56 (0.0220)	38454-M8003
0.60 (0.0236)	38454-M8004
0.64 (0.0252)	38454-M8005
0.68 (0.0268)	38454-M8006
0.72 (0.0283)	38454-M8007
0.76 (0.0299)	38454-M8008
0.80 (0.0315)	38454-M8009
0.84 (0.0331)	38454-M8010
0.88 (0.0346)	38454-M8011

*: Always check with the parts department for the latest information.

PRECAUTIONS

PFP:00001

Caution

ECS005V2

- Do not reuse transaxle oil, once it has been drained.
- Check oil level, and drain and refill transaxle oil with the vehicle on level ground.
- During removal or installation, keep inside of transaxle clean of dust and dirt.
- Check for the correct installation orientation prior to removal or disassembly. If mating marks are required, be certain they do not interfere with the function of the parts they are applied to.
- In principle, tighten bolts or nuts gradually in several steps working diagonally and from inside to outside as applicable. If a tightening sequence is specified, follow it as specified.
- Be careful not to damage the sliding surfaces and mating surfaces of parts.

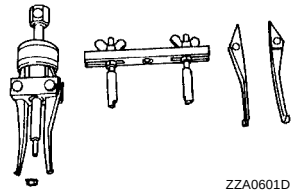
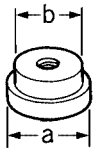
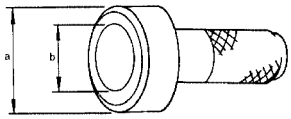
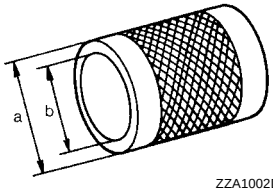
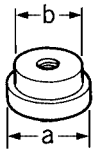
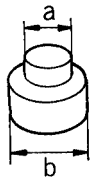
PREPARATION

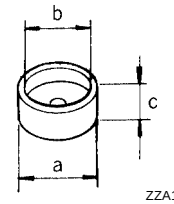
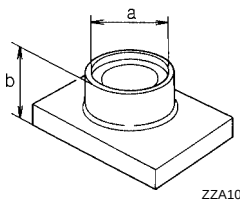
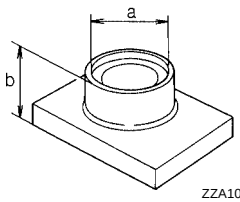
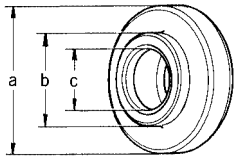
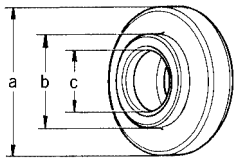
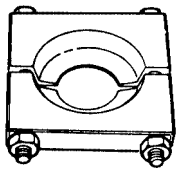
PFP:00002

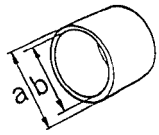
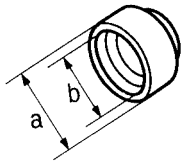
Special Service Tools

ECS005V3

The actual shapes of the Kent-Moore tools may differ from those of the special tools illustrated here.

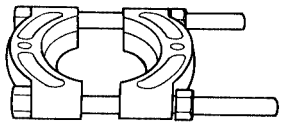
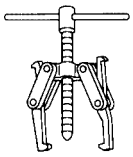
Tool number (Kent-Moore No.) Tool name	Description
KV381054S0 (J34286) Puller  ZZA0601D	Side bearing outer race removal Mainshaft front bearing removal
ST35321000 (—) Drift  ZZA1000D	Input shaft oil seal installation Reverse main gear installation 1st bushing installation 1st-2nd synchronizer hub installation 2nd bushing installation 3rd main gear installation **a: 49 mm (1.93 in) dia.** **b: 41 mm (1.61 in) dia.**
ST30720000 (J25405) Drift  ZZA0811D	Differential oil seal installation Differential side bearing outer race installation Mainshaft rear bearing installation Differential side bearing installation **a: 77 mm (3.03 in) dia.** **b: 55.5 mm (2.185 in) dia.**
ST33200000 (J26082) Drift  ZZA1002D	Mainshaft front bearing installation 6th bushing installation 4th main gear installation 5th main gear installation 6th main gear installation **a: 60 mm (2.36 in) dia.** **b: 44.5 mm (1.752 in) dia.**
ST33061000 (J8107-2) Drift  ZZA1000D	Bore plug installation Differential side bearing removal **a: 38 mm (1.50 in) dia.** **b: 28.5 mm (1.122 in) dia.**
ST33052000 (—) Drift  ZZA1023D	Welch plug installation Input shaft rear bearing removal 5th bushing, thrust washer, 4th input gear, 4th gear bushing, 3rd-4th synchronizer hub and 3rd input gear removal Input shaft front bearing installation 6th input gear and 6th bushing removal Mainshaft rear bearing removal 4th main gear and 5th main gear removal 6th main gear removal **a: 22 mm (0.87 in) dia.** **b: 28 mm (1.10 in) dia.**

Tool number (Kent-Moore No.) Tool name		Description
KV40105020 (—) Drift	 ZZA1133D	5th input gear and synchronizer hub removal 3rd main gear, 2nd main gear, 2nd bushing, 1st-2nd synchronizer hub, 1st main gear, reverse main gear and 1st bushing removal **a: 39.7 mm (1.563 in) dia.** **b: 35 mm (1.38 in) dia.** **c: 15 mm (0.59 in)**
KV40105710 (—) Press stand	 ZZA1058D	3rd-4th synchronizer hub installation 4th bushing installation 5th bushing installation 5th-6th synchronizer hub installation 2nd bushing installation 3rd main gear installation **a: 46 mm (1.81 in) dia.** **b: 41 mm (1.61 in)**
ST38220000 (—) Press stand	 ZZA1058D	Reverse main gear installation 1st bushing installation 1st-2nd synchronizer hub installation **a: 63 mm (2.48 in) dia.** **b: 65 mm (2.56 in)**
ST30032000 (J26010-01) Drift	 ZZA0978D	Input shaft front bearing installation **a: 80 mm (3.15 in) dia.** **b: 38 mm (1.50 in) dia.** **c: 31 mm (1.22 in) dia.**
ST30901000 (J26010-01) Drift	 ZZA0978D	Input shaft rear bearing installation 4th main gear installation 5th main gear installation 6th main gear installation Mainshaft rear bearing installation **a: 79 mm (3.11 in) dia.** **b: 45 mm (1.77 in) dia.** **c: 35.2 mm (1.386 in) dia.**
ST30031000 (J22912-01) Puller	 ZZA0537D	Measuring wear of 1st and 2nd baulk ring

Tool number (Kent-Moore No.) Tool name	Description
KV40101630 (J35870) Drift  ZZA1003D	Reverse main gear installation **a: 68 mm (2.68 in) dia.** **b: 60 mm (2.36 in) dia.**
KV38102510 (—) Drift  ZZA0838D	1st bushing installation 1st-2nd synchronizer hub installation Differential side bearing installation **a: 71 mm (2.80 in) dia.** **b: 65 mm (2.56 in) dia.**

Commercial Service Tools

ECS005V4

Tool name	Description
Puller  ZZB0823D	Each bearing gear and bushing removal
Puller  NT077	Each bearing gear and bushing removal
Pin punch ZZA0815D	Each retaining pin removal and installation **Tip: 4.5 mm (0.177 in) dia.**

NOISE, VIBRATION, AND HARSHNESS (NVH) TROUBLESHOOTING

PFP:00003

NVH Troubleshooting Chart

ECS005V5

Use the chart below to help you find the cause of the symptom. The numbers indicate the order of the inspection. If necessary, repair or replace these parts.

Reference page		MA-30, "Checking M/T Oil"	MA-13, "Fluids and Lubricants"	MA-30, "Checking M/T Oil"	MT-74			MT-76	MT-121		MT-102, MT-109			
Suspected parts (Possible cause)		(Oil level is low)	(Wrong oil)	(Oil level is high)	Gasket (Damaged)	Oil seal (Worn or damaged)	O-Ring (Worn or damaged)	Control device and cable (Worn)	Check plug return spring and check ball (Worn or damaged)	Shift fork (Worn)	Gear (Worn or damaged)	Bearing (Worn or damaged)	Baulk ring (Worn or damaged)	Insert spring, shifting insert (Damaged)
Symptom	Noise	1	2								3	3		
	Oil leakage		3	1	2	2	2							
	Hard to shift or will not shift		1	1				2					3	3
	Jumps out of gear							1	2	3	3			

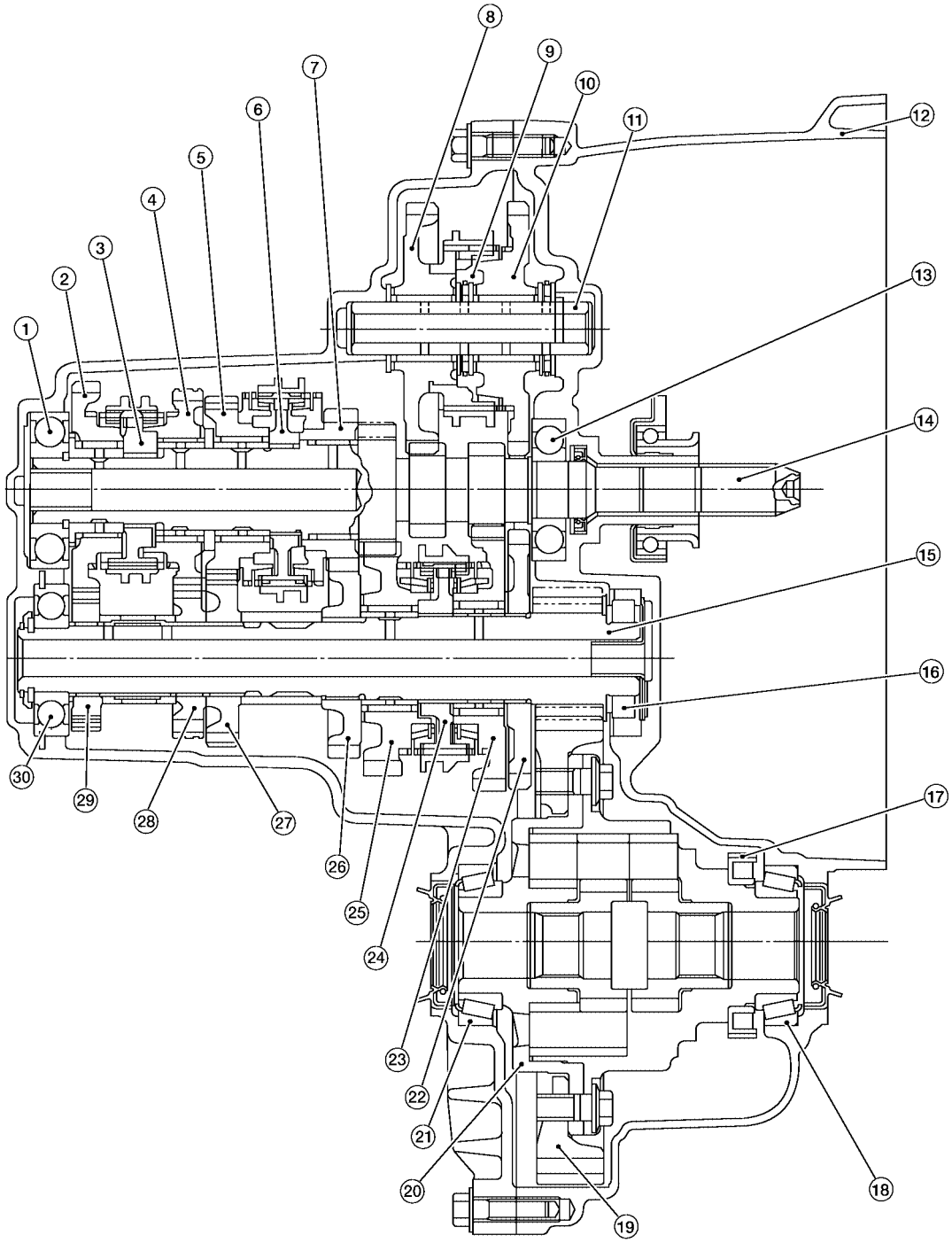
DESCRIPTION

PFP:00000

Cross-sectional View

ECS005V6

RS6F51H

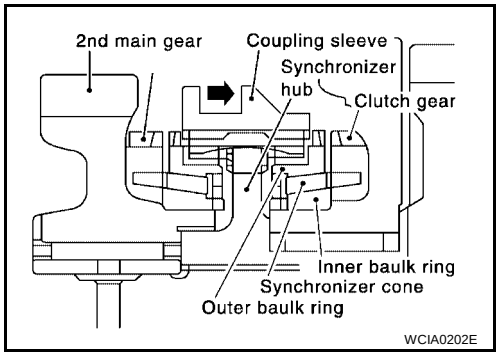


WCIA0364E

1. Input shaft rear bearing
2. 6th input gear
3. 5th & 6th synchronizer
4. 5th input gear
5. 4th input gear
6. 3rd & 4th synchronizer
7. 3rd input gear
8. Reverse idler gear (rear)
9. Reverse synchronizer
10. Reverse idler gear (front)
11. Reverse idler shaft
12. Clutch housing
13. Input shaft front bearing
14. Input shaft
15. Mainshaft
16. Mainshaft front bearing
17. Speedometer drive gear
18. Differential side bearing (front)
19. Final gear
20. Differential case
21. Differential side bearing (rear)
22. Reverse main gear
23. 1st main gear
24. 1st & 2nd synchronizer
25. 2nd main gear
26. 3rd main gear
27. 4th main gear
28. 5th main gear
29. 6th main gear
30. Mainshaft rear bearing

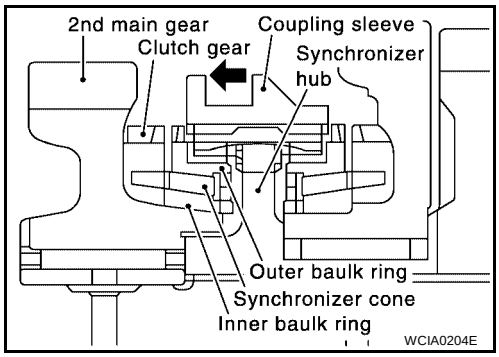
DOUBLE-CONE SYNCHRONIZER

The 1st gear is equipped with a double-cone synchronizer to reduce the operating force of the shift lever as shown.



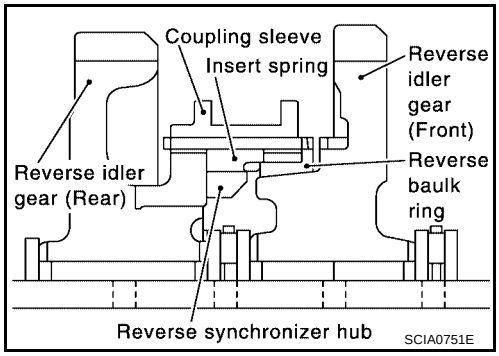
TRIPLE-CONE SYNCHRONIZER

The 2nd gear is equipped with a triple-cone synchronizer to reduce the operating force of the control lever as shown.



REVERSE GEAR

Description of the reverse gear components are as shown.



M/T OIL

PFP:KLD20

Replacement

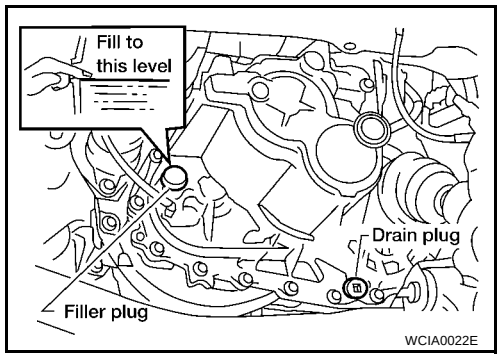
ECS005V7

DRAINING

1. Start the engine and let it run to warm up the transaxle oil.
2. Stop the engine. Remove drain plug and drain oil.
3. Set a new gasket on the drain plug and install it in transaxle body.

Drain plug : 30 - 39 N·m (3.1 - 4.0 kg-m, 23 - 28 ft-lb)

CAUTION:
Do not reuse gasket.



FILLING

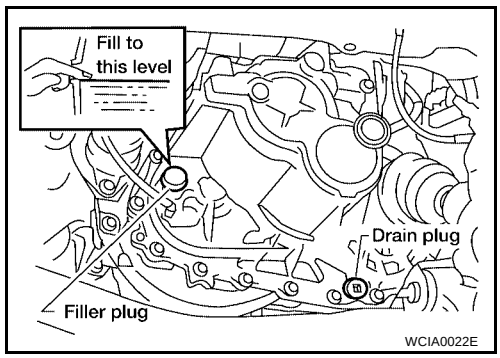
1. Remove filler plug. Fill with new oil until oil level reaches the specified limit near filler plug mounting hole.

Oil grade : API GL-4, Viscosity SAE 75W-85
Capacity (approximately) : 2.2 ℓ (2 3/8 US qt, 2 Imp qt)

2. After refilling oil, check oil level. Assemble a new gasket on to filler plug, then install it in transaxle body.

Filler plug : 30 - 39 N·m (3.1 - 4.0 kg-m, 23 - 28 ft-lb)

CAUTION:
Do not reuse gasket.



Checking

ECS005V8

OIL LEAKAGE AND OIL LEVEL

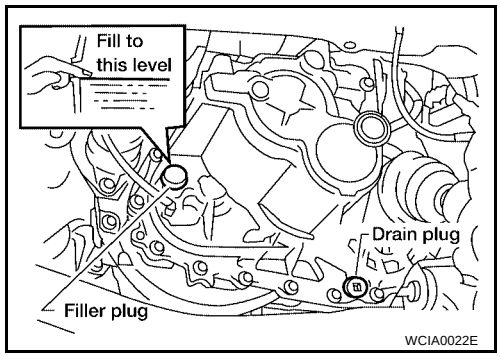
- Check that oil is not leaking from transaxle.
- Check oil level from filler plug mounting hole as shown.

CAUTION:
Never start engine while checking oil level.

- Set a new gasket on the filler plug and install it in transaxle body.

Filler plug : 30 - 39 N·m (3.1 - 4.0 kg-m, 23 - 28 ft-lb)

CAUTION:
Do not reuse gasket.



SIDE OIL SEAL

PFP:32113

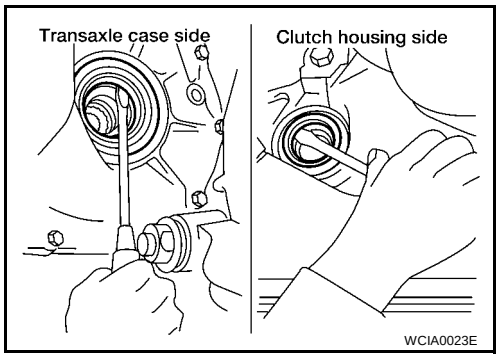
Removal and Installation

ECS005V9

REMOVAL

1. Remove the drive shaft from the transaxle body. Refer to FAX-14, "Removal" .
2. Remove oil seal with a slotted screwdriver.

CAUTION:
Be careful not to damage the case surface when removing the oil seal.



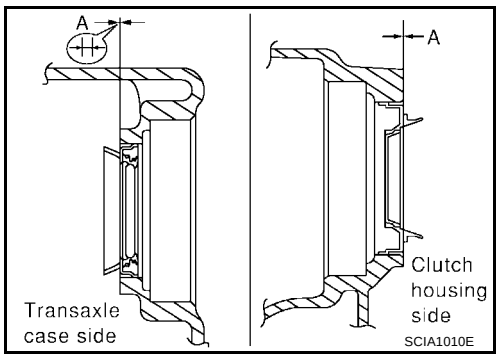
INSTALLATION

Installation is in the reverse order of removal.

- Using Tool (drift), drive the new oil seal straight until it protrudes from the case end equal to dimension "A" as shown.

Dimension "A" : Within 0.5 mm (0.02 in) or flush with the case.

Tool (drift) : ST30720000 (J25405)



CAUTION:
- **Before installing oil seal, apply multi-purpose grease to oil seal lips.**
- **Oil seal is not reusable.**

- Check oil level after installation. Refer to MT-73, "Checking" .

POSITION SWITCH

PFP:32005

Checking

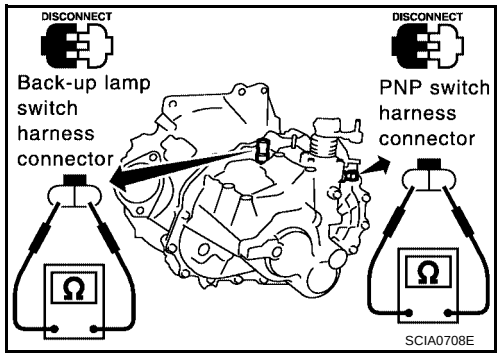
ECS005VA

NOTE:
For removal and installation of the switches. Refer to MT-81, "Component Parts" .

BACK-UP LAMP SWITCH

- Check continuity.

Gear position	Continuity
Reverse	Yes
Except reverse	No



PARK/NEUTRAL POSITION SWITCH

- Check continuity.

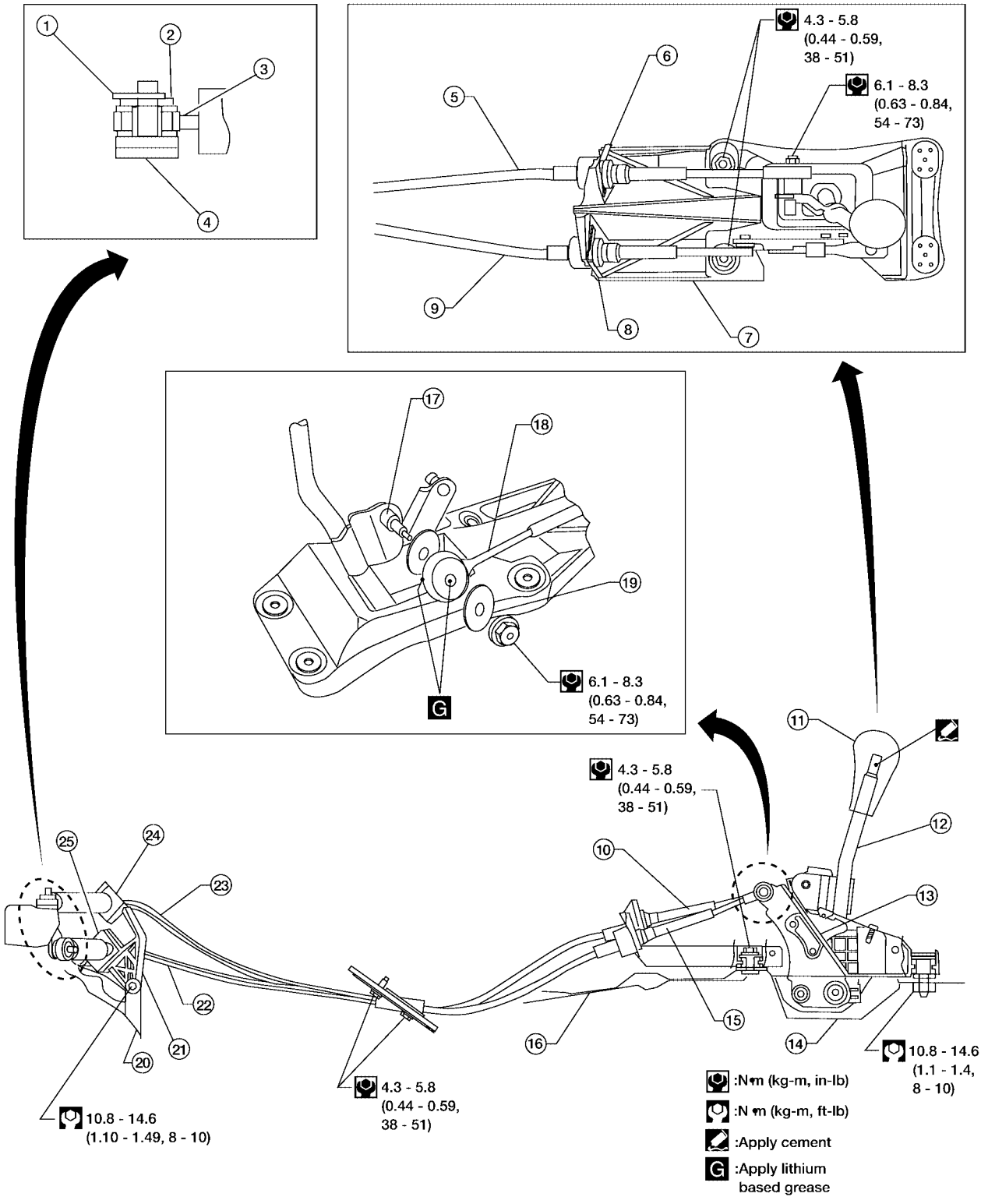
Gear position	Continuity
Neutral	Yes
Except neutral	No

CONTROL LINKAGE

PFP:34103

Removal and Installation of Control Device and Cable

ECS006H6



WCIA0136E

1. Snap pin
2. Washer
3. Cable
4. Manual lever
5. Shift cable
6. Lock plate
7. Control device assembly
8. Lock plate
9. Select cable
10. Shift cable
11. Control lever knob
12. Control lever

13. Control device assembly
14. Cover
15. Select cable
16. Floor
17. Pin
18. Shift cable
19. Washer
20. Clutch housing
21. Cable mounting bracket
22. Select cable
23. Shift cable
24. Lock plate
25. Lock plate

CAUTION:

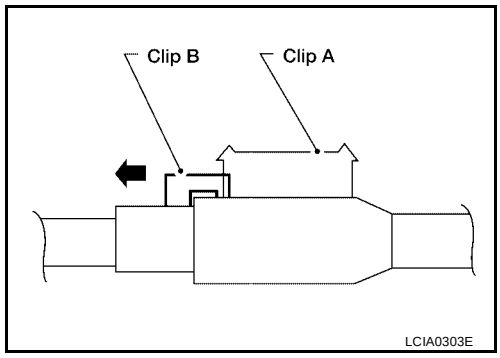
- **Note that the select side lock plate for securing the control cable is different from the one on the shift side.**
- **After assembly, make sure selector lever automatically returns to Neutral when it is moved to 1st, 2nd, or Reverse.**

Cable Adjustment

ECS006S7

NOTE:
After installation of the select cable, the cable must be adjusted for proper operation. This adjustment is performed before installing the interior console and shift boot.

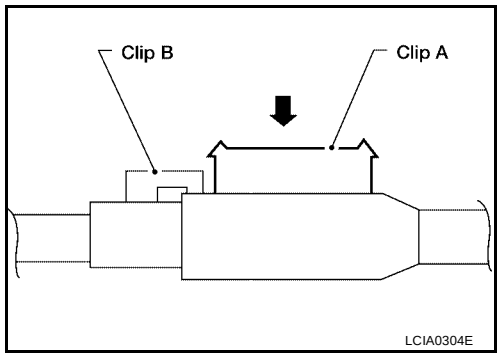
1. Slide clip “B” from under clip “A” as shown.



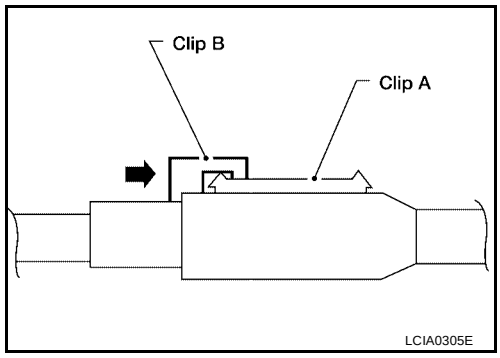
2. Shift the control lever to the neutral position.

   CAUTION:
   Do not move the control lever when adjusting the cables.

3. Push clip “A” into the cable end case until it snaps into place as shown.



4. Slide clip “B” back over clip “A” until it snaps into place and holds clip “A” in place as shown.

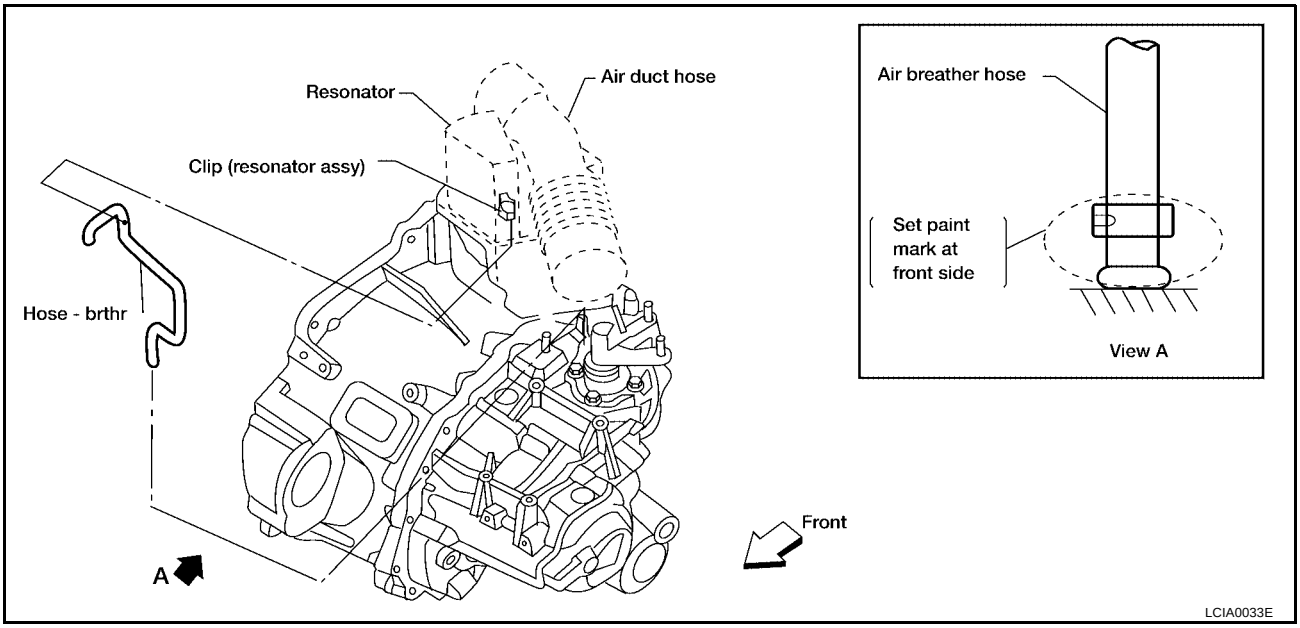


AIR BREATHER HOSE

PFP:31098

Removal and Installation

ECS005VC



CAUTION:

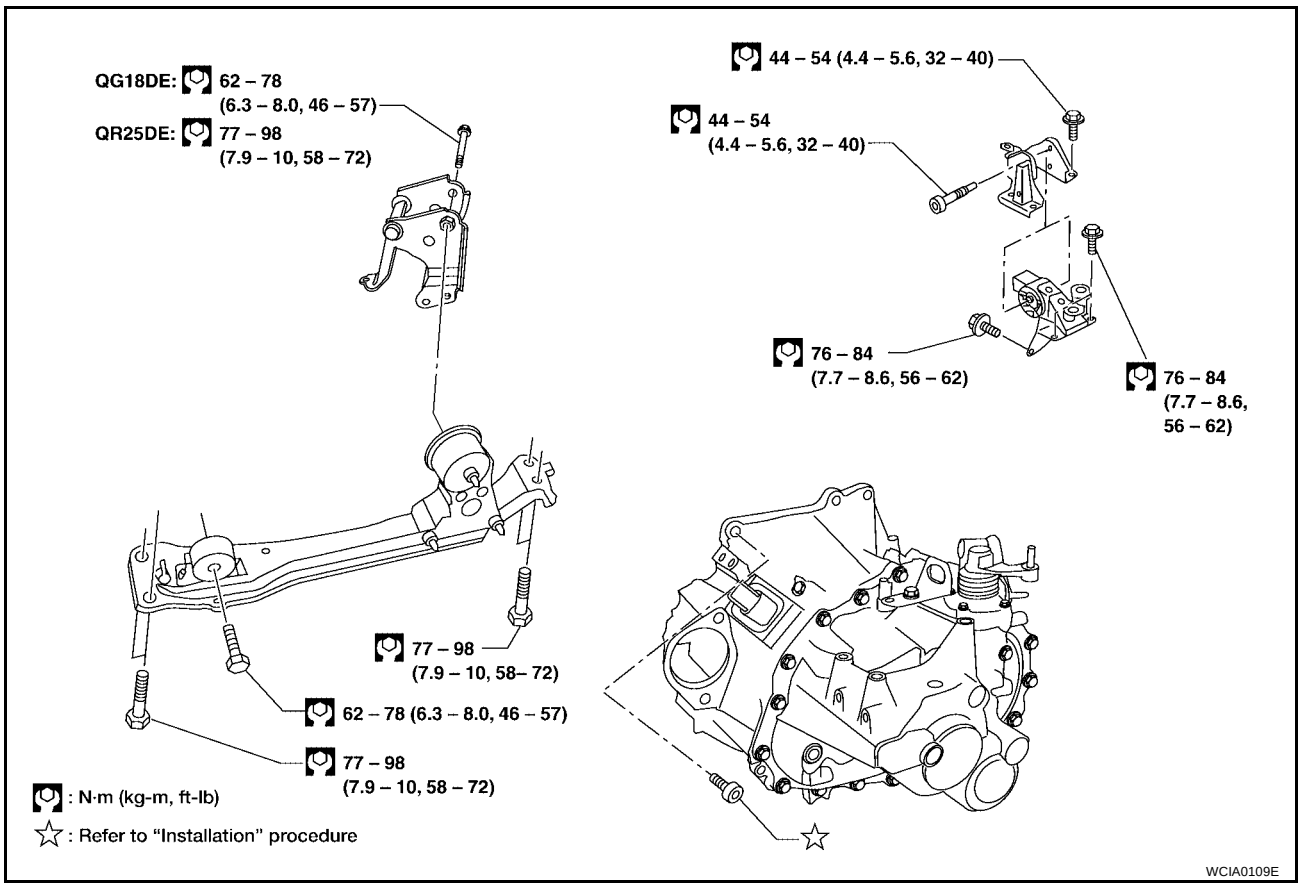
- **Make sure there are no pinched or restricted areas on the air breather hose caused by bending or winding when installing it.**
- **Insert the air breather hose into the transaxle tube until the overlap area reaches the spool.**

TRANSAXLE ASSEMBLY

PFP:32010

Removal and Installation

ECS005VD



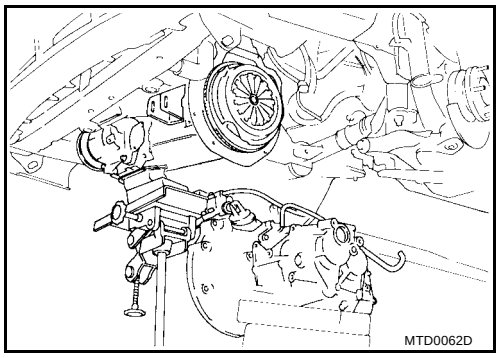
REMOVAL

1. Remove the air cleaner and air duct.
2. Remove the battery.
3. Remove the air breather hose.
4. Remove the clutch operating cylinder.

   CAUTION:
   Do not depress the clutch pedal during the removal procedure.
5. Remove the engine under cover.
6. Disconnect the control cable from the transaxle. Refer to MT-76, "Removal and Installation of Control Device and Cable" .
7. Drain the gear oil from the transaxle. Refer to MA-30, "Changing M/T Oil" .
8. Remove the connectors and harnesses for:
   - PNP switch
   - Speed sensor
   - Back-up lamp switch
   - Ground
9. Remove the exhaust front tube. Refer to EX-3, "Removal and Installation" .
10. Remove the drive shaft. Refer to FAX-14, "Removal" .
11. Remove the starter motor. Refer to SC-20, "Removal and Installation" .
12. Place a suitable jack under the transaxle.

    CAUTION:
    When setting the jack, be careful not to bring it into contact with the switches.
13. Remove the center member, engine insulator, and engine mount bracket.
14. Support the engine by placing a jack under the engine oil pan.

15. Remove the bolts that mount the engine to the transaxle.
16. Remove the transaxle from the vehicle as shown.



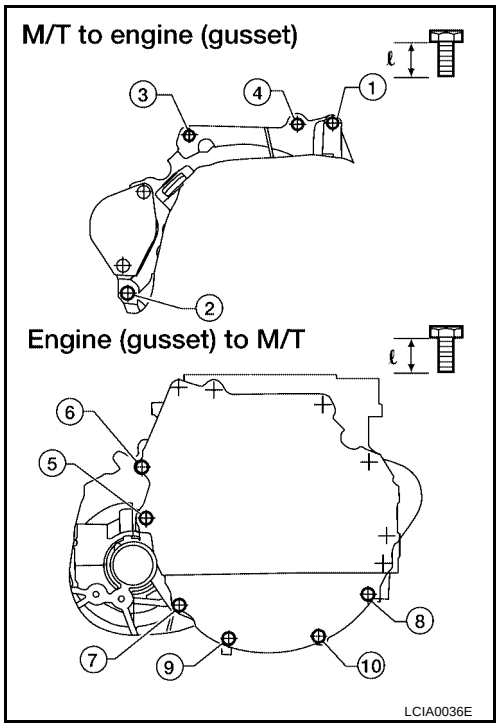
INSTALLATION

Installation is the reverse order of removal.

- When installing the transaxle to the engine, use them specified tightening torque in the numerical sequence as shown.

  CAUTION:
  When installing the transaxle, do not allow the transaxle input shaft to make contact with the clutch cover.

Bolt No.	1	2	3	4	5	6	7	8	9	10
" ℓ " mm (in)	40	82	47	47	52	40	40	40	30	30
Tightening torque N·m (kg-m, ft-lb)	30 - 40 (3.1 - 4.1, 22 - 29)	70 - 80 (7.1 - 8.1, 52 - 59)				30 - 40 (3.1 - 4.1, 22 - 29)				

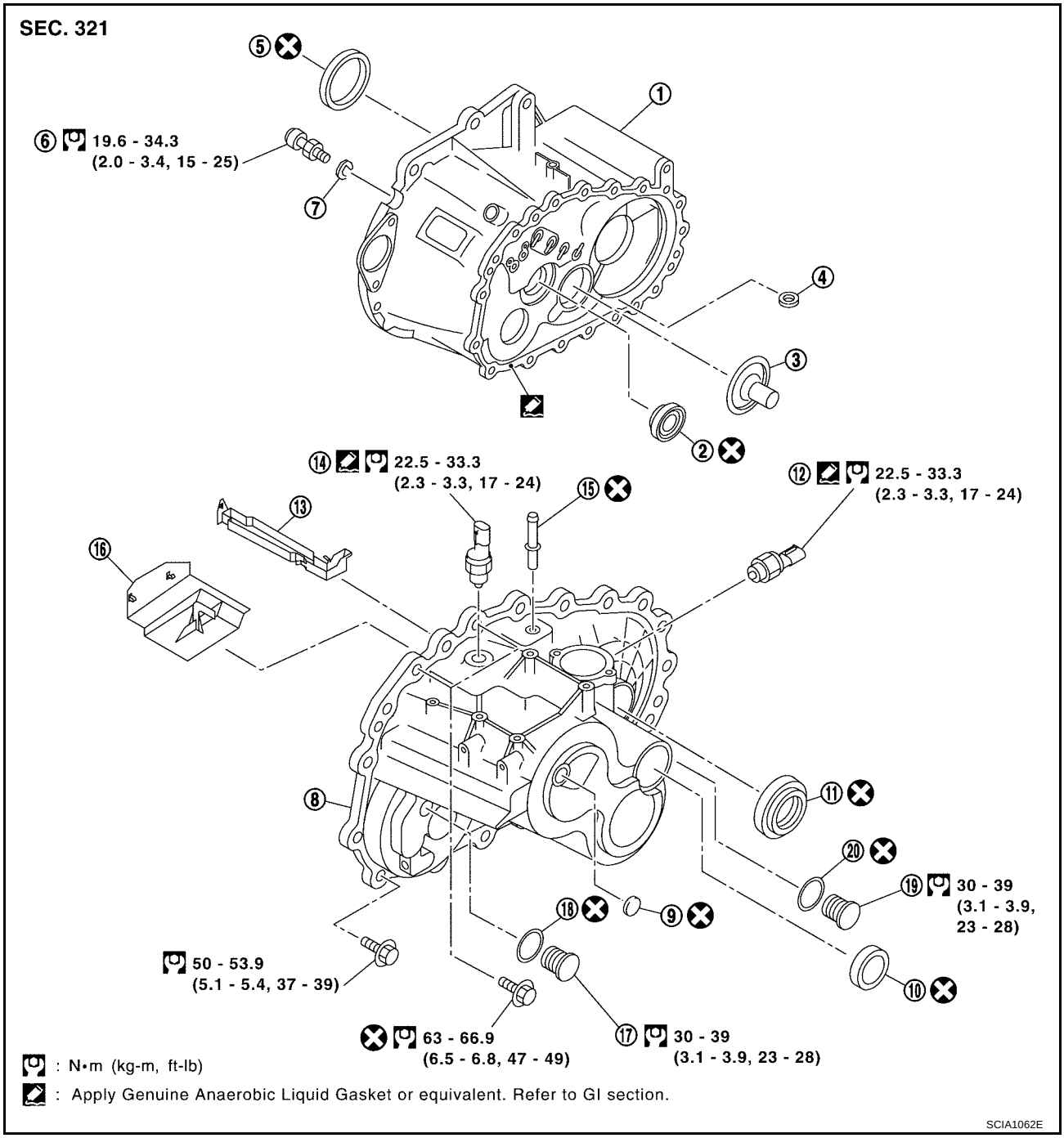


- After installation, check the transaxle oil level. Refer to MT-73, "Checking" .
- After installation, check for any leaks and any loose mechanisms.

Component Parts

ECS005VE

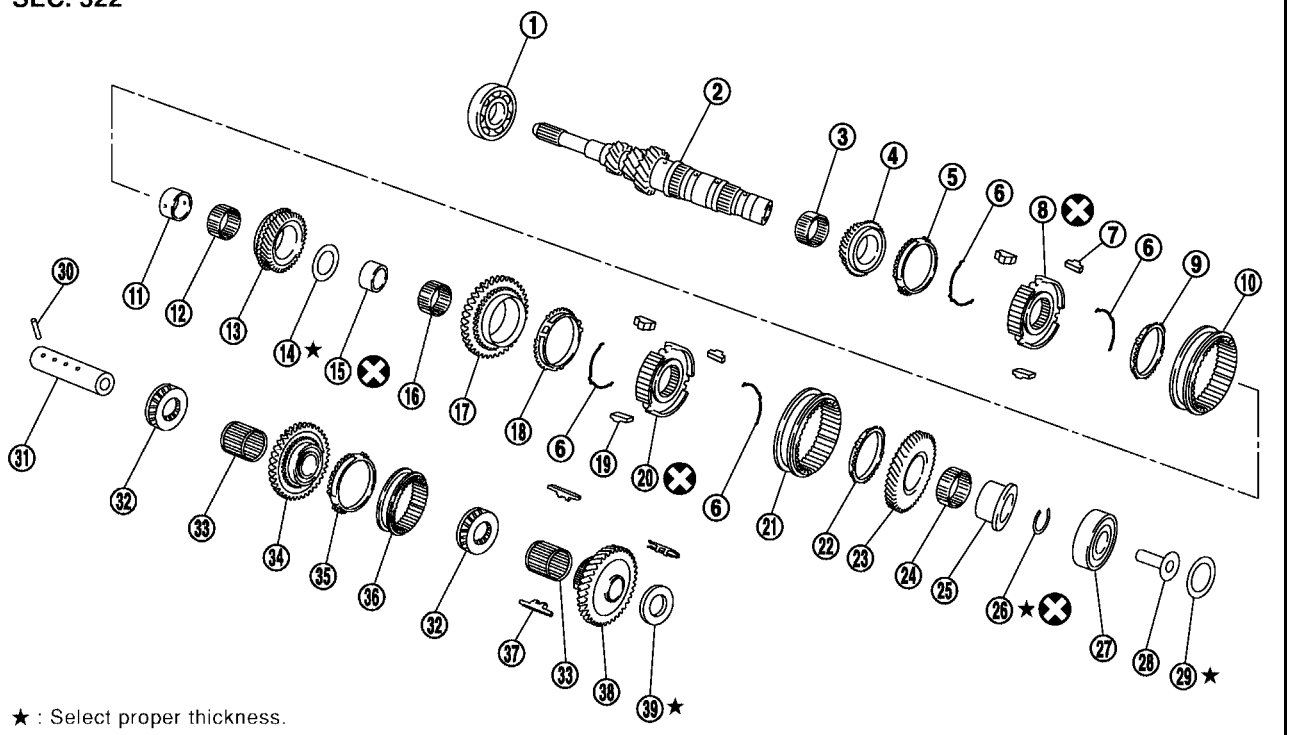
CASE AND HOUSING COMPONENTS



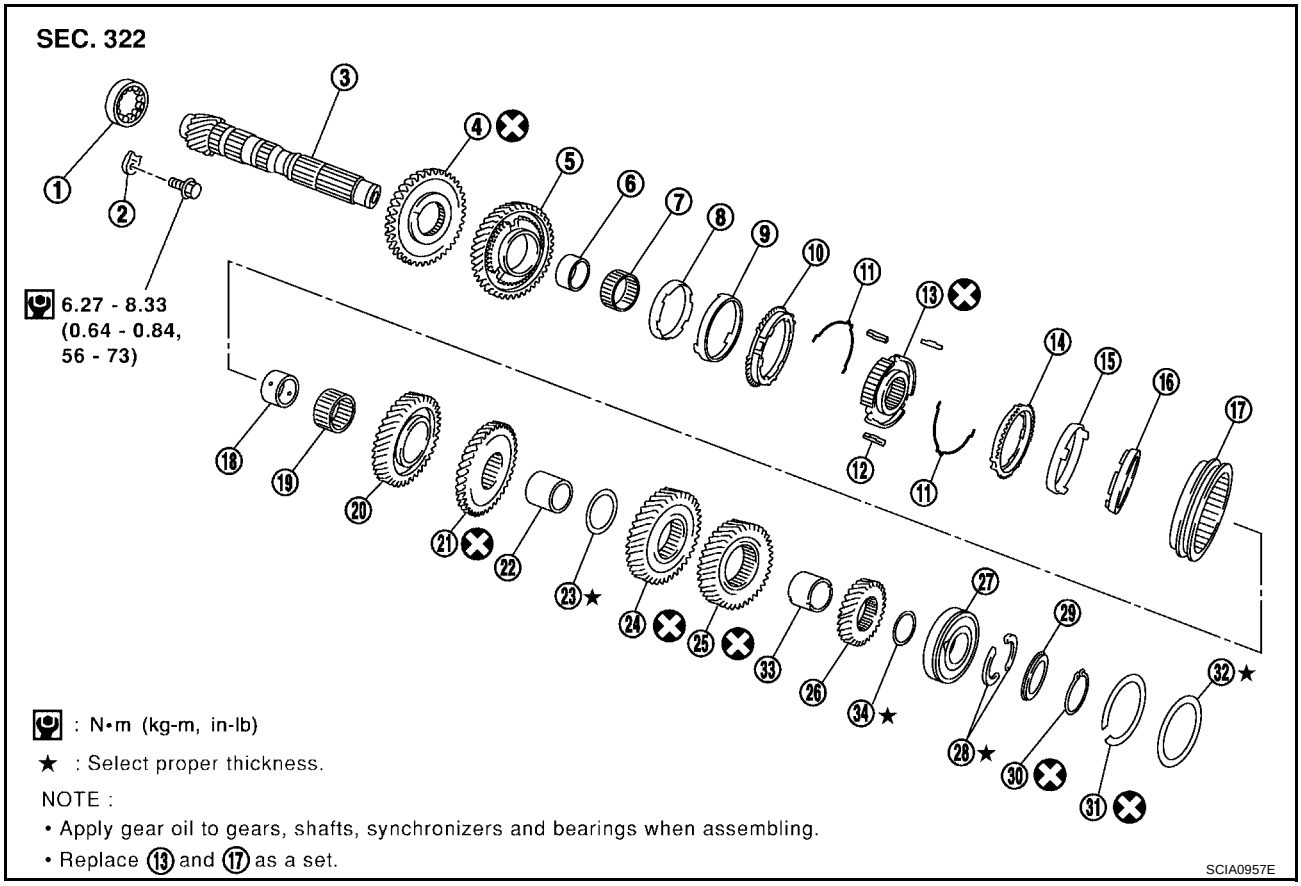
1. Clutch housing
2. Input shaft oil seal
3. Oil channel
4. Magnet
5. Differential oil seal
6. Ball pin
7. Washer
8. Transaxle case
9. Welch plug
10. Bore plug
11. Differential oil seal
12. Park/Neutral position switch
13. Oil gutter
14. Back-up lamp switch
15. Air breather tube
16. Baffle plate
17. Filler plug
18. Gasket
19. Drain plug
20. Gasket

GEAR COMPONENTS

SEC. 322

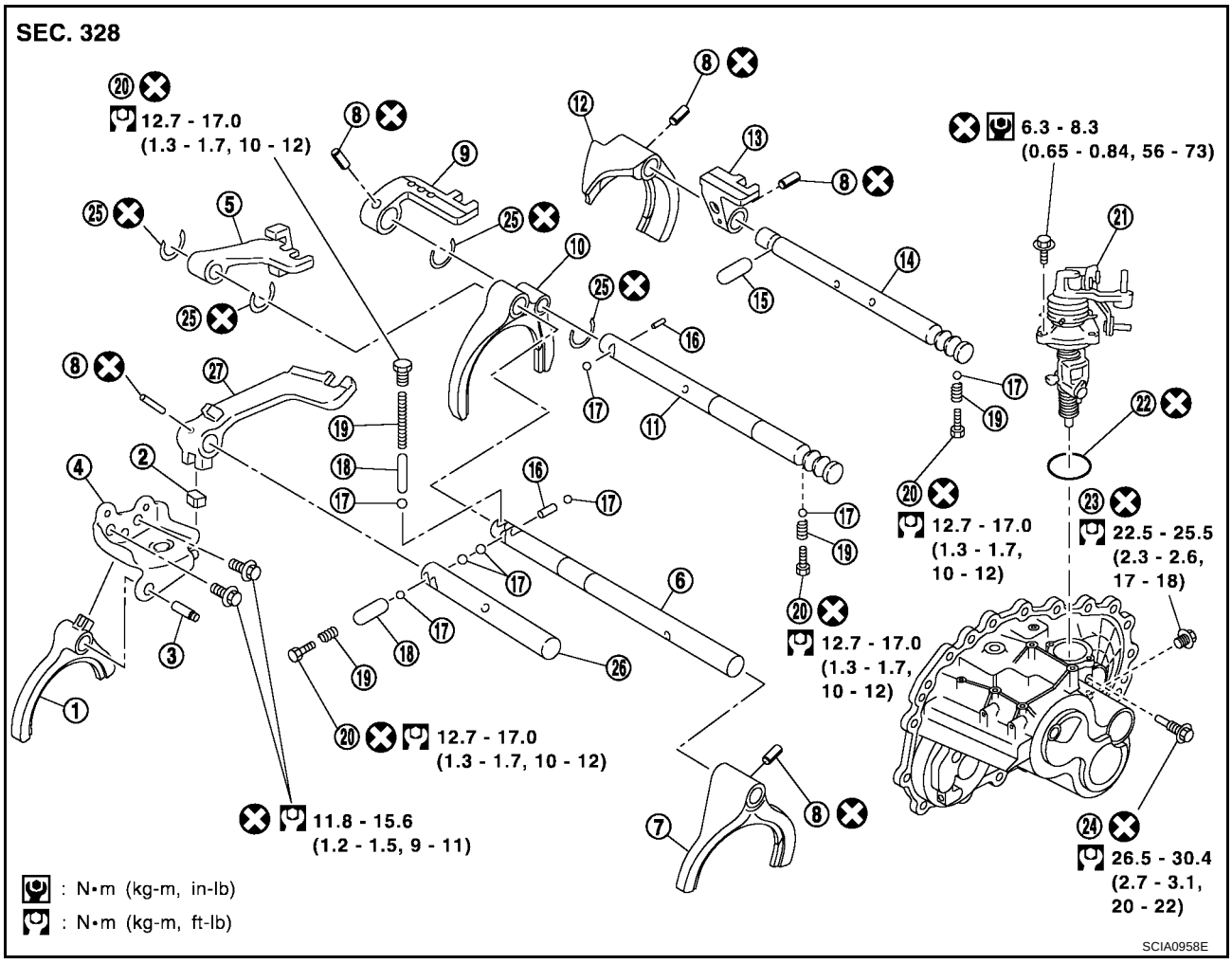


1. Input shaft front bearing
2. Input shaft
3. Needle bearing
4. 3rd input gear
5. 3rd baulk ring
6. Spread spring
7. 3rd & 4th shifting insert
8. 3rd & 4th synchronizer hub
9. 4th baulk ring
10. 3rd & 4th coupling sleeve
11. Bushing
12. Needle bearing
13. 4th input gear
14. Thrust washer
15. Bushing
16. Needle bearing
17. 5th input gear
18. 5th baulk ring
19. 5th & 6th shifting insert
20. 5th & 6th synchronizer hub
21. 5th & 6th coupling sleeve
22. Baulk ring
23. 6th input gear
24. Needle bearing
25. Bushing
26. Snap ring
27. Input shaft rear bearing
28. Oil channel
29. Input shaft rear bearing adjusting shim
30. Retaining pin
31. Reverse idler shaft
32. Thrust bearing
33. Needle bearing
34. Reverse idler gear (front)
35. Reverse baulk ring
36. Reverse coupling sleeve
37. Insert spring
38. Reverse idler gear (rear)
39. Reverse idler gear adjusting shim



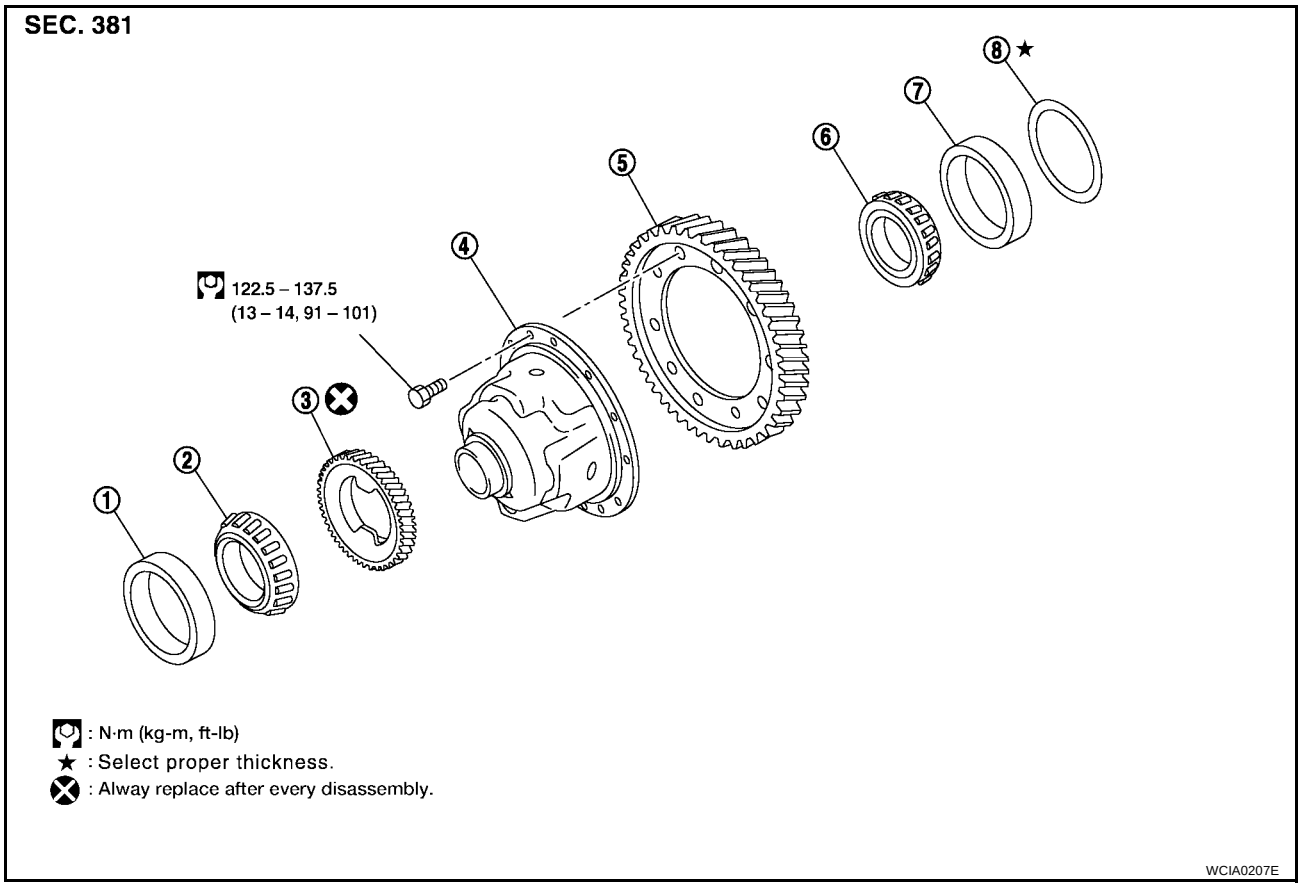
1. Mainshaft front bearing
2. Mainshaft bearing retainer
3. Mainshaft
4. Reverse main gear
5. 1st main gear
6. Bushing
7. Needle bearing
8. 1st inner baulk ring
9. 1st gear synchronizer cone
10. 1st outer baulk ring
11. Spread spring
12. 1st & 2nd shifting insert
13. 1st & 2nd synchronizer hub
14. 2nd outer baulk ring
15. 2nd gear synchronizer cone
16. 2nd inner baulk ring
17. 1st & 2nd coupling sleeve
18. Bushing
19. Needle bearing
20. 2nd main gear
21. 3rd main gear
22. 3rd & 4th mainshaft spacer
23. 4th main adjusting shim
24. 4th main gear
25. 5th main gear
26. 6th main gear
27. Mainshaft rear bearing
28. Mainshaft C-ring
29. C-ring holder
30. Snap ring
31. Snap ring
32. Mainshaft rear bearing adjusting shim
33. 5th & 6th mainshaft spacer
34. 6th main adjusting shim

SHIFT CONTROL COMPONENTS



1. Reverse shift fork
2. Shifter cap
3. Reverse fork rod
4. Reverse lever assembly
5. 5th & 6th bracket
6. 5th & 6th fork rod
7. 5th & 6th shift fork
8. Retaining pin
9. 3rd & 4th bracket
10. 3rd & 4th shift fork
11. 3rd & 4th fork rod
12. 1st & 2nd shift fork
13. 1st & 2nd bracket
14. 1st & 2nd fork rod
15. Shift check sleeve
16. Inter lock pin
17. Check ball
18. Shift check sleeve
19. Check spring
20. Check plug
21. Control assembly
22. O-ring
23. Shift check
24. Stopper bolt
25. Stopper ring
26. Reverse bracket fork rod
27. Reverse bracket

FINAL DRIVE COMPONENTS



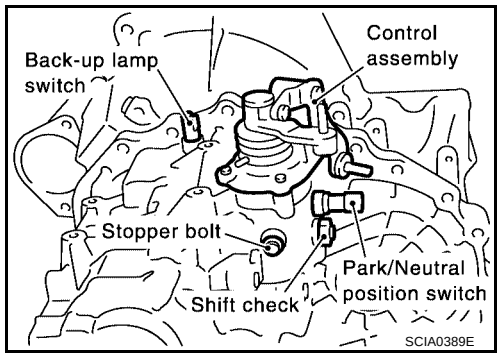
1. Differential side bearing outer race
2. Differential side bearing
3. Speedometer drive gear
4. Differential case
5. Final gear
6. Differential side bearing
7. Differential side bearing outer race
8. Differential side bearing adjusting shim

Disassembly and Assembly

ECS005VF

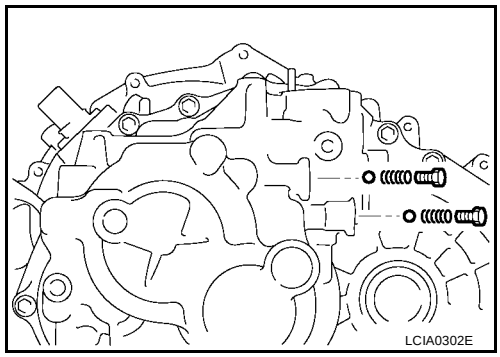
DISASSEMBLY

1. Remove the drain plug and filler plug.
2. Remove the park/neutral position switch and back-up lamp switch.
3. After removing the shift check and stopper bolt, remove the control assembly.

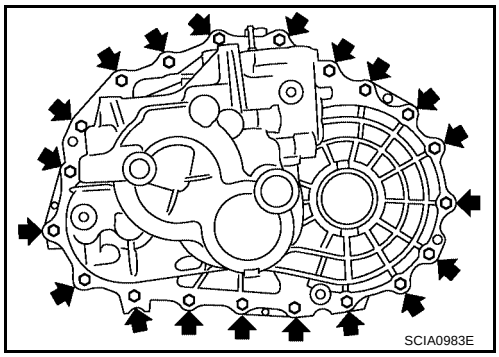


4. Remove the 2 check ball plugs, 2 check springs, and 2 check balls as shown. Discard the check ball plug.

CAUTION:
Check ball plugs are not reusable.



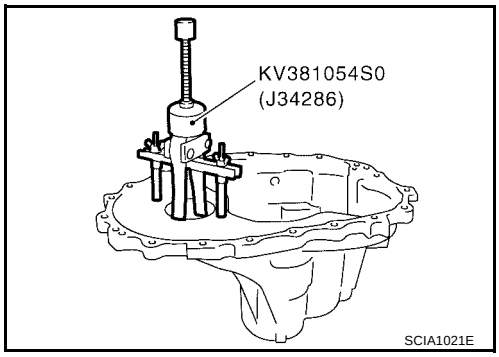
5. Remove the transaxle case bolts as shown.


SCIA0983E

6. Remove the bore plug.

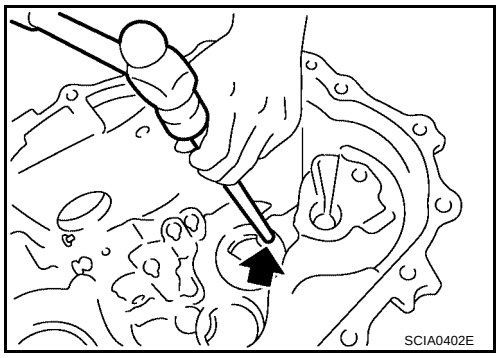
CAUTION:
Be careful not to damage transaxle case.

7. While spreading the snap ring of the mainshaft rear bearing located at bore plug hole, remove the transaxle case.
8. Remove the oil gutter and baffle plate.
9. Remove the snap ring, mainshaft rear bearing adjusting shim, and input shaft rear bearing adjusting shim from the transaxle case.
10. Remove the differential side bearing outer race (transaxle case side) using Tool as shown, and then remove the adjusting shim.

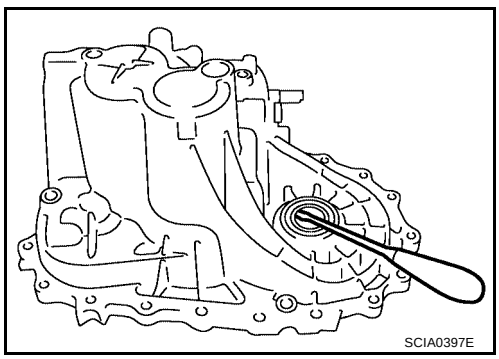


SCIA1021E

11. Remove the welch plug with a suitable punch and hammer as shown.


SCIA0402E

12. Remove the differential oil seal with a suitable tool as shown.


SCIA0397E

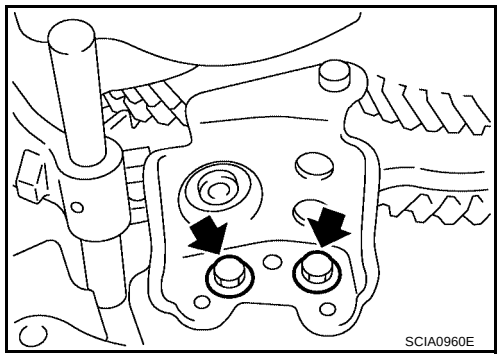
13. Remove the magnet from the clutch housing.

14. Remove the reverse check ball plug, reverse check spring, reverse shift check sleeve, and check ball. Discard the check ball plug.

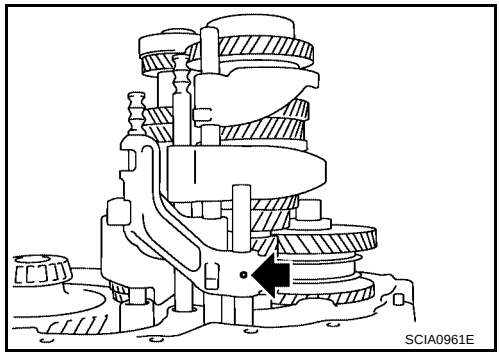
CAUTION:
- **Do not reuse the check ball plug.**
- **Do not drop the check ball.**

15. With the shift lever in 5th position, remove the bracket bolts from the reverse lever assembly as shown. Lift the reverse lever assembly to remove.

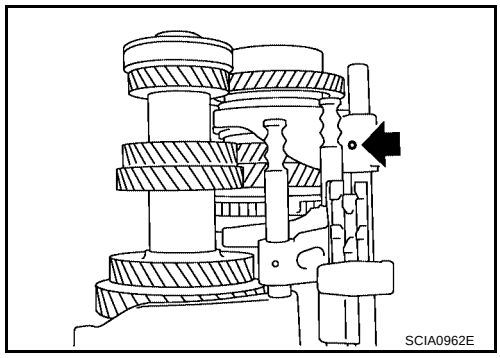
CAUTION:
Retain the shifter cap for installation.


SCIA0960E

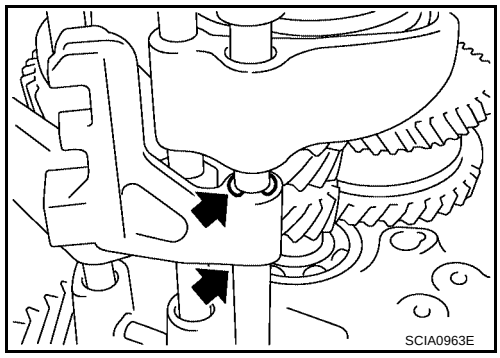
16. Pull out the reverse fork rod then remove the reverse shift fork.
17. Remove the retaining pin of the reverse bracket.


SCIA0961E

18. Pull out the reverse lever and the reverse bracket fork rod.
19. Remove the two check balls and the interlock pin.
20. Shift the 3rd-4th fork rod to the 3rd position. Remove the retaining pin of the 5th-6th shift fork using a pin punch.

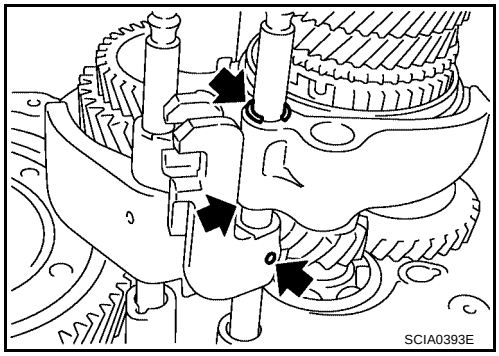

SCIA0962E

21. Remove the stopper rings for the 5th-6th bracket.

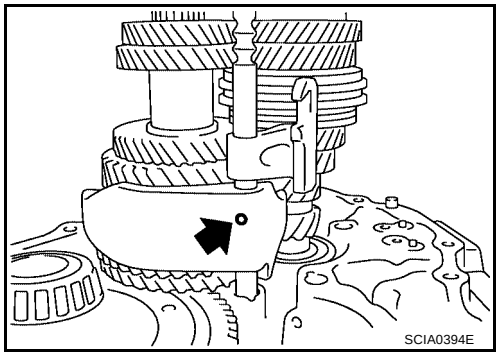

SCIA0963E

22. Pull out the 5th-6th fork rod and remove the 5th-6th shift fork and the 5th-6th bracket.
23. Remove the check balls (2 pieces) and interlock pin.

24. Remove the retaining pin of 3rd-4th bracket using pin punch.
25. Remove the stopper rings for 3rd-4th shift fork.



26. Pull out the 3rd-4th fork rod and remove 3rd-4th shift fork and bracket.
27. Remove the shift check sleeve from the clutch housing.
28. Remove the retaining pin of 1st-2nd shift fork using a suitable pin punch.

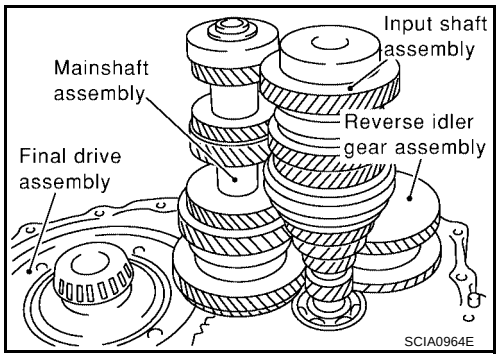


29. Pull out the 1st-2nd fork rod with bracket.
30. Remove the 1st-2nd shift fork.
31. Remove the retaining pin of 1st-2nd bracket using a suitable pin punch and separate the fork rod and bracket.
32. Remove the gear components from the clutch housing.

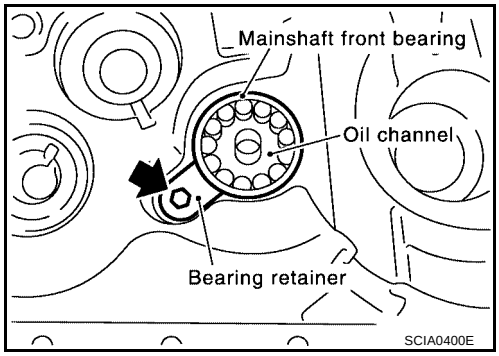
a. While tapping the input shaft with a plastic hammer, remove the input shaft assembly, mainshaft assembly, and reverse idler gear assembly as a set.

CAUTION:
Always withdraw the mainshaft straight out. Failure to do so can damage the resin oil channel on the clutch housing side.

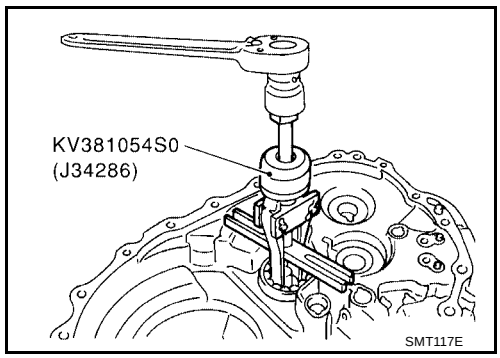
b. Remove the final drive assembly.



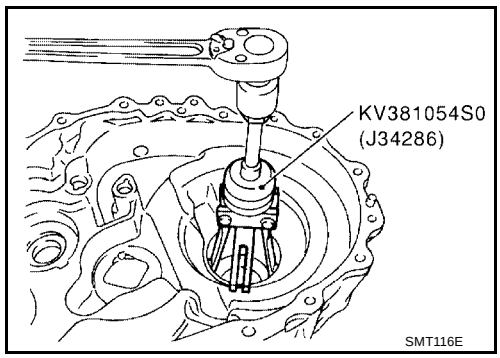
33. Remove the bearing retainer and then the mainshaft front bearing as shown.
34. Remove the oil channel on the mainshaft side.



35. Remove the differential oil seal (clutch housing side) using Tool as shown.

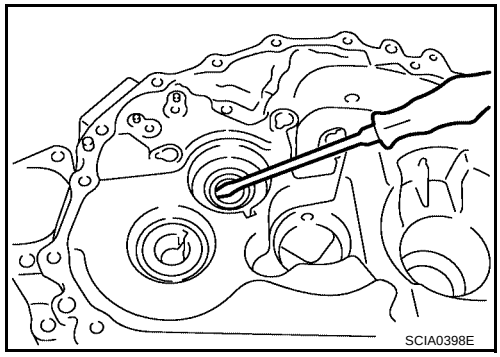


36. Remove the differential side bearing outer race (clutch housing side) using Tool as shown.



37. Remove the input shaft oil seal using a suitable tool as shown.

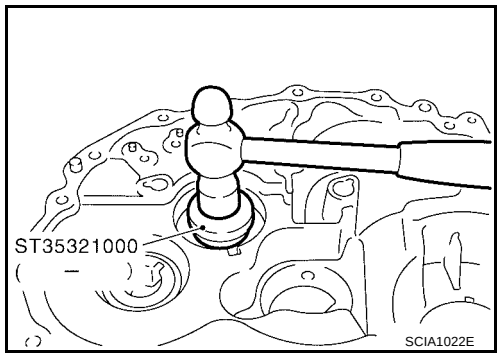
CAUTION:
Do not damage the clutch housing sealing surface.



ASSEMBLY

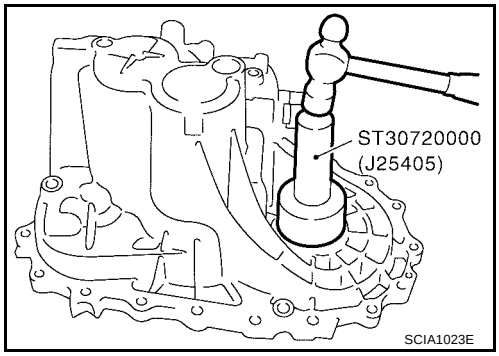
1. Install a new input shaft oil seal from the clutch housing end of the side, to the depth of 1.8 - 2.8 mm (0.071 - 0.110 in) using Tool (drift) as shown.

CAUTION:
Oil seals are not reusable.



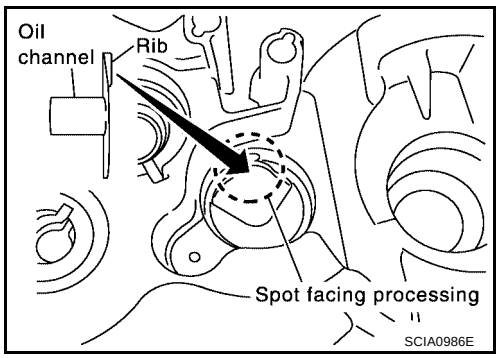
2. Install a new differential oil seal using Tool (drift) as shown.

CAUTION:
Oil seals are not reusable.



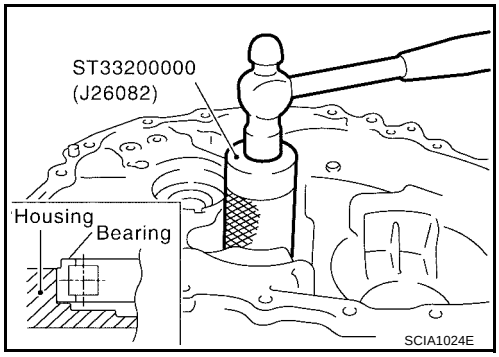
3. Install the oil channel on the mainshaft side as shown.

CAUTION:
Position the oil channel with the orientation as shown, for installation.



4. Install the mainshaft front bearing using Tool (drift) as shown.

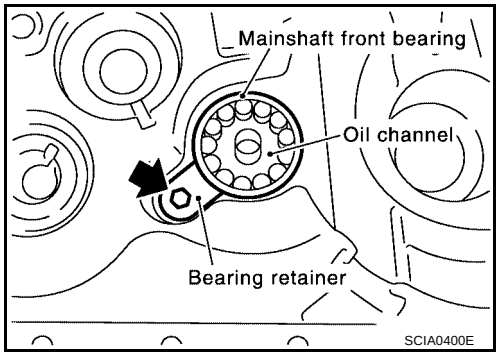
CAUTION:
Position the mainshaft front bearing with the orientation as shown, for installation



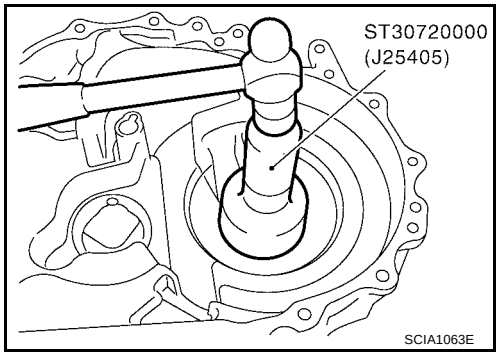
5. Install the mainshaft front bearing retainer.

CAUTION:
Install the bearing retainer with the punched surface facing up.

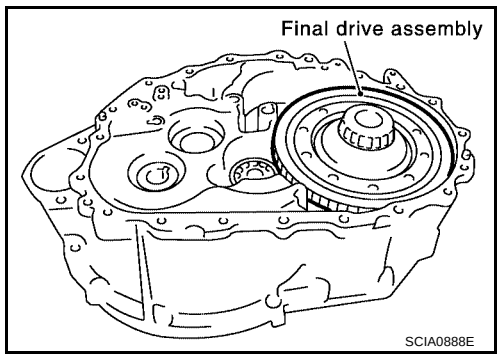
Bearing retainer bolt : 6.27 - 8.33 N·m (0.64 - 0.84 kg-m, 56 - 73 in-lb)



6. Install the differential side bearing outer race using Tool as shown.

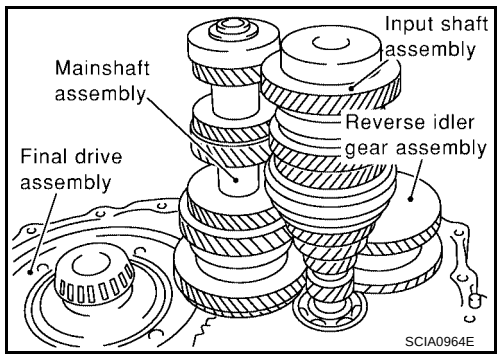


7. Install the final drive assembly into the clutch housing.



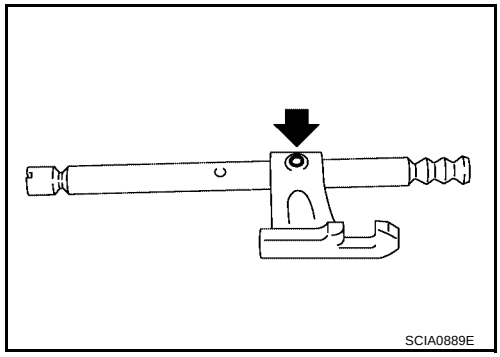
8. Install the input shaft assembly, mainshaft assembly, and reverse idler gear assembly into the clutch housing.

CAUTION:
Do not damage the input shaft oil seal.



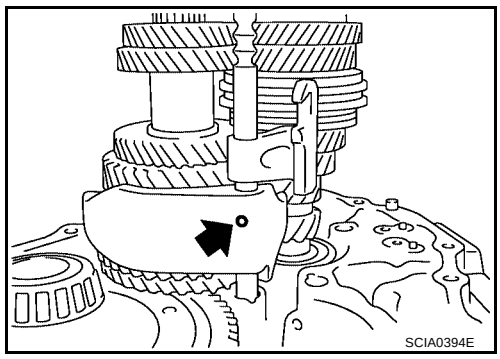
9. Install the 1st-2nd fork rod bracket onto the 1st-2nd fork rod, and then install a new retaining pin as shown.

CAUTION:
Retaining pins are not reusable.



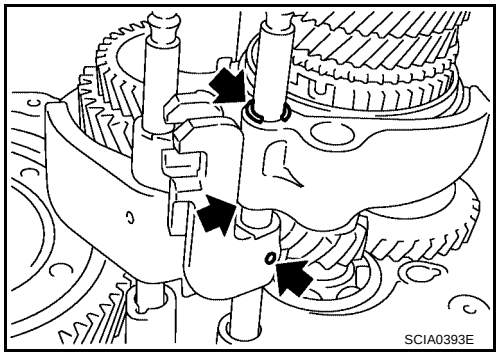
10. Install the 1st-2nd fork rod and the 1st-2nd shift fork, and then install a new retaining pin.

CAUTION:
Retaining pins are not reusable.



11. Install the shift check sleeve.
12. Install the 3rd-4th bracket, 3rd-4th shift fork, and 3rd-4th fork rod with the interlock pin.

13. Install the new stopper rings onto the 3rd-4th shift fork.
    CAUTION:
    Stopper rings are not reusable.
14. Install a new retaining pin onto the 3rd-4th bracket.
    CAUTION:
    Retaining pins are not reusable.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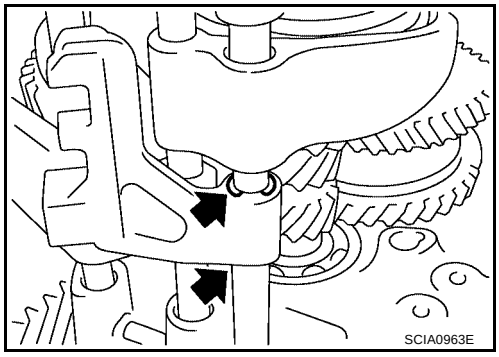
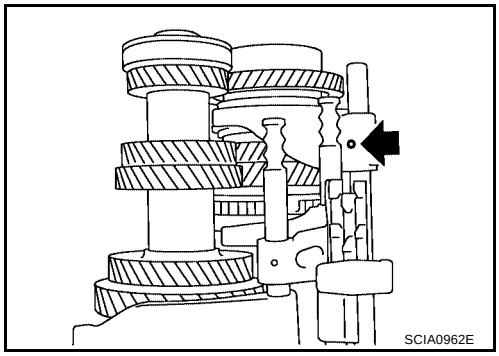
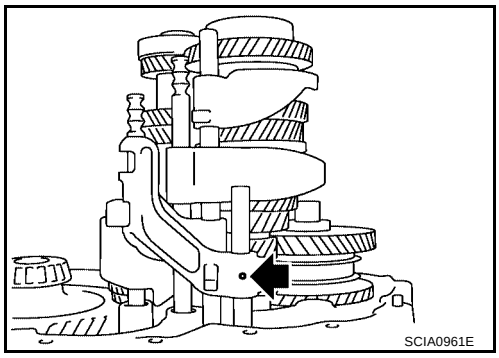
15. Install the 2 check balls.
16. Install the 5th-6th bracket, 5th-6th shift fork, and 5th-6th fork rod.
17. Install new stopper rings onto the 5th-6th bracket with interlock pin.
    CAUTION:
    Stopper rings are not reusable.


SCIA0963E

18. Install a new retaining pin onto the 5th-6th shift fork.
    CAUTION:
    Retaining pins are not reusable.


SCIA0962E

19. Install the two check balls.
20. Install the check ball, 5th-6th shift check sleeve, 5th-6th check spring, and 5th-6th check ball plug. Discard the check ball plug.
    CAUTION:
    - **Do not reuse the check ball plug.**
    - **Do not drop the check ball.**
21. Install the reverse bracket fork rod and reverse lever bracket.
22. Install a new retaining pin onto the reverse bracket.
    CAUTION:
    Retaining pins are not reusable.


SCIA0961E

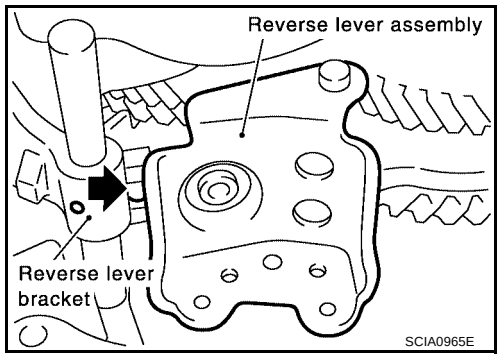
23. Install the reverse shift fork and reverse fork rod.

24. Install the reverse lever assembly using the following steps:

a. Install the shifter cap onto the reverse lever assembly cam, and then install them onto the reverse shift fork.

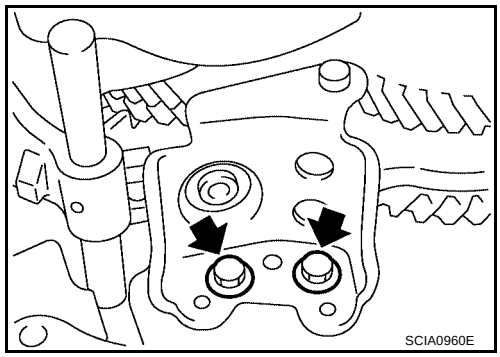
CAUTION:
Do not drop the shifter cap.

b. While lifting the reverse shift fork, align the cam with the reverse bracket.



c. Tighten the bracket bolts to specification, and install the reverse lever assembly.

Bracket bolts : 11.8 - 15.6 N·m (1.2 - 1.5 kg-m, 9 - 11 ft-lb)



25. Install the check ball, reverse shift check sleeve, reverse check spring, and reverse check ball plug.

CAUTION:
- **Do not reuse the check ball plug.**
- **Do not drop the check ball.**

26. Install the magnet onto the clutch housing.
27. Install the selected input shaft adjusting shim onto the input shaft.
    - For selection of adjusting shims, refer to MT-96, "INPUTSHAFT END PLAY" .
28. Install the baffle plate and oil gutter.
29. Install the transaxle case using the following steps:

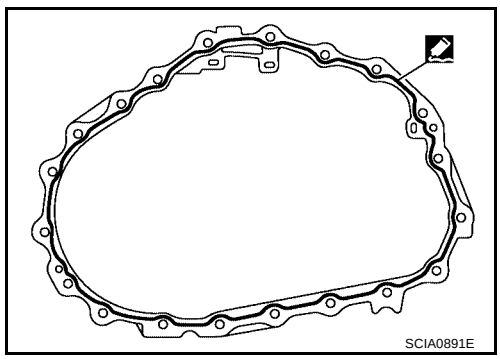
a. Install the selected mainshaft rear bearing adjusting shim into the transaxle case.
    - For selection of adjusting shims, refer to MT-98, "MAINSHAFT END PLAY" .

b. Temporarily install the snap ring of the mainshaft rear bearing into the transaxle case.

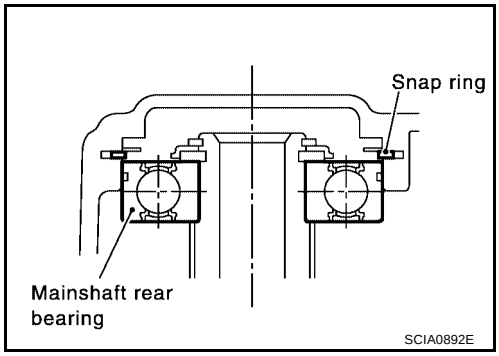
CAUTION:
Do not reuse the snap ring.

c. Apply sealant to the mating surfaces of the transaxle case and clutch housing as shown. Use Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI-45, "Recommended Chemical Products and Sealants" .

CAUTION:
Remove any old sealant adhering to the mounting surfaces. Also remove any moisture, oil, or foreign material adhering to the sealant application and mounting surfaces.

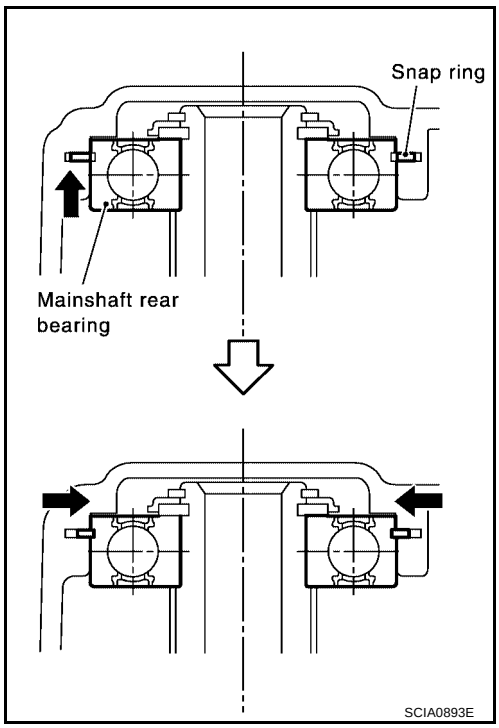


d. Using a snap ring of the mainshaft rear bearing temporarily, install the transaxle case over the clutch housing as shown.



e. Through the bore plug mounting hole, with the snap ring stretched, lift up the mainshaft assembly from the control assembly mounting hole.

f. Securely install the snap ring onto the mainshaft rear bearing as shown.



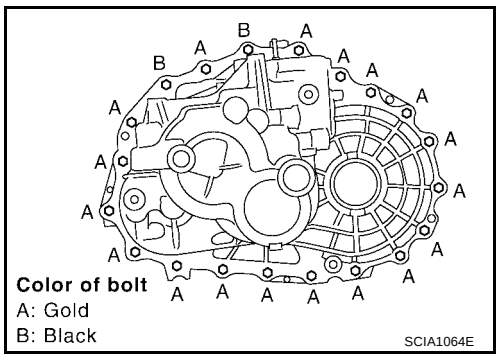
g. Tighten the “A” bolts (gold) and new “B” bolts (black) to specification.

“A” Bolt : 50.0 - 53.9 N·m (5.1 - 5.4 kg-m, 37 - 39 ft-lb)

“B” Bolt : 63.0 - 66.9 N·m (6.5 - 6.8 kg-m, 47 - 49 ft-lb)

CAUTION:

Always replace the “B” bolts as they are self-sealing bolts.



h. Install the control assembly using new O-rings.

CAUTION:

Do not reuse the O-ring.

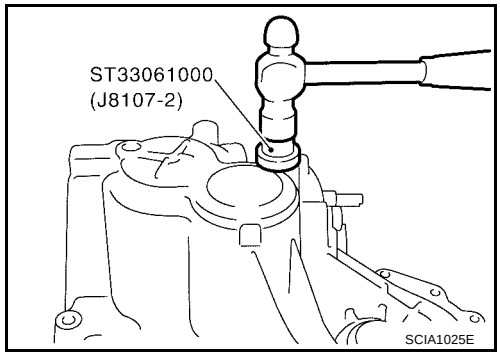
i. Install a new shift check and a new stopper bolt.

CAUTION:

Shift check and stopper bolt are not reusable.

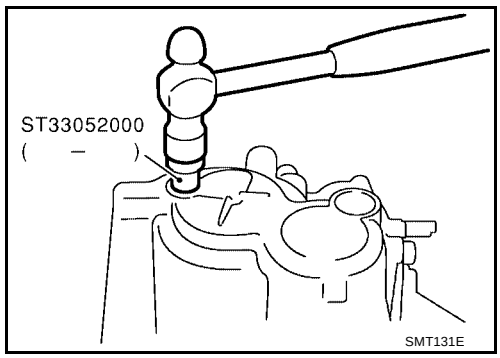
30. Install a new bore plug using Tool (drift) as shown.

CAUTION:
Bore plugs are not reusable.



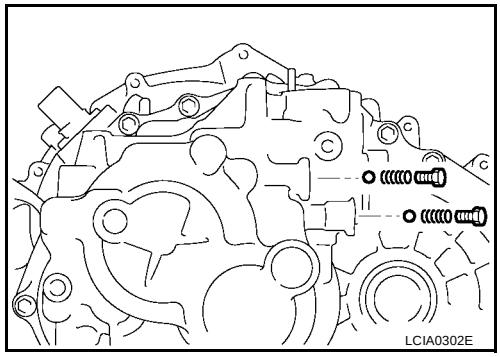
31. Install the new welch plug using Tool (drift).

CAUTION:
Do not reuse the welch plug

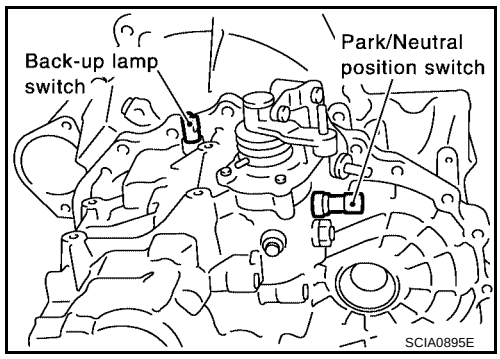


32. Install the 2 check balls, 2 check springs, and 2 new check ball plugs.

CAUTION:
Check ball plugs are not reusable.



33. Apply sealant to the threads of the neutral switch and reverse lamp switch. Then install them into the transaxle case. Refer to MT-81, "CASE AND HOUSING COMPONENTS" . Use Genuine Anaerobic Liquid Gasket or equivalent. Refer to GI-45, "Recommended Chemical Products and Sealants" .



34. Install new gaskets onto the drain plug and filler plug, and then install them into the transaxle case.

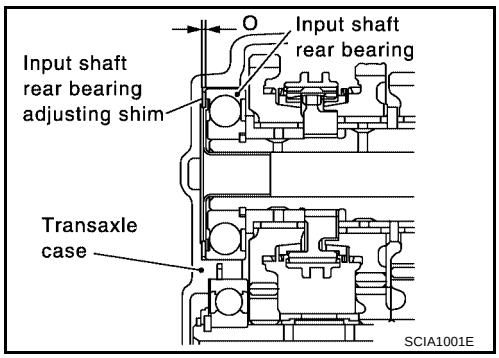
CAUTION:
- **Gaskets are not reusable.**
- **After oil is filled, tighten filler plug to specification. Refer to MT-81, "CASE AND HOUSING COMPONENTS" .**

Adjustment

ECS005VG

INPUTSHAFT END PLAY

- When adjusting the input shaft end play, select the adjusting shim for the input shaft bearing. To select the correct thickness for the adjusting shim, measure the clearance between the transaxle case and input shaft rear bearing.
- Calculate the dimension “O” (thickness of adjusting shim) using the following steps to adjust the input shaft rear bearing for the specified end play.



CAUTION:

Only 1 adjusting shim can be selected.

End play : 0 - 0.06 mm (0 - 0.0024 in)

Dimension “O” = (“O_1 ” - “O_2 ”) + End play

“O” : Thickness of adjusting shim.

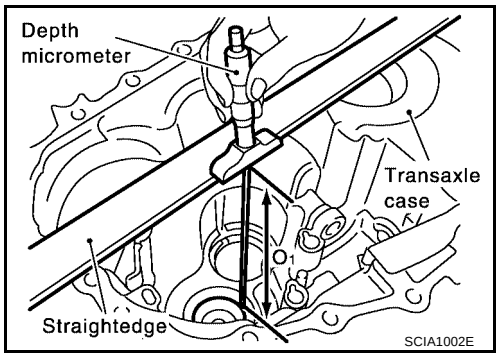
“O_1 ” : Distance between transaxle case end face and mounting face of adjusting shim.

“O_2 ” : Distance between clutch housing case end face and end face of input shaft rear bearing.

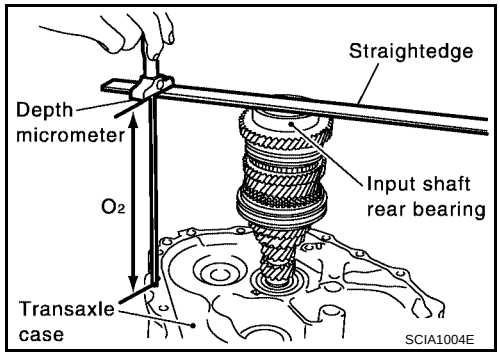
Adjusting Shims

Shim thickness	Part number	Shim thickness	Part number	Shim thickness	Part number
0.40 mm (0.0157 in)	32225 8H500	0.88 mm (0.0346 in)	32225 8H512	1.36 mm (0.0520 in)	32225 8H524
0.44 mm (0.0173 in)	32225 8H501	0.92 mm (0.0362 in)	32225 8H513	1.40 mm (0.0551 in)	32225 8H560
0.48 mm (0.0189 in)	32225 8H502	0.96 mm (0.0378 in)	32225 8H514	1.44 mm (0.0567 in)	32225 8H561
0.52 mm (0.0205 in)	32225 8H503	1.00 mm (0.0396 in)	32225 8H515	1.48 mm (0.0583 in)	32225 8H562
0.56 mm (0.0220 in)	32225 8H504	1.04 mm (0.0409 in)	32225 8H516	1.52 mm (0.0598 in)	32225 8H563
0.60 mm (0.0236 in)	32225 8H505	1.08 mm (0.0425 in)	32225 8H517	1.56 mm (0.0614 in)	32225 8H564
0.64 mm (0.0252 in)	32225 8H506	1.12 mm (0.0441 in)	32225 8H518	1.60 mm (0.0630 in)	32225 8H565
0.68 mm (0.0268 in)	32225 8H507	1.16 mm (0.0457 in)	32225 8H519	1.64 mm (0.0646 in)	32225 8H566
0.72 mm (0.0283 in)	32225 8H508	1.20 mm (0.0472 in)	32225 8H520		
0.76 mm (0.0299 in)	32225 8H509	1.24 mm (0.0488 in)	32225 8H521		
0.80 mm (0.0315 in)	32225 8H510	1.28 mm (0.0504 in)	32225 8H522		
0.84 mm (0.0331 in)	32225 8H511	1.32 mm (0.0520 in)	32225 8H523		

1. Using a depth micrometer and straight edge, measure the dimension “O_1 ” between the transaxle case end face and mounting face of the adjusting shim as shown.



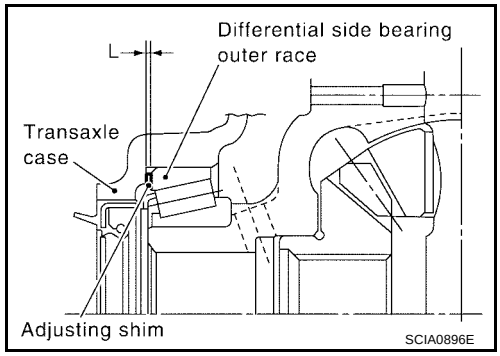
2. Using a depth micrometer and straight edge, measure the dimension "O_2 " between the clutch housing case end face and end face of the input shaft rear bearing as shown.



3. Install the selected input shaft rear bearing adjusting shim onto the input shaft.

DIFFERENTIAL SIDE BEARING PRELOAD

- When adjusting differential side bearing preload, select adjusting shim for differential side bearing. To select adjusting shim, measure clearance "L" between transaxle case and differential side bearing outer race.
- Calculate dimension "L" (thickness of adjusting shim) using the following procedure to meet specification of preload for differential side bearing.



Preload : 0.15 - 0.21 mm (0.0059 - 0.0083 in)

Dimension "L" = ("L_1 " - "L_2 ") + Preload

"L" : Thickness of adjusting shim

"L_1 " : Distance between clutch housing case end face and mounting face of adjusting shim

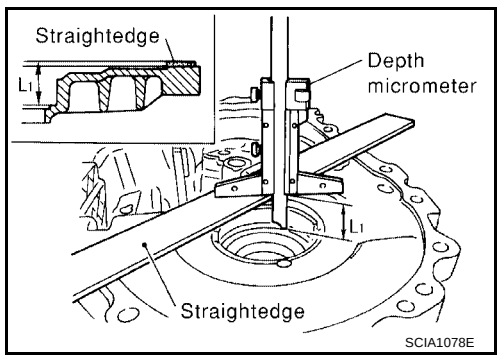
"L_2 " : Distance between differential side bearing and transaxle case

CAUTION:
Up to only 2 adjusting shims can be selected.

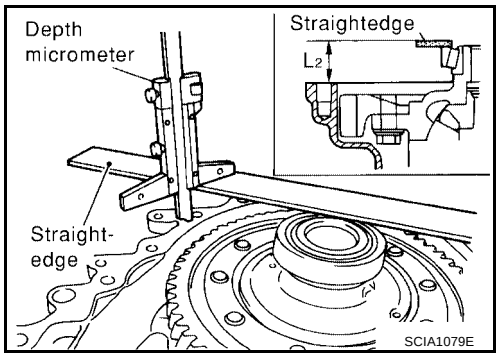
Adjusting Shim

Shim thickness	Part number
0.48 mm (0.0189 in)	31438 80X00
0.52 mm (0.0205 in)	31438 80X01
0.56 mm (0.0220 in)	31438 80X02
0.60 mm (0.0236 in)	31438 80X03
0.64 mm (0.0252 in)	31438 80X04
0.68 mm (0.0268 in)	31438 80X05
0.72 mm (0.0283 in)	31438 80X06
0.76 mm (0.0299 in)	31438 80X07
0.80 mm (0.0315 in)	31438 80X08
0.84 mm (0.0331 in)	31438 80X09
0.88 mm (0.0346 in)	31438 80X10
0.92 mm (0.0362 in)	31438 80X11

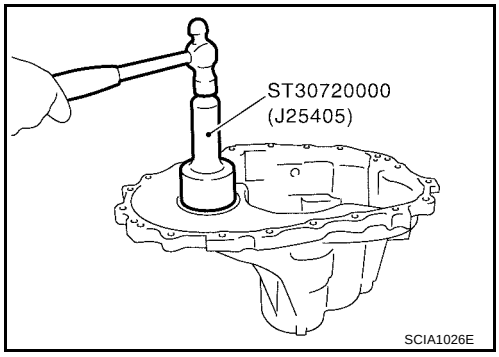
1. Using a depth micrometer and straight edge, measure the dimension "L_1 " between the clutch housing case end face and mounting face of the adjusting shim as shown.



2. Install the outer race onto the differential side bearing on the final gear side. Holding the outer race horizontally by hand, rotate the final gear five times or more (for smooth movement of the bearing roller).
3. Using a depth micrometer and straight edge, measure the dimension "L_2 " between the differential side bearing outer race and transaxle case end face as shown.

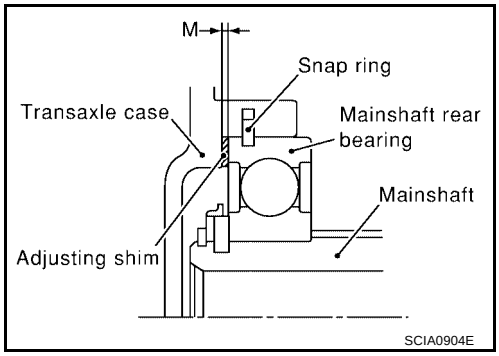


4. Install the selected adjusting shim and then the differential side bearing outer race using Tool as shown.



MAINSHAFT END PLAY

- When adjusting the mainshaft end play, select the adjusting shim for the mainshaft rear bearing. To select the adjusting shim, measure clearance "M" between the transaxle case and mainshaft rear bearing.
- Calculate the dimension "P" (thickness of adjusting shim) using the following procedure to meet specification of end play for mainshaft rear bearing.



End play : 0 - 0.06 mm (0 - 0.0024 in)

Dimension "P" = "M" - End play

"P" : Thickness of adjusting shim

"M" : Distance between mainshaft rear bearing and transaxle case

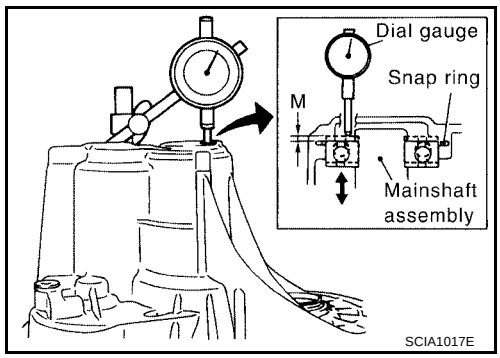
CAUTION:

Only 1 adjusting shim can be selected.

Adjusting Shim

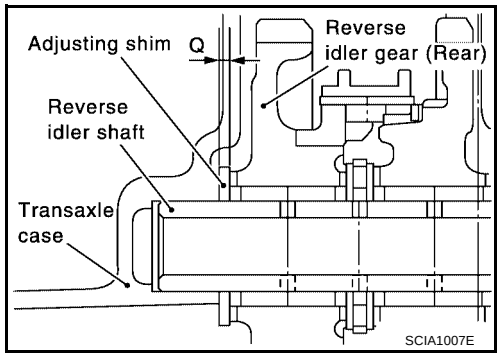
Shim thickness	Part number
0.44 mm (0.0173 in)	32238 8H510
0.48 mm (0.0189 in)	32238 8H511
0.52 mm (0.0205 in)	32238 8H512
0.56 mm (0.0220 in)	32238 8H513
0.60 mm (0.0236 in)	32238 8H514
0.64 mm (0.0252 in)	32238 8H515
0.68 mm (0.0268 in)	32238 8H516
0.72 mm (0.0283 in)	32238 8H517
0.76 mm (0.0299 in)	32238 8H518
0.80 mm (0.0315 in)	32238 8H519
0.84 mm (0.0331 in)	32238 8H520
0.88 mm (0.0346 in)	32238 8H521
0.92 mm (0.0362 in)	32238 8H522
0.96 mm (0.0378 in)	32238 8H523
1.00 mm (0.0396 in)	32238 8H524
1.04 mm (0.0409 in)	32238 8H560
1.08 mm (0.0425 in)	32238 8H561

1. Install the mainshaft assembly to the clutch housing.
2. Install the snap ring to the transaxle case.
3. Install the transaxle case to clutch housing, and temporarily assemble them with fixing bolts. Temporarily install the snap ring to the mainshaft rear bearing.
4. Install the dial gauge to the snap ring access hole, and expand the snap ring as shown. Lift the mainshaft assembly through the control assembly installation hole, and push it against the transaxle case. This state shall be defined as base. Moving the distance of the mainshaft assembly, with the snap ring installed on the main bearing, becomes “M”.



REVERSE IDLER GEAR END PLAY

- When adjusting the reverse idler gear end play, select the adjusting shim for the reverse idler gear. To select the correct thickness of adjusting shim, measure the clearance between the transaxle case and reverse idler gear.
- Calculate the dimension “Q” (thickness of adjusting shim) using the following steps to adjust the end play of the reverse idler gear to specification.



End play : 0.04 - 0.14 mm (0.0016 - 0.0055 in)

Dimension “Q” = (“Q_1 ” - “Q_2 ”) + End play

“Q” : Thickness of adjusting shim

“Q_1 ” : Distance between transaxle case end face and mounting face of adjusting shim

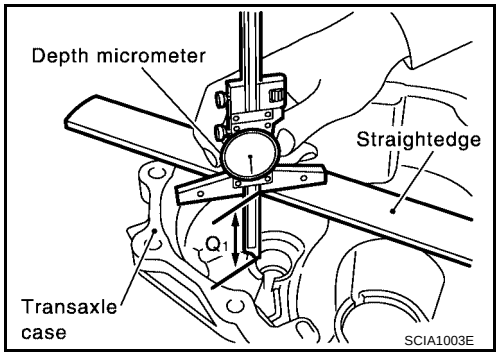
“Q_2 ” : Distance between clutch housing case end face and end face of reverse idler gear

CAUTION:
Only 1 adjusting shim can be selected.

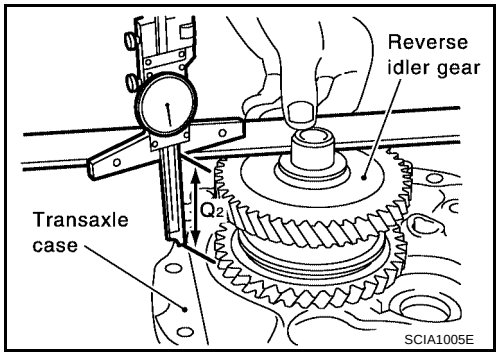
Adjusting Shim

Shim thickness	Part number
1.76 mm (0.0693 in)	32237 8H500
1.84 mm (0.0724 in)	32237 8H501
1.92 mm (0.0756 in)	32237 8H502
2.00 mm (0.0787 in)	32237 8H503
2.08 mm (0.0819 in)	32237 8H504
2.16 mm (0.0850 in)	32237 8H505
2.24 mm (0.0882 in)	32237 8H506
2.32 mm (0.0913 in)	32237 8H507
2.40 mm (0.0945 in)	32237 8H508
2.48 mm (0.0976 in)	32237 8H509
2.56 mm (0.1008 in)	32237 8H510
2.64 mm (0.1039 in)	32237 8H511

1. Using a depth micrometer and straight edge, measure the dimension "Q_1 " between the transaxle case end face and the mounting face of the adjusting shim as shown.



2. Using a depth micrometer and straight edge, measure the dimension "Q_2 " between the clutch housing case end face and the end face of reverse idler gear as shown.



3. Install the selected reverse idler gear adjusting shim onto the reverse idler gear.

INPUT SHAFT AND GEARS

PFP:32200

Disassembly and Assembly

ECS005VH

DISASSEMBLY

1. Before disassembling, measure the end play for 3rd, 4th, 5th, and 6th input gears.

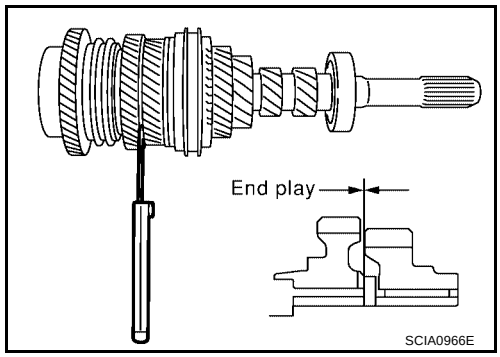
End play standard values

3rd gear : 0.18 - 0.31 mm (0.0071 - 0.0122 in)

4th gear : 0.20 - 0.30 mm (0.0079 - 0.0118 in)

5th gear : 0.06 - 0.16 mm (0.0024 - 0.0063 in)

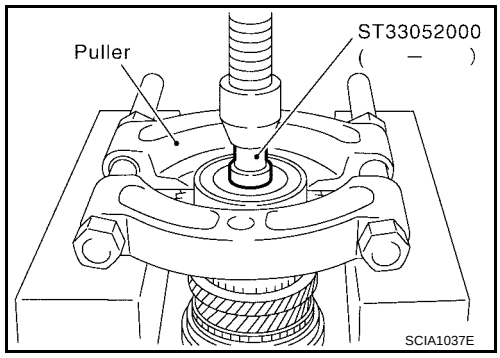
6th gear : 0.06 - 0.16 mm (0.0024 - 0.0063 in)



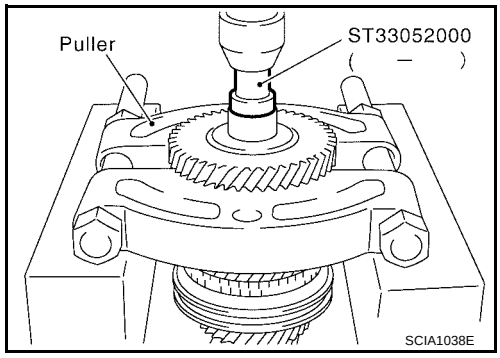
CAUTION:

If measurement is outside the standard value, disassemble to check the contact surfaces of the gear, shaft, and, hub. Adjust using the correct size snap ring for assembly.

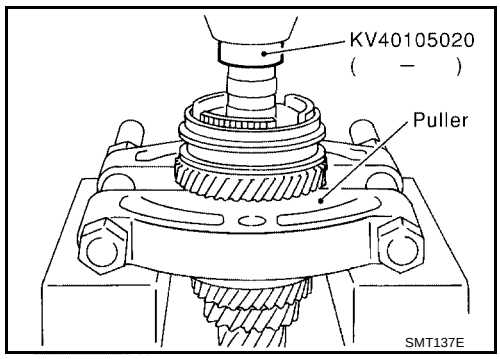
2. Remove the oil channel.
3. Remove the input shaft rear bearing using Tool as shown.
4. Remove the snap ring.



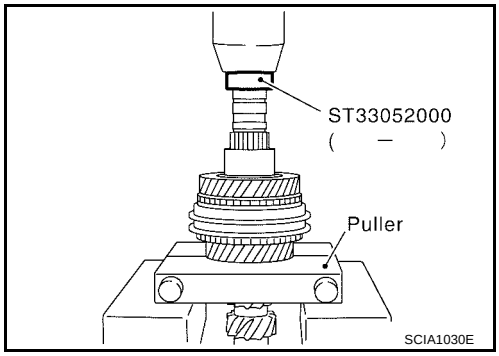
5. Remove the 6th input gear, 6th bushing, and 6th needle bearing using Tool as shown.
6. Remove the 6th baulk ring, 5th-6th coupling sleeve, and shifting insert.



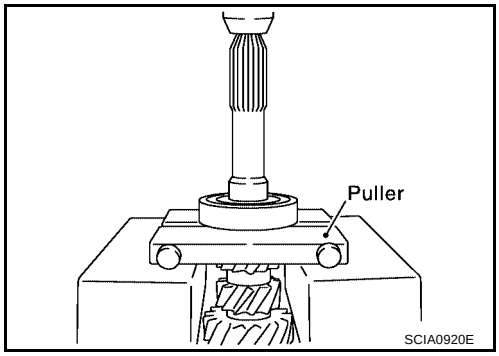
7. Remove the 5th input gear and synchronizer hub assembly simultaneously using Tool as shown.
8. Remove the 5th needle bearing.



9. Remove the 5th bushing, thrust washer, 4th input gear, 4th needle bearing, 4th bushing, 4th baulk ring, 3rd-4th synchronizer hub assembly, 3rd baulk ring, and 3rd input gear simultaneously using Tool as shown.
10. Remove the 3rd needle bearing.



11. Remove the input shaft front bearing using Tool as shown.

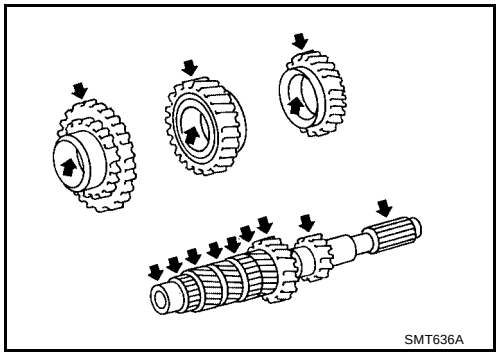


INSPECTION AFTER DISASSEMBLY

Input Shaft and Gear

Inspect the components for the following conditions as shown. If necessary, replace them with new ones.

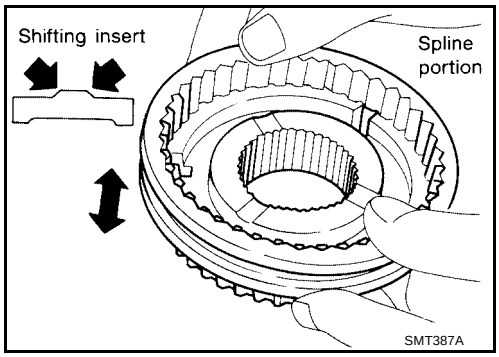
- Damage, peeling, dent, uneven wear, or bending of the input shaft.
- Excessive wear, damage, or peeling of the input gears.



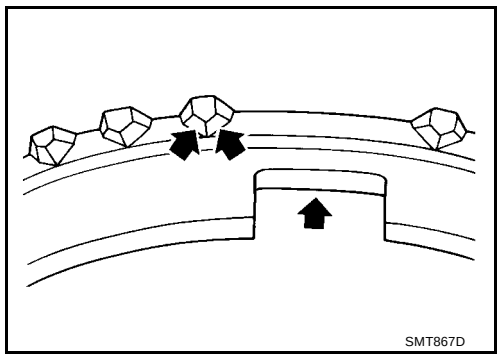
Synchronizer

Check the items below. If necessary, replace them with new ones.

- Damage and excessive wear of the contact surfaces of coupling sleeve, synchronizer hub, and shifting insert.
- Coupling sleeve and synchronizer hub must move smoothly as shown.



- If any cracks, damage, or excessive wear is found on the cam face of baulk ring or working face of the insert as shown, replace it.



Baulk ring clearance

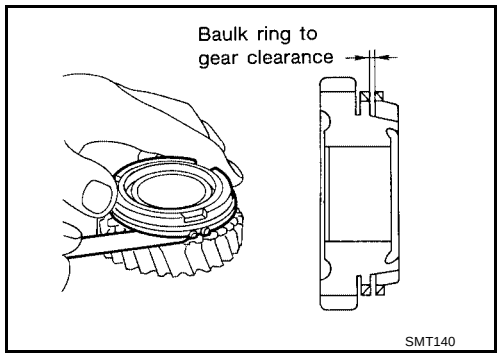
Press the baulk ring against cone, and measure clearance between baulk ring and cone. If measurement is below limit, replace it with a new one.

Clearance - standard

3rd and 4th : 0.9 - 1.45 mm (0.035 - 0.0571 in)

5th and 6th : 0.95 - 1.4 mm (0.0374 - 0.055 in)

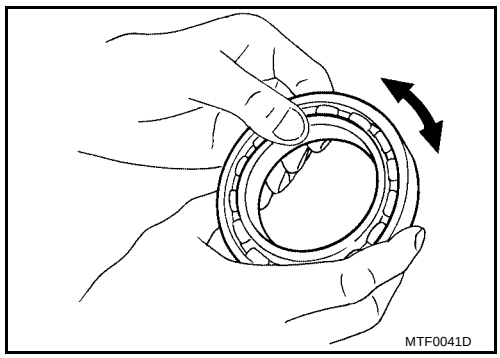
Limit : 0.7 mm (0.028 in)



Bearing

Check the items below. If necessary, replace them with new ones.

- Rough rotation of the bearing as shown.
- Damage to the bearing.



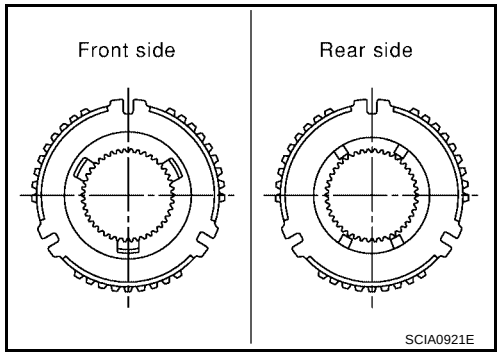
ASSEMBLY

1. Install the 3rd needle bearing.
2. Install the 3rd input gear and 3rd baulk ring.
3. Install the spread spring, shifting insert, and a new 3rd-4th synchronizer hub onto the 3rd-4th coupling sleeve.

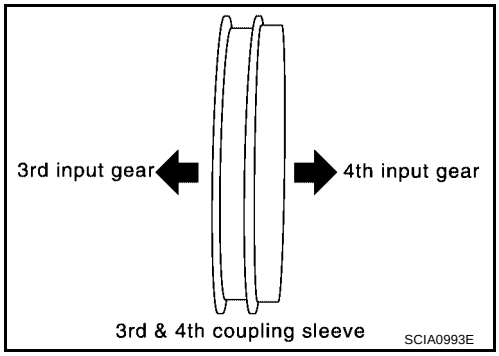
CAUTION:

Do not reuse the 3rd-4th synchronizer hub.

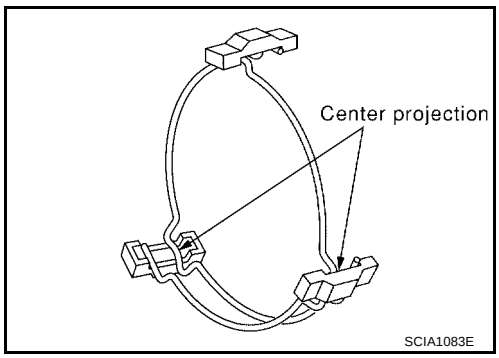
- Install with orientation of the synchronizer hub as shown.



- Install with orientation of coupling sleeve as shown.

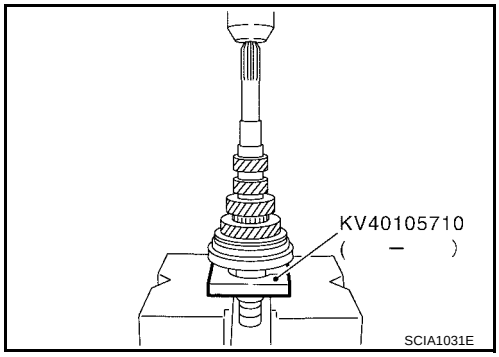


- Be sure not to hook the ends of the 2 spread springs (front and back have two each) on the same shifting insert.

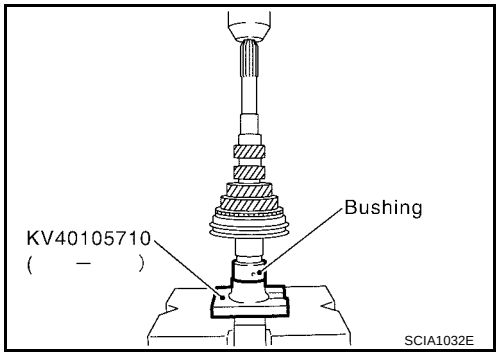


4. Install 3rd-4th coupling sleeve assembly using Tool as shown.

CAUTION:
Align the grooves of the shifting insert and the 3rd baulk ring.



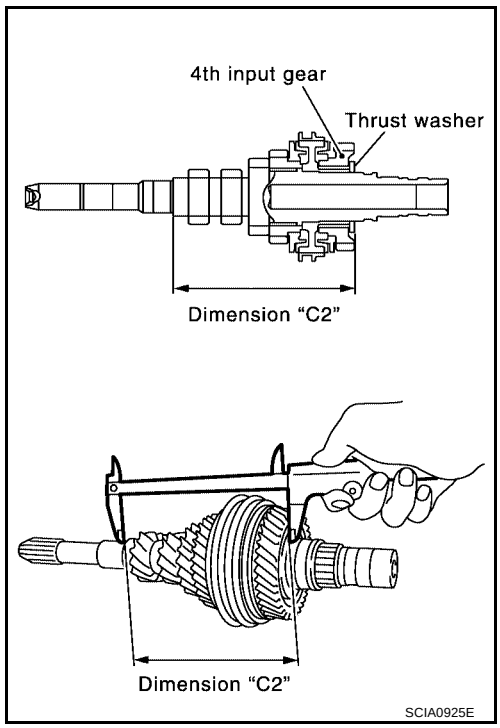
5. Install the 4th bushing using Tool as shown.
6. Install the 4th baulk ring.
7. Install the 4th input gear and 4th needle bearing.



8. Measure the dimension “C_2 ” as shown. Select a thrust washer so that dimension “C_2 ” satisfies standard dimension specification. Then install the thrust washer onto the input shaft.

Standard for dimension “C_2 ” : 154.7 - 154.8 mm (6.091 - 6.094 in)

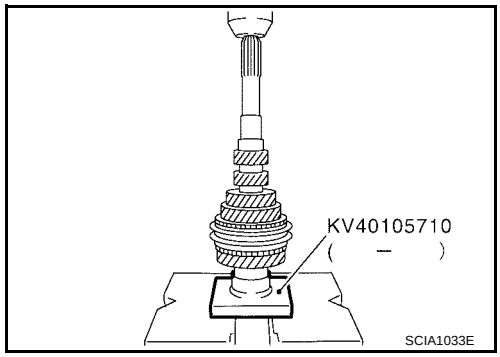
CAUTION:
Only 1 thrust washer can be selected.



Thrust Washer

Thickness	Part number	Thickness	Part number
3.84 mm (0.1512 in)	32347 8H500	4.02 mm (0.1583 in)	32347 8H503
3.90 mm (0.1535 in)	32347 8H501	4.08 mm (0.1606 in)	32347 8H504
3.96 mm (0.1559 in)	32347 8H502	4.14 mm (0.1630 in)	32347 8H505

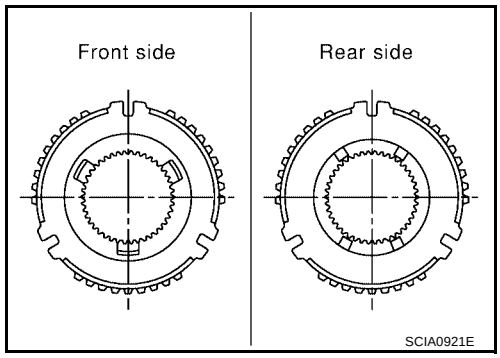
9. Install the 5th bushing using Tool as shown.
10. Install the 5th needle bearing and 5th input gear.
11. Install the 5th baulk ring.



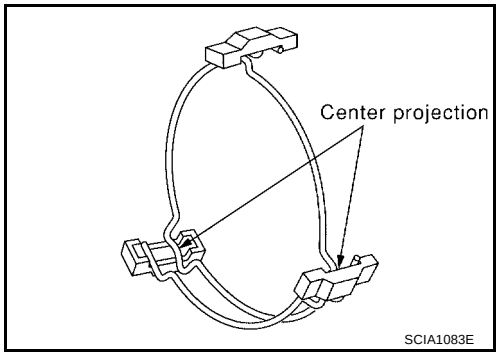
12. Install the synchronizer assembly onto a new 5th-6th synchronizer hub.

CAUTION:
Do not reuse the 5th-6th synchronizer hub.

- Install with the orientation of the synchronizer hub as shown.

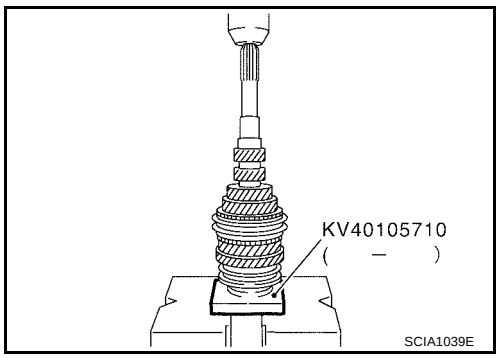


- Be sure not to hook the ends of the 2 spread springs (front and back have two each) on the same shifting insert.

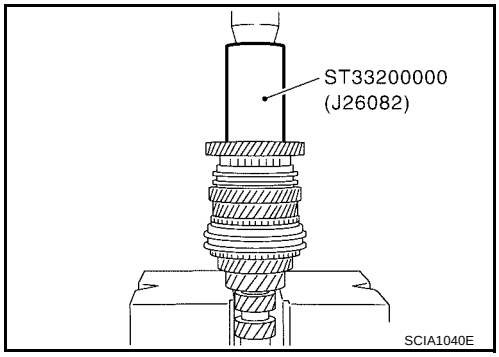


13. Install the 5th-6th synchronizer hub assembly using Tool as shown.

CAUTION:
Align the grooves of the 5th-6th shifting insert and 5th-6th baulk ring.



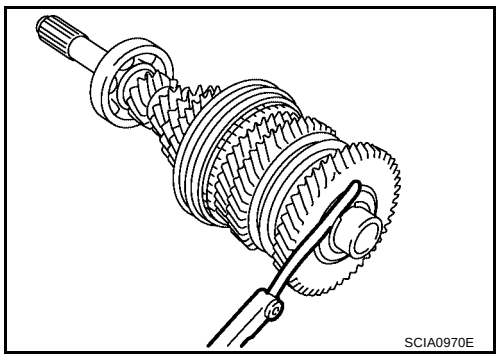
14. Install the needle bearing, 6th input gear and then 6th bushing using Tool as shown.



15. Install the snap ring onto the input shaft, and measure to check that end play (gap between snap ring and groove) of the 6th bushing is within specification.

End play standard value : 0 - 0.1 mm (0 - 0.004 in)

- If the measurement is outside the standard value, select the appropriate size snap ring.

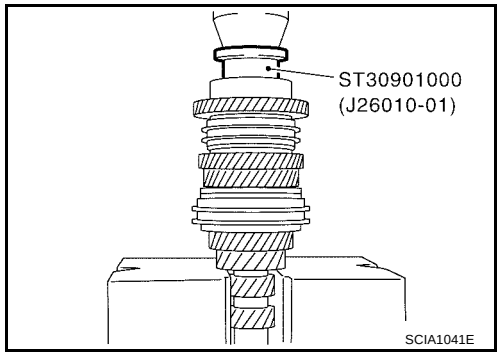


Snap Rings

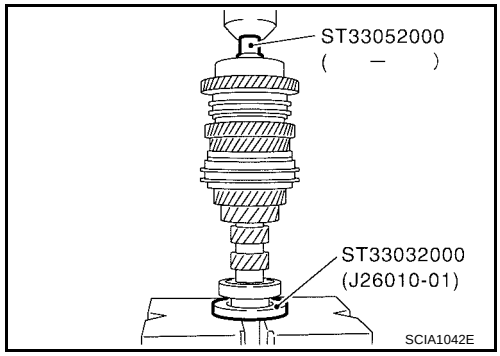
Thickness	Part number	Thickness	Part number
1.76 mm (0.0693 in)	32204 8H511	2.01 mm (0.0791 in)	32204 8H516
1.81 mm (0.0713 in)	32204 8H512	2.06 mm (0.0811 in)	32204 8H517
1.86 mm (0.0732 in)	32204 8H513	2.11 mm (0.0831 in)	32204 8H518
1.91 mm (0.0752 in)	32204 8H514	2.16 mm (0.0850 in)	32204 8H519
1.96 mm (0.0772 in)	32204 8H515	2.21 mm (0.0871 in)	32204 8H520

16. Install the input shaft rear bearing using Tool as shown.

CAUTION:
Install input shaft rear bearing with its brown surface facing the input gear side.



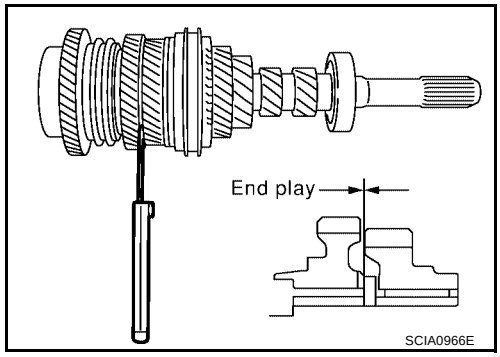
17. Install the input shaft front bearing using Tool as shown.
18. Install the oil channel onto the input shaft.



19. Check the end play of the 3rd, 4th, 5th and 6th input gears as shown.

End play standard value

3rd gear : 0.18 - 0.31 mm (0.0071 - 0.0122 in)
4th gear : 0.20 - 0.30 mm (0.0079 - 0.0118 in)
5th gear : 0.06 - 0.16 mm (0.0024 - 0.0063 in)
6th gear : 0.06 - 0.16 mm (0.0024 - 0.0063 in)



MAINSHAFT AND GEARS

PFP:32241

Disassembly and Assembly

ECS005VI

DISASSEMBLY

1. Before disassembling, measure the end play of 1st and 2nd main gears as shown.

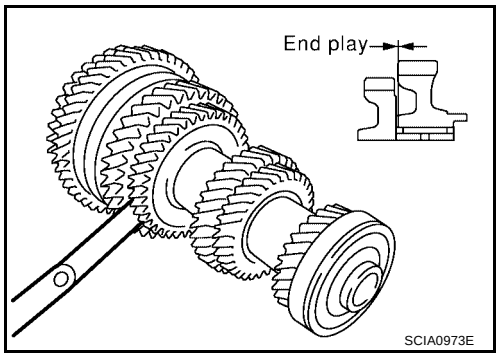
End play standard value

1st gear : 0.20 - 0.30 mm (0.0079 - 0.0118 in)

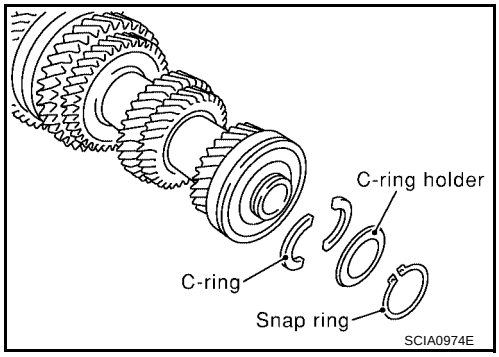
2nd gear : 0.06 - 0.16 mm (0.0024 - 0.0063 in)

CAUTION:

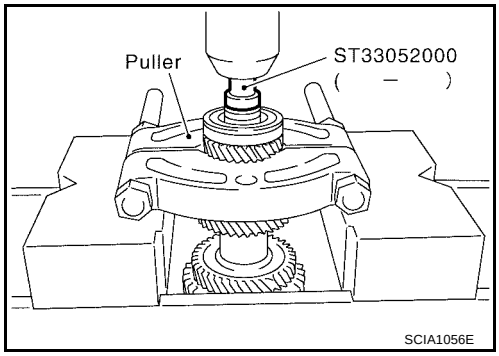
If the measurement is outside the standard value, disassemble to check the contact surfaces of gear, shaft, and hub. Adjust with the snap ring at assembly.



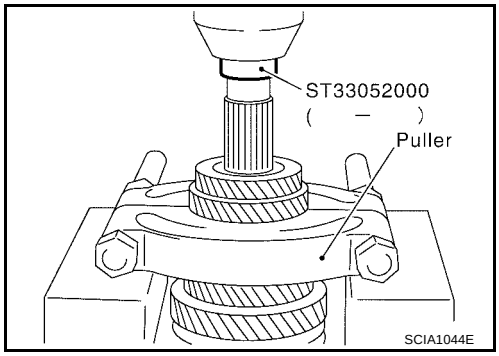
2. Remove the snap ring.
3. Remove the C-ring holder, and then mainshaft C-ring as shown.



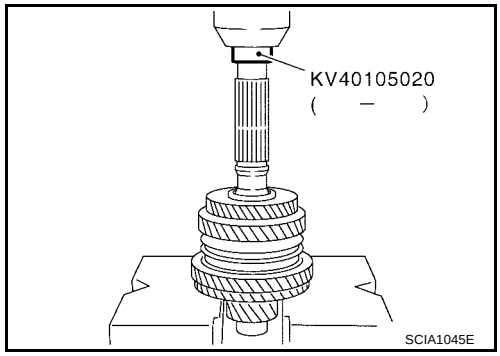
4. Remove the mainshaft rear bearing, adjust shim, and 6th main gear using Tool as shown.
5. Remove the 5th-6th mainshaft spacer.



6. Remove the 4th main gear and 5th main gear simultaneously using Tool as shown.
7. Remove the adjusting shim.
8. Remove the 3rd-4th mainshaft spacer.



9. Remove the 3rd main gear, 2nd main gear, 2nd gear needle bearing, 2nd bushing, 1st-2nd synchronizer assembly, 1st main gear, reverse main gear, 1st gear needle bearing, and 1st bushing simultaneously using Tool as shown.

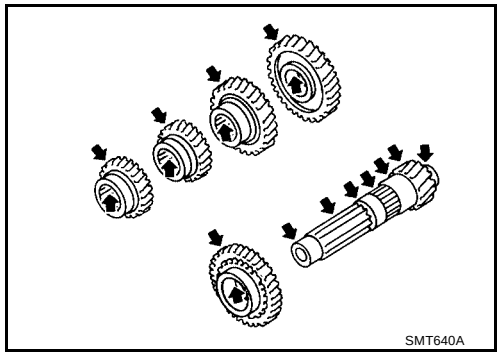


INSPECTION AFTER DISASSEMBLY

Mainshaft and Gears

Check the items listed as shown. If necessary, replace them with new ones.

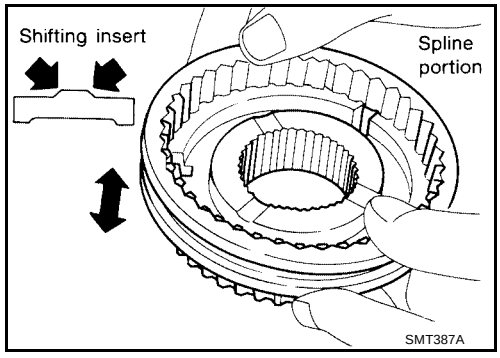
- Damage, peeling, dent, uneven wear, bending, and other non-standard conditions of the mainshaft.
- Excessive wear, damage, peeling, and other non-standard conditions of the mainshaft gears.



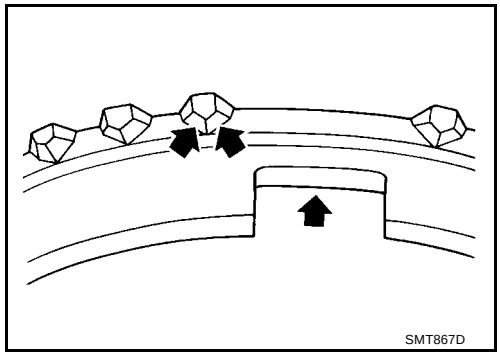
Synchronizer

Check the items listed as shown. If necessary, replace them with new ones.

- Damage, unusual wear on contact surfaces of coupling sleeve, synchronizer hub, and shifting insert.
- Coupling sleeve and synchronizer hub must move smoothly as shown.



- If any cracks, damage, or excessive wear is found on the cam face of baulk ring or working face of the insert, replace it.



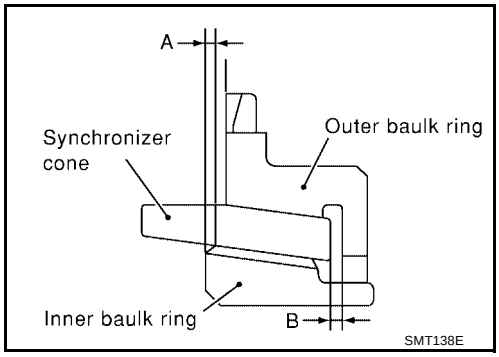
Baulk Ring Clearance

Double Cone Synchronizer (1st)

Check the clearance of outer baulk ring, synchronizer cone, and inner baulk ring of 1st double cone synchronizer, using the following steps.

NOTE:
The mean value is the middle value of a set of measurements between the highest and lowest values. It is calculated by adding the highest and lowest measured value and dividing their sum by two: [(high value) + (low value)] / 2 = mean value.

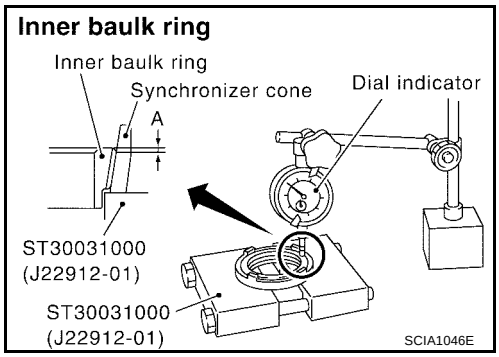
CAUTION:
Outer baulk ring, synchronizer cone, and inner baulk ring act as a set to control the clearances "A" and "B". If the measurement exceeds the service limit value, replace all of them as a set.



1. Using a dial gauge and Tool, measure clearance "A" at two or more points diagonally opposite, and calculate mean value.

Clearance "A"

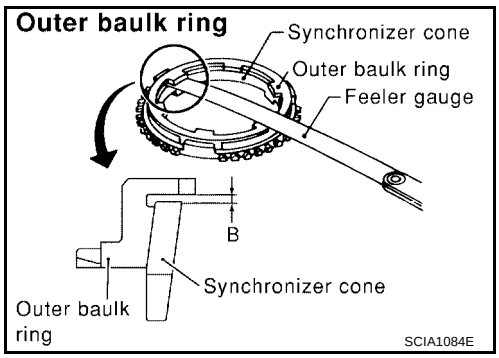
Standard	**: 0.6 - 0.8 mm (0.024 - 0.031 in)**
Limit value	**: 0.2 mm (0.008 in) or less**



2. Using a feeler gauge, measure clearance "B" at two or more points diagonally opposite, and calculate mean value as shown.

Clearance "B"

Standard	**: 0.6 - 1.1 mm (0.024 - 0.043 in)**
Limit value	**: 0.2 mm (0.008 in) or less**

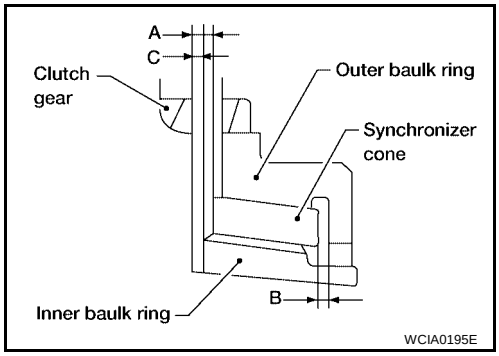


Triple Cone Synchronizer (2nd)

Check the clearance of the outer baulk ring, synchronizer cone, and inner baulk ring of the 2nd triple cone synchronizers, using the following procedure.

CAUTION:
The outer baulk ring, synchronizer cone, and inner baulk ring operate as a set to control the clearances "A", "B", and "C". If the measured clearances exceed the service limit value, replace the components as a set.

NOTE:
To calculate the mean value of two or more measured values, add the highest and lowest measured values and divide by two.

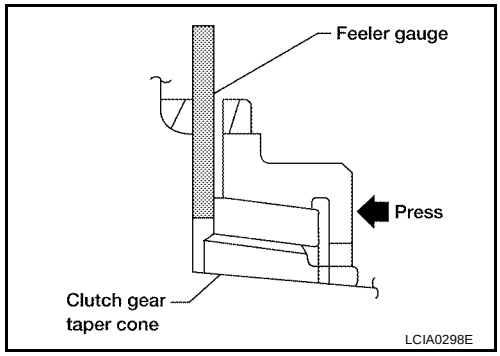


3. Press the baulk ring on to the clutch gear taper cone by hand, then measure the clearance “A” at two or more points diagonally opposite with a feeler gauge, and then calculate the mean value.

Clearance “A”

Standard : 0.6 - 1.2 mm (0.024 - 0.047 in)

Limit : 0.3 mm (0.012 in)

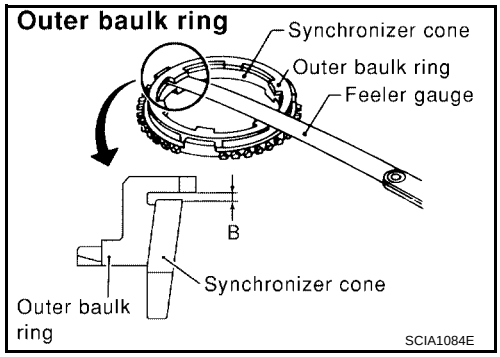


4. Measure clearances “B” at two or more points diagonally opposite with a feeler gauge, and then calculate the mean value.

Clearance “B”

Standard : 0.6 - 1.1 mm (0.024 - 0.043 in)

Limit : 0.2 mm (0.008 in)

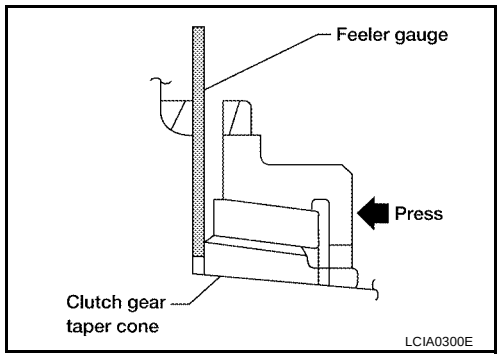


5. Press the baulk ring on to the clutch gear taper cone by hand, then measure the clearance “C” at two or more points diagonally opposite with a feeler gauge, and then calculate the mean value.

Clearance “C”

Standard : 0.7 - 1.1 mm (0.028 - 0.043 in)

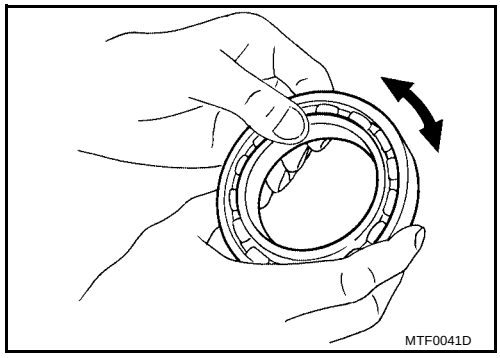
Limit : 0.3 mm (0.012 in)



Bearing

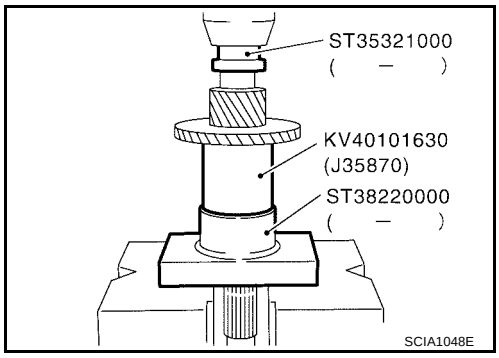
Check the items below. If necessary, replace them with new ones.

- Rough rotation of the bearing as shown.
- Damage to the bearing.

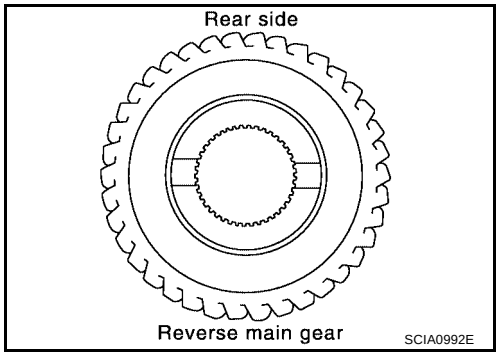


ASSEMBLY

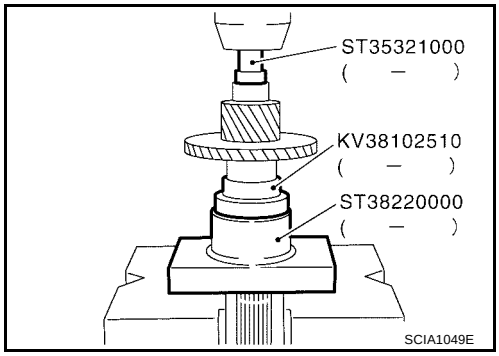
1. Install the reverse main gear using Tool as shown.



CAUTION:
Install with the orientation of reverse main gear as shown.

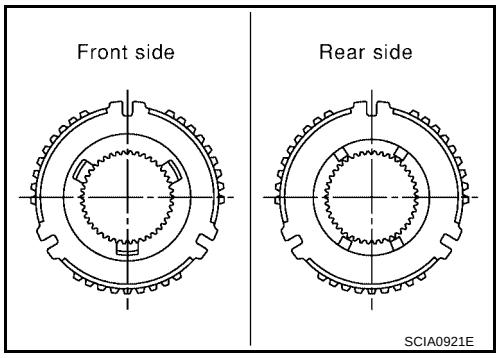


2. Install the 1st bushing using Tool as shown.
3. Install the needle bearing, and then the 1st main gear.

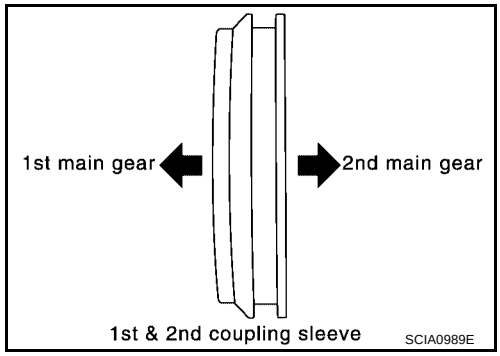


4. Install the spread spring, shifting insert, and a new 1st-2nd synchronizer hub onto the 1st-2nd coupling sleeve.

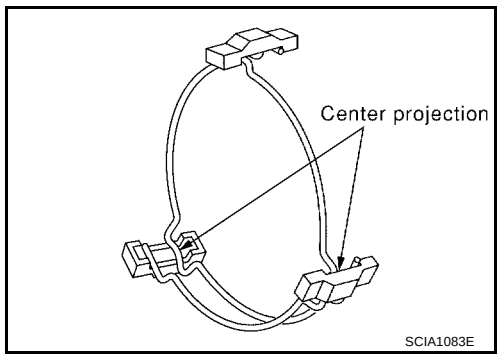
CAUTION:
- **Do not reuse 1st-2nd synchronizer hub**
- **Install with the orientation of the new synchronizer hub as shown.**



- **Install with the orientation of coupling sleeve as shown.**

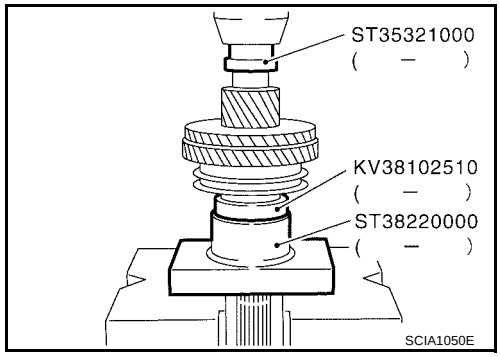


- **Do not hook the ends of the two spread springs (front and back have two each) on the same shifting insert.**

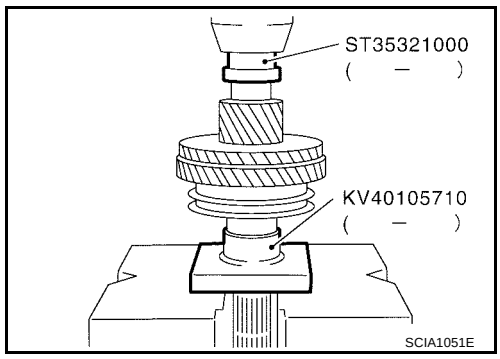


5. Install the 1st-2nd coupling sleeve assembly onto the mainshaft, and the synchronizer hub assembly onto the mainshaft using Tool as shown.

CAUTION:
- **Outer baulk ring, synchronizer cone, and inner baulk ring on the 2nd gear-side must have been removed.**
- **Install the coupling sleeve with the proper orientation.**



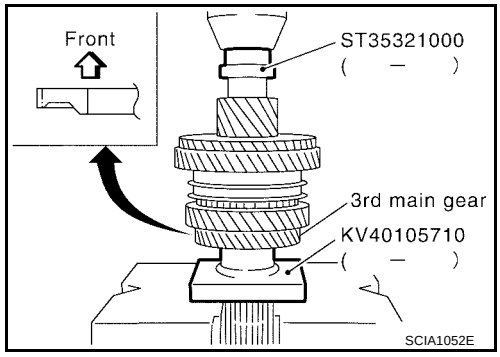
6. Install the 2nd bushing using Tool as shown.
7. Install the outer baulk ring, synchronizer cone, and inner baulk ring on 2nd gear-side.
8. Install the 2nd needle bearing and 2nd gear.



9. Install the 3rd main gear.

CAUTION:
Install the 3rd main gear with the orientation as shown.

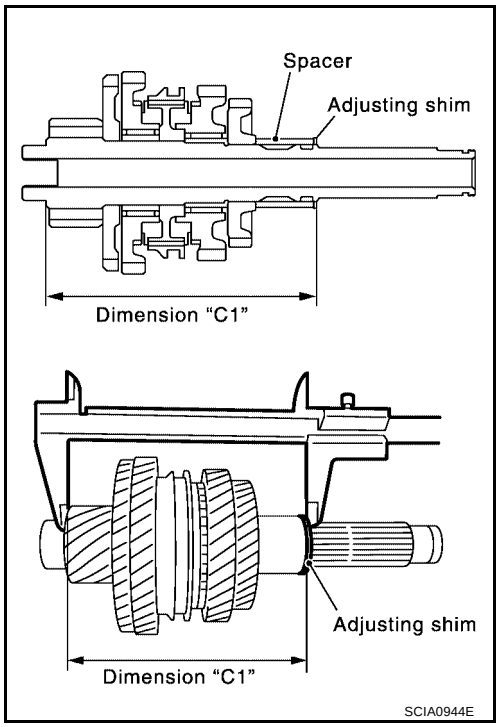
10. Install the 3rd-4th mainshaft spacer.



11. Measure the dimension "C_1 ". Select a suitable adjusting shim so that the dimension "C_1 " satisfies the specified standard value, and install it onto the mainshaft.

Standard for dimension "C_1 " : 173.85 - 173.95 mm (6.844 - 6.848 in)

CAUTION:
Only 1 adjusting shim can be selected.

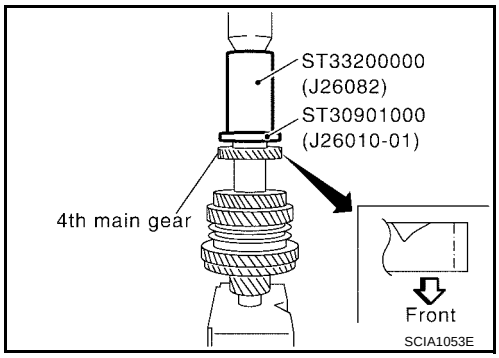


Adjusting Shim

Thickness	Part number	Thickness	Part number
0.52 mm (0.0205 in)	32238 8H500	0.84 mm (0.0331 in)	32238 8H504
0.60 mm (0.0236 in)	32238 8H501	0.92 mm (0.0362 in)	32238 8H505
0.68 mm (0.0268 in)	32238 8H502	1.00 mm (0.0394 in)	32238 8H506
0.76 mm (0.0299 in)	32238 8H503	1.08 mm (0.0425 in)	32238 8H507

12. Install the 4th main gear with the specified orientation as shown, using Tool as shown.

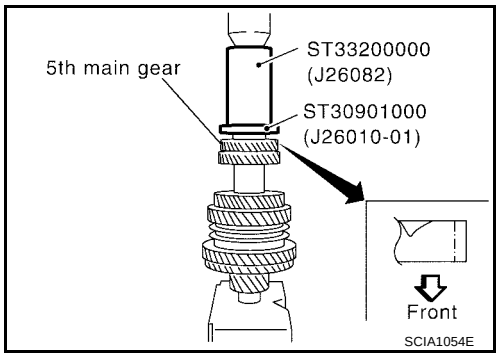
CAUTION:
Install the 4th main gear with the orientation as shown.



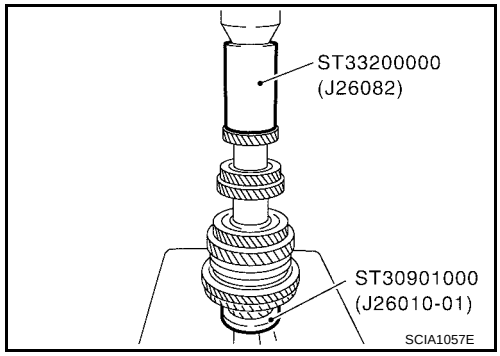
13. Install the 5th main gear with the specified orientation as shown, using Tool as shown.

CAUTION:
Install the 5th main gear with the orientation as shown.

14. Install the 5th-6th mainshaft spacer.



15. Install the 6th main gear using Tool as shown.



16. Select the 6th main adjusting shim and then install it onto the mainshaft.

- Calculate thickness “S” of 6th main adjusting shim by procedure below so that end play dimension between 6th main gear and mainshaft rear bearing becomes the dimension specified.

End play : 0 - 0.1 mm (0 - 0.004 in)

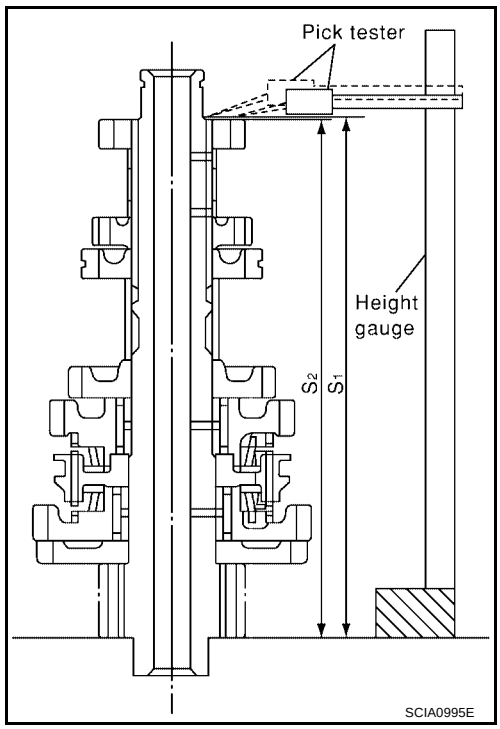
Dimension “S” = (“S_1 ” – “S_2 ”) + End play

“S” : Thickness of adjusting shim

“S_2 ” : Dimension from mainshaft standard face to mainshaft rear bearing press-fit end face

“S_2 ” : Dimension from mainshaft standard face to 6th main gear end face

CAUTION:
Only 1 adjusting shim can be selected.

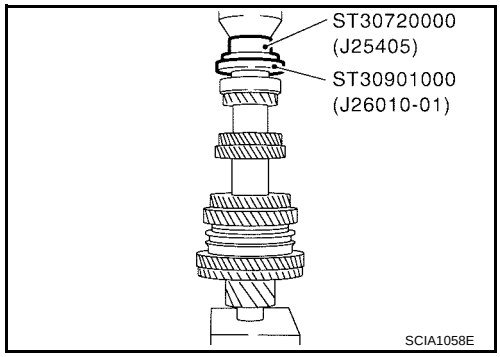


Adjusting Shim

Thickness	Part number	Thickness	Part number
0.88 mm (0.0346 in)	32237 8H560	1.20 mm (0.0472 in)	32237 8H564
0.96 mm (0.0378 in)	32237 8H561	1.28 mm (0.0504 in)	32237 8H565
1.04 mm (0.0409 in)	32237 8H562	1.36 mm (0.0535 in)	32237 8H566
1.12 mm (0.0441 in)	32237 8H563		

a. Using a height gauge, measure the dimension “S_1 ” and “S_2 ” as shown.
b. Install the selected 6th main adjusting shim to the mainshaft.

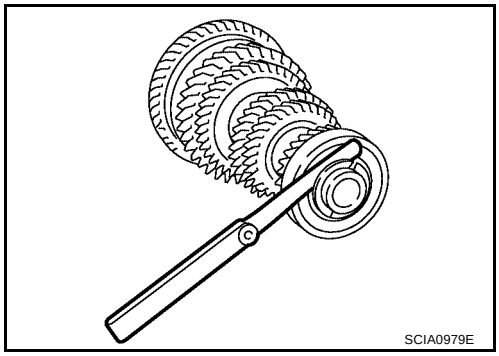
17. Install the mainshaft rear bearing using Tool as shown.



18. Install the C-ring onto the mainshaft, and check that the end play of mainshaft rear bearing meets specifications.

End play standard value : 0 - 0.06 mm (0 - 0.0024 in)

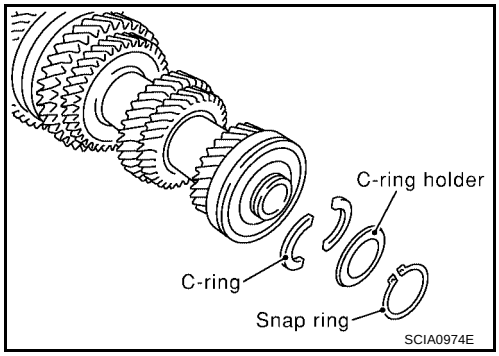
- If the measurement is outside the specified standard value, reselect a new C-ring.


SCIA0979E

C-Ring

Thickness	Part number	Thickness	Part number
2.535 mm (0.0866 in)	32348 8H800	2.835 mm (0.1116 in)	32348 8H810
2.565 mm (0.1010 in)	32348 8H801	2.865 mm (0.1128 in)	32348 8H811
2.595 mm (0.1022 in)	32348 8H802	2.895 mm (0.1140 in)	32348 8H812
2.625 mm (0.1033 in)	32348 8H803	2.925 mm (0.1152 in)	32348 8H813
2.655 mm (0.1045 in)	32348 8H804	2.955 mm (0.1163 in)	32348 8H814
2.685 mm (0.1057 in)	32348 8H805	2.985 mm (0.1175 in)	32348 8H815
2.715 mm (0.1069 in)	32348 8H806	3.015 mm (0.1187 in)	32348 8H816
2.745 mm (0.1081 in)	32348 8H807	3.045 mm (0.1199 in)	32348 8H817
2.775 mm (0.1093 in)	32348 8H808	3.075 mm (0.1211 in)	32348 8H818
2.805 mm (0.1104 in)	32348 8H809		

19. Fit the C-ring holder, and install the snap ring as shown.



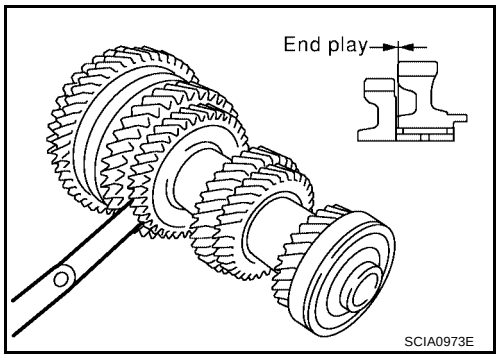
SCIA0974E

20. Check the end play of 1st and 2nd main gears as shown.

End play standard value

1st gear : 0.20 - 0.30 mm (0.0079 - 0.0118 in)

2nd gear : 0.06 - 0.16 mm (0.0024 - 0.0063 in)



SCIA0973E

REVERSE IDLER SHAFT AND GEARS

PFP:32281

Disassembly and Assembly

ECS005VJ

DISASSEMBLY

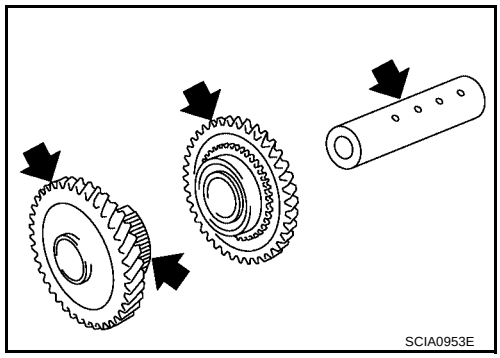
1. Remove the reverse idler gear adjusting shim.
2. Remove the reverse idler gear (rear), reverse coupling sleeve and insert spring simultaneously.
3. Remove the reverse idler gear needle bearing.
4. Remove the thrust needle bearing.
5. Remove the reverse baulk ring.
6. Remove the reverse idler gear (front).
7. Remove the reverse idler gear needle bearing.
8. Remove the thrust needle bearing.
9. Pull off the locking pin from the reverse idler shaft.

INSPECTION AFTER DISASSEMBLY

Reverse Idler Shaft and Gears

Check the parts listed. If necessary, replace them with new ones.

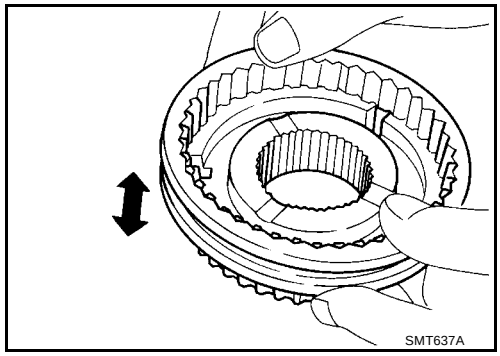
- Damage, peeling, dent, uneven wear, bending, and other non-standard conditions of the reverse idler shaft.
- Excessive wear, damage, peeling, and other non-standard conditions of the reverse idler gears.


SCIA0953E

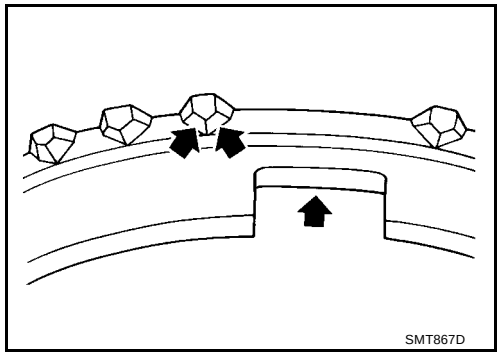
Synchronizer

Check parts listed. If necessary, replace them with new ones.

- Damage and unusual wear on contact surfaces of coupling sleeve, synchronizer hub, and insert spring.
- Coupling sleeve and synchronizer hub must move smoothly as shown.


SMT637A

- If any crack, damage, or excessive wear is found on cam face of baulk ring or working face of insert, replace it.


SMT867D

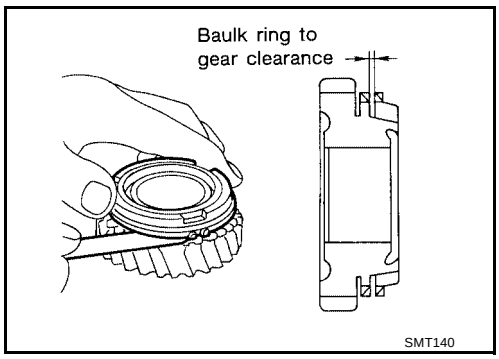
Baulk ring clearance

- Press the baulk ring against the cone, and measure the clearance between the baulk ring and cone as shown. If the measurement is below the specified limit, replace it with a new one.

Baulk ring to gear clearance

Standard : 0.95 - 1.4 mm (0.0374 - 0.055 in)

Limit value : 0.7 mm (0.028 in)



Bearing

Check the parts listed. If necessary, replace them with new ones.

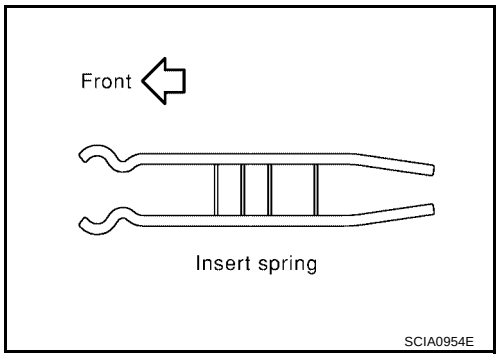
- Damage and rough rotation of the bearing.

ASSEMBLY

Assembly is in the reverse order of disassembly.

CAUTION:

- **Install the insert spring with the orientation as shown.**



FINAL DRIVE

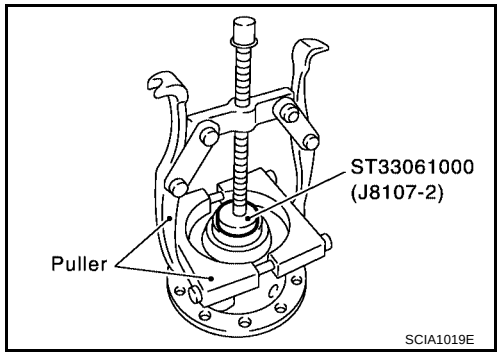
PFP:38411

Disassembly and Assembly

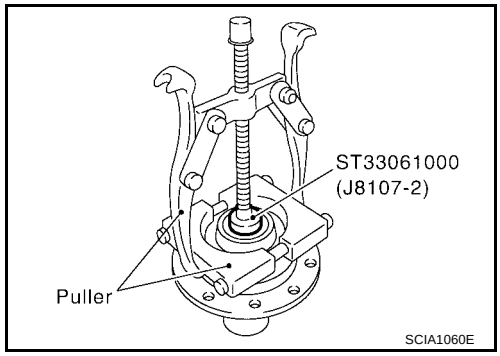
ECS005VK

DISASSEMBLY

1. Remove the mounting bolts. Then, separate the final gear from the differential case.
2. Remove the speedometer drive gear.
3. Using a puller and Tool (drift), remove the differential side bearing (clutch housing side) as shown.



4. Using a puller and Tool (drift), remove the differential side bearing (transaxle case side) as shown.



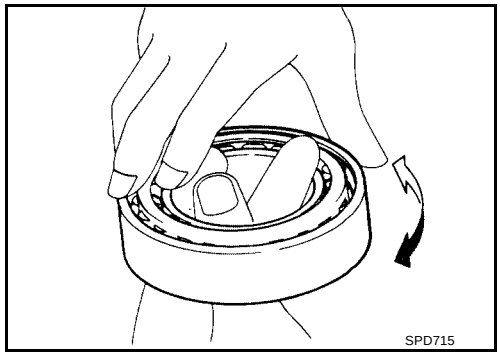
INSPECTION AFTER DISASSEMBLY

Bearing

Check for bearing damage and rough rotation as shown. If necessary, replace with a new one.

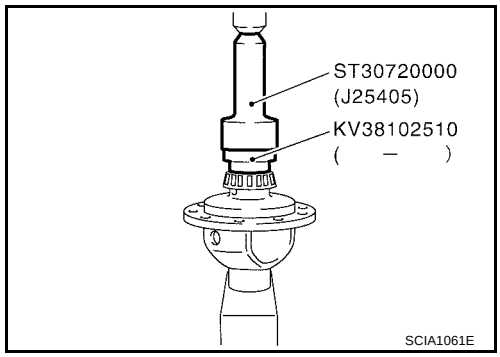
CAUTION:

When replacing the tapered roller bearing, replace the outer and inner races as a set.

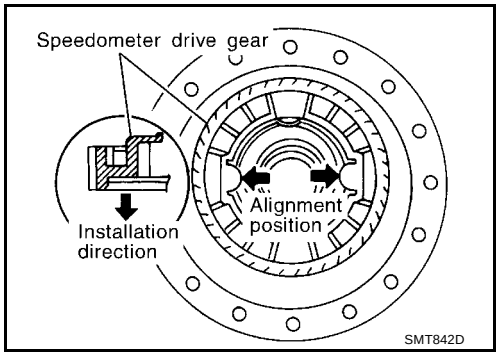


ASSEMBLY

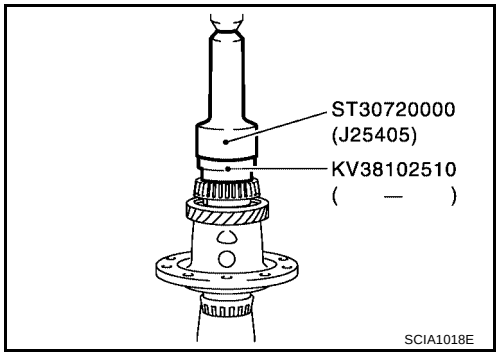
1. Using Tool (drift), install the differential side bearing (transaxle case side) as shown.



2. Align and install the speedometer drive gear onto the differential case as shown.

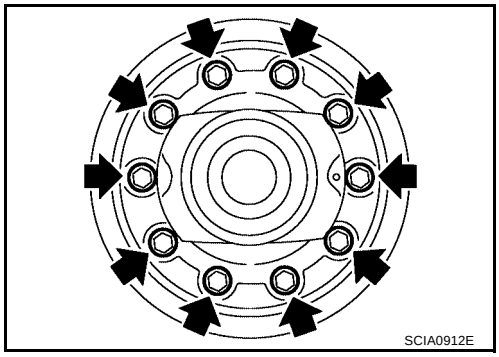


3. Using Tool (drift), install the differential side bearing (clutch housing side) as shown.



4. Install the final gear into the differential case, and tighten the final gear bolts to specification.

Final gear bolts **: Refer to MT-85, "FINAL DRIVE COMPONENTS" .**



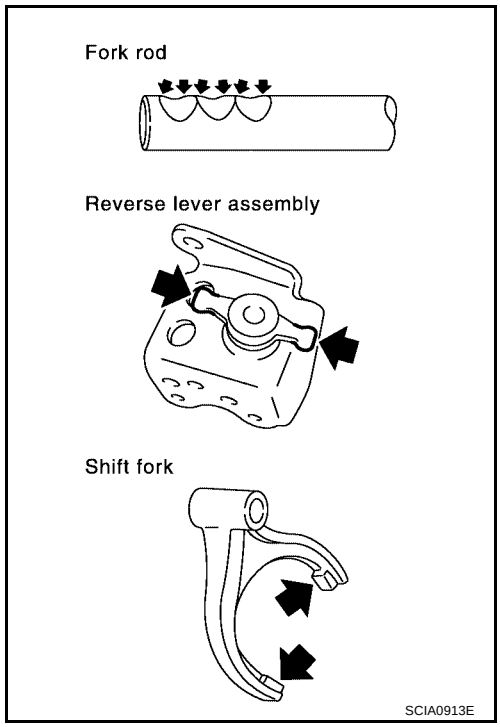
SHIFT CONTROL

PFP:32982

Inspection

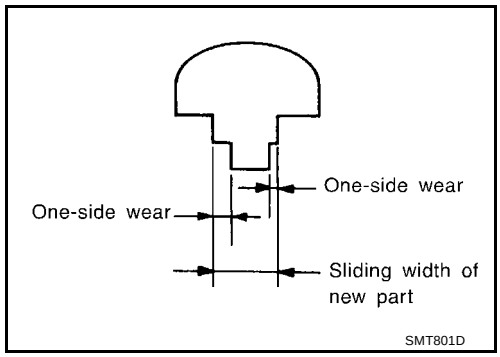
ECS005VL

Check the contact surfaces and sliding area for wear, damage, or bending as shown. If necessary, replace the parts.



SHIFT FORK

Check if the width of the shift fork hook (sliding area with coupling sleeve) is within specification, as shown.



Shift Fork

Item	One-side wear specification	Sliding width of new part
1st & 2nd	0.2 mm (0.008 in)	7.80 - 7.93 mm (0.3071 - 0.3122 in)
3rd & 4th	0.2 mm (0.008 in)	7.80 - 7.93 mm (0.3071 - 0.3122 in)
5th & 6th	0.2 mm (0.008 in)	6.10 - 6.23 mm (0.2402 - 0.2453 in)
Reverse	0.2 mm (0.008 in)	12.80 - 12.93 mm (0.5039 - 0.5091 in)

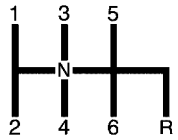
SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

General Specifications

ECS005VM

TRANSAXLE

Engine			QR25DE
Transaxle model			RS6F51H
Model code number			7Y076
Number of speed			6
Synchromesh type			Warner
Shift pattern			 SCIA0955E
Gear ratio	1st		3.153
	2nd		1.944
	3rd		1.392
	4th		1.055
	5th		0.809
	6th		0.630
	Reverse		3.002
Number of teeth	Input gear	1st	13
		2nd	18
		3rd	31
		4th	36
		5th	42
		6th	46
		Reverse	13
	Main gear	1st	41
		2nd	35
		3rd	39
		4th	38
		5th	34
		6th	29
		Reverse	38
	Reverse idler gear	Front	37
		Rear	38
Oil capacity ℓ (US qt, Imp qt)			2.2 (2 3/8, 2)
Remarks	Reverse synchronizer		Installed
	Double baulk ring type synchronizer		1st synchronizer
	Triple baulk ring type synchronizer		2nd synchronizer

FINAL GEAR

Engine		QR25DE
Transaxle model		RS6F51H
Model code number		7Y076
Final gear ratio		4.133
Number of teeth	Final gear/Pinion	62/15
	Side gear/Pinion mate gear	—

Gear End Play

ECS005VN

Unit: mm (in)

Gear	End play
1st main gear	0.20 - 0.30 (0.0079 - 0.0118)
2nd main gear	0.06 - 0.16 (0.0024 - 0.0063)
3rd input gear	0.18 - 0.31 (0.0071 - 0.0122)
4th input gear	0.20 - 0.30 (0.0079 - 0.0118)
5th input gear	0.06 - 0.16 (0.0024 - 0.0063)
6th input gear	0.06 - 0.16 (0.0024 - 0.0063)

Clearance Between Baulk Ring and Gear

ECS005VO

3RD, 4TH, 5TH, 6TH & REVERSE BAULK RING

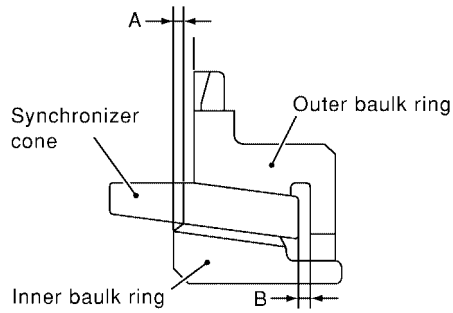
Unit: mm (in)

Gear	Standard	Wear limit
3rd	0.9 - 1.45 (0.035 - 0.0571)	0.7 (0.028)
4th	0.9 - 1.45 (0.035 - 0.0571)	0.7 (0.028)
5th	0.95 - 1.4 (0.0374 - 0.055)	0.7 (0.028)
6th	0.95 - 1.4 (0.0374 - 0.055)	0.7 (0.028)
Reverse	0.95 - 1.4 (0.0374 - 0.055)	0.7 (0.028)

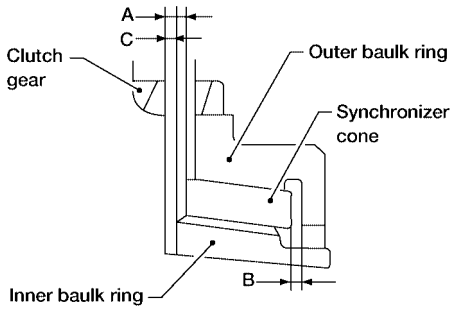
1ST AND 2ND BAULK RING

Unit: mm (in)

1st Double Baulk Ring



2nd Triple Baulk Ring



Dimension	Standard		Wear limit	
	Double baulk ring	Triple baulk ring	Double baulk ring	Triple baulk ring
A	0.6 - 0.8 (0.024 - 0.031)	0.6 - 1.2 (0.024 - 0.047)	0.2 (0.008)	0.3 (0.012)
B	0.6 - 1.1 (0.024 - 0.043)	0.6 - 1.1 (0.024 - 0.043)	0.2 (0.008)	0.2 (0.008)
C	—	0.7 - 1.1 (0.028 - 0.043)	—	0.3 (0.012)

Available Snap Rings

ECS005VP

6TH BUSHING

End play		0 - 0.1 mm (0 - 0.004 in)	
Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
1.76 (0.0693)	32204 8H511	2.01 (0.0791)	32204 8H516
1.81 (0.0713)	32204 8H512	2.06 (0.0811)	32204 8H517
1.86 (0.0732)	32204 8H513	2.11 (0.0831)	32204 8H518
1.91 (0.0752)	32204 8H514	2.16 (0.0850)	32204 8H519
1.96 (0.0772)	32204 8H515	2.21 (0.0871)	32204 8H520

*: Always check with the Parts Department for the latest parts information.

Available C-rings

ECS005VQ

MAINSHAFT C-RING

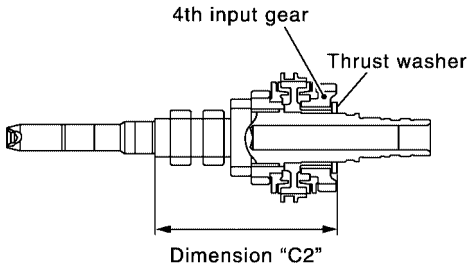
End play		0 - 0.06 mm (0 - 0.0024 in)	
Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
2.535 (0.0866)	32348 8H800	2.835 (0.1116)	32348 8H810
2.565 (0.1010)	32348 8H801	2.865 (0.1128)	32348 8H811
2.595 (0.1022)	32348 8H802	2.895 (0.1140)	32348 8H812
2.625 (0.1033)	32348 8H803	2.925 (0.1152)	32348 8H813
2.655 (0.1045)	32348 8H804	2.955 (0.1163)	32348 8H814
2.685 (0.1057)	32348 8H805	2.985 (0.1175)	32348 8H815
2.715 (0.1069)	32348 8H806	3.015 (0.1187)	32348 8H816
2.745 (0.1081)	32348 8H807	3.045 (0.1199)	32348 8H817
2.775 (0.1093)	32348 8H808	3.075 (0.1211)	32348 8H818
2.805 (0.1104)	32348 8H809		

*: Always check with the Parts Department for the latest parts information.

Available Thrust Washers

ECS005VR

INPUT SHAFT THRUST WASHER



SCIA1008E

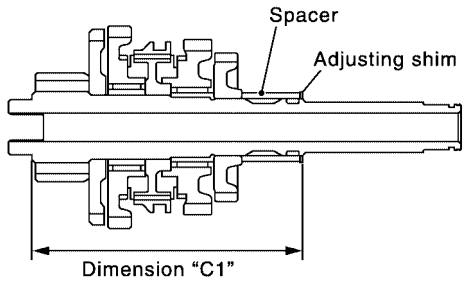
Standard length "C_2"		154.7 - 154.8 mm (6.091 - 6.094in)	
Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
3.84 (0.1512)	32347 8H500	4.02 (0.1583)	32347 8H503
3.90 (0.1535)	32347 8H501	4.08 (0.1606)	32347 8H504
3.96 (0.1559)	32347 8H502	4.14 (0.1630)	32347 8H505

*: Always check with the Parts Department for the latest parts information.

Available Adjusting Shims

ECS005VS

MAINSHAFT ADJUSTING SHIM



SCIA1009E

Standard length "C_1"		173.85 - 173.95 mm (6.844 - 6.848in)	
Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
0.52 (0.0205)	32238 8H500	0.84 (0.0331)	32238 8H504
0.60 (0.0236)	32238 8H501	0.92 (0.0362)	32238 8H505
0.68 (0.0268)	32238 8H502	1.00 (0.0394)	32238 8H506
0.76 (0.0299)	32238 8H503	1.08 (0.0425)	32238 8H507

*: Always check with the Parts Department for the latest parts information.

INPUT SHAFT REAR BEARING ADJUSTING SHIM

End play			0 - 0.06 mm (0 - 0.0024 in)		
Thickness mm (in)	Part number*	Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
0.40 (0.0157)	32225 8H500	0.88 (0.0346)	32225 8H512	1.36 (0.0520)	32225 8H524
0.44 (0.0173)	32225 8H501	0.92 (0.0362)	32225 8H513	1.40 (0.0551)	32225 8H560
0.48 (0.0189)	32225 8H502	0.96 (0.0378)	32225 8H514	1.44 (0.0567)	32225 8H561
0.52 (0.0205)	32225 8H503	1.00 (0.0396)	32225 8H515	1.48 (0.0583)	32225 8H562
0.56 (0.0220)	32225 8H504	1.04 (0.0409)	32225 8H516	1.52 (0.0598)	32225 8H563
0.60 (0.0236)	32225 8H505	1.08 (0.0425)	32225 8H517	1.56 (0.0614)	32225 8H564
0.64 (0.0252)	32225 8H506	1.12 (0.0441)	32225 8H518	1.60 (0.0630)	32225 8H565
6.68 (0.0268)	32225 8H507	1.16 (0.0457)	32225 8H519	1.64 (0.0646)	32225 8H566
0.72 (0.0283)	32225 8H508	1.20 (0.0472)	32225 8H520		
0.76 (0.0299)	32225 8H509	1.24 (0.0488)	32225 8H521		
0.80 (0.0315)	32225 8H510	1.28 (0.0504)	32225 8H522		
0.84 (0.0331)	32225 8H511	1.32 (0.0520)	32225 8H523		

*: Always check with the Parts Department for the latest parts information.

MAINSHAFT REAR BEARING ADJUSTING SHIM

End play		0 - 0.06 mm (0 - 0.0024 in)	
Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
0.44 (0.0173)	32238 8H510	0.80 (0.0315)	32238 8H519
0.48 (0.0189)	32238 8H511	0.84 (0.0331)	32238 8H520
0.52 (0.0205)	32238 8H512	0.88 (0.0346)	32238 8H521
0.56 (0.0220)	32238 8H513	0.92 (0.0362)	32238 8H522
0.60 (0.0236)	32238 8H514	0.96 (0.0378)	32238 8H523
0.64 (0.0252)	32238 8H515	1.00 (0.0396)	32238 8H524
0.68 (0.0268)	32238 8H516	1.04 (0.0409)	32238 8H560
0.72 (0.0283)	32238 8H517	1.08 (0.0425)	32238 8H561
0.76 (0.0299)	32238 8H518		

*: Always check with the Parts Department for the latest parts information.

REVERSE IDLER GEAR ADJUSTING SHIM

End play		0.04 - 0.14 mm (0.0016 - 0.0055 in)	
Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
1.76 (0.0693)	32237 8H500	2.24 (0.0882)	32237 8H506
1.84 (0.0724)	32237 8H501	2.32 (0.0913)	32237 8H507
1.92 (0.0756)	32237 8H502	2.40 (0.0945)	32237 8H508
2.00 (0.0787)	32237 8H503	2.48 (0.0976)	32237 8H509
2.08 (0.0819)	32237 8H504	2.56 (0.1008)	32237 8H510
2.16 (0.0850)	32237 8H505	2.64 (0.1039)	32237 8H511

*: Always check with the Parts Department for the latest parts information.

6TH MAIN GEAR ADJUSTING SHIM

End play		0 - 0.1 mm (0 - 0.004 in)	
Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
0.88 (0.0346)	32237 8H560	1.20 (0.0472)	32237 8H564
0.96 (0.0378)	32237 8H561	1.28 (0.0504)	32237 8H565
1.04 (0.0409)	32237 8H562	1.36 (0.0520)	32237 8H566
1.12 (0.0441)	32237 8H563		

*: Always check with the Parts Department for the latest parts information.

Available Shims – Differential Side Bearing Preload and Adjusting Shim(s) ECS005VT

BEARING PRELOAD

Differential side bearing preload L*	0.15 - 0.21 mm (0.0059 - 0.0083)

*: Install shims which are “deflection of differential case” + “L” in thickness.

DIFFERENTIAL SIDE BEARING ADJUSTING SHIM(S)

Thickness mm (in)	Part number*	Thickness mm (in)	Part number*
0.48 (0.0189)	31438 80X00	0.72 (0.0283)	31438 80X06
0.52 (0.0205)	31438 80X01	0.76 (0.0299)	31438 80X07
0.56 (0.0220)	31438 80X02	0.80 (0.0315)	31438 80X08
0.60 (0.0236)	31438 80X03	0.84 (0.0331)	31438 80X09
0.64 (0.0252)	31438 80X04	0.88 (0.0346)	31438 80X10
0.68 (0.0268)	31438 80X05	0.92 (0.0362)	31438 80X11

*: Always check with the Parts Department for the latest parts information.